(19)中华人民共和国国家知识产权局

(12)发明专利

(10)授权公告号 CN 107205355 B
(45)授权公告日 2021.04.30

(21)申请号 201580072184.5
(22)申请日 2015.11.03
(65)同一申请的已公布的文献号
申请公布号 CN 107205355 A
(43)申请公布日 2017.09.26
(30)优先权数据
701643 2014.11.04 NZ
(85)PCT国际申请进入国家阶段日
2017.07.03
(86)PCT国际申请的申请数据
PCT/IB2015/058479 2015.11.03
(87)PCT国际申请的公布数据
WO2016/071830 EN 2016.05.12
(73)专利权人 农牧研究公司
地址 新西兰哈密尔顿
(72)发明人 N·J·罗伯茨 K·A·理查森 D·W·R·怀特
(74)专利代理机构 北京润平知识产权代理有限公司 11283
代理人 刘依云 严政
(51)Int.Cl.
C12N 15/82(2006.01)
C12N 15/29(2006.01)
A01H 5/06(2018.01)
A01H 6/20(2018.01)
A01H 6/46(2018.01)
A01H 6/54(2018.01)
(56)对比文件
CN 102260679 A,2011.11.30
US 20070039067 A1,2005.09.30
WO 2007105967 A1,2007.09.20
CN 102676563 A,2012.09.19
审查员 马彧博
权利要求书2页 说明书51页
序列表146页 附图12页

(54)发明名称

用于植物改良的方法

(57)摘要

本发明提供了通过增加植物中至少一种PEAPOD蛋白或其片段的表达以增加所述植物中的根生物量的方法和材料。本发明还提供了用于产生具有增加的根生物量的植物的方法和材料，所述方法包括增加所述植物中至少一种PEAPOD蛋白或其片段的表达的步骤。

CN 107205355 B

1.一种增加植物中的根生物量的方法,该方法包括增加植物中至少一种PEAPOD蛋白的表达的步骤,其中,所述PEAPOD蛋白以PEAPOD蛋白共享的共有序列为特征,其中,所述共享序列选自由SEQ ID NO: 28、29、31和32所组成的组中。

2.根据权利要求1所述的方法,其中,至少一种PEAPOD蛋白的表达增加是用编码所述PEAPOD蛋白的多核苷酸转化植物、或其祖先植物或植物细胞的结果。

3.根据权利要求1或2所述的方法,其中,所述植物为用编码和表达所述PEAPOD蛋白的至少一种多核苷酸进行转基因的。

4.一种产生具有增加的根生物量的植物的方法,该方法包括增加植物中至少一种PEAPOD蛋白的表达的步骤;

其中,所述PEAPOD蛋白以PEAPOD蛋白共享的共有序列为特征,其中,所述共享序列选自由SEQ ID NO: 28、29、31和32所组成的组中。

5.根据权利要求4所述的方法,其中,用编码PEAPOD蛋白的至少一种多核苷酸或其片段转化植物。

6.根据权利要求4或5所述的方法,该方法包括用编码所述PEAPOD蛋白的多核苷酸转化植物,或转化再生为植物的植物细胞的步骤。

7.根据权利要求6所述的方法,该方法包括测试或评估所述植物的增加的根生物量的额外步骤。

8.根据权利要求1、2、4、5和7中任意一项的方法,其中,所述共有序列为TIFY基序,所述TIYF基序选自SEQ ID NO: 34和35所组成的组中。

9.根据权利要求1、2、4、5和7中任意一项的方法,其中,所述PEAPOD蛋白的序列为SEQ ID NO: 1-26中任意一项的序列。

10.根据权利要求1、2、4、5和7中任意一项的方法,其中,通过将编码PEAPOD蛋白的多核苷酸引入所述植物细胞或植物中以增加表达。

11.根据权利要求10所述的方法,其中,所述多核苷酸的序列选自由SEQ ID NO: 83-107所组成的组中。

12.根据权利要求10所述的方法,其中,将所述多核苷酸作为表达构建体的一部分被引入植物。

13.根据权利要求12所述的方法,其中,所述表达构建体包含与所述多核苷酸可操作地连接的启动子。

14.根据权利要求13所述的方法,其中,所述启动子能够驱动或驱动可操作地连接的多核苷酸在植物的所有组织中组成型表达。

15.根据权利要求13所述的方法,其中,所述启动子是组织用启动子。

16.根据权利要求13所述的方法,其中,所述启动子能够驱动或驱动可操作地连接的多核苷酸在植物的地下组织中表达。

17.根据权利要求13所述的方法,其中,所述启动子是地下组织用启动子。

18.根据权利要求13所述的方法,其中,所述启动子是光阻遏型启动子。

19.根据权利要求13所述的方法,其中,所述启动子能够驱动或驱动可操作地连接的多核苷酸在植物的根中表达。

20.根据权利要求13所述的方法,其中,所述启动子是根用启动子。

21.根据权利要求13所述的方法,其中,所述启动子是根特异性启动子。

用于植物改良的方法

技术领域

[0001] 本发明涉及产生具有增加的根生物量的植物的方法。

背景技术

[0002] 维管植物的根具有多种功能。这些功能包括:1)吸收水和无机养分,2)将植物固着至地面并支持植物,3)储存食物和养分,4)无性繁殖。在对养分的浓度的反应中,根也合成细胞分裂素,其充当影响芽生长快慢的信号。

[0003] 具有增加的根生物量的植物也潜在地具有多种优势,包括更好的固着、更有效的水摄取、更有效的养分摄取和提高的耐旱性。这些特征的组合也可以导致产量提高,包括谷物或果实生物量增加和/或叶生物量增加。

[0004] 目前,对控制植物中的根生物量的遗传机制的理解有限。

[0005] 因此,获得控制植物中的根生物量的可用替代方法是有利的。

[0006] 因此,本发明的目的是提供增加植物中的根生物量的产生的方法和材料,和/或至少为公众提供有用的选择。

发明内容

[0007] 之前,White(2006)在拟南芥属(Arabidopsis)中发现了两个邻近的同源基因(命名为PEAPOD,PPD1和PPD2),其在叶和种荚(seed pod)发育的后期阶段调控拟分生组织的细胞增殖。在拟南芥属中这些基因的缺失导致叶肥大和种荚变宽,而PPD1的过表达导致叶和长角果的大小减小(White,2006)。

[0008] 本申请人现已令人惊讶地证明PEAPOD基因在植物中的过表达导致根生物量产生的增加。

[0009] 因此,本申请人的发明涉及通过异位表达PEAPOD以增加植物中的根生物量的方法。具体地,本发明涉及异位表达PEAPOD蛋白,其特征在于存在对于由广泛的植物物种表现出的所有PEAPOD蛋白均常见的共有氨基酸基序。

[0010] 方法

[0011] 第一方面,本发明提供了增加植物中根生物量的方法,该方法包括增加植物中至少一种PEAPOD蛋白的表达的步骤。

[0012] 在一种实施方式中,根生物量相对于同一物种或品种的对照植物中的根生物量增加。

[0013] 在一种实施方式中,至少一种PEAPOD蛋白的表达增加是用编码PEAPOD蛋白的多核苷酸转化植物、或其祖先植物或植物细胞的结果。

[0014] 在其他实施方式中,所述植物为用编码和表达PEAPOD蛋白的至少一种多核苷酸进行转基因的。

[0015] 在其他方面,本发明提供了产生具有增加的根生物量的植物的方法,所述方法包括增加所述植物中至少一种PEAPOD蛋白的表达的步骤。

[0016] 在一种实施方式中,使用编码PEAPOD蛋白的至少一种多核苷酸转化所述植物。

[0017] 在其他实施方式中,所述方法包括用编码PEAPOD蛋白的多核苷酸转化植物,或转化再生为植物的植物细胞的步骤。

[0018] 在一种实施方式中,所述方法包括测试或评估所述植物的增加的根生物量的额外步骤。

[0019] 在其他实施方式中,所述方法包括通过无性或有性繁殖被测试其增加的生物量的植物以进一步产生具有增加的根生物量的植物的步骤。

[0020] PEAPOD蛋白

[0021] 在一种实施方式中,所述PEAPOD蛋白是包含SEQ ID NO:28、29、31、32、34和35中的至少一种序列的多肽。

[0022] 在其他实施方式中,所述PEAPOD蛋白包含SEQ ID NO:28的序列。在其他实施方式中,所述PEAPOD蛋白包含SEQ ID NO:29的序列。在其他实施方式中,所述PEAPOD蛋白包含SEQ ID NO:31的序列。在其他实施方式中,所述PEAPOD蛋白包含SEQ ID NO:32的序列。在其他实施方式中,所述PEAPOD蛋白包含SEQ ID NO:34的序列。在其他实施方式中,所述PEAPOD蛋白包含SEQ ID NO:35的序列。

[0023] 在其他实施方式中,所述PEAPOD蛋白是包含与SEQ ID NO:1-26中任意一项具有至少70%同一性的序列的多肽。

[0024] 在其他实施方式中,所述PEAPOD蛋白是包含选自SEQ ID NO:1-26中任意一项序列的多肽。

[0025] 在其他实施方式中,所述PEAPOD蛋白是包含与SEQ ID NO:1具有至少70%同一性的序列的多肽。

[0026] 在其他实施方式中,所述PEAPOD蛋白是包含SEQ ID NO:1的序列的多肽。

[0027] 表达PEAPOD

[0028] 在植物中表达蛋白的方法是本领域技术人员公知的,并在本文中进行描述。所有这些方法都包括在本发明的范围内。

[0029] 通过引入多核苷酸增加PEAPOD的表达

[0030] 在一种实施方式中,通过将至少一种多核苷酸引入植物细胞或植物中以增加表达。

[0031] 在一个优选的实施方式中,所述多核苷酸编码如本文所定义的PEAPOD蛋白。

[0032] 在其他实施方式中,所述多核苷酸包含与SEQ ID NO:83-107中任意一项的编码序列具有至少70%同一性的序列。

[0033] 在其他实施方式中,所述多核苷酸包含与SEQ ID NO:83-107中任意一项的序列具有至少70%同一性的序列。

[0034] 在其他实施方式中,所述多核苷酸包含SEQ ID NO:83-107中任意一项的编码序列。

[0035] 在其他实施方式中,所述多核苷酸包含SEQ ID NO:83-107中任意一项的序列。

[0036] 在其他实施方式中,所述多核苷酸包含以上所述的序列的片段,其能够编码与PEAPOD蛋白具有相同功能的多肽。在一种实施方式中,所述片段编码能够增加根生物量的多肽。

[0037] 通过表达构建体表达PEAPOD

[0038] 在一个优选的实施方式中,将所述多核苷酸作为表达构建体的一部分被引入植物。

[0039] 在一个优选的实施方式中,所述表达构建体包含与所述多核苷酸可操作地连接的启动子。

[0040] 用于增加PEAPOD表达的启动子

[0041] 在一种实施方式中,所述启动子能够驱动或驱动可操作地连接的多核苷酸在植物的所有组织中组成型表达。

[0042] 在其他实施方式中,所述启动子是组织优选的启动子。

[0043] 在其他实施方式中,所述启动子能够驱动或驱动可操作地连接的多核苷酸在植物的地下组织中表达。

[0044] 在一种实施方式中,所述启动子是地下组织优选的启动子。

[0045] 在其他实施方式中,所述启动子是地下组织特异性启动子。

[0046] 在一种实施方式中,所述启动子是光阻遏型启动子(light-repressed promoter)。

[0047] 在其他实施方式中,所述启动子能够驱动或驱动可操作地连接的多核苷酸在植物的根中表达。

[0048] 在一种实施方式中,所述启动子是根优选的启动子。

[0049] 在其他实施方式中,所述启动子是根特异性启动子。

[0050] 多核苷酸和多肽的来源

[0051] 本发明的或本发明方法中使用的多核苷酸和多核苷酸的变体可以衍生自任何物种。所述多核苷酸和变体也可以是合成产生的或重组产生的,并且也可以是“基因改组(gene shuffling)”方法的产物。

[0052] 本发明的或本发明方法中使用的多肽和多肽的变体可衍生自任何物种。所述多肽和变体也可以是重组产生的,并且还可以由“基因改组”方法的产物表达。

[0053] 在一种实施方式中,所述多核苷酸、多肽或变体衍生自植物物种。

[0054] 在其他实施方式中,所述多核苷酸、多肽或变体衍生自裸子植物(gymnosperm plant)物种。

[0055] 在其他实施方式中,所述多核苷酸、多肽或变体衍生自被子植物(angiosperm plant)物种。

[0056] 在其他实施方式中,所述多核苷酸、多肽或变体衍生自双子叶植物(dicotyledonous)物种。

[0057] 在一个优选的实施方式中,所述多核苷酸、多肽或变体衍生自真双子叶植物(eudicot)物种。

[0058] 在其他实施方式中,所述多核苷酸、多肽或变体衍生自真双子叶植物物种。

[0059] 在其他实施方式中,所述多核苷酸、多肽或变体衍生自单子叶植物物种。优选的单子叶植物包括:棕榈、香蕉、浮萍和兰花物种。

[0060] 待转化的植物细胞和植物

[0061] 本发明的,或在本发明的方法中使用的植物细胞和植物来自于任何植物物种。

[0062] 在一种实施方式中,所述植物细胞或植物来自于裸子植物物种。

[0063] 在其他实施方式中,所述植物细胞或植物来自于被子植物物种。

[0064] 在其他实施方式中,所述植物细胞或植物来自于双子叶植物物种。

[0065] 优选的单子叶植物属包括:冰草属(Agropyron)、葱属(Allium)、看麦娘属(Alopecurus)、须芒草属(Andropogon)、燕麦草属(Arrhenatherum)、天门冬属(Asparagus)、燕麦属(Avena)、刺竹属(Bambusa)、孔颖草属(Bothrichloa)、格兰马草属(Bouteloua)、雀麦属(Bromus)、沙茅属(Calamovilfa)、蒺藜草属(Cenchrus)、虎尾草属(Chloris)、香茅属(Cymbopogon)、狗牙根属(Cynodon)、鸭茅属(Dactylis)、双花草属(Dichanthium)、马唐属(Digitaria)、䅟属(Eleusine)、画眉草属(Eragrostis)、荞麦属(Fagopyrum)、羊茅属(Festuca)、向日葵属(Helianthus)、大麦属(Hordeum)、黑麦草属(Lolium)、芒属(Miscanthis)、芒属(Miscanthus x giganteus)、稻属(Oryza)、黍属(Panicum)、雀稗属(Paspalum)、狼尾草属(Pennisetum)、鹀草属(Phalaris)、梯牧草属(Phleum)、早熟禾属(Poa)、甘蔗属(Saccharum)、黑麦属(Secale)、狗尾草属(Setaria)、印第安草属(Sorgahastum)、高粱属(Sorghum)、小麦属(Triticum)、香荚兰属(Vanilla)、小黑麦属(X Triticosecale Triticale)和玉蜀黍属(Zea)。

[0066] 优选的单子叶植物物种包括:冰草(Agropyron cristatum)、冰生冰草(Agropyron desertorum)、长穗偃麦草(Agropyron elongatum)、中间偃麦草(Agropyron intermedium)、蓝莲冰草(Agropyron smithii)、丛生小麦草(Agropyron spicatum)、细莲冰草(Agropyron trachycaulum)、毛冰草(Agropyron trichophorum)、古月葱(Allium ascalonicum)、洋葱(Allium cepa)、藠头(Allium chinense)、韭葱(Allium porrum)、北葱(Allium schoenoprasum)、大葱(Allium fistulosum)、大蒜(Allium sativum)、大看麦娘(Alopecurus pratensis)、须芒草(Andropogon gerardi)、大须芒草(Andropogon Gerardii)、小须芒草(Andropogon scoparious)、燕麦草(Arrhenatherum elatius)、石刁柏(Asparagus officinalis)、裸燕麦(Avena nuda)、燕麦(Avena sativa)、大佛肚竹(Bambusa vulgaris)、藤茎须芒草(Bothrichloa barbinodis)、白羊草(Bothrichloa ischaemum)、针草(Bothrichloa saccharoides)、垂穗草(Bouteloua curipendula)、黑格兰马草(Bouteloua eriopoda)、格兰马草(Bouteloua gracilis)、直立雀麦(Bromus erectus)、无芒雀麦(Bromus inermis)、沙拂子茅(Calamovilfa longifilia)、纤毛蒺藜草(Cenchrus ciliaris)、非洲虎尾草(Chloris gayana)、香茅(Cymbopogon nardus)、狗牙根(Cynodon dactylon)、鸭茅(Dactylis glomerata)、双花草(Dichanthium annulatum)、毛梗双花草(Dichanthium aristatum)、昆士兰蓝草(Dichanthium sericeum)、俯仰马唐(Digitaria decumbens)、南非马唐(Digitaria smutsii)、圆形薯蓣(Dioscorea rotundata)、参薯(Dicsorea alata)、麻山药(Dicscorea opposita)、黄药(Dicscorea bulbifera)、甘薯(Dioscorea esculenta)、三浅裂薯蓣(Dioscorea trifida)、穆子(Eleusine coracan)、窄颖新麦草(Elymus angustus)、俄罗斯新麦草(Elymus junceus)、弯叶画眉草(Eragrostis curvula)、埃塞俄比亚画眉草(Eragrostis tef)、荞麦(Fagopyrum esculentum)、苦荞麦(Fagopyrum tataricum)、苇状羊茅(Festuca arundinacea)、羊茅(Festuca ovina)、草甸羊茅(Festuca pratensis)、紫羊茅(Festuca rubra)、向日葵(Helianthus annuus sunflower)、二列大麦(Hordeum distichum)、大麦

(Hordeum vulgare)、多花黑麦草(Lolium multiflorum)、多年生黑麦草(Lolium perenne)、中国银色草(Miscanthis sinensis)、奇岗(Miscanthus x giganteus)、水稻(Oryza sativa)、秫米(Panicum italicium)、大黍(Panicum maximum)、稷(Panicum miliaceum)、紫黍草(Panicum purpurascens)、柳枝稷(Panicum virgatum)、柳枝稷(Panicum virgatum)、毛花雀稗(Paspalum dilatatum)、百喜草(Paspalum notatum)、狼尾草(Pennisetum clandestinum)、珍珠狼尾草(Pennisetum glaucum)、象草(Pennisetum purpureum)、御谷(Pennisetum spicatum)、蘆草(Phalaris arundinacea)、梯牧草(Phleum bertolinii)、猫尾草(Phleum pratense)、羊肉早熟禾(Poa fendleriana)、草地早熟禾(Poa pratensis)、林地早熟禾(Poa nemoralis)、甘蔗(Saccharum officinarum)、大茎野生蔗(Saccharum robustum)、竹蔗(Saccharum sinense)、割手密(Saccharum spontaneum)、黑麦(Secale cereale)、非洲狗尾草(Setaria sphacelata)、印第安草(Sorghastrum nutans)、印第安草(Sorghastrum nutans)、甜高粱(Sorghum dochna)、假高粱(Sorghum halepense)、苏丹草(Sorghum sudanense)、高粱(Sorghum vulgare)、高粱(Sorghum vulgare)、小麦(Triticum aestivum)、二粒小麦(Triticum dicoccum)、硬粒小麦(Triticum durum)、一粒小麦(Triticum monococcum)、香荚兰(Vanilla fragrans)、小黑麦(X Triticosecale)和玉米(Zea mays)。

[0067] 单子叶植物的优选科系是禾本科。

[0068] 优选的禾本科亚科包括:柊叶竺亚科(Anomochlooideae)、服叶竺亚科(Pharoideae)、姜叶竺亚科(Puelioideae)、竹亚科(Bambusoideae)、早熟禾亚科(Pooideae)、稻亚科(Ehrhartoideae)、三芒草亚科(Aristidoideae)、芦竹亚科(Arundinoideae)、虎尾草亚科(Chloridoideae)、黍亚科(Panicoideae)、扁芒草亚科(Danthonioideae)和百生草亚科(Micrairoideae)。

[0069] 优选的禾本科亚科为早熟禾亚科。优选的早熟禾亚科植物包括小麦、大麦、燕麦、雀麦草和芦苇草。

[0070] 另一个优选的禾本科亚科为稻亚科。优选的稻亚科植物包括水稻。

[0071] 另一个优选的禾本科亚科为黍亚科。优选的黍亚科植物包括稗草、玉米、高粱、甘蔗(sugar cane)、能源甘蔗(energy cane)、小米、福尼奥米(fonio)和须芒草。

[0072] 另一个优选的禾本科亚科为芦竹亚科。优选的芦竹亚科植物包括芦竹(Arundo donax)。

[0073] 另一个优选的禾本科亚科为竹亚科。优选的竹亚科植物包括竹子。

[0074] 优选的禾本科物种包括来自黑麦草属(Lolium)的那些物种。

[0075] 优选的黑麦草属物种包括长花黑麦草(Lolium longiflorum)、多花黑麦草(Lolium multiflorum)、多年生黑麦草、西方黑麦草(Lolium westerwoldicum)、毒麦(Lolium temulentum)和杂种黑麦草(Lolium hybridum)。

[0076] 其他优选的禾本科物种包括来自羊茅属(Festuca)的那些物种。优选的羊茅属物种包括高羊茅(Festuca arundinacea)、硬羊茅(Festuca ovina)、草甸羊茅(Festuca pratensis)和紫羊茅(Festuca rubra)。

[0077] 优选地,所述植物细胞或植物来自双子叶植物物种。

[0078] 优选的双子叶植物属包括:桃属(Amygdalus)、槚如树属(Anacardium)、花生属

(Arachis)、芸苔属(Brassica)、木豆属(Cajanus)、大麻属(Cannabis)、红花属(Carthamus)、山核桃属(Carya)、吉贝属(Ceiba)、鹰嘴豆属(Cicer)、椰子属(Cocos)、芫荽属(Coriandrum)、小冠花属(Coronilla)、棉属(Cossypium)、猪屎豆属(Crotalaria)、扁豆属(Dolichos)、油棕属(Elaeis)、大豆属(lycine)、棉花属(Gossypium)、向日葵属(Helianthus)、香豌豆属(Lathyrus)、兵豆属(Lens)、胡枝子属(Lespedeza)、亚麻属(Linum)、莲属(Lotus)、羽扇豆属(Lupinus)、澳洲坚果属(Macadamia)、苜蓿属(Medicago)、草木犀属(Melilotus)、黎豆属(Mucuna)、木犀榄属(Olea)、驴食草属(Onobrychis)、料豆属(Ornithopus)、罂粟属(Papaver)、菜豆属(Phaseolus)、刺葵属(Phoenix)、黄连木属(Pistacia)、豌豆属(Pisum)、樱桃属(Prunus)、葛属(Pueraria)、茶藨子属(Ribes)、蓖麻属(Ricinus)、胡麻属(Sesamum)、可可(Theobroma)、三叶草属(Trifolium)、胡芦巴属(Trigonella)、蚕豆属(Vicia)和豇豆属(Vigna)。

[0079] 优选的双子叶植物物种包括::扁桃(Amygdalus communis)、腰果(Anacardium occidentale)、花生(Arachis hypogaea)、花生(Arachis hypogea)、油菜(Brassica napus Rape)、黑芥(Brassica nigra)、白菜(Brassica campestris)、木豆(Cajanus cajan)、木豆(Cajanus indicus)、大麻(Cannabis sativa)、红花(Carthamus tinctorius)、美国山核桃(Carya illinoinensis)、吉贝(Ceiba pentandra)、鹰嘴豆(Cicer arietinum)、可可椰子(Cocos nucifera)、芫荽(Coriandrum sativum)、绣球小冠花(Coronilla varia)、陆地棉(Cossypium hirsutum)、菽麻(Crotalaria juncea)、扁豆(Dolichos lablab)、油棕(Elaeis guineensis)、亚洲棉(Gossypium arboreum)、中棉(Gossypium nanking)、海岛棉(Gossypium barbadense)、草棉(Gossypium herbaceum)、陆地棉(Gossypium hirsutum)、大豆(Glycine max)、野大豆(Glycine ussuriensis)、宽叶蔓豆(Glycine gracilis)、向日葵(Helianthus annus)、Jatropha cuneata、麻疯树(Jatropha curcas)、窄叶羽扇豆(Lupinus angustifolius)、黄羽扇豆(Lupinus luteus)、珍珠羽扇豆(Lupinus mutabilis)、铁扫帚(Lespedeza sericea)、鸡眼草(Lespedeza striata)、大百脉根(Lotus uliginosus)、山黧豆(Lathyrus sativus)、兵豆(Lens culinaris)、长萼妁眼草(Lespedeza stipulacea)、亚麻(Linum usitatissimum)、百脉根(Lotus corniculatus)、白羽扇豆(Lupinus albus)、窄叶羽扇豆(Lupinus angustifolius)、黄羽扇豆(Lupinus luteus)、木本苜蓿(Medicago arborea)、黄花苜蓿(Medicago falcate)、金花菜(Medicago hispida)、黄香草木犀(Medicago officinalis)、紫花苜蓿(Medicago sativa(alfalfa))、硬果苜蓿(Medicago tribuloides)、澳洲坚果(Macadamia integrifolia)、褐斑苜蓿(Medicago arabica)、白花草木樨(Melilotus albus)、刺毛黎豆(Mucuna pruriens)、油橄榄(Olea europaea)、红豆草(Onobrychis viciifolia)、锯齿草(Ornithopus sativus)、绿豆(Phaseolus aureus)、红叶李(Prunus cerasifera)、欧洲酸樱桃(Prunus cerasus)、荷包豆(Phaseolus coccineus)、欧洲李(Prunus domestica)、棉豆(Phaseolus lunatus)、马哈利樱桃(Prunu.maheleb)、绿豆(Phaseolus mungo)、桃(Prunus.persica)、樱桃(Prunus.pseudocerasus)、菜豆(Phaseolus vulgaris)、罂粟(Papaver somniferum)、宽叶菜豆(Phaseolus acutifolius)、海枣(Phoenix dactylifera)、阿月浑子(Pistacia vera)、豌豆(Pisum sativum)、甜扁桃(Prunus amygdalus)、杏(Prunus armeniaca)、野葛(Pueraria thunbergiana)、黑茶镳子(Ribes nigrum)、红茶藨子(Ribes rubrum)、鹅莓

(Ribes grossularia)、蓖麻(Ricinus communis)、芝麻(Sesamum indicum)、马铃薯(Solanum tuberosum)、狭叶三叶草(Trifolium augustifolium)、分散三叶草(Trifolium diffusum)、杂种车轴草(Trifolium hybridum)、降车轴草(Trifolium incarnatum)、球花车轴草(Trifolium ingrescens)、红车轴草(Trifolium pratense)、白三叶草(Trifolium repens)、波斯三叶草(Trifolium resupinatum)、地三叶草(Trifolium subterraneum)、可可(Theobroma cacao)、埃及车轴草(Trifolium alexandrinum)、胡芦巴(Trigonella foenumgraecum)、油桐(Vernicia fordii)、窄叶野豌豆(Vicia angustifolia)、深紫花野豌豆(Vicia atropurpurea)、距花豌豆(Vicia calcarata)、广布野豌豆(Vicia dasycarpa)、苦野豌豆(Vicia ervilia)、红莓苔子(Vaccinium oxycoccos)、褐毛野豌豆(Vicia pannonica)、长豇豆(Vigna sesquipedalis)、豇豆(Vigna sinensis)、长柔毛野豌豆(Vicia villosa)、蚕豆(Vicia faba)、野碗豆(Vicia sative)和赤豆(Vigna angularis)。

[0080] 植物和植物部分

[0081] 在其他方面,本发明提供了由于具有增加的PEAPOD蛋白或其片段的表达而具有增加的根生物量的植物。

[0082] 在一种实施方式中,所述PEAPOD蛋白或其片段的表达增加是用编码PEAPOD蛋白或其片段的多核苷酸转化植物、或其祖先植物或植物细胞的结果。

[0083] 在其他实施方式中,所述植物为用表达PEAPOD蛋白或其片段的多核苷酸进行转基因的。

[0084] 在其他实施方式中,所述多核苷酸或其片段是与组织优选的启动子可操作地连接的多核苷酸。

[0085] 在其他实施方式中,所述启动子是根优选的启动子。

[0086] 在其他实施方式中,所述启动子是根特异性启动子。

[0087] 在其他实施方式中,所述PEAPOD蛋白如本文所定义。

[0088] 在其他实施方式中,所述编码PEAPOD蛋白的多核苷酸如本文所定义。

[0089] 在其他方面,本发明提供了植物的细胞、部分、繁殖体或子代,其为用以下中的至少一种进行转基因的:

[0090] a)多核苷酸,和

[0091] b)多核苷酸和可操作地连接的启动子。

具体实施方式

[0092] 在本说明书中,提及专利说明书、其他外部文献或其他信息来源时,通常是为了提供用于讨论本发明特征的上下文。除非另有具体说明,对这些外部文献的参考并不被解释为承认这些文献或这些信息来源以任何权限作为现有技术,或形成本领域的公知常识的一部分。

[0093] 本说明书中使用的术语“包含(comprising)”意指“至少部分由…组成”。当解释本说明书中的每个包括术语“包含”的语句时,除了以该术语开始的特征以外的特征也可能存在。相关的术语如“包含(comprise)”将以相同的方式解释。

[0094] 增加的根生物量

[0095] 具有“增加的根生物量”的植物比同一类型和年龄的对照植物产生更多的根生物量。因此，“增加的”意指相对于同一类型和年龄的对照植物的增加。

[0096] 优选地，具有“增加的根生物量”的植物比同一类型和年龄的对照植物产生的根生物量多至少10％、优选至少20％、更优选至少30％、更优选至少40％、更优选至少50％、更优选至少60％、更优选至少70％、更优选至少80％、更优选至少90％、更优选至少100％、更优选至少150％、更优选至少200％、更优选至少300％、更优选至少400％。

[0097] 在一种实施方式中，具有“增加的根生物量”的植物相比于对照植物具有以下中的至少一种：更大的根、更多的根或更延伸的根系。

[0098] 根生物量

[0099] 术语根生物量是指由植物产生的根组织的总质量。这可以由干重或湿重来评估。

[0100] 根

[0101] 本文使用的术语根意指与该术语的标准用法相同。术语根包含初生根、次生根、不定根、根分枝和根毛。根通常在地下，但是该术语也包含气生根。在一种实施方式中，术语根包含植物的非含叶、非含节部分。

[0102] 增加的耐旱性

[0103] 在一种实施方式中，具有“增加的根生物量”的植物也具有增加的耐旱性。同样地，“增加的”意指相对于同一类型和年龄的对照植物的增加。

[0104] 术语“增加的耐旱性”旨在描述在次优的水化条件下其在生长和发育的任一方面都比在相同条件下的适宜的对照植物表现更好的植物。

[0105] 对照植物

[0106] 在一种实施方式中，所述对照植物是野生型植物。在其他实施方式中，所述对照植物是未转化的植物。在其他实施方式中，所述对照植物是尚未用PEAPOD多核苷酸转化的植物。在其他实施方式中，所述对照植物是尚未用构建体转化的植物。在其他实施方式中，所述对照植物是用对照构建体转化的植物。在一种实施方式中，所述构建体是空载体构建体。

[0107] 异位表达

[0108] 术语“异位表达”旨在被广义地解释。该术语是指多核苷酸或多肽在以下的任意一项中的表达：

[0109] • 在其中所述多核苷酸或多肽未被正常表达的细胞、器官、组织或植物，

[0110] • 在所述多核苷酸或多肽未被正常表达时的时间或发育阶段的细胞、器官、组织或植物，和

[0111] • 在其中所述多核苷酸或多肽以比其正常表达时更高的水平表达的细胞、器官、组织或植物。

[0112] 组织优选的启动子

[0113] 在某些实施方式中，所述编码多核苷酸的PEAPOD蛋白在组织优选的启动子的控制下表达。关于组织优选的启动子的术语“优选的”意指启动子首先在该组织中驱动表达。因此，例如，根优选的启动子在根组织中比在植物的其他组织或器官中驱动更高水平的可操作地连接的多核苷酸的表达。

[0114] 根优选的启动子

[0115] 根优选的启动子在根组织中比在植物的其他组织或器官中驱动更高水平的可操

作地连接的多核苷酸的表达。

[0116] 根优选的启动子可以包括非光合组织优选的启动子和光阻遏调节型启动子。

[0117] 非光合组织优选的启动子

[0118] 非光合组织优选的启动子包括优选在植物的非光合组织/器官中表达的启动子。

[0119] 非光合组织优选的启动子也可包括光阻遏型启动子。

[0120] 光阻遏型启动子

[0121] 光阻遏型启动子的实例可见于US 5,639,952和US 5,656,496。

[0122] 根特异性启动子

[0123] 根特异性启动子的实例可见于US 5,837,848和US 2004/0067506以及US 2001/0047525。

[0124] 关于优选在某一组织中表达的启动子的术语“优选表达”意指在该组织中比在植物的其他组织中以更高水平表达的启动子。

[0125] 关于启动子的术语“组织特异性的”意指所述启动子基本上仅在该组织而非植物的其他组织中表达。

[0126] 在一种实施方式中,所述根优选的启动子是根特异性启动子。

[0127] 本文使用的术语“基因”意指包括编码多肽或蛋白的编码序列的内源基因组序列。所述编码序列被一个或多个内含子间隔。基因通常还包括启动子序列、5’非翻译序列、3’非翻译序列和终止子序列。调节蛋白表达的基因组序列也可被认为是基因的一部分。

[0128] 多核苷酸和片段

[0129] 本文使用的术语“多核苷酸”意指任意长度但优选至少15个核苷酸的单链或双链脱氧核糖核苷酸或核糖核苷酸聚合物,并且包括以下非限制性实例:基因的编码和非编码序列、正义和反义序列互补物、外显子、内含子、基因组DNA、cDNA、前mRNA、mRNA、rRNA、siRNA、miRNA、tRNA、核酶、重组多肽、分离的和纯化的天然存在的DNA或RNA序列、合成的RNA和DNA序列、核酸探针、引物和片段。

[0130] 多核苷酸的“片段”是指较长的多核苷酸序列的连续子序列。优选地,所述片段为所公开的多核苷酸的至少15个核苷酸、优选至少16个核苷酸、更优选至少17个核苷酸、更优选至少18个核苷酸、更优选至少19个核苷酸、更优选至少20个核苷酸、更优选至少21个核苷酸、更优选至少22个核苷酸、更优选至少23个核苷酸、更优选至少24个核苷酸、更优选至少25个核苷酸、更优选至少26个核苷酸、更优选至少27个核苷酸、更优选至少28个核苷酸、更优选至少29个核苷酸、更优选至少30个核苷酸、更优选至少31个核苷酸、更优选至少32个核苷酸、更优选至少33个核苷酸、更优选至少34个核苷酸、更优选至少35个核苷酸、更优选至少36个核苷酸、更优选至少37个核苷酸、更优选至少38个核苷酸、更优选至少39个核苷酸、更优选至少40个核苷酸、更优选至少41个核苷酸、更优选至少42个核苷酸、更优选至少43个核苷酸、更优选至少44个核苷酸、更优选至少45个核苷酸、更优选至少46个核苷酸、更优选至少47个核苷酸、更优选至少48个核苷酸、更优选至少49个核苷酸、更优选至少50个核苷酸、更优选至少51个核苷酸、更优选至少52个核苷酸、更优选至少53个核苷酸、更优选至少54个核苷酸、更优选至少55个核苷酸、更优选至少56个核苷酸、更优选至少57个核苷酸、更优选至少58个核苷酸、更优选至少59个核苷酸、更优选至少60个核苷酸、更优选至少61个核苷酸、更优选至少62个核苷酸、更优选至少63个核苷酸、更优选至少64个核苷酸、更优选至

少65个核苷酸、更优选至少66个核苷酸、更优选至少67个核苷酸、更优选至少68个核苷酸、更优选至少69个核苷酸、更优选至少70个核苷酸、更优选至少71个核苷酸、更优选至少72个核苷酸、更优选至少73个核苷酸、更优选至少74个核苷酸、更优选至少75个核苷酸、更优选至少76个核苷酸、更优选至少77个核苷酸、更优选至少78个核苷酸、更优选至少79个核苷酸、更优选至少80个核苷酸、更优选至少81个核苷酸、更优选至少82个核苷酸、更优选至少83个核苷酸、更优选至少84个核苷酸、更优选至少85个核苷酸、更优选至少86个核苷酸、更优选至少87个核苷酸、更优选至少88个核苷酸、更优选至少89个核苷酸、更优选至少90个核苷酸、更优选至少91个核苷酸、更优选至少92个核苷酸、更优选至少93个核苷酸、更优选至少94个核苷酸、更优选至少95个核苷酸、更优选至少96个核苷酸、更优选至少97个核苷酸、更优选至少98个核苷酸、更优选至少99个核苷酸、更优选至少100个核苷酸、更优选至少150个核苷酸、更优选至少200个核苷酸、更优选至少250个核苷酸、更优选至少300个核苷酸、更优选至少350个核苷酸、更优选至少400个核苷酸和最优选至少500个核苷酸的连续核苷酸。多核苷酸序列的片段可用于反义RNA干扰(RNAi)、基因沉默、三螺旋或核酶技术中，或作为包括在微阵列中的引物、探针，或用于本发明的基于多核苷酸的可选方法中。

[0131] 在一种实施方式中，所述片段编码执行或能够执行与由该片段是其一部分的更长的多核苷酸编码的多肽相同的功能的多肽。

[0132] 术语“引物”是指通常具有游离的3’OH基团的短多核苷酸，其与或能够与模板杂交，并用于引发与靶标互补的多核苷酸的聚合。

[0133] 术语“探针”是指在基于杂交的测定中，用于或可用于检测与探针互补的多核苷酸序列的短多核苷酸。所述探针可由如本文所定义的多核苷酸的“片段”组成。

[0134] 多肽和片段

[0135] 本文使用的术语“多肽”包含任意长度但优选至少5个氨基酸的氨基酸链，包括其中氨基酸残基通过共价肽键连接的全长蛋白。本发明的或用于本发明方法中的多肽可以是纯化的天然产物，或者可以部分或全部使用重组或合成技术产生。该术语可是指多肽、多肽的聚合体，例如，二聚体或其他多聚体、融合多肽、多肽片段、多肽变体或其衍生物。

[0136] 多核苷酸的“片段”是指较长的多核苷酸序列的连续子序列。优选所述片段

[0137] 多肽的“片段”是指较长的多肽的连续子序列。优选所述片段为至少5个、更优选至少10个、更优选至少20个、更优选至少30个、更优选至少40个、更优选至少50个、更优选至少100个、更优选至少120个、更优选至少150个、更优选至少200个、更优选至少250个、更优选至少300个、更优选至少350个、更优选至少400个。

[0138] 在一种实施方式中，所述片段执行或能够执行与该片段是其一部分的多肽相同的功能。

[0139] 优选地，所述片段执行生物活性所必需的功能和/或提供多肽的三维结构。

[0140] 应用于本文公开的多核苷酸或多肽序列的术语“分离的”用于指从其天然细胞环境中去除的序列。在一种实施方式中，所述序列与其天然存在的侧翼序列相分离。分离的分子可以通过包括生化、重组和合成技术的任意方法或方法的组合来获得。

[0141] 术语“重组体(recombinant)”是指经合成产生的或从在其天然环境中围绕它的序列中去除的多核苷酸序列。所述重组序列可以与其天然环境中不存在的序列重新组合。

[0142] “重组体”多肽序列通过从“重组体”多核苷酸序列的翻译而产生。

[0143] 关于衍生自特定属或物种的本发明的多核苷酸或多肽的术语“衍生自”意指所述多核苷酸或多肽与天然存在于该属或物种中的多核苷酸或多肽具有相同的序列。衍生自特定属或物种的多核苷酸或多肽因此可以合成产生或重组产生。

[0144] 变体

[0145] 本文使用的术语“变体”是指不同于特定鉴定的序列的多核苷酸或多肽序列,其中一个或多个核苷酸或氨基酸残基被缺失、置换或添加。变体可以是天然存在的等位基因变体或非天然存在的变体。变体可以来自同一物种或来自其他物种并且可以包含同源物(homologue)、旁系同源物(paralogue)和直系同源物(orthologue)。在某些实施方式中,本文公开的多肽和多核苷酸的变体具有与所公开的多肽或多核苷酸的生物活性相同或相似的生物活性。关于多肽和多核苷酸的术语“变体”包含如本文所定义的多肽和多核苷酸的所有形式。

[0146] 多核苷酸变体

[0147] 变体核苷酸序列优选显示出与本发明的序列至少50%、更优选至少51%、更优选至少52%、更优选至少53%、更优选至少54%、更优选至少55%、更优选至少56%、更优选至少57%、更优选至少58%、更优选至少59%、更优选至少60%、更优选至少61%、更优选至少62%、更优选至少63%、更优选至少64%、更优选至少65%、更优选至少66%、更优选至少67%、更优选至少68%、更优选至少69%、更优选至少70%、更优选至少71%、更优选至少72%、更优选至少73%、更优选至少74%、更优选至少75%、更优选至少76%、更优选至少77%、更优选至少78%、更优选至少79%、更优选至少80%、更优选至少81%、更优选至少82%、更优选至少83%、更优选至少84%、更优选至少85%、更优选至少86%、更优选至少87%、更优选至少88%、更优选至少89%、更优选至少90%,更优选至少91%、更优选至少92%、更优选至少93%、更优选至少94%、更优选至少95%、更优选至少96%、更优选至少97%、更优选至少98%和最优选至少99%的同一性。同一性通过至少20个核苷酸位置、优选至少50个核苷酸位置、更优选至少100个核苷酸位置以及最优选本发明的全长多核苷酸的比较窗口而发现。

[0148] 多核苷酸序列同一性可以通过以下方式测定。使用bl2seq中的BLASTN(来自BLAST程序套件,2.2.5版本[2002年11月])将所述目标多核苷酸序列与候选多核苷酸序列进行比较(Tatiana A.Tatusova,Thomas L.Madden(1999),"Blast 2 sequences-a new tool for comparing protein and nucleotide sequences",FEMS Microbiol Lett.174:247-250),该程序可从NCBI公开获得(ftp:jjftp.ncbi.nih.govjblastj)。在一种实施方式中,使用bl2seq的默认参数。在其他实施方式中,使用bl2seq的默认参数,除了应该关闭对低复杂度部分的过滤以外。

[0149] 也可以使用全局序列比对程序(例如,Needleman,S.B.and Wunsch,C.D.(1970)J.Mol.Biol.48,443-453)在候选多核苷酸序列和目标多核苷酸序列之间的整个重叠长度上计算多核苷酸序列同一性。Needleman-Wunsch全局比对算法的完整实施方式可见于EMBOSS程序包中的needle程序(Rice,P.Longden,l.and Bleasby,A.EMBOSS:The European Molecular Biology Open Software Suite,Trends in Genetics June 2000,第16卷,第6期,第276-277页),其可从http://www.hgmp.mrc.ac.uk/Software/EMBOSS/获得。欧洲生物信息学研究所服务器也提供了在线上(在http:/www.ebi.ac.uk/emboss/align/上)进行两

条序列之间的EMBOSS-needle全局比对的工具。

[0150] 或者,可以使用GAP程序,其计算两条序列的最佳全局比对,而不会对末端空位进行罚分。GAP记载于以下文章中:Huang,X.(1994)On Global Sequence Alignment.Computer Applications in the Biosciences 10,227-235。

[0151] 计算多核苷酸的序列同一性%的优选方法基于使用Clustal X比对待比较的序列(Jeanmougin et al.,1998,Trends Biochem.Sci.23,403-5)。

[0152] 本发明的多核苷酸变体还包含表现出与一个或多个特定鉴定的序列具有相似性的那些,其可能保留这些序列的功能等效性并且无法被合理预期已随机发生。所述关于多肽的序列相似性可以使用可公开获得的NCBI的BLAST程序套件的bl2seq程序(2.2.5版本[2002,11月])(ftp://ftp.ncbi.nih.gov/blast/)来确定。

[0153] 或者,本发明的变体多核苷酸在严格条件下与特定的多核苷酸序列或其互补物杂交。

[0154] 术语"在严格条件下杂交"及其语法上的同义语是指多核苷酸分子与靶多核苷酸分子(如固定在DNA或RNA印迹(如Southern印迹或Northern印迹)上的靶多核苷酸分子)在确定的温度和盐浓度的条件下杂交的能力。在严格杂交条件下杂交的能力可以通过在较不严格条件下初始杂交然后增加严格性至预期严格性的条件下杂交来测定。

[0155] 对于长度大于约100个碱基的多核苷酸分子,典型的严格杂交条件是不超过25至30℃(例如,10℃),低于天然双链的解链温度(Tm)(通常参见,Sambrook et al.,Eds,1987,Molecular Cloning,A Laboratory Manual,第2版,Cold Spring Harbor Press;Ausubel et al.,1987,Current Protocols in Molecular Biology,Greene Publishing)。大于约100个碱基的多核苷酸分子的Tm可以通过公式Tm=81.5+0.41%(G+C-log(Na+)来计算(Sambrook et al.,Eds,1987,Molecular Cloning,A Laboratory Manual,第2版,Cold Spring Harbor Press;Bolton and McCarthy,1962,PNAS 84:1390)。长度大于约100个碱基的多核苷酸的典型严格条件为杂交条件,如在6X SSC、0.2%SDS的溶液中预洗涤;在65℃、6X SSC、0.2%SDS中过夜杂交;然后在65℃下在1X SSC、0.1%SDS中洗涤两次,每次30分钟,以及在65℃下在0.2X SSC、0.1%SDS中洗涤两次,每次30分钟。

[0156] 对于长度小于100个碱基的多核苷酸分子,示例性的严格杂交条件为低于Tm的5至10℃。平均而言,长度小于100bp的多核苷酸分子的Tm降低约(500/寡核苷酸长度)℃。

[0157] 对于已知作为肽核酸(PNA)的DNA模拟物(Nielsen et al.,Science.1991 Dec 6;254(5037):1497-500),Tm值比DNA-DNA杂交体或DNA-RNA杂交体的Tm值高,并且可以使用Giesen et al.,Nucleic Acids Res.1998 Nov 1;26(21):5004-6中记载的公式计算。具有长度小于100个碱基的DNA-PNA杂交体的示例性严格杂交条件为低于Tm的5至10℃。

[0158] 本发明的变体多核苷酸还包含这样的多核苷酸,其不同于本发明的序列,但是因遗传密码的简并性而编码与由本发明的多核苷酸编码的多肽具有相似活性的多肽。不改变多肽的氨基酸序列的序列改变是"沉默变异"。除了ATG(甲硫氨酸)和TGG(色氨酸),相同氨基酸的其他密码子可以通过本领域公知的技术改变,例如,在特定的宿主生物体中以优化密码子的表达。

[0159] 本发明也包括这样的多核苷酸序列改变,其导致所编码的多肽序列的一个或几个氨基酸的保守置换,而不明显改变其生物活性。本领域技术人员将会知晓制备表型沉默氨

基酸置换的方法(参见,例如,Bowie et al.,1990,Science 247,1306)。

[0160] 由于所编码的多肽序列中的沉默变异和保守置换而导致的变体多核苷酸可以通过如前所述的tblastx算法使用可公开获得的NCBI的BLAST程序套件的bl2seq程序(2.2.5版本[2002,11月])(ftp://ftp.ncbi.nih.gov/blast/)来测定。

[0161] 多肽变体

[0162] 关于多肽的术语“变体”包含天然存在的、重组产生的和合成产生的多肽。变体多肽序列优选表现出与本发明的序列至少50%、更优选至少51%、更优选至少52%、更优选至少53%、更优选至少54%、更优选至少55%、更优选至少56%、更优选至少57%、更优选至少58%、更优选至少59%、更优选至少60%、更优选至少61%、更优选至少62%、更优选至少63%、更优选至少64%、更优选至少65%、更优选至少66%、更优选至少67%、更优选至少68%、更优选至少69%、更优选至少70%、更优选至少71%、更优选至少72%、更优选至少73%、更优选至少74%、更优选至少75%、更优选至少76%、更优选至少77%、更优选至少78%、更优选至少79%、更优选至少80%、更优选至少81%、更优选至少82%、更优选至少83%、更优选至少84%、更优选至少85%、更优选至少86%、更优选至少87%、更优选至少88%、更优选至少89%、更优选至少90%,更优选至少91%、更优选至少92%、更优选至少93%、更优选至少94%、更优选至少95%、更优选至少96%、更优选至少97%、更优选至少98%和最优选至少99%的同一性。同一性通过至少20个氨基酸位置、优选至少50个氨基酸位置、更优选至少100个氨基酸位置以及最优选本发明的全长多肽的比较窗口而发现。

[0163] 多肽序列同一性可以通过以下方式确定。使用bl2seq中的BLASTN(来自BLAST程序套件,2.2.5版本[2002年11月],其可从NCBI公开获得(ftp://ftp.ncbi.nih.gov/blast/))将所述目标多肽序列与候选多肽序列进行比较。在一种实施方式中,使用bl2seq的默认参数。在其他实施方式中,使用bl2seq的默认参数,除了应关闭对低复杂度部分的过滤。

[0164] 也可以使用全局序列比对程序在候选多肽序列和目标多肽序列之间的整个重叠长度上计算多肽序列同一性。如上所讨论的EMBOSS-needle(可从http:/www.ebi.ac.uk/emboss/align/上获得)和GAP(Huang,X.(1994)On Global Sequence Alignment.Computer Applications in the Biosciences 10,227-235)也是用于计算多肽序列同一性的合适的全局序列比对程序。

[0165] 计算多肽的序列同一性%的优选方法基于使用Clustal X比对待比较的序列(Jeanmougin et al.,1998,Trends Biochem.Sci.23,403-5)。

[0166] 变体多肽包括这样的多肽,其中氨基酸序列与本文的多肽的区别在于一个或多个不影响肽的生物活性的保守氨基酸置换、缺失、添加或插入。保守置换通常包括一个氨基酸置换为具有相似特征的另一个,例如,以下组中的置换:缬氨酸、甘氨酸;甘氨酸、丙氨酸;缬氨酸、异亮氨酸、亮氨酸;天冬氨酸、谷氨酸;天冬酰胺、谷氨酰胺;丝氨酸、苏氨酸;赖氨酸、精氨酸;和苯丙氨酸、酪氨酸。

[0167] 非保守置换需要将这些类别之一的一个成员换成另一类别的成员。

[0168] 对进化的生物序列的分析已证明并不是所有的序列改变都具有同样可能性,反映了保守置换和非保守置换在生物水平上的至少部分差异。例如,某些氨基酸置换可以频繁发生,而其他则非常少见。氨基酸残基的进化性改变或置换可以通过评分矩阵(也称为置换矩阵)来模拟。将所述矩阵用于生物信息学分析中以鉴定序列之间的关系,一个实例为以下

所示的BLOSUM62矩阵(表1)。

[0169] 表1:含有所有可能的置换分数的BLOSUM62矩阵[Henikoff and Henikoff,1992]

[0170]

	A	R	N	D	C	Q	E	G	H	I	L	K	M	F	P	S	T	W	Y	V
A	4	-1	-2	-2	0	-1	-1	0	-2	-1	-1	-1	-1	-2	-1	1	0	-3	-2	0
R	-1	5	0	-2	-3	1	0	-2	0	-3	-2	2	-1	-3	-2	-1	-1	-3	-2	-3
N	-2	0	6	1	-3	0	0	0	1	-3	-3	0	-2	-3	-2	1	0	-4	-2	-3
D	-2	-2	1	6	-3	0	2	-1	-1	-3	-4	-1	-3	-3	-1	0	-1	-4	-3	-3
C	0	-3	-3	-3	9	-3	-4	-3	-3	-1	-1	-3	-1	-2	-3	-1	-1	-2	-2	-1
Q	-1	1	0	0	-3	5	2	-2	0	-3	-2	1	0	-3	-1	0	-1	-2	-1	-2
E	-1	0	0	2	-4	2	5	-2	0	-3	-3	1	-2	-3	-1	0	-1	-3	-2	-2
G	0	-2	0	-1	-3	-2	-2	6	-2	-4	-4	-2	-3	-3	-2	0	-2	-2	-3	-3
H	-2	0	1	-1	-3	0	0	-2	8	-3	-3	-1	-2	-1	-2	-1	-2	-2	2	-3
I	-1	-3	-3	-3	-1	-3	-3	-4	-3	4	2	-3	1	0	-3	-2	-1	-3	-1	3
L	-1	-2	-3	-4	-1	-2	-3	-4	-3	2	4	-2	2	0	-3	-2	-1	-2	-1	1
K	-1	2	0	-1	-3	1	1	-2	-1	-3	-2	5	-1	-3	-1	0	-1	-3	-2	-2
M	-1	-1	-2	-3	-1	0	-2	-3	-2	1	2	-1	5	0	-2	-1	-1	-1	-1	1
F	-2	-3	-3	-3	-2	-3	-3	-3	-1	0	0	-3	0	6	-4	-2	-2	1	3	-1
P	-1	-2	-2	-1	-3	-1	-1	-2	-2	-3	-3	-1	-2	-4	7	-1	-1	-4	-3	-2
S	1	-1	1	0	-1	0	0	0	-1	-2	-2	0	-1	-2	-1	4	1	-3	-2	-2
T	0	-1	0	-1	-1	-1	-1	-2	-2	-1	-1	-1	-1	-2	-1	1	5	-2	-2	0
W	-3	-3	-4	-4	-2	-2	-3	-2	-2	-3	-2	-3	-1	1	-4	-3	-2	11	2	-3
Y	-2	-2	-2	-3	-2	-1	-2	-3	2	-1	-1	-2	-1	3	-3	-2	-2	2	7	-1
V	0	-3	-3	-3	-1	-2	-2	-3	-3	3	1	-2	1	-1	-2	-2	0	-3	-1	4

[0171] 使用所示的BLOSUM62矩阵生成相应的行和列的交汇点处存在的各比对的氨基酸对的分数。例如,从谷氨酸残基(E)至天冬氨酸残基(D)的置换分数为2。对角线示出了还未改变的氨基酸的分数。大部分置换改变具有负分数。所述矩阵只包含整数。

[0172] 确定合适的评分矩阵以产生对给定序列组最佳的比对被认为是在本领域技术的范围内。表1中的BLOSUM62矩阵也可以用作BLAST检索中的缺省矩阵,尽管并不局限于此。

[0173] 其他变体包括具有影响肽稳定性的修饰的肽。这种类似物可以包含,例如,肽序列中的一个或多个非-肽键(其替换肽键)。也包括这样的类似物,其包括非天然存在的L-氨基酸的残基,例如,D-氨基酸或非天然存在的合成氨基酸,例如,β或γ氨基酸和环状类似物。

[0174] 构建体、载体和其组件

[0175] 术语“遗传构建体”是指多核苷酸分子,通常为双链DNA,其可能已经被插入至另一个多核苷酸分子(插入多核苷酸分子)(例如,但不限于cDNA分子)中。遗传构建体可以包含必要的元件,其允许转录插入多核苷酸分子,并且,任选地,将转录物翻译为多肽。所述插入多核苷酸分子可衍生自宿主细胞,或可衍生自不同的细胞或生物体和/或可以是重组多核苷酸。一旦在宿主细胞内,所述遗传构建体可以整合在宿主染色体DNA中。所述遗传构建体可与载体连接。

[0176] 术语“载体”是指多核苷酸分子,通常为双链DNA,其被用于将所述遗传构建体转运到宿主细胞中。所述载体能够在至少一种其他宿主系统(如大肠杆菌)中复制。

[0177] 术语“表达构建体”是指包括必要元件的遗传构建体,所述元件允许转录所述插入多核苷酸分子,并且,任选地,将转录物翻译为多肽的必要的元件。表达构建体通常在5’至3’方向上包含:

[0178] a)在所述构建体将转化至其中的宿主细胞中具有功能的启动子;

[0179] b)待表达的多核苷酸;

[0180] c)在所述构建体将转化至其中的宿主细胞中具有功能的终止子。

[0181] 术语“编码区域”或“开放阅读框”(ORF)是指能够在适当的调控序列的控制下产生

转录产物和/或多肽的基因组DNA序列的正义链或cDNA序列。所述编码序列通过5’翻译起始密码子和3’翻译终止密码子的存在而鉴定。当插入至遗传构建体中时，“编码序列”在其与启动子序列和终止子序列可操作地连接时能够被表达。

[0182] “可操作地连接”意指待表达的序列被置于调控元件的控制下，所述调控元件包括启动子、组织特异性调控元件、时间调控元件、增强子、抑制子和终止子。

[0183] 术语“非编码区域”是指非翻译序列，其为翻译起始位点的上游和翻译终止密码子的下游。这些序列也分别称为5’UTR和3’UTR。这些区域包括转录起始和终止以及调控翻译效率所必需的元件。

[0184] 终止子是终止转录的序列，并存在于所翻译序列下游的基因的3’非翻译末端。终止子是mRNA稳定性的重要决定因素，并且在一些情况下被发现具有空间调控功能。

[0185] 术语“启动子”是指编码区域上游的调控基因转录的非转录顺式调控元件。启动子包含指定转录起始位点和保守框(如TATA框)以及被转录因子结合的基序的顺式起始元件。

[0186] 启动子可以与待表达的多核苷酸是同源的。这意指所述启动子和多核苷酸天然以可操作地连接的形式存在。

[0187] 或者，所述启动子可以与待表达的多核苷酸是异源的。这意指所述启动子和多核苷酸天然不以可操作地连接的形式存在。

[0188] “转基因”是通过转化被引入生物体中的多聚核苷酸。所述转基因可以衍生自相同物种或与所述转基因被引入至其中的生物体的物种不同的物种。所述转基因也可以是合成的并且天然不存在于任何物种中。

[0189] “转基因植物”是指含有作为遗传操作或转化结果的新遗传物质的植物。所述新遗传物质可衍生自与所得转基因植物的物种相同或不同的植物，或可是合成的。

[0190] 优选地，所述“转基因植物”因转基因的存在而与天然存在的任何植物不同。

[0191] “反向重复”是重复的序列，其中，重复序列的后半段是互补链，例如：

[0192] (5’)GATCTA.....TAGATC(3’)

[0193] (3’)CTAGAT.....ATCTAG(5’)

[0194] 只要在重复区域间具有3-5个碱基对的间隔区，通读转录将产生经过互补碱基配对来形成发卡结构的转录物。所述间隔区可以是通常长度至少为3个碱基对的任意多核苷酸序列。

[0195] 宿主细胞

[0196] 宿主细胞可以衍生自，例如，细菌、真菌、昆虫、哺乳动物或植物生物体。

[0197] 分离或产生多核苷酸的方法

[0198] 本发明的多核苷酸分子可以使用本领域普通技术人员已知的多种技术分离。例如，可以通过使用Mullis et al.,Eds.1994The Polymerase Chain Reaction,Birkhauser(以引用的方式纳入本文)中记载的聚合酶链式反应(PCR)分离所述多肽。本发明的多肽可以使用如本文所定义的衍生自本发明的多核苷酸序列的引物来扩增。

[0199] 分离本发明的多核苷酸的其他方法包括使用具有如本文所示的杂交探针的序列的多肽的全部或部分。将标记的多核苷酸探针与固定在固体支持物(如硝化纤维素滤膜或尼龙膜)上的多核苷酸杂交的技术可以被用于筛选基因组文库或cDNA文库。示例性的杂交和洗涤条件为：在65℃下在5.0X SSC、0.5％十二烷基硫酸钠、1X Denhardt溶液中杂交20小

时;在1.0X SSC,1%(w/v)十二烷基硫酸钠中洗涤(在55℃下洗涤3次,每次20分钟),以及任选地,在60℃下在0.5X SSC、1%(w/v)十二烷基硫酸钠中洗涤1次(20分钟)。在60℃、0.1X SSC、1%(w/v)十二烷基硫酸钠的条件下进行任选的进一步洗涤(20分钟)。

[0200] 本发明的多核苷酸片段可以通过本领域公知的技术(例如,限制性内切酶消化、寡核苷酸合成和PCR扩增)产生。

[0201] 部分多核苷酸序列可以在本领域公知的方法中使用,以鉴定相应的全长多核苷酸序列。这种方法包括基于PCR的方法,5'RACE(Frohman MA,1993,Methods Enzymol.218:340-56)和基于杂交的方法、基于计算机/数据库的方法。此外,例如,使用以基于已知区域的引物为起始的反向PCR允许捕获位于本文公开的多核苷酸序列侧翼的未知序列(Triglia et al.,1998,Nucleic Acids Res 16,8186,以引用的方式纳入本文)。该方法使用若干个限制性酶来以在基因的已知区域中产生合适的片段。所述片段然后通过分子内连接进行环化并用作PCR模板。发散引物(divergent primer)从已知区域设计而来。为了完全组装全长的克隆,可使用标准分子生物学方法(Sambrook et al.,Molecular Cloning:A Laboratory Manual,第2版Cold Spring Harbor Press,1987)。

[0202] 当从特定物种产生转基因植物时,使用衍生自该物种的序列转化这样的植物可能是有益的。益处可能是改善公众对在产生转基因生物中的物种间转化的关注。此外,当基因的下调是期望的结果时,利用与所述植物中的序列相同(或至少是高度相似的)的序列可能是必需的,对该基因而言,降低的表达是期望的。因为这些以及其他原因,能够鉴定和分离在几个不同植物物种中鉴定和分离出特定基因的直系同源物是可期望的。

[0203] 变体(包括直系同源物)可以通过所描述的方法进行鉴定。

[0204] 用于鉴定变体的方法

[0205] 物理方法

[0206] 变体多肽可以通过使用基于PCR的方法进行鉴定(Mullis et al.,Eds.1994 The Polymerase Chain Reaction,Birkhauser)。通常,可用于通过PCR扩增本发明的多聚核苷酸分子变体的引物的多聚核苷酸序列可以基于编码相应氨基酸序列的保守区域的序列。

[0207] 或者,可以使用本领域技术人员所公知的文库筛选方法(Sambrook et al.,Molecular Cloning:A Laboratory Manual,第2版,Cold Spring Harbor Press,1987)。当鉴定所述探针序列的变体时,相对于当寻找精确的序列匹配时,其杂交和/或洗涤的严格性通常将被降低。

[0208] 多肽变体也可以通过物理方法进行鉴定,例如,通过使用抗本发明的多肽的抗体筛选表达文库(Sambrook et al.,Molecular Cloning:A Laboratory Manual,第2版,Cold Spring Harbor Press,1987)或在这样的抗体的帮助下将多肽从天然来源中鉴定出。

[0209] 基于计算机的方法

[0210] 包括多核苷酸和多肽变体的本发明的变体序列也可以通过本领域技术人员所公知的基于计算机的方法使用公开的域序列比对算法和序列相似性搜索工具来搜索序列数据库(公开的域数据库包括Genbank、EMBL、Swiss-Prot、PIR等)而进行鉴定。参见,例如,Nucleic Acids Res.29:1-10and 11-16,2001中在线资源的实例。相似性搜索检索和比对用于与待分析序列相比较的靶序列(即查询序列)。序列比较算法使用评分矩阵来为每一条比对序列赋予总分数。

[0211] 用于鉴定序列数据库中变体的示例性程序族是包括BLASTN、BLASTP、BLASTX、tBLASTN和tBLASTX的BLAST程序套件(2.2.5版本[2002年11月]),它们可以从(ftp://ftp.ncbi.nih.gov/blast/)或从美国马里兰州贝塞斯达市(邮编20894)38A栋8N805房间的国家医学图书馆国家生物技术信息中心(NCBI)公开获得。NCBI服务器也提供了使用这些程序来筛选大量可公开获得的序列数据库的工具。BLASTN比较核苷酸查询序列和核苷酸序列数据库。BLASTP比较氨基酸查询序列和蛋白序列数据库。BLASTX比较在所有阅读框中被翻译的核苷酸查询序列和蛋白序列数据库。tBLASTN比较蛋白查询序列和在所有阅读框中动态翻译的核苷酸序列数据库。tBLASTX比较核苷酸查询序列的六读码框翻译和核苷酸序列数据库的六读码框翻译。BLAST程序可以以默认参数使用或者可以根据需要改变参数以改进筛选。

[0212] 包括BLASTN、BLASTP和BLASTX的BLAST算法族的使用在出版物Altschul et al., Nucleic Acids Res.25:3389-3402,1997中进行了描述。

[0213] 由BLASTN、BLASTP、BLASTX、tBLASTN、tBLASTX或相似算法产生的被查询序列产生的对于一个或多个数据库序列的“击中序列数”(hit)比对和鉴定了序列的相似部分。击中序列数以相似性的程度和序列重叠的长度的顺序排列。对数据库序列的击中序列数通常代表了仅是被查询序列的序列长度的部分的重叠。

[0214] BLASTN、BLASTP、BLASTX、tBLASTN和tBLASTX算法也针对比对产生“期望”值。期望值(E)表明当搜索含有随机连续序列的相同大小的数据库时,人们能“期望”随机看到的击中的数目。期望值用作决定对于数据库的击中是否表明真的相似性的显著性阈值。例如,指定到多核苷酸击中数的E值为0.1被解释为意味着,在被筛选的数据库大小的数据库中,人们可能期望看到具有简单随机地相似分数的序列的被比对部分的0.1匹配。对于被比对和匹配部分具有0.01或更低的E值的序列,通过使用所述BLASTN、BLASTP、BLASTX、tBLASTN或tBLASTX算法在那个数据库中发现随机匹配的可能性是1%或更低。

[0215] 一组相关序列的多序列比对可以使用CLUSTALW(Thompson,J.D.,Higgins,D.G.and Gibson,T.J.(1994)CLUSTALW:improving the sensitivity of progressive multiple sequence alignment through sequence weighting,positions-specific gap penalties and weight matrix choice.Nucleic Acids Research,22:4673-4680,http://www-igbmc.u-strasbg.fr/BioInfo/ClustalW/Top.html)或T-COFFEE(Cedric Notredame,Desmond G.Higgins,Jaap Heringa,T-Coffee:A novel method for fast and accurate multiple sequence alignment,J.Mol.Biol.(2000)302:205-217))或PILEUP进行,这些算法使用渐进配对比对。(Feng and Doolittle,1987,J.Mol.Evol.25,351)。

[0216] 模式识别软件应用可用于发现基序或标记序列。例如,MEME(用于基序挖掘的多重Em)在一组序列中发现基序标记序列,和MAST(基序比对和搜索工具)使用这些基序来鉴定查询序列中的相似或相同基序。MAST结果以具有适当统计数据和发现的基序的可视化概况的系列比对的形式提供。MEME和MAST在圣地亚哥的加利福尼亚大学开发。

[0217] PROSITE(Bairoch and Bucher,1994,Nucleic Acids Res.22,3583;Hofmann et al.,1999,Nucleic Acids Res.27,215)是鉴定从基因组或cDNA序列翻译而来的未表征的蛋白的功能的方法。PROSITE数据库(www.expasy.org/prosite)含有生物学上重要的模式和配置文件并被设计以使其能与适当的计算机工具一起使用,以指定新的序列至已知的蛋

白家族或测定哪些已知的结构域存在于所述序列中(Falquet et al.,2002,Nucleic AcidsRes.30,235)。Prosearch是能够使用给定序列模式或标记搜索SWISS-PROT和EMBL数据库的工具。

[0218] 分离多肽的方法

[0219] 包括变体多肽的本发明的,或用于本发明的方法中使用的多肽可以通过使用本领域公知的肽合成方法进行制备,例如使用固相合成技术的定向肽合成(例如Stewart et al.,1969,in Solid-Phase Peptide Synthesis,WH Freeman Co,加利福尼亚圣弗朗西斯科)或自动化合成,例如使用应用Applied Biosystems 431A肽合成仪(加利福尼亚,福斯特市)。所述多肽的突变形式也可以在该合成过程中产生。

[0220] 本发明的或在本发明方法中使用的多肽和变体多肽也可以通过使用本领域公知的各种技术从天然来源中纯化而来(例如,Deutscher,1990,Ed,Methods in Enzymology,Vol.182,Guide to Protein Purification)。

[0221] 或者,本发明的或在本发明的方法中使用的多肽和变体多肽可能在合适的宿主细胞中重组表达并按照如下所述从细胞中分离而来。

[0222] 产生构建体和载体的方法

[0223] 本发明的遗传构建体包含一条或多条本发明的多核苷酸序列和/或编码本发明的多肽的多核苷酸,并可用于转化例如细菌、真菌、昆虫、哺乳动物或植物生物体。本发明的遗传构建体旨在包括如本文所定义的表达构建体。

[0224] 产生和使用遗传构建体和载体的方法在本领域中是公知的并通常记载于Sambrook et al.,Molecular Cloning:A Laboratory Manual,第2版,Cold Spring Harbor Press,1987;Ausubel et al.,Current Protocols in Molecular Biology,Greene Publishing,1987)中。

[0225] 产生包含多核苷酸、构建体或载体的宿主细胞的方法

[0226] 本发明提供了包含本发明的遗传构建体或载体的宿主细胞。

[0227] 包含本发明的遗传构建体(如表达构建体)的宿主细胞可以用于本领域公知的方法中(例如,Sambrook et al.,Molecular Cloning:A Laboratory Manual,第2版,Cold Spring Harbor Press,1987;Ausubel et al.,Current Protocols in Molecular Biology,Greene Publishing,1987)以用于重组产生本发明的多肽。该方法可以涉及在适当的培养基中在适于或有助于本发明的多肽的表达的条件下培养宿主细胞。可任选地分泌至培养物中的经表达的重组多肽然后可以被从培养基、宿主细胞或培养物培养基中通过本领域公知的方法分离(例如,Deutscher,Ed,1990,Methods in Enzymology,第182卷,Guide to Protein Purification)。

[0228] 产生包含构建体和载体的植物细胞和植物的方法

[0229] 本发明还提供了包含本发明的遗传构建体的植物细胞,以及被修饰以改变本发明的多核苷酸或多肽的表达的植物细胞。包含该细胞的植物也形成了本发明的一个方面。

[0230] 用多肽转化植物细胞、植物和其部分的方法在下述文献中进行了描述:Draper et al.,1988,Plant Genetic Transformation and Gene Expression.A Laboratory Manual Blackwell Sci.Pub.Oxford,p.365;Potrykus and Spangenburg,1995,Gene Transfer to Plants.Springer-Verlag,Berlin.;和Gelvin et al.,1993,Plant Molecular

Biol.Manual.Kluwer Acad.Pub.Dordrecht。包括转化技术的转基因植物的综述在Galun and Breiman,1997,Transgenic Plants.Imperial College Press,London中提供。

[0231] 植物遗传操纵的方法

[0232] 大量植物转化策略是可获得的(例如,Birch,1997,Ann Rev Plant Phys Plant Mol Biol,48,297,Hellens RP,et al(2000)Plant Mol Biol 42:819-32,Hellens R et al Plant Meth 1:13)。例如,在多核苷酸/多肽被正常表达时,可以设计策略以增加多核苷酸/多肽在植物细胞、器官中和/或在特定发育阶段的表达,或在多核苷酸/多肽不能正常被表达时,设计策略以在细胞、组织、器官中和/或在特定发育阶段异位表达多核苷酸/多肽。所表达的多核苷酸/多肽可以衍生自待转化的植物物种或可衍生自不同的植物物种。

[0233] 在转基因植物中用于表达基因的遗传构建体通常包括驱动一个或多个克隆多核苷酸表达的启动子、终止子和用于检测遗传构建体在被转化的植物中存在的选择性标记序列。

[0234] 适用于遗传构建体的启动子在单子叶植物或双子叶植物的细胞、组织或器官中具有功能并包括细胞、组织和器官特异性启动子,细胞循环特异性启动子,时间启动子,诱导型启动子,在大多数植物组织中有活性的组成型启动子和重组启动子。启动子的选择将依赖于所期望的克隆的多核苷酸在时间和空间上的表达。所述启动子可能是与目的转基因正常相关的启动子,或衍生自其他植物、病毒和植物病原性细菌和真菌的基因的启动子。无需过多的实验,本领域技术人员将能够通过使用包含本发明的多核苷酸序列的遗传构建体选择适用于修饰和调控植物特性的启动子。组成型植物启动子的实例包括CaMV 35S启动子、胆脂碱合成酶启动子和章鱼碱合成酶启动子和来自于玉米的Ubi 1启动子。在特定组织中有活性并对内部发育信号或外部非生物胁迫或生物胁迫产生应答的植物启动子记载于科学文献中。示例性的启动子记载于例如WO 02/00894中,其以引用的方式纳入本文。

[0235] 在植物转化遗传构建体中普遍使用的示例性的终止子包括,例如,花椰菜花叶病毒(CaMV)35S终止子、根癌农杆菌(Agrobacterium tumefaciens)胭脂碱合成酶或章鱼肉碱合成酶终止子、玉米(Zea mays)醇溶蛋白基因终止子、水稻(Oryza sativa)ADP葡糖焦磷酸化酶终止子和马铃薯PI-II终止子。

[0236] 在植物转化中普遍使用的选择性标志物包括赋予卡那霉素抗性的新霉素磷酸转移酶II基因(NPT II)、赋予壮观霉素和链霉素抗性的aadA基因、赋予Ignite(AgrEvo)和Basta(Hoechst)抗性的膦丝菌素乙酰基转移酶(bar基因)和赋予潮霉素抗性的潮霉素磷酸转移酶基因(hpt)。

[0237] 包含可能用于植物和植物组织中启动子表达分析的报告基因(表达对于宿主而言是外来的、通常是酶活性和/或可视信号(例如荧光素酶、GUS、GFP)的活性的编码序列)的遗传构建体的使用也是被考虑的。报告基因的文献在Herrera-Estrella et al.,1993,Nature 303,209,和Schrott,1995,In:Gene Transfer to Plants(Potrykus,T.,Spangenberg.Eds)Springer Verlag.Berline,pp.325-336中进行了综述。

[0238] 基因沉默

[0239] 在多核苷酸/多肽被正常表达时,可以设计转化策略以降低多核苷酸/多肽在植物细胞、组织、器官中和/或在特定发育阶段的表达。

[0240] 基因沉默策略可能会关注基因本身或影响所编码的多肽的表达的调控元件。“调

控元件”在本文中以其最广泛可能的意义使用并包括与目的基因相互作用的其他基因。

[0241] 被设计用于降低或沉默本发明的多核苷酸/多肽的表达的遗传构建体可以包括本发明多核苷酸的反义拷贝。在这样的构建体中，所述多核苷酸被以相对于启动子和终止子的反义方向进行放置。

[0242] “反义”多核苷酸通过将多核苷酸或多核苷酸或片段反向获得，以使得所产生的转录物将与该基因的mRNA转录物互补，例如，

[0243] 5’GATCTA 3’(编码链) 3’CTAGAT 5’(反义链)

[0244] 3’CUAGAU 5’mRNA 5’GAUCUCG 3’反义RNA

[0245] 被设计用于基因沉默的遗传构建体也可以包括反向重复序列。“反向重复序列”是重复的序列，其中，重复序列的后半段是互补链，例如，

[0246] 5’-GATCTA……TAGATC-3’

[0247] 3’-CTAGAT……ATCTAG-5’

[0248] 所形成的转录物可能经历互补碱基配对以形成发卡结构。通常在重复区域之间的至少3-5个碱基对的间隔区是允许发卡形成所必需的。包括这种反向重复序列的构建体可用于RNA干扰(RNAi)中，并因此可称为RNAi构建体。

[0249] 另一种沉默方法涉及靶向于miRNA的转录等价物的小反义RNA的使用(Llave et al.,2002,Science 297,2053)。这样的对应于本发明的多核苷酸的小反义RNA的使用是特别考虑的。

[0250] 本文所用的术语遗传构建体也包括小反义RNA和其他影响基因沉默的这样的多肽。

[0251] 如本文所定义的，用表达构建体进行的转化也可以通过被称为有义抑制的过程产生基因沉默(例如，Napoli et al.,1990,Plant Cell 2,279;de Carvalho Niebel et al.,1995,Plant Cell,7,347)。在一些情况下，有义抑制可涉及全部或部分编码序列的过表达但也可涉及所述基因的非编码区(如内含子或5’或3’非翻译区(UTR))的表达。嵌合的部分正义构建体能用于协调沉默多个基因(Abbott et al.,2002,Plant Physiol.128(3):844-53;Jones et al.,1998,Planta 204:499-505)。这样的用于沉默本发明的多核苷酸的表达的有义抑制的使用也是被考虑的。

[0252] 被设计用于基因沉默的遗传构建体中多核苷酸插入物可能对应于相应基因的编码序列和/或非编码序列(如启动子和/或内含子和/或5’或3’UTR序列)。

[0253] 其他基因沉默策略包括显性负向方法和核酶构建体的使用(McIntyre,1996,Transgenic Res,5,257)。

[0254] 转录前沉默可能通过基因本身或其调控元件的突变而实现。这样的突变可以包括点突变、移码、插入、缺失和置换。

[0255] 转化方案

[0256] 以下是公开的能够被用于遗传转化下述植物物种的遗传转化方案的代表性出版物：水稻(Alam et al.,1999,Plant Cell Rep.18,572)、苹果(Yao et al.,1995,Plant Cell Reports 14,407-412)、玉米(美国专利序列No.5,177,010和5,981,840)、小麦(Ortiz et al.,1996,Plant Cell Rep.15,1996,877)、番茄(美国专利序列No.5,159,135)、马铃薯(Kumar et al.,1996 Plant J.9,:821)、木薯(Li et al.,1996 Nat.Biotechnology 14,

736)、莴苣(Michelmore et al.,1987,Plant Cell Rep.6,439)、烟草(Horsch et al.,1985,Science 227,1229)、棉花(美国专利序列No.5,846,797和5,004,863)、草(美国专利No.5,187,073和6,020,539)、薄荷(Niu et al.,1998,Plant Cell Rep.17,165)、柑橘植物(Pena et al.,1995,Plant Sci.104,183);葛缕子(Kren et al.,1997,Plant Cell Rep,17,39)、香蕉(美国专利序列No.5,792,935)、大豆(美国专利No.5,416,011、5,569,834、5,824,877、5,563,04455和5,968,830)、菠萝(美国专利序列No.5,952,543)、白杨(美国专利No.4,795,855)、普通单子叶植物(美国专利No.5,591,616和6,037,522)、芸苔(美国专利No.5,188,958、5,463,174和5,750,871)、谷物(美国专利No.6,074,877)、梨(Matsuda et al.,2005,Plant Cell Rep.24(1):45-51)、李子(Ramesh et al.,2006、Song和Sink 2005、Gonzalez Padilla et al.,2003)、草莓(Oosumi et al.,2006、Oosumi et al.,2006Planta.223(6):1219-30;Folta et al.,2006Planta Apr 14;PMID:16614818Foltaet al.,2006)、玫瑰(Li et al.,2003)、悬钩子(Graham et al.,1995Methods Mol Biol.1995;44:129-33)、番茄(Dan et al.,2006,Plant Cell Reports V25:432-441)、苹果(Yao et al.,1995,Plant Cell Rep.14,407-412)和毛花猕猴桃(Actinidia eriantha)(Wang et al.,2006,Plant Cell Rep.25,5:425-31)、欧洲桦(silver birch)(Keinonen-Mettala et al.,1998,Plant Cell Rep.17:356-361.)和山杨(Nilsson O,et al.,1992,Transgenic Research.1:209-220)。其他物种的转化也被本发明所考虑。合适的方法和方案在科学文献中可以获得。

[0257] 本领域已知的多个其他方法可能被用于改变本发明的核苷酸和/或多肽的活性的表达。这样的方法包括但不限于Tilling(Till et al.,2003,Methods Mol Biol,2%,205)、所谓的“Deletagene”技术(Li et al.,2001,Plant Journal 27(3),235)和人工转录因子(如合成的锌指转录因子)的使用(例如,Jouvenot et al.,2003,Gene Therapy 10,513)。此外,靶向于特定多肽的抗体或其片段也可以在植物中表达以调控该多肽的活性(Jobling et al.,2003,Nat.Biotechnol,21(1),35)。转座子标签方法也可以被使用。此外,与本发明的多肽相互作用的肽可以通过如相位展示的技术(Dyax Corporation)进行鉴定。这样的相互作用的多肽可以在植物中表达或应用到植物以影响本发明的多肽的活性。上述改变本发明的核苷酸和/或多肽的表达的每一种方法的使用都是被特别考虑的。

[0258] 术语“改变本发明的或在本发明的方法中使用的多核苷酸或多肽的表达”或“改变的本发明的或在本发明的方法中使用的多核苷酸或多肽的表达”旨在包括对应于本发明的多核苷酸的基因组DNA被修饰从而导致本发明的多核苷酸或多肽的改变的表达的情况。所述基因组DNA的修饰可能是通过遗传转化或其他的本领域已知的诱导突变的方法而进行。所述“改变的表达”可能与产生的信使RNA和/或多肽的量的增加或减少有关,并可能由于产生的多核苷酸和多肽的序列的改变而导致多肽的活性改变。

[0259] 选择植物的方法

[0260] 还提供了选择具有增加的根生物量的植物的方法。该方法包括测试植物中是否存在至少一种PEAPOD多核苷酸或多肽的表达改变,包括本文所定义的或所公开的那些。当增加的根生物量特征不必然易于测量时,该方法可以在幼年或早期发育阶段使用。

[0261] 多核苷酸(如信使RNA)的表达经常被用作相应多肽表达的指标。测量多核苷酸的表达的示例性的方法包括但不限于Northern分析、RT-PCR和斑点印记(dot-blot)分析

(Sambrook et al.,Molecular Cloning:A Laboratory Manual,第2版,Cold Spring Harbor Press,1987)。因此,如本文所定义的,本发明的多核苷酸或其部分在鉴定具有增加的根生物量的植物的方法中可用作探针或引物。本发明或本文公开的多肽可以在被设计以鉴定这样的植物的杂交实验中用作探针或基于PCR的实验中用作引物。

[0262] 或者,可以获得抗本文所述或所公开的PEAPOD多肽的抗体。获得和使用抗体的方法是本领域中的标准方法(参见例如:Antibodies,A Laboratory Manual,Harlow A Lane,Eds,Cold Spring Harbour Laboratory,1998)。这样的抗体可以被用在检测所述多肽的表达改变的方法中。这样的方法可以包括ELISA(Kemeny,1991,A Practical Guide to ELISA,NY Pergamon Press)和Western分析(Towbin&Gordon,1994,J Immunol Methods,72,313)。

[0263] 这些分析多核苷酸或多肽表达和选择具有增加的根生物量的植物的方法在被设计以产生具有所述改变的特征的品种的传统育种程序中是有用的。

[0264] 植物

[0265] 术语“植物”旨在包括完整的植物或植物的任意部分、植物的繁殖体和子代。

[0266] 术语“繁殖体”意指可用在有性或无性生殖或繁殖中的植物的任意部分,包括种子和插穗。

[0267] 本发明的植物可能被种植,并且进行自交或与不同的植物植株进行杂交且所产生的具有期望的表型特征的杂交体可以被鉴定。两代或更多代植物可以被种植以确保目标表型特征被稳定维持和遗传。从这样的标准育种方法产生的植物也形成本发明的一个方面。

[0268] 通过赤霉素(GA)、油菜素内酯(BR)和其他植物激素控制植物生长和发育

[0269] 赤霉素(GA)和油菜素内酯(BR)是两类植物激素,它们参与植物形态发生和生长的很多方面,包括:种子萌发、细胞伸长、维管组织发育、种子大小、叶直立、开花、叶和果实衰老(Mathew et al 2009,NZJAR 52,213-225;Hou et al2010,Developmental Cell 19,884-894;Jiang and Lin 2013,Plant Signaling and Behaviour 8:10,e25928)。

[0270] 考虑到GA和BR在植物发育中的作用,调控GA和BR的水平或它们下游靶标的能力在提高很多植物物种的产量和质量方面是高度期望的。实际上,有一些这两种激素中的一种的外源施用被用于提高农艺价值的商业实例。

[0271] GA可被应用于黑麦草以刺激过季生长以及促进开花(Mathew et al 2009,NZJAR 52,213-225),其也可以被用于抵消较低温度对甘蔗(热带C4草)的副作用。GA也可以用于增大无籽葡萄和樱桃的果实大小,以促进苹果和梨的结实并延迟特别是柑橘属作物的果皮老化(Sun 2011,Current Biology 21,R338-R345)。类似地,建议将BR制品用于提高马铃薯、番茄、黄瓜、辣椒和大麦、水稻、玉米、小麦、棉花和烟草的作物产量和质量(Prusakova et al 1999,Agrarian Russia,41-44;Khripach et al 2000Annals of Botany 86,441-447;Anjum et al 2011 J.Agronomy Crop Sci.197,177-185;Vardhini 2012 J.Phytology 4,1-3)。但是,商业上应用的油菜素内酯的低采用率可以反映出成本和在类固醇被外源施用时植物不能对其进行有效吸收的事实。此外,需要严格控制时机和外源施用的GA和BR的浓度限制了它们的应用。

[0272] 在大多数情况下,被子植物中的GA和BR生物合成和分解代谢途径已经被表征并包括负调控因子和下游转录因子靶标。GA或BR一旦结合至其各自的受体,复杂的信号通路便

接续发生，在这两种情况中，调控的中心点均涉及改变负调控因子DELLA(在GA的情况下)和转录调控因子(在BR的情况下)的泛素-蛋白酶体通路。

[0273] DELLA蛋白的去除导致对生长抑制的去除和对GA应答的生长和发育的促进。相反地，对BR的检测导致未被磷酸化的BZR1蛋白在细胞核中的累积。BZR1的去磷酸化阻止了其被蛋白酶体降解并反而使得BZR1能与其他DNA结合转录因子结合并与转录辅因子相互作用。这导致对参与生长和其他细胞过程的成千上万个基因的调控，包括抑制BR生物合成基因的表达(He et al 2005,Science 307,1634-1638;Guo et al 2013,Current Opinion Plant Biol.16,545-553)。

[0274] 存在很多外源信号和环境提示，它们影响GA-GID1-DELLA调控模块，在该模块中DELLA通过与多种来自其他通路的关键调控蛋白的直接蛋白-蛋白相互作用整合了不同的信号传导活性。因此，DELLA蛋白是主要的生长抑制子，其通过整合来自其他激素通路的内部信号(植物生长素、脱落酸、茉莉酸和乙烯)和外部生物刺激(病原体)和非生物刺激(光照条件、冷和盐胁迫)来控制植物生长和发育(Sun 2011,Current Biology 21,R338-R345)。干旱是限制植物生长和农业生产力的最重要的环境限制因素之一。不出所料地，在提高的耐旱性和更延伸的根系之间存在正相关性，所述更延伸的根系包括更深的根和更多的侧根，它们都能够进行土壤勘探和地下资源获取(Yu et al 2008,Plant Cell 20,1134-1151;Werner et al 2010,Plant Cell 22,3905-3920)。因此，由此可见，共同的农业目标是对根系结构的优化以有助于克服由水或养分缺乏造成的作物植物的产量限制。但是，在所有缩减作物产量的非生物胁迫中，干旱是最具破坏性的一种并且是对抗育种者工作的最顽固胁迫。因为性状受很多基因控制，传统的育种方法是困难的并且难以评估(Werner et al 2010,Plant Cell 22,3905-3920)。当标记辅助选择(MAS)、数量性状基因座(QTL)和其他基因组学方法被广泛用于辅助育种工作以产生抵抗干旱的栽培种时(Tuberosa and Salvi,2006,Trends in Plant Science,11:405-412)，所述系统受限于筛选群体中存在的变异。

[0275] 有趣地是，水稻仅具有一个DELLA蛋白(SLR1)，玉米具有两个(d8和d9)(Lawit et al 2010,Plant Cell Physiol 51,1854-1868)，而拟南芥属具有5个(GA1、RGA、RGL1、RGL2和RGL3)(Achard and Genschik 2009,J.Exp.Bot.60,1085-1092)。此外，在最近的系统进化分析中，Chen et al 2013发现了它们所分析的六个禾本科物种有5个仅具有单个DELLA，而18个双子叶植物物种中有14个具有两个或更多个DELLA蛋白。相比之下，水稻中存在BZR家族中的6个成员，玉米中存在10个成员(www.Grassius.org)以及拟南芥属中存在6个成员(Wang et al 2002,Developmental Cell 2,505-513)。

[0276] 植物的生长和发育依赖于提供其固着生活习性所需的高发育可塑性的信号传导通路之间的多种连接(Gallego-Bartolome et al 2012,PNAS 109,13446-13451)。因此，目前的证据，而不是以绝缘形式存在的各激素信号传导通路表明不同的通路之间存在高程度的相互作用，以及给定的激素通常调控由其余激素引起的输出。例如，近来已证明GA和BR信号传导通路之间的相互干预包括DELLA和BZR1/BES1之间的直接相互作用，由此DELLA蛋白不仅影响蛋白稳定性而且抑制BZR1的转录活性(Li and He 2013,Plant Signaling and Behaviour 8:7,e24686及其中的文献)。因此，由GA促进细胞伸长部分是通过去除DELLA介导的对BZR1的抑制。

[0277] 近来已证明植物生长和发育可以通过直接操控主生长调节子DELLA(Lawit, Kundu,Rao and Tomes,2007,ISOLATED POLYNUCLEOTIDE MOLECULES CORRESPONDING TO MUTANT AND WILD-TYPE ALLELES OF THE MAIZE D9 GENE AND METHODS OF USE,WO 2007124312 A2)和BZR1(Chory and Wang,2005,GENES INVOLVED IN BRASSINOSTEROID HORMONE ACTION IN PLANTS,US 6,921,848B2)来改变。

[0278] 类固醇激素在协调植物和动物的广泛的发育和生理过程中起着重要作用(Thummel and Chory 2002,Genes Dev.16,3113-3129)。在植物中,类固醇激素油菜素内酯(BR)在生长、发育和对生物和非生物胁迫的应答中起着广泛的作用(Zhu et al 2013, Development 140,1615-1620;Clouse 2011,Plant Cell 23,1219-1230)。相比于通过核受体起作用的动物类固醇激素信号传导,在植物中,BR结合于细胞表面受体激酶BRASSINOSTEROID INSENSITIVE 1(BRI1)的胞外结构域并激活调控基因表达的细胞内信号转导级联(Clouse 2011,Plant Cell 23,1219-1230;Kinoshita et al 2005,Nature 433, 167-171)。有包括中间体的激活和失活的多个步骤,所述中间体导致两个转录因子BRASSINAZOLE RESISTANT 1(BZR1)和BZR2(也称为BES1)的磷酸化。因此,信号转导BZR转录因子是将信号传导转换为BR应答基因表达的靶组分。

[0279] 在植物激素信号传导中存在一种新兴模式,其中,由激素激活的靶转录因子也被特定的阻遏因子复合物负调控。例如,在茉莉酸(JA)、植物生长素、脱落酸(ABA)和独角金内酯(SL)信号传导通路中,所述靶转录因子被利用作为由激素通路特异性抑制因子招募的常用协同阻遏物的TOPLESS(TPL)的抑制因子复合物负调控(Pauwels et al 2010,Nature 464,788-791)。在JA转导通路中,JASMONATE ZIM DOMAIN(JAZ)家族的转录阻遏因子直接地或通过衔接蛋白NOVEL INTERACTOR OF JAZ(NINJA)与靶JA-应答转录激活子MYC2相互作用并招募TPL(Pauwels et al 2010,Nature 464,788-791)。

[0280] 因此,调控影响很多不同的目的农业性状的GA和BR通路的能力对于商业性农业具有相当大的价值。

[0281] 本申请人的发明

[0282] 如上所述,本发明涉及通过异位表达PEAPOD以增加植物中的根生物量的方法。

[0283] 不希望被理论所束缚,本申请人已经证明PEAPOD(PPD)似乎通过与主生长调节子DELLA和BZR的直接或间接相互作用来调控GA和BR通路。

[0284] 对PPD蛋白的一级氨基酸结构的分析表明高度保守的新的植物特异性结构域仅存在于这些蛋白中。在广泛的双子叶植物、松柏类植物和一些单子叶植物(棕榈、香蕉、兰花和浮萍)而非禾本科植物中发现了这些基因的同源物。

[0285] 拟南芥属的PPD基因编码植物特异性TIFY家族(其以称为ZIM的结构域内发现的核心TIF[F/Y]XG基序命名)成员的蛋白(Vanholme et al 2007,Trends Plant Sci.12,239-244)。这两个拟南芥属PPD蛋白PPD1和PPD2包括在与12个已经充分表征的充当茉莉酮酸酯应答的阻遏因子的JAZ蛋白相同的II类TIFY组中。但是,PPD蛋白和该组中的另一个非-JAZ蛋白似乎并不参与对茉莉酮酸酯激素信号传导的应答(Pauwels et al 2010,Nature 464, 788-791)。

[0286] 同样地,不希望被理论所束缚,本申请人提出根据本发明,根生物量的增加由新的机制介导,该机制使用PPD基因调控GA和BR通路。以下实施例3和4支持该提议。

[0287] 本发明也可以广义地说是由本申请的说明书中单独或共同提及或指出的部分、元素和特征，以及所述部分、元素或特征中的任意两个或更多个的任意或全部组合组成，并且其中在本文中提到的特定整体在本发明涉及的领域中具有已知的等同性，这种已知的等同性被认为如同单独提出一样被纳入本文。

附图说明

[0288] 参照以下附图可以更好地理解本发明，其中：

[0289] 图1示出了包含来自一些植物物种的PEAPOD区域的46个氨基酸残基，相同的残基用星号表示。

[0290] 图2示出了来自一些植物物种的PEAPOD区域内的内部27个氨基酸残基，相同的残基用星号表示。

[0291] 图3示出了来自一些植物物种的PEAPOD蛋白的TIFY结构域的6个氨基酸残基，相同的残基用星号表示。

[0292] 图4示出了PPD蛋白和保守的PPD、TIFY和Jas*区域的大致位置的示意图。

[0293] 图5示出了在Y2H测定中PPD蛋白的二聚化以及TPL和NINJA之间的相互作用。

[0294] 图6示出了在Y2H测定中PPD和NINJA之间的相互作用以及TPL和BZR1之间的相互作用。

[0295] 图7示出了使用BiFC测定证明的在嫩叶(A和B)和老叶(C)中的PPD、NINJA、TPL和BZR1之间的相互作用。

[0296] 图8示出了PPD-NINJA-TPL-BZR1复合物的示意图。

[0297] 图9示出了在Y1H测定中PPD和BZR1之间的相互作用。

[0298] 图10示出了野生型、Δppd突变体和PEAPOD过表达子(PPD-OX)下胚轴长度对外源GA和PAC施用的应答。

[0299] 图11示出了与野生型和载体对照相比过表达来自拟南芥(Arabidopsis thaliana)的PPD(PPD-OX)或来自无油樟(Ambroella trichopoda)的PEAPOD的黑麦草植物的根生长的增加。

[0300] 图12示出了与对照植物相比过表达PPD(PPD-OX)的苜蓿植物的根长度的增加。

[0301] 图13示出了来自拟南芥、北美云杉(Picea sitchensis)、无油樟、小果野蕉(Musa acuminate)、白三叶草(Trifolium repens)和江南卷柏(Selaginella moellendorffii)的PEAPOD蛋白是功能等效的。来自每一个的优化的PEAPOD编码序列被用于互补PEAPOD缺失突变体Δppd拟南芥(生态型兰兹贝格(Landsberg erecta))。在等同的发育阶段拍摄幼苗图片。

[0302] 实施例

[0303] 现在参照以下非限制性实施例对本发明进行说明。

[0304] 实施例1:对多个植物物种的PEAPOD基因的表征

[0305] 为了鉴定其他植物物种中的PPD基因直系同源物，将来自拟南芥属PPD1基因(SEQ ID NO:27)的保守的PPD区域(46个氨基酸)用于使用搜索程序TBLASTN和BLASTP进行公共植物基因序列数据库搜索(Altschul et al 1990)。从多种植物物种(包括苔藓植物、松柏类植物、所检查的双子叶植物的所有目和一些单子叶植物目，包括棕榈、香蕉、兰花和浮萍)中

鉴定PEAPOD序列。PEAPOD序列不存在于禾本科植物中。代表性的PEAPOD蛋白和核酸序列分别示于SEQ ID NO:1-26和SEQ ID NO:83-107中。

[0306] 来自拟南芥PPD1的46个氨基酸PEAPOD区域示于SEQ ID NO:27中。如图1所示，用vector NTI(VNTI)比对来自多肽SEQ ID NO:1-26的该区域。

[0307] SEQ ID NO:28示出了这46个氨基酸PPD区域的共有序列。SEQ ID NO:29示出了相同的共有区域，但是示出了哪些氨基酸可存在于各可变位置处。

[0308] 来自拟南芥PPD1的46个氨基酸PEAPOD区域内的27个氨基酸子序列示于SEQ ID NO:30中。

[0309] 对图1中的每个相同序列的这27个氨基酸子序列的比对示于图2中。

[0310] SEQ ID NO:30示出了这27个氨基酸PPD区域的共有序列。SEQ ID NO:32示出了相同的共有区域，但是示出了哪些氨基酸可存在于各可变位置处。

[0311] 在每一个SEQ ID NO:1-26的PPD肽序列中，也有保守的TIFY基序，其位于所述46个氨基酸PPD区域之后。分隔开PPD区域的C-末端和TIFY基序的N-末端的氨基酸残基的数目取决于PPD的来源；例如，对于SEQ ID NO:1-26，所述数目在46至140个氨基酸之间变化。

[0312] SEQ ID NO:33示出了拟南芥属PPD1序列的TIFY基序。对来自SEQ ID NO:1-26的TIFY基序的比对(如Vanholme et al 2007,Trends Plant Sci.12,239-244中所述)示于图3中。

[0313] SEQ ID NO:34示出了这6个氨基酸TIFY基序的共有序列。SEQ ID NO:35示出了相同的共有区域，但是示出了哪些氨基酸可存在于各可变位置。PPD和TIFY结构域中完全保守的残基在图1-3中用星号突出显示。

[0314] 本申请人认为以上所述的这些区域和基序存在于所有鉴定的PEAPOD蛋白中并且可用于诊断这些PEAPOD蛋白。

[0315] 实施例2：证明来自多个植物物种的PEAPOD序列的PEAPOD功能

[0316] 可以通过拟南芥属Δppd突变体叶表型的互补作用来确认任意PEAPOD序列的功能。首先将拟南芥属Δppd突变体叶表型的互补作用用于鉴定拟南芥属PPD基因(White 2006)。这可以通过将与圆顶叶和玫瑰花结的扭曲相反的野生型扁平叶表型和正常玫瑰花结形恢复为“螺旋桨”表型而看到。

[0317] PEAPOD序列，如SEQ IN NO:1-26中的那些(包括棕榈、松柏类植物、苔藓、兰花和其他双子叶植物物种)，或任意其他待测试的PEAPOD序列可以通过本领域技术人员公知的方法被转化到拟南芥属Δppd突变体中。这类方法中的一个实例在下文描述。

[0318] 克隆和基因构建体

[0319] 用于在拟南芥属Δppd突变体中过表达拟南芥属PPD1的CaMV35s::拟南芥PPD1构建体的产生合成表达构建体以使得在拟南芥属Δppd突变体中拟南芥PPD1在CaMV35s启动子(SEQ ID NO:129)下过表达。优化PPD ORF以用于在拟南芥属中表达，这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。然后将该构建体(有或没有所述尾部)通过GATEWAY®LR反应置于CaMV35s启动子和ocs终止子之间，其分别编码为SEQ ID NO:105和SEQ ID NO:111。

[0320] 用于在拟南芥属Δppd突变体中过表达白三叶草PPD1的CaMV35s::白三叶草PPD构建体的产生

[0321] 合成表达构建体以使得在拟南芥属Δppd突变体中白三叶草PPD在CaMV35s启动子(SEQ ID NO:129)下过表达。优化PPD ORF以用于在拟南芥属中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。然后将该构建体(有或没有所述尾部)通过GATEWAY®LR反应置于CaMV35s启动子和ocs终止子之间,其分别编码为SEQ ID NO:106和SEQ ID NO:112。

[0322] 用于在拟南芥属Δppd突变体中过表达无油樟PPD的CaMV35s::无油樟PPD构建体的产生

[0323] 合成表达构建体以使得在拟南芥属Δppd突变体中无油樟PPD在CaMV35s启动子(SEQ ID NO:129)下过表达。优化PPD ORF以用于在拟南芥属中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。然后将该构建体(有或没有所述尾部)通过GATEWAY®LR反应置于CaMV35s启动子和ocs终止子之间,其分别编码为SEQ ID NO:107和SEQ ID NO:113。

[0324] 用于在拟南芥属Δppd突变体中过表达小果野蕉PPD的CaMV35s::小果野蕉PPD构建体的产生

[0325] 合成表达构建体以使得在拟南芥属Δppd突变体中小果野蕉PPD在CaMV35s启动子(SEQ ID NO:129)下过表达。优化PPD ORF以用于在拟南芥属中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。然后将该构建体(有或没有所述尾部)通过GATEWAY®LR反应置于CaMV35s启动子和ocs终止子之间,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0326] 用于在拟南芥属Δppd突变体中过表达北美云杉PPD的CaMV35s::北美云杉PPD1构建体的产生

[0327] 合成表达构建体以使得在拟南芥属Δppd突变体中北美云杉PPD在CaMV35s启动子(SEQ ID NO:129)下过表达。优化PPD ORF以用于在拟南芥属中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。然后将该构建体(有或没有所述尾部)通过GATEWAY®LR反应置于CaMV35s启动子和ocs终止子之间,其分别编码为SEQ ID NO:109和SEQ ID NO:115。

[0328] 用于在拟南芥属Δppd突变体中过表达江南卷柏PPD1的CaMV35s::江南卷柏PPD构建体的产生

[0329] 合成表达构建体以使得在拟南芥属Δppd突变体中江南卷柏PPD在CaMV35s启动子(SEQ ID NO:129)下过表达。优化PPD ORF以用于在拟南芥属中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。然后将该构建体(有或没有所述尾部)通过GATEWAY®LR反应置于CaMV35s启动子和ocs终止子之间,其分别编码为SEQ ID NO:110和SEQ ID NO:116。

[0330] 植物材料和生长条件

[0331] 拟南芥(L.)Heynh生态型Ler可以被用作野生型(WT)。功能缺失突变体(缺失PPD1和PPD2)的Δppd缺失如先前White 2006,PNAS 103,13238-13243中所述。

[0332] 使植物生长于持续为21℃的温度可控的温室中或在23℃下在16h光照_8h黑暗循环下的可控环境室中。

[0333] 拟南芥属转化

[0334] 可以通过蘸花(floral dip)浸润法将上述构建体转化到拟南芥属中(Clough and Bent,1998,Plant J 16,735-43)。转化Δppd株系以通过标准技术表达PPD多肽。通过标准PCR分析技术并结合转基因特异性和T-DNA引物确认转基因植物。

[0335] 在T1幼苗(经浸润的植物的子代)中产生野生型叶和玫瑰花结表型的Δppd株系的互补作用确认了所引入的基因的PEAPOD功能,如照片所示。

[0336] 该方法可用于确认本申请人指定的任意基因的PEAPOD功能,表明其适用于本发明。

[0337] 通过PEAPOD缺失突变体Δppd拟南芥生态型Landsberg erecta的互补作用证明来自拟南芥、北美云杉、无油樟、小果野蕉和江南卷柏的PEAPOD蛋白是功能等效的(图13)。

[0338] 实施例3:PEAPOD可能参与调控油菜素类固醇信号传导通路

[0339] 本申请人使用酵母双杂交(Y2H)测定、双分子荧光(BiFC)来研究PPD、NINJA、TPL和BZR1之间的相互作用。

[0340] 克隆和构建体

[0341] 如下产生用于Y2H和BiFC测定的构建体。合成编码以下的开放阅读框的拟南芥属DNA序列:At4g14713(PPD1)和PPD1的截短和缺失衍生物、PPD1、PPD1Δppd(编码氨基酸1-61的序列的N-末端截短)、PPD1Δtify(编码氨基酸154-186的序列的内部缺失)、PPD1Δjas*(编码氨基酸229-313的序列的C-末端截短)(图4)、At4g28910(NINJA)、At1g15750(TPL)、At1g75080(BZR1)、合成的PUAS-35S启动子和编码GAL4DBD和c-myc融合蛋白的序列,并通过GeneArt验证序列。提供大部分序列作为备用于Gateway克隆到酵母和植物表达载体中的pENTR221中的克隆。例外的是,整合了5’Xho1和3’Nco1限制性酶切位点的用于植物内转录激活测定的启动子序列被提供在pMA-RQ中进行克隆。用于瞬时LUC报告测定的质粒:将具有-105bp CaMV35S启动子上游的5X UAS GAL4 DNA结合位点的合成启动子克隆至包含含内含子的萤火虫荧光素酶基因(LUC)和35Spro::海肾荧光素酶(REN)作为内标的双荧光素酶构建体pNWA62内的XhoI-NcoI位点,以构建pAML7。对于GAL4DBD融合蛋白的过表达,使用Gateway技术将编码GAL4 DNA结合结构域(GAL4DBD氨基酸1-147)以及N-末端GAL4DBD与2X VP16激活子结构域(GAL4DBD-VP16)或PPD1(GAL4DBD-PPD1)的融合体(使用编码GGGGS的接

头)的DNA序列克隆至pRSh1(Winichayakul et al 2008)中以构建载体pRSh1-GAL4DBD、pRSh1-GAL4DBD-VP16和pRSh1-GAL4DBD-PPD1,用于在植物内表达该融合蛋白。

[0342] 用于酵母双杂交分析的质粒

[0343] 将BZR1、NINJA、TPL和PPD1,以及PPD1的截短或缺失衍生物(PPD1Δppd、PPD1Δtify和PPD1Δjas*)的全长编码序列Gateway亚克隆至pDEST32(N-末端GAL4DBD)或pDEST22(N-末端GAL4AD),以构建作为诱饵载体的pDEST32-PPD1、pDEST32-PPD1Δppd、pDEST32-PPD1Δtify、pDEST32-PPD1Δjas*、pDEST32-TPL以及作为猎物载体的pDEST22-PPD1、pDEST22-BZR1和pDEST22-NINJA。当被表达时,这些构建体产生序列56-67和70-72中所列的蛋白,包括DNA结合结构域(DBD)、激活结构域(AD)、与DBD融合的PPD1(PPD1-DBD)、与AD融合的PPD1(PPD1-AD)、未与AD融合的TIFY结构域的PPD1(PPD1-tify-AD)、未与AD融合的jas结构域的PPD1(PPD1-jas*-AD)、TOPLESS(TPL)、与DBD融合的TPL(TPL-DBD)、NINJA、与AD融合的NINJA(NINJA-AD)、与AD融合的BZR1(BZR1-AD)、不含与DBD融合的ppd结构域的PPD1(PPD1-Δppd-DBD)、不含与DBD融合的TIFY结构域的PPD1(PPD1-tify-DBD)、不含与DBD融合的jas结构域的PPD1(PPD1-jas*-DBD)。

[0344] 用于双分子荧光互补的质粒

[0345] 使用具有N-末端融合体的双元BiFC-Gateway YFP载体pDEST-VYNE(R)^{GW}(Venus氨基酸1-173)和pDEST-VYCE(R)^{GW}(Venus氨基酸156-239)构建以下载体:pDESTnYFP-BZR1、pDESTnYFP-NINJA、pDESTnYFP-PPD1、pDESTcYFP-BZR1、pDESTcYFP-PPD1、pDESTcYFP-PPD1Δppd、pDESTcYFP-PPD1Δtify和pDESTcYFP-PPD1Δjas*。对于与PPD1或BZR相互作用的蛋白在植物中的瞬时表达,将NINJA和TPL Gateway®亚克隆至pRSh1以构建pRSh1-NINJA和pRSh1-TPL。用于免疫共沉淀的质粒:将编码PPD1和3X c-myc C-末端融合体的合成的DNA构建体亚克隆至pRSh1以产生pRSh1-PPD1-3xc-myc,同时将NINJA cDNA序列亚克隆至pB7FWG2,0(Karimi et al 2002,Trends Plant Sci.7,193-195)以构建pB7FWG2-NINJA-GFP。当被表达时,这些构建体产生序列63、65、73-82中所列的蛋白,包括TOPLESS(TPL)、NINJA、双分子荧光(BiFC)nYFP、BiFC cYFP、BiFC nYFP-NINJA、BiFC nYFP-BZR1、BiFC cYFP-PPD1、BiFC cYFP-NINJA、BiFC cYFP-BZR1、BiFC cYFP-PPD1-ppd、BiFC cYFP-PPD1-tify、BiFC cYFP-PPD1-jas*。

[0346] 使用ProQuest双杂交体系(Invitrogen)分析PPD1、NINJA、TPL和BZR1之间的相互作用。使用诱饵构建体和猎物构建体的组合共转化酵母菌株MaV203(Invitrogen),在合成缺陷型(SD)SD/-Leu/-Trp琼脂平板上进行选择。在具有不同浓度的3-氨基三唑(3-AT)(Sigma)的SD/-Leu/-Trp/-His平板上使用10μl1:10和1:100稀释度的液滴测试转化菌株的相互作用。

[0347] 使用pDESTnYFP和pDESTcYFP质粒的组合,使用或不使用用于表达NINJA(pRSh1-NINJA)或TPL(pRSh1-TPL)和用于本氏烟(Nicotiana benthamiana)叶的农杆菌-浸润的质粒进行瞬时BiFC实验。对于浸润,从平板上重悬含有该双元载体的根癌农杆菌GV3101菌株并制备以用于如上所述用于LUC测定的转化。将所有的YFP和表达菌株以1:1(体积/体积)的比例混合,并添加1/10体积的菌株P19。40h后,从各经浸润的叶中取5个叶盘样品。在取样用于显微镜荧光观察之前2小时,将叶用1μg/ml DAPI溶液浸润以染色细胞核。使用Olympus Fluoview FV10i共聚焦激光扫描显微镜检测YFP荧光和DAPI染色。每个实验重复两次。

[0348] 使用PPD1作为诱饵蛋白的Y2H筛选鉴定NINJA为与PPD1的直接相互作用因子。BiFC测定的结果表明PPD1在植物中与NINJA相互作用，并且表明TIFY基序对于该相互作用也是必需的(图7)。可能NINJA作为TPL和PPD1之间的桥梁而发挥功能。使用Y2H，没有观察到PPD1和BZR1之间的直接相互作用(图5)。但是，近来的串联亲和纯化(TAP)实验已表明TPL可能与BZR1相互作用(Wang et al 2013,Mol.Cell.Proteomics 12,3653-3665)，并且在此，Y2H结果确认发生了直接的相互作用(图6)。

[0349] 为了确定PPD蛋白的分子功能，在植物内研究了PPD1、NINJA、TPL和BZR1的相互作用。使用双分子荧光(BiFC)证明在未成熟的本氏烟叶的扁平细胞中，PPD1似乎在细胞核中与BZR1相互作用(图7A、B)。PPD1中的NINJA-结合TIFY基序对于该相互作用是必需的。此外，在完全展开的叶中当nYFP-PPD1和cYFP-BZR1共表达时，未观察到相互作用(图7C)。有趣地是，PPD1和BZR1之间的相互作用在共表达NINJA而非单独的TPL时得到恢复，表明在成熟的叶中缺少相互作用是由于内源NINJA的限制。对于未成熟的叶，当PPD1NINJA-结合TIFY基序缺失时，甚至在NINJA和TPL共表达的存在下，也观察不到PPD1和BZR1之间的相互作用(图7C)。这些结果表明PPD1、NINJA、TPL和BZR1在植物内作为复合物存在，并且表明NINJA是招募PPD1以通过TPL与BZR1相互作用所必需的。

[0350] PPD1似乎并不直接与靶BZR1转录因子相互作用。相反地，PPD1蛋白相互作用实验结果表明了这样一种模式，其中PPD蛋白使用NINJA作为衔接体来招募TPL转录共表达子，该PPD-NINJA-TPL复合物与BZR转录因子的EAR基序相互作用(图8)。因此，在该模式中，拟南芥的PEAPOD1(PPD1)蛋白会充当BR信号传导通路的阻遏物并与NINJA和TPL组合来负调控BZR1。

[0351] 实施例4:PEAPOD可能参与调控赤霉素信号传导通路

[0352] 已知赤霉酸(GA)处理降低GA阻遏物DELLA蛋白(包括RGA1)的水平;为了确定PPD、DELLA和GA信号传导通路之间的关系，本申请人进行PPD和DELLA(RGA1)之间的酵母双杂交(Y2H)分析，并将赤霉酸(GA)激素和GA生物合成抑制剂(多效唑，PAC)施用至野生型、Δppd突变体和Δppd突变体PPD过表达子(PPD-OX)。

[0353] 将ProQuest双杂交系统(Invitrogen)用于分析PPD1和RGA1之间的相互作用。将PPD1以及PPD1的截短或缺失衍生物(PPD1Δppd、PPD1Δtify和PPD1Δjas*)的全长编码序列(图4)Gateway亚克隆至pDEST32(N-末端GAL4DBD)或pDEST22(N-末端GAL4AD)。当被翻译时，这些产生了以下肽序列:SEQ ID NO:58、68、69、70、71、72，它们分别为PPD1-DBD、RGA1、RGA1-AD、PPD1-ppd-DBD、PPD1-tify-DBD、PP1-jas*-DBD。

[0354] 使用诱饵构建体和猎物构建体的组合共转化酵母菌株MaV203(Invitrogen)，在合成缺陷型(SD)SD/-Leu/-Trp琼脂平板上进行选择。在具有不同浓度的3-氨基三唑(3-AT)(Sigma)的SD/-Leu/-Trp/-His平板上使用10μl 1:10和1:100稀释度的液滴测试转化菌株的相互作用。使用PPD1-DBD作为诱饵测试PPD1-RGA1相互作用。将转化的酵母以10倍稀释液点样在对照培养基(-2)或具有15mM 3AT的选择培养基上。对照为空载体、DBD、GAL4DNA结合结构域、AD、GAL4激活结构域(图4)。Y2H结果表明PPD可以直接与DELLA结合(图9)。

[0355] 对于外源施用GA或PAC，用70％乙醇、0.01％Triton X-100对种子进行表面消毒10min，然后用100％乙醇消毒5min，在无菌的滤纸上空气干燥，转移到含有半强度的MS盐、1％蔗糖和0.8％琼脂的培养基平板上。将平板在黑暗中于4℃孵育5天，然后转移到24℃下

的14h光照/10h黑暗的日循环中。通过荧光灯管(Philips TLD 58W/865)以100μM $m^{-2}s^{-1}$的强度提供光照。使野生型(Col-0)Δppd突变体和转基因PPD-OX幼苗在含有不同浓度的GA(图10A)或PAC(图10B)的培养基上生长5天。将GA(ACROS有机物)和PAC(Sigma-Aldrich)分别溶解于乙醇和丙酮中,过滤消毒并添加到培养基平板中。将乙醇或丙酮(0.5%)用于对照处理。使幼苗在24℃下的14h光照/10h黑暗的日循环中生长5天,然后分析下胚轴长度(n=35)。每次处理重复2次,误差棒=平均值的标准误差。

[0356] DELLA的降低导致促进细胞扩增的DELLA靶基因的转录的增加并可以通过测量生长在含不同水平GA的培养基上的幼苗的下胚轴长度来定量。最低浓度的GA(1μM)不能促进野生型(WT)下胚轴的伸长,而功能丧失的PPD突变体(Δppd)和过表达苗的转基因PPD(PPD-OX)都显示出增加的下胚轴长度(图10A)。在更高的GA浓度(5-50μM)下,野生型下胚轴的伸长以剂量依赖的方式发生。在比较中,Δppd和PPD-OX幼苗分别显示出对最高达5和10μM GA的超敏感性伸长,其中它们大约达到相同的长度(图10A)。

[0357] 通过施用外源性多效唑(PAC)抑制GA生物合成;这导致DELLA阻遏蛋白的增加和细胞扩增的相应降低。野生型幼苗显示出下胚轴伸长的从0至10μM PAC呈剂量依赖性降低(图10B)。再次,Δppd幼苗显示出高敏感性应答,观察到下胚轴伸长在相同范围的PAC施用下降低更大。但是,PPD-OX幼苗是相对不敏感的,直到PAC浓度增加超过0.1μM,这之后,它们也显示出下胚轴长度的降低(图10B)

[0358] Δppd幼苗对GA的超敏感性应答潜在地反映了不存在通过PPD的转录因子阻遏时,用于降解的增加的DELLA的靶标的组合。类似地,在Δppd背景中添加PAC可能导致与WT相比下胚轴伸长的降低更大,因为这种情况在不存在DELLA天然拮抗剂之一-PPD时发生的,表明PPD和GA竞争与DELLA结合。

[0359] 可以预测的是PPD的过表达将导致更高水平的对DELLA的拮抗作用,因此,这些植物的下胚轴伸长应该对GA超敏感;实际上,这是本发明人在PPD-OX幼苗中所观察到的结果。在相反的情况下,当GA水平降低(通过施用PAC)时,PPD-OX幼苗无应答直到PAC浓度大于0.1μM。这可能反映了在该点内源GA水平具有足够的降低以观察到未被过表达的PPD拮抗的DELLA蛋白的影响。

[0360] 实施例5:通过增加PEAPOD在植物中的表达来增加根生物量

[0361] 构建体

[0362] 以下描述的是几种用于在不同启动子的控制下表达来自从不同物种的PEAPOD序列的构建体,用于在双子叶植物和单子叶植物中表达。

[0363] 用于拟南芥属PPD在双子叶植物中的(根优选的)过表达的pTobRB7 Δ1.3::PPD双子叶植物构建体的产生

[0364] 合成含有用于在双子叶植物的根中表达的PPD1的编码序列的构建体,核酸序列示于SEQ ID NO:40和126中。PPDORF来自于拟南芥PPD1cDNA(登录号NM_202819)并被修饰以包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、隐性剪接位点的去除,在SEQ ID NO:40的情况中来自多年生黑麦草DGAT1的第3个内含子的加入(SEQ ID NO:39)、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。优化内含子的位置以用于剪接位点预测,通过NetGene2进行(http://www.cbs.dtu.dk/services/NetGene2/)。

[0365] 然后通过GATEWAY®LR反应将SEQ ID NO 40(具有或不具有所述尾部)的构建体置于TobRB7 Δ1.3启动子(Yamamoto et al 1991,Plant Cell,3:371-382)和NOS终止子之间以产生SEQ ID NO:42和SEQ ID NO:44,其分别编码为SEQ ID NO:36和SEQ ID NO:38。在SEQ ID NO 126所示的构建体(具有或不具有所述C-末端尾部)上进行类似的亚克隆步骤,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0366] 用于拟南芥属PPD在双子叶植物中的(根优选的)过表达的pTobRB7Δ0.6::PPD双子叶植物构建体的产生

[0367] 合成含有用于在双子叶植物的根中表达的PPD1的编码序列的构建体,核酸序列示于SEQ ID NO:40和126中。PPD ORF来自于拟南芥PPD1cDNA(登录号NM_202819)并被修饰以包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、隐性剪接位点的去除,在SEQ ID NO:40的情况中来自多年生黑麦草DGAT1的第3个内含子的加入(SEQ ID NO:39)、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。优化内含子的位置以用于剪接位点预测,通过NetGene2进行(http://www.cbs.dtu.dk/services/NetGene2/)。

[0368] 然后通过GATEWAY®LR反应将(具有或不具有所述尾部)的构建体置于TobRB7Δ0.6启动子(Yamamoto et al 1991,Plant Cell,3:371-382)和NOS终止子之间以产生SEQ ID NO:43和SEQ ID NO:45,其分别编码为SEQ ID NO:36和SEQ ID NO:38。在SEQ ID NO 126所示的构建体(具有或不具有所述C-末端尾部)上进行类似的亚克隆步骤,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0369] 用于拟南芥属PPD在双子叶植物中的(根优选的)过表达的pAtWRKY6::PPD双子叶植物构建体的产生

[0370] 合成含有用于在双子叶植物的根中表达的PPD1的编码序列的构建体,核酸序列示于SEQ ID NO:41和126中。PPD ORF来自于拟南芥PPD1cDNA(登录号NM_202819)并被修饰以包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、隐性剪接位点的去除,在SEQ ID NO:41的情况中来自多年生黑麦草DGAT1的第3个内含子的加入(SEQ ID NO:39)、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。优化内含子的位置以用于剪接位点预测,通过NetGene2进行(http://www.cbs.dtu.dk/services/NetGene2/)。

[0371] 然后通过GATEWAY®LR反应将(具有或不具有所述尾部)的构建体置于烟草AtWRKY6启动子(Robatzek and Somssich 2001,The Plant Journal,28:123-133)和NOS终止子之间以产生SEQ ID NO:44和SEQ ID NO:47,其分别编码为SEQ ID NO:36和SEQ ID NO:38。在SEQ ID NO 126所示的构建体(具有或不具有所述C-末端尾部)上进行类似的亚克隆步骤,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0372] 用于拟南芥属PPD在单子叶植物中的(根优选的)过表达的pTobRB7Δ1.3::PPD单子叶植物构建体的产生

[0373] 合成含有用于在单子叶植物的根中表达的PPD1的编码序列的构建体,核酸序列示于SEQ ID NO:49和120中。优化PPD ORF以用于在单子叶植物中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、在SEQ ID NO:49的情况中来自多

年生黑麦草DGAT1的第3个内含子的加入(SEQ ID NO:48)、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。优化内含子的位置以用于剪接位点预测,通过deepc2进行(http://www.cbs.dtu.dk/services/NetGene2/)。

[0374] 然后通过GATEWAY®LR反应将(具有或不具有所述尾部)的构建体置于pTobRB7Δ1.3启动子(Yamamoto et al 1991,Plant Cell,3:371-382)和NOS终止子之间以产生SEQ ID NO:50和SEQ ID NO:53,其分别编码为SEQ ID NO:36和SEQ ID NO:38。在SEQ ID NO 120所示的构建体(具有或不具有所述C-末端尾部)上进行类似的亚克隆步骤,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0375] 用于拟南芥属PPD在双子叶植物中的(根优选的)过表达的pTobRB7Δ0.6::PPD单子叶植物构建体的产生

[0376] 合成含有用于在单子叶植物的根中表达的PPD1的编码序列的构建体,核酸序列示于SEQ ID NO:49和120中。优化PPD ORF以用于在单子叶植物中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、在SEQ ID NO:49的情况中来自多年生黑麦草DGAT1的第3个内含子的加入(SEQ ID NO:48)、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。优化内含子的位置以用于剪接位点预测,通过deepc2进行(http://www.cbs.dtu.dk/services/NetGene2/)。

[0377] 然后通过GATEWAY®LR反应将(具有或不具有所述尾部)的构建体置于pTobRB7Δ0.6启动子(Yamamoto et al 1991,Plant Cell,3:371-382)和NOS终止子之间以产生SEQ ID NO:51和SEQ ID NO:54,其分别编码为SEQ ID NO:36和SEQ ID NO:38。在SEQ ID NO 120所示的构建体(具有或不具有所述C-末端尾部)上进行类似的亚克隆步骤,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0378] 用于拟南芥属PPD在单子叶植物中的(根优选的)过表达的pAtWRKY6::PPD单子叶植物构建体的产生

[0379] 合成含有用于在单子叶植物的根中表达的PPD1的编码序列的构建体,核酸序列示于SEQ ID NO:49和120中。优化PPD ORF以用于在单子叶植物中表达,这包括修饰的Joshi序列(Joshi 1997,Nucleic Acid Research 15,6643-6653)、密码子的优化、mRNA不稳定性序列的去除、多聚A信号序列的去除、隐性剪接位点的去除、在SEQ ID NO:49的情况中来自多年生黑麦草DGAT1的第3个内含子的加入(SEQ ID NO:48)、BamHI可去除的C-末端V5表位和His标签尾部(编码SEQ ID NO:37)的添加和双终止密码子的添加。优化内含子的位置以用于剪接位点预测,通过deepc2进行(http://www.cbs.dtu.dk/services/NetGene2/)。

[0380] 然后通过GATEWAY®LR反应将(具有或不具有所述尾部)的构建体置于pAtWRKY6启动子(Robatzek and Somssich 2001The Plant Journal,28:123-133)和NOS终止子之间以产生SEQ ID NO:52和SEQ ID NO:55,其分别编码为SEQ ID NO:36和SEQ ID NO:38。在SEQ ID NO 120所示的构建体(具有或不具有所述C-末端尾部)上进行类似的亚克隆步骤,其分别编码为SEQ ID NO:108和SEQ ID NO:114。

[0381] 含有来自其他植物物种的PPD的表达构建体的产生

[0382] 为了证明可使用来自非拟南芥属的物种的PPD,我们合成了这样的构建体,其在被置于合适的启动子下时会表达来自以下物种的PPD:拟南芥(PPD对照)、豆科植物白三叶草、

原始被子植物无油樟、单子叶植物小果野蕉、松柏类植物挪威云杉和北美云杉以及石松门植物江南卷柏。优化这些构建体以用于在水稻(包括单子叶植物内含子)或拟南芥属(无内含子)中表达。对这些构建体进行改造以包含可去除的尾部,该尾部由编码V5-His标签的核酸序列的任一侧上的两个BamHI位点(编码甘氨酸-丝氨酸)组成。所述肽序列(有和没有C-末端V5-His标签尾部)示于序列108-119中。被优化用于在水稻中表达的相应的核酸序列示于序列120-125中,被优化用于在拟南芥属中表达的相应的核酸序列示于序列126-131中。

[0383] 通过GATEWAY LR反应将拟南芥属优化版本置于双元载体的适当的启动子下游,并通过蘸花方法转化到Δppd拟南芥中。

[0384] 通过GATEWAY LR反应将水稻优化版本置于适当的启动子下游,并通过生物裂解的方式(biolystically)转化到黑麦草中。

[0385] 植物转化

[0386] 拟南芥属的转化

[0387] 按照实施例2所述的方法转化拟南芥属。

[0388] 苜蓿的转化

[0389] 使用改良自Samac et al.2000(Methods in Molecular Biology 343:301-311)的方法通过农杆菌介导的转化产生过表达Peapod构建体的苜蓿植物。

[0390] 植物组织

[0391] 对Regen-SY的高度可再生基因型(Bingham 1991Crop Sci.31,1098)进行鉴定,其具有在体外条件下从体细胞胚胎形成完整植株的能力。使用该方案选择单一基因型用于植物转化实验。

[0392] 农杆菌菌株和载体

[0393] 使用双元载体pRSh1::PPD-OP和pRSh1::PPD-OP-V5用于所有的转化实验。载体pRSh1是pART27(Gleave 1992 Plant Mol Biol 20:1203-1207)的衍生物并且包含由CaMV 35S启动子表达的bar选择基因和也在CaMV 35S启动子的表达下的禾本科植物优化的Peapod基因。将质粒转移到根癌农杆菌菌株GV310中,并在含有200mgl-1壮观霉素的YM平板上选择转化体。在从细菌培养物中制备质粒DNA之后,通过限制性图谱确认质粒成功转移到农杆菌中。

[0394] 将双元质粒的培养物加入到含有100mg/L壮观霉素的25mL Mannitol Glutamate Luria(MGL)培养基中。使细菌培养物于28℃在旋转振荡器上生长过夜(16个小时)。通过离心(3000x g)收集培养物,去除上清液并将细胞重悬于溶于用于植物转化的制品中的5mL 10mM $MgSO_4$溶液中。

[0395] 植物转化

[0396] 收集来自Regen-SY的组织培养物相应基因型的第二和第三完全展开叶,并在50%乙醇溶液中冲洗30秒,然后在无菌蒸馏水中洗涤,接着在次氯酸钠溶液(3%可用氯)中进行表面消毒。然后将无菌叶切成叶蝶,接着将它们浮于SH1.5D愈伤组织诱导培养基的溶液上。对于叶蝶的转化,将约3mL农杆菌培养液加入到12mL SH1.5D中,并孵育15分钟,偶尔搅拌以将叶用农杆菌全部覆盖。然后去除细菌溶液,将叶小片在无菌滤纸上稍微印干,然后使近轴侧朝上置于用0.8%植物用琼脂凝胶化的SH1.5D上。接着将平板于25℃在黑暗中孵育5天。

[0397] 接种后,从平板上去除叶小片,并在无菌SH1.5D液体培养基中冲洗3-4次,在无菌

滤纸上印干，放置于补充有用于筛选的5mg/L草铵膦和100mg/L头孢噻肟和特美汀的SH1.5D平板上，并于25℃在黑暗中孵育15天。然后将在叶小片上形成的愈伤组织传代至新鲜的SH1.5D选择培养基中，再持续15天。

[0398] 然后将转化的愈伤组织转移到补充有草甘膦、头孢噻肟和特美汀的BL0培养基中用于形成体细胞胚胎。一旦胚胎形成，将它们解剖并转移到用于发芽筛选的半强度MSN培养基中。将整个生根植株转移并使其在温室中定植(establish)。

[0399] PCR分析

[0400] 进行PCR分析以确认T-DNA稳定整合至从转化实验中回收的植物的基因组中。使用基因组DNA Mini试剂盒(Geneaid)从约50mg的体外生长的叶中提取基因组DNA。

[0401] 使用特异性针对nos3’聚腺苷酸化信号的引物对(ocs3’-1f,5’-GATATGCGAGACGCCTATGA-3’[SEQ ID NO:132];ocs3’-1r,5’-GAGTTCCCTTCAGTGAACGT-3’[SEQ ID NO:133])产生439bp的扩增产物。也包括仅包含质粒DNA模板、未转化的植物DNA或水的对照反应。PCR反应的方案由如下组成:94℃下起始变性5分钟，30个循环的95℃30s、55℃15s、72℃1min，和72℃延伸10min。在TAE缓冲液中通过凝胶电泳将扩增产物在1.0％琼脂糖凝胶上进行分析并使用Bio-Rad Gel Doc成像系统进行显影。

[0402] 用于苜蓿转化的培养基的一般组成

[0403] A.MGL

- 甘露醇 5.0 g/L
- L 谷氨酸 1.0 g/L
- KH_2PO_4 250 mg/L

[0404]

- $MgSO_4$ 100 mg/L
- NaCl 100 mg/L
- 生物素 100 mg/L

- 蛋白胨 5.0 g/L
- 酵母提取物 2.5 g/L
- pH7.0 (NaOH)

[0405] B.SH1.5D

[0406]

- SH 大量和微量营养元素 (Duchefa)
- SH 维生素 (Duchefa)

- K_2SO_4 4.34 g/L
- 脯氨酸 288 g/L
- 硫代脯氨酸 53 mg/L

[0407]

- 蔗糖 30 g/L
- pH 5.8 (KOH)
- 植物用琼脂 8.0 g/L

- 激动素 0.2 mg/L (在高压灭菌后加入)
- 2,4D 1.5 mg/L (在高压灭菌后加入)

[0408] C.BL0(Blaydes培养基)

[0409] •Blaydes改良的基础培养基(PhytoTechnology Laboratories)

- L 肌醇 100 mg/
- 酵母提取物 2.0 g/L

[0410]

- pH 5.8 (KOH)
- 植物用凝胶 2.5 g/L

[0411] D.半MSN培养基

[0412] •MS大量和微量营养元素,半强度(Duchefa)

- Nitch & Nitch 维生素 (Duchefa)
- 蔗糖 15 g/L

[0413]

- pH 5.8 (KOH)
- 植物用琼脂 8.0 g/L

[0414] 黑麦草的转化

[0415] 使用改良自Altpeter et al.2000(Molecular Breeding 6:519-528)的方法通过微粒轰击产生过表达Peapod构建体的黑麦草植物。

[0416] 从高达7mm的不成熟花序诱导用于转化的愈伤组织。收获花分蘖,在次氯酸钠溶液(4%可用氯)中进行表面消毒,解剖,然后在黑暗中于25℃下培养4至6周,接着在含大量营养物、微量营养物和维生素的Murashige和Skoog(MS)基础培养基(1962Physiol Plant.15:473-497)上进行转化,该培养基补充有30g/L麦芽糖、5mg/L 2,4-D,pH被调节至5.8,并用6g/L琼脂糖固化。

[0417] 使用Invitrogen Pure Link Hi Pure Plasmid Maxiprep试剂盒制备质粒,浓度

调节至1μg/μL。将质粒pAcH1用于选择，该质粒包含含有由具有第一个内含子的水稻肌动蛋白启动子表达并终止于nos 3’聚腺苷酸化信号的嵌合潮霉素转移酶(HPH)基因(Bilang et al.1991 Gene 100:247-250)的表达盒。将含有PPD表达盒的质粒以1:1的摩尔比与pAcH1混合。

[0418] 使用Sanford et al.1993的方法(Meth.Enzymol.217:483-509.)将质粒DNA包被于M17钨颗粒(1.4μM平均直径分布)上，并使用DuPont PDS-1000/氦生物弹射粒子输送系统转化至靶组织中。在转化前高达6小时，将愈伤组织传代培养至含有64g/L甘露醇的愈伤组织起始培养基上。转化后(约16小时)，然后将转化的愈伤组织转移到补充有2mg/L 2,4-D、不含甘露醇的MS基础培养基中。2天后，将愈伤组织转移至含有200mg/L潮霉素的相同培养基中，并在黑暗中培养4小时用于转基因株系的选择。在补充有0.2mg/L激动素、30g/L蔗糖、和50mg/L潮霉素，被调节至pH5.8并用8g/L植物用琼脂固化的MS基础培养基上在光照下发生来自体细胞胚胎的整株植物的再生。将转化的植物转移到含有温室的环境中用于分析。

[0419] 转化体的PCR分析

[0420] 进行PCR分析以确认HPH和PPD转基因稳定整合至从转化实验中回收的植物的基因组中。使用基因组DNA Mini试剂盒(Geneaid)从约50mg的体外生长的叶中提取基因组DNA。分别使用特异性针对HPH gene的引物对(hpt-1,5’-GCTGGGGCGTCGGTTTCCACTATCCG-3’[SEQ ID NO:134];hpt-2,5’-CGCATAACAGCGGTCATTGACTGGAGC-3’)[SEQ ID NO:135];和特异性针对nos3’聚腺苷酸化信号的引物对(nos3’-1f,5’-CTGTTGCCGGTCTTGCGATG-3’-[SEQ ID NO:136];nos3’-1r,5’-GTCACATAGATGACACCGCG-3’-[SEQ ID NO:137])产生375bp和202bp的扩增产物。也包括仅包含质粒DNA模板、未转化的植物DNA或水的对照反应。PCR反应的方案由如下组成：94℃下起始变性5分钟，30个循环的95℃30s、55℃15s、72℃1min，和72℃延伸10min。在TAE缓冲液中通过凝胶电泳将扩增产物在1.0％琼脂糖凝胶上进行分析并使用Bio-Rad Gel Doc成像系统进行显影。

[0421] 禾本科植物转化体的DNA印迹分析

[0422] 使用DNA印迹杂交评估每个株系的转基因拷贝数。使用Doyle J和Doyle J 1990的方法(Focus,12:13-15)从温室生长的植物的叶材料提取基因组DNA用于DNA印迹杂交。将DNA(20μg)消化，并在0.8％琼脂糖凝胶上进行分离并使用0.4N NaOH通过毛细管转移将其转移至尼龙膜(Roche)上。当探测HPH和PPD转基因时，分别用XbaI或HindIII消化基因组DNA。使用DIG PCR合成试剂盒制备探针。分别使用特异性针对HPH基因的引物对(rgh1,5’-CTCGTGCTTTCAGCTTCGATGTAG-3’[SEQ ID NO:138];rgh5,5’-GCTGGGGCGTCGGTTTCCACTATCGG-3’[SEQ ID NO:139])和特异性针对PPD的引物对(GrPPD1F,5’-CACAGGATGGATTCTCCAAGG-3’[SEQ ID NO:140];GrPPD1R,5’-TAAGGTCCACGGAGAGGTTC-3’[SEQ ID NO:141])产生906bp和586bp的扩增产物用于探针。使用标准缓冲液(Roche)在45℃下进行预杂交(1小时)和杂交(12小时)。使用CDP-Star作为化学发光底物根据制造商的方案使用非放射性方法实现检测。使用Bio-Rad ChemiDoc MP系统和软件检测光信号。

[0423] 抗PPD1蛋白的多克隆抗体的产生和免疫印迹

[0424] 使用全长的拟南芥PPD1蛋白通过GenScript产生定制的抗PPD1亲和纯化的兔多克隆抗体。在1:5000的稀释度下所述抗体能够通过免疫印迹检测低于10ng的经纯化的PPD蛋白。将植物组织冷冻在液氮中，并研磨成细粉。将冷冻的组织粉末以1.0/1.5(重量/体积)的

比例加入到含有50mM Tris pH 7.5、150mM NaCl、1mM EDTA、10％(体积/体积)甘油、5mM DTT、1％(体积/体积)完全蛋白酶抑制剂混合物(Sigma)和1％(体积/体积)Triton X-100的提取缓冲液中，均质化直到解冻，然后以16,300g在4℃下离心12min。通过Bradford测定(Coomassie Plus,Thermo Scientific)对上清液中的总的溶解蛋白定量，进行调节以得到等同的总蛋白浓度/样品(通常在10-40μg之间)，在1XNuPAGE LDS样品缓冲液(Invitrogen)中变性并在4-12％Bis-Tris SDS/PAGE凝胶(Novex)上运行。在使用iBlot装置(Invitrogen)印迹到PVDF膜上后，使用1:5,000稀释度的1^0抗PPD1多克隆抗体，然后使用1:5,000稀释度的2^0山羊抗兔HRP抗体(Sigma)，用Western Bright ECL试剂(Advansta)检测蛋白，并使用ChemiDoc™仪器(BioRad)捕获图像。

[0425] 转化体的根生物量分析

[0426] 从野生型和用在组成型启动子下的拟南芥属PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的拟南芥属PPD转化的黑麦草植物的根生物量/生长/长度/分支增加(图11)。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量(表2)。

[0427] 表2

[0428]

	Wt 黑麦草	载体对照	组成型启动子::拟南芥属 PPD 株系 1	组成型启动子::拟南芥属 PPD 株系 2	组成型启动子::拟南芥属 PPD 株系 3	组成型启动子::拟南芥属 PPD 株系 4
Av 根重量(g) (n=12)	0.0733	0.0387	0.4506	0.5657	0.3077	0.3503
SE	0.0138	0.0125	0.0428	0.0625	0.0426	0.0638

[0429] 从野生型和用在三个根启动子之一下的拟南芥属PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的拟南芥属PPD转化的黑麦草植物的根生物量/生长/长度/分支增加(图12)。可以通过在流水下冲洗根、去除所连接的地上部分(叶和芽)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量(表3和表4)。

[0430] 表3

[0431]

	Wt 黑麦草	载体对照	pTobRB7Δ0.6::拟南芥属 PPD 株系 1	pTobRB7Δ0.6::拟南芥属 PPD 株系 2	pTobRB7Δ0.6::拟南芥属 PPD 株系 3
Av 根重量(g) (n=12)	0.0733	0.0387	0.2338	0.3686	0.3704
SE	0.0138	0.0125	0.0357	0.0356	0.0611

[0432] 表4

[0433]

	Wt 黑麦草	载体对照	pTobRB7Δ1.3::拟南芥属PPD株系1	pTobRB7Δ1.3::拟南芥属PPD株系2	pTobRB7Δ1.3::拟南芥属PPD株系3	pTobRB7Δ1.3::拟南芥属PPD株系4
Av 根重量(g)(n=12)	0.0733	0.0387	0.3227	0.2338	0.2720	0.4014
SE	0.0138	0.0125	0.0556	0.0191	0.0581	0.0445

[0434] 从野生型和用在组成型启动子下的拟南芥属PPD转化的苜蓿植物(品种USD5)中取约相等大小的插条。将插条种植到含有盆栽混合物的塑料生长袋中。使植物在具有x小时日长的生长室中生长约6周;通过观察生长袋外的根生长可以看出,与野生型植物相比,用在组成型启动子下的拟南芥属PPD转化的苜蓿植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根(对这些进行拍照,图12),然后去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时,然后进行称重来对根生物量的增加进行定量(表5)。

[0435] 表5

[0436]

植物株系	合并的来自10个插条的干根重(mg)
未转化的对照	43
转化的株系1	110
转化的株系2	54
转化的株系3	160
转化的株系4	59
转化的株系5	53
转化的株系6	85
转化的株系7	148

[0437] 从野生型和用在组成型启动子下的白三叶草PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周,通过观察生长袋外的根生长可以看出,与野生型植物相比,用在组成型启动子下的白三叶草PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时,然后对干重进行称重来对根生物量的增加进行定量。

[0438] 从野生型和用在三个根启动子之一下的白三叶草PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周,通过观察生长袋外的根生长可以看出,与野生型植物相比,用在组成型启动子下的白三叶草PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时,然后对干重进行称重来对根生物量的增加进行定量。

[0439] 从野生型和用在组成型启动子下的无油樟PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周,通过观察生长袋外的根生长可以看出,与野生型植物相比,用在组成型启动子下的无油樟PPD转化的黑麦草植物的根生物量/生长/长度/分支增加(图11)。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小

时，然后对干重进行称重来对根生物量的增加进行定量。

[0440] 从野生型和用在三个根启动子之一下的无油樟PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的无油樟PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0441] 从野生型和用在组成型启动子下的小果野蕉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的小果野蕉PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0442] 从野生型和用在三个根启动子之一下的小果野蕉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的小果野蕉PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0443] 从野生型和用在组成型启动子下的北美云杉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的北美云杉PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0444] 从野生型和用在三个根启动子之一下的北美云杉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的北美云杉PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0445] 从野生型和用在组成型启动子下的江南卷柏PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的江南卷柏PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0446] 从野生型和用在三个根启动子之一下的江南卷柏PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物的塑料生长袋中并修剪至相同的

高度。使植物在温室中生长约6周，通过观察生长袋外的根生长可以看出，与野生型植物相比，用在组成型启动子下的江南卷柏PPD转化的黑麦草植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后对干重进行称重来对根生物量的增加进行定量。

[0447] 将来自野生型和用在组成型启动子下的白三叶草PPD转化的Δppd拟南芥属植物的种子划破并播种于盆栽混合物中。使植物在具有x小时日长的生长室中生长约6周；通过观察盆外的根生长可以看出，与野生型植物相比，用在组成型启动子下的白三叶草PPD转化的拟南芥属植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、然后去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后进行称重来对根生物量的增加进行定量。

[0448] 将来自野生型和用在组成型启动子下的小果野蕉PPD转化的Δppd拟南芥属植物的种子划破并播种于盆栽混合物中。使植物在具有x小时日长的生长室中生长约6周；通过观察盆外的根生长可以看出，与野生型植物相比，用在组成型启动子下的小果野蕉PPD转化的拟南芥属植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、然后去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后进行称重来对根生物量的增加进行定量。

[0449] 将来自野生型和用在组成型启动子下的无油樟PPD转化的Δppd拟南芥属植物的种子划破并播种于盆栽混合物中。使植物在具有x小时日长的生长室中生长约6周；通过观察盆外的根生长可以看出，与野生型植物相比，用在组成型启动子下的无油樟PPD转化的拟南芥属植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、然后去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后进行称重来对根生物量的增加进行定量。

[0450] 将来自野生型和用在组成型启动子下的挪威云杉PPD转化的Δppd拟南芥属植物的种子划破并播种于盆栽混合物中。使植物在具有x小时日长的生长室中生长约6周；通过观察盆外的根生长可以看出，与野生型植物相比，用在组成型启动子下的挪威云杉PPD转化的拟南芥属植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、然后去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后进行称重来对根生物量的增加进行定量。

[0451] 将来自野生型和用在组成型启动子下的江南卷柏PPD转化的Δppd拟南芥属植物的种子划破并播种于盆栽混合物中。使植物在具有x小时日长的生长室中生长约6周；通过观察盆外的根生长可以看出，与野生型植物相比，用在组成型启动子下的江南卷柏PPD转化的拟南芥属植物的根生物量/生长/长度/分支增加。可以通过在流水下冲洗根、然后去除所连接的地上部分(叶和茎)并在65℃下干燥根48小时，然后进行称重来对根生物量的增加进行定量。

[0452] 对转化体的耐旱性分析

[0453] 从野生型和用在组成型启动子下的拟南芥属PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长，然后将一半的各类型植物进行水胁迫(通常为12％的重量含水量，正好在永久凋萎点之上)，同时使另一半保持含水(通常为22％的重量含水量，约为田间持水量)。通过与WT植

物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0454] 从野生型和用在组成型启动子下的白三叶草PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0455] 从野生型和用在组成型启动子下的小果野蕉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0456] 从野生型和用在组成型启动子下的无油樟PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0457] 从野生型和用在组成型启动子下的北美云杉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0458] 从野生型和用在组成型启动子下的江南卷柏PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0459] 从野生型和用在三个根启动子之一下的拟南芥属PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0460] 从野生型和用在三个根启动子之一下的白三叶草PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0461] 从野生型和用在三个根启动子之一下的小果野蕉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎

点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0462] 从野生型和用在三个根启动子之一下的无油樟PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0463] 从野生型和用在三个根启动子之一下的北美云杉PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0464] 从野生型和用在三个根启动子之一下的江南卷柏PPD转化的黑麦草植物中取等数量(通常为4-10个)的分蘖。将分蘖种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0465] 将相同数目(通常为4-10)的野生型和用在组成型启动子下的拟南芥属PPD转化的Δppd拟南芥属幼苗种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0466] 将相同数目(通常为4-10)的野生型和用在组成型启动子下的白三叶草PPD转化的Δppd拟南芥属幼苗种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0467] 将相同数目(通常为4-10)的野生型和用在组成型启动子下的小果野蕉PPD转化的Δppd拟南芥属幼苗种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0468] 将相同数目(通常为4-10)的野生型和用在组成型启动子下的无油樟PPD转化的Δppd拟南芥属幼苗种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0469] 将相同数目(通常为4-10)的野生型和用在组成型启动子下的挪威云杉PPD转化的Δppd拟南芥属幼苗种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将

一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0470] 将相同数目(通常为4-10)的野生型和用在组成型启动子下的江南卷柏PPD转化的Δppd拟南芥属幼苗种植到含有盆栽混合物和土壤的大盆中。使植物在温室中生长,然后将一半的各类型植物进行水胁迫(通常为12%的重量含水量,正好在永久凋萎点之上),同时使另一半保持含水(通常为22%的重量含水量,约为田间持水量)。通过与WT植物比较根和芽生物量可以对过表达PPD的植物的增加的干旱胁迫耐受性进行定量。

[0471] 文献

[0472] Achard,P.Genschik P.(2009).Releasing the brakes of plant growth:how Gas shutdown DELLA proteins.J.Exp.Bot.,60:1985-1092.

[0473] Altschul,S.F.,Gish,W.,Miller,W.,Myers,E.W.,Lipman,D.J.(1990).Basic local alignment search tool.J.Mol.Biol.215:403-410.

[0474] Anjum,SA.,Wang,LC.,Farooq,M.,Hussain,M.,Zou,CM.(2011)Brassinolide application improves the drought tolerance in maize through modulation of enzymatic antioxidants and leaf gas exchange.J.Agronomy and Crop Sci.197:177-185.

[0475] Chory and Wang,2005,Genes involved in brassinosteroid hormone action in plants,US 6,921,848 B2

[0476] Clough S.J.and Bent A.F.(1998)Floral dip:a simplified method for Agrobacterium-mediated transformation of Arabidopsis thaliana.Plant J.16:735-743.

[0477] Clouse,S.D.Brassinosteroid signal transduction:from receptor kinase activation to transcriptional networks regulating plant development.Plant Cell 23,1219-1230(2011).

[0478] Clouse,S.D.&Sasse,J.M.BRASSINOSTEROIDS:Essential regulators of plant growth and development.Annu.Rev.Plant Physiol.Plant Mol.Biol.16,427-451(1998).

[0479] Gallego-Bartolome,J.,Minguet,EG.,Grau-Enguix,F.,Abbas,M.,Locascio,A.,Thomas,SG.,Alabadi,D.,Blazquez,MA.(2012).Molecular mechanism for the interaction between gibberellin and brassionosteroid signalling pathways in Arabidopsis.PNAS,109:13446-13451.

[0480] Garcia,M.E.,Lynch,T.,Peeters,J.,Snowden,C.&Finkelstein,R.A small plant-specific protein family of ABI five binding proteins(AFPs)regulates stress response in germinating Arabidopsis seeds and seedlings.Plant Mol.Biol.67,643-658(2008).

[0481] Guo,H.,Li,L.,Aluru,M.,Sluru,S.,Yin,Y.(2013).Mechanisms and networkes for brassinosteroid regulated gene expression.Current Opinion in Plant Biology 16:545-553.

[0482] He,J-X.,Gendron,JM.,Sun,Y.,Gampaia,SL.,Gendron,N.,Sun,CQ.,Wang,Z-Y.(2005).BZR1 is a transcriptional repressor with dual roles in brassinosteroid homeostasis and growth responses.Science 307:1634-1638.

[0483] Hothorn,M.,Belkhadir,Y.,Dreux,M.,Dabi,T.,Noel,J.P.,Wilson,I.A.&Chory,J.Structural basis of steroid hormone perception by the receptor kinase BRI1.Nature 474,467-471(2011).

[0484] Hou,X.,Lee LYC,Xia,K.,Yan,Y.,Yu H.(2010).DELLAs modulate jasmonate signalling via competitive binding to JAZs.Devel.Cell 19:884-894.

[0485] Jiang,W-B.,Lin,W-H.(2013).Brassinosteroid functions in Arabidopsis seed development.Plant Signaling &Behavior 8:10,e25928;October 2013.

[0486] Jiang,L.,Liu,X.,Xiong,G.,Liu,H.,Chen,F.,Wang,L.,Meng,X.,Liu,G.,Yu,H.,Yuan,Y.,Yi,W.,Zhao,L.,Ma,H.,He,Y.,Wu,Z.,Melcher,K.,Qian,Q.,Xu,H.E.,Wang,Y.&Li,J.DWARF 53 acts as a repressor of strigolactone signalling in rice.Nature 504,401-405(2013).

[0487] Karimi,M.,Inzé,D.&Depicker,A.Gateway vectors for Agrobacterium-mediated plant transformation.Trends Plant Sci.7,193-195(2002).

[0488] Khripach,V.,Zhabinskii,V.,Groot,AD.(2000).Twenty years of brassinosteroids:Steroidal plant hormones warrant better crops for the XXI century.Ann.Bot.,86:441-447.

[0489] Kinoshita,T.,Caño-Delgado,A.,Seto,H.,Hiranuma,S.,Fujioka,S.,Yoshida,S.&Chory,J.Binding of brassinosteroids to the extracellular domain of plant receptor kinase BRI1.Nature 433,167-171(2005).

[0490] Lawit,Kundu,Rao and Tomes,2007,Isolated polynucleotide molecules corresponding to mutant and wild-type alleles of the maize D9 gene and methods of use,WO 2007124312 A2

[0491] Li,Q-F.,He,J-X.(2013).Mechanisms of signalling crosstalk between brassinosteroids and gibberellins.Plant Signaling&Behavior 8:7,e24686;July 2013;©2013 Landes Bioscience.

[0492] Mathew,C.,Hofmann,WA.,Osborne,MA.(2009).Pasture response to gibberellins:A review and recommendations.NZ.J.Agric.Res.,52:213-225.

[0493] Pauwels,L.,Barbero,G.F.,Geerink,J.,Tilleman,S.,Grunewald,W.,Pérez,A.C.,Chico,J.M.,Bossche,R.V.,Sewell,J.,Gil,E.,Garcia-Casado,G.,Witters,E.,Inzé,D.,Long,J.A.,Jaeger,G.D.,Solano,R.&Goossens,A.NINJA connects the co-repressor TOPLESS to jasmonate signalling.Nature 464,788-791(2010).

[0494] Pérez,A.C.,Durand,A.N.,Bossche,R.V.,De Clercq,R.,Persiau,G.,Van Wees,S.C.M.,Pieterse,C.M.J.,Gevaert,K.,DeJaeger,G.,Goossens,A.&Pauwels,L.The non-JAZ TIFY protein TIFY8 from Arabidopsis thaliana is a transcriptional repressor.PLos ONE 9,e84891(2014).

[0495] Prusakova,LD.,Ezhov,MN.,Salnikov,AI.(1999).The use of emistim,

epibrassinolide and uniconazole to overcome quality difference of buckwheat grains.Agrarian Russia:41-44.

[0496] Robatzek and Somssich(2001).The PlantJournal,28:123-133

[0497] She,J.,Han,Z.,Kim,T.W.,Wang,J.,Cheng,W.,Chang,J.,Shi,S.,Wang,J.,Yang,M.,Wang,Z-Y.&Chai,J.Structural insight into brassinosteroid perception by BRI1.Nature 474,472-476(2011).

[0498] Sun,T-P.(2011).The molecular mechanism and evolution of the GA-GID1-DELLA signalling module in plants.Review.Current Biology,21:R338-R345.

[0499] Szemenyei,H.,Hannon,M.&Long,J.A.TOPLESS mediates auxin-dependent transcriptional repression during Arabidopsis embryogenesis.Science 319,1384-1386(2008).

[0500] Thummel,C.S.&Chory,J.Steroid signalling in plants and insects-common themes,different pathways.Genes Dev.16,3113-3129(2002).

[0501] Vanhaeren,H.,Gonzalez,N,Coppens,F,De Milde,L,Van Daele,T,Vermeesch,M,Eloy,NB,Storme,V,Inez,D.(2014).Combining growth-promoting genes leads topositive epistasis in Arabidopsis thaliana.eLife 2014;3:e02252.DOI:10.7554/eLife.02252

[0502] Vanholme,B.,Grunewald,W.,Bateman,A.,Kohchi,T.,Gheysen,G.(2007).The tify family previously known as ZIM.Trends in Plant Science,12:239-244.

[0503] Vardhini,BV.(2012).Application of brassinolide mitigates saline stress of certain metabolites of sorghum grown in Karaikal.J.Phytology,4:1-3.

[0504] Wang,Z-Y.,Nakano T.,Gendron,J.,He,J.,Chen,M.,Vafeados,D.,Yang,Y.,Fujioka,S.,Yoshida,S.,Asami,T.,Chory,J.(2002).Nuclear-localised BZR1 mediates brassinosteroid-induced growth and feedback suppression of brassinosteroid biosynthesis.Developmental Cell 2:505-513.

[0505] Wang,C-M.,Shang,J-X.,Chen,Q-X.,Oses-Prieto,J.A.,Bai,M-Y,Yang,Y.,Yuan,M.,Zhang,Y-L.,Mu,C-C.,Deng,Z.,Wei C-Q.,Burlingame,A.L.,Wang,Z-Y.&Sun,Y.Identification of BZR1-interacting proteins as potential components of the brassinosteroid signalling pathway in Arabidopsis through tandem affinity purification.Mol.Cell.Proteomics 12,3653-3665(2013).

[0506] Winichayakul,S.,Pernthaner,A.,Scott,R.,Vlaming,R.&Roberts,N.(2008) Head-to-tail fusions of camelid antibodies can be expressed in planta and bind in rumen fluid.Biotech.&Appl.Biochem.53,111-122.

[0507] White,D.(2006)PEAPOD regulates lamina size and curvature in Arabidopsis.PNAS,103:13238-13243.

[0508] White,D.(2007).Novel plant genes and uses thereof,WO 2007105967A8.

[0509] Yamamoto et al(1991).Characterization of cis-acting sequences regulating root-specific gene expression in tobacco.Plant Cell,3:371-382.

[0510] Zhu,J-Y.,Sae-Seaw,J.&Wang,Z-Y.Brassinosteroid signalling.Development

140,1615-1620(2013).

[0511] 序列汇总

[0512]

SEQ ID NO:	序列类型	物种/来源	参考
1	多肽	拟南芥（*Arabidopsis thaliana*）	PEAPOD 1 蛋白
2	多肽	拟南芥	PEAPOD 2 蛋白
3	多肽	毛果杨（Populus trichocarpa）	PEAPOD 蛋白
4	多肽	挪威云杉（Picea abies）	PEAPOD 蛋白
5	多肽	北美云杉（*Picea sitchensis*）	PEAPOD 蛋白
6	多肽	雷蒙德氏棉（Gossypium raimondii）	PEAPOD 蛋白
7	多肽	洛矶山耧斗菜（Aquilegia coerulea）	PEAPOD 蛋白 1
8	多肽	洛矶山耧斗菜	PEAPOD 蛋白 2
9	多肽	蒺藜状苜蓿（Medicago truncatula）	PEAPOD 蛋白
10	多肽	番茄（Solanum lycopersicum）	PEAPOD 蛋白
11	多肽	白三叶草（*Trifolium repens*）	PEAPOD 蛋白
12	多肽	无油樟（*Amborella trichopoda*）	PEAPOD 蛋白
13	多肽	江南卷柏（*Selaginella moellendorffii*）	PEAPOD 蛋白 1
14	多肽	江南卷柏	PEAPOD 蛋白 2
15	多肽	烟草（Nicotiana tabacum）	PEAPOD 蛋白
16	多肽	马铃薯（*Solanum tuberosum*）	PEAPOD 蛋白
17	多肽	大豆（*Glycine max*）	PEAPOD 蛋白
18	多肽	克莱门氏柑桔（Citrus clementine）	PEAPOD 蛋白
19	多肽	蓖麻（Ricinus communus）	PEAPOD 蛋白
20	多肽	葡萄（Vitis vinifera）	PEAPOD 蛋白
21	多肽	川桑（Morus notabilis）	PEAPOD 蛋白
22	多肽	海枣（Phoenix dactylifera）	PEAPOD 蛋白
23	多肽	可可（*Theobroma cacao*）	PEAPOD 蛋白
24	多肽	紫萍（Spirodela polyrhiza）	PEAPOD 蛋白
25	多肽	芭蕉属（Musa）物种	PEAPOD 蛋白
26	多肽	白蝴蝶兰（Phalaenopsis aphrodite）	PEAPOD 蛋白
27	多肽	人工	内部 46 个氨基酸拟南芥属 PPD1 区域
28	多肽	人工	内部 46 个氨基酸共有基序 1，相同的残基
29	多肽	人工	内部 46 个氨基酸共有基序 2，可变残基
30	多肽	人工	内部 27 个氨基酸拟南芥属 PPD1 区域

[0513]

31	多肽	人工	内部 27 个氨基酸共有基序 1，相同的残基
32	多肽	人工	内部 27 个氨基酸共有基序 2，可变残基
33	多肽	人工	来自拟南芥属 PPD1 的 6 个氨基酸 TIFY 基序
34	多肽	人工	6 个氨基酸 TIFY 共有基序 1，相同的残基
35	多肽	人工	6 个氨基酸 TIFY 共有基序 1，可变残基
36	多肽	人工	在根中表达的 PPD1 V5-HIS 尾部肽序列
37	多肽	人工	接头盒 V5-His 尾部肽序列
38	多肽	人工	在根中表达的 PPD1（无尾部）肽序列
39	多核苷酸		拟南芥 DGAT1 内含子 3 核酸序列
40	多核苷酸	人工	用于在烟草 TobRB7 Δ1.3 根启动子下在双子叶植物根中表达的 GenScript 合成的优化的拟南芥属 PPD1 编码区域（有内含子）核酸序列；烟草 TobRB7 Δ0.6 根启动子
41	多核苷酸	人工	用于在拟南芥属 AtWRKY6 根启动子下在双子叶植物根中表达的 GenScript 合成的优化的拟南芥属 PPD1 编码区域（有内含子）核酸序列
42	多核苷酸	人工	TobRB7 Δ1.3 启动子::attB1:: 优化的拟南芥属 PPD-V5-His(INTRON)::attB2::nos 终止子表达盒核酸序列
43	多核苷酸	人工	TobRB7 Δ0.6 启动子::attB1:: 优化的拟南芥属 PPD-V5-His(INTRON)::attB2::nos 终止子表达盒核酸序列
44	多核苷酸	人工	AtWRKY6 启动子::attB1:: 优化的拟南芥属 PPD-V5-His(INTRON)::attB2::nos 终止子表达盒核酸序列
45	多核苷酸	人工	TobRB7 Δ1.3 启动子::attB1:: 优化的拟南芥属 PPD (INTRON)::attB2::nos 终止子表达盒
46	多核苷酸	人工	TobRB7 Δ0.6 启动子::attB1:: 优化的拟南芥属 PPD (INTRON)::attB2::nos 终止子表达盒
47	多核苷酸	人工	AtWRKY6 启动子::attB1:: 优化的拟

[0514]

			南芥属 PPD (INTRON)::attB2::nos 终止子表达盒.
48	多核苷酸		多年生黑麦草 DGAT1 内含子 3 核酸序列
49	多核苷酸	人工	用于使用烟草 TobRB7 Δ1.3 根启动子在禾本科植物根表达的 GENEART 合成的水稻优化的 PPD1 编码区域（有内含子）核酸序列
50	多核苷酸	人工	TobRB7 Δ1.3 启动子::attB1::水稻优化的 PPD-V5-His(INTRON)::attB2::nos 终止子表达盒核酸序列
51	多核苷酸	人工	TobRB7 Δ0.6 启动子::attB1::水稻优化的 PPD-V5-His(INTRON)::attB2::nos 终止子表达盒核酸序列
52	多核苷酸	人工	AtWRKY6 启动子::attB1::水稻优化的 PPD-V5-His(INTRON)::attB2::nos 终止子表达盒核酸序列
53	多核苷酸	人工	TobRB7 Δ1.3 启动子::attB1::水稻优化的 PPD (INTRON)::attB2::nos 终止子表达盒
54	多核苷酸	人工	TobRB7 Δ0.6 启动子::attB1::水稻优化的 PPD (INTRON)::attB2::nos 终止子表达盒
55	多核苷酸	人工	AtWRKY6 启动子::attB1::水稻优化的 PPD (INTRON)::attB2::nos 终止子表达盒
56	多肽	人工	酵母双杂交（Y2H）DNA 结合结构域（DBD）肽序列
57	多肽	人工	Y2H 激活结构域（AD）肽序列
58	多肽	人工	Y2H PPD1-DBD 肽序列
59	多肽	人工	Y2H PPD1-AD 肽序列
60	多肽	人工	Y2H PPD1-ppd-AD 肽序列
61	多肽	人工	Y2H PPD1-tify-AD 肽序列
62	多肽	人工	Y2H PPD1-jas*-AD 肽序列
63	多肽	人工	TPL 肽序列
64	多肽	人工	Y2H TPL-DBD 肽序列
65	多肽	人工	NINJA 肽序列
66	多肽	人工	Y2H NINJA-AD 肽序列
67	多肽	人工	Y2H BZR1-AD 肽序列
68	多肽	人工	Y2H RGA1 肽序列
69	多肽	人工	Y2H RGA1-AD 肽序列
70	多肽	人工	Y2H PPD1-ppd-DBD 肽序列

[0515]

71	多肽	人工	Y2H PPD1-tify-DBD 肽序列
72	多肽	人工	Y2H PPD1-jas*-DBD 肽序列
73	多肽	人工	双分子荧光(BiFC) nYFP 肽序列
74	多肽	人工	BiFC cYFP 肽序列
75	多肽	人工	BiFC nYFP-NINJA 肽序列
76	多肽	人工	BiFC nYFP-BZR1 肽序列
77	多肽	人工	BiFC cYFP-PPD1 肽序列
78	多肽	人工	BiFC cYFP-NINJA 肽序列
79	多肽	人工	BiFC cYFP-BZR1 肽序列
80	多肽	人工	BiFC cYFP-PPD1-ppd 肽序列
81	多肽	人工	BiFC cYFP-PPD1-tify 肽序列
82	多肽	人工	BiFC cYFP-PPD1-jas* 肽序列
83	多核苷酸	拟南芥	拟南芥 PPD1 编码序列
84	多核苷酸	拟南芥	拟南芥 PPD2 编码序列
85	多核苷酸	毛果杨	毛果杨, PPD 编码序列
86	多核苷酸	挪威云杉	挪威云杉, PPD 基因组序列
87	多核苷酸	雷蒙德氏棉	雷蒙德氏棉, PPD 编码序列
88	多核苷酸	洛矶山耧斗菜	洛矶山耧斗菜, PPD 编码序列 1
89	多核苷酸	洛矶山耧斗菜	洛矶山耧斗菜, PPD 编码序列 2
90	多核苷酸	蒺藜状苜蓿	蒺藜状苜蓿, PPD 编码序列
91	多核苷酸	番茄	番茄, PPD 编码序列
92	多核苷酸	白三叶草	白三叶草, PPD 编码序列
93	多核苷酸	无油樟	无油樟, PPD 编码序列
94	多核苷酸	江南卷柏	江南卷柏, PPD 编码序列 1
95	多核苷酸	江南卷柏	江南卷柏, PPD 编码序列 2
96	多核苷酸	烟草	烟草, PPD 编码序列
97	多核苷酸	马铃薯	马铃薯, PPD 编码序列
98	多核苷酸	大豆	大豆, PPD 编码序列
99	多核苷酸	克莱门氏柑桔	克莱门氏柑桔, PPD 编码序列
100	多核苷酸	蓖麻	蓖麻, PPD 编码序列
101	多核苷酸	葡萄	葡萄, PPD 编码序列
102	多核苷酸	川桑	川桑, PPD 编码序列
103	多核苷酸	海枣	海枣, PPD 编码序列
104	多核苷酸	可可	可可, PPD 编码序列
105	多核苷酸	紫萍	紫萍, PPD 基因组序列
106	多核苷酸	芭蕉属物种	芭蕉属物种, PPD 编码序列
107	多核苷酸	白蝴蝶兰	白蝴蝶兰, PPD 编码序列
108	多肽	人工	拟南芥 PPD1+ V5-His 标签
109	多肽	人工	白三叶草 PPD + V5-His 标签
110	多肽	人工	无油樟 PPD + V5-His 标签
111	多肽	人工	小果野蕉 PPD + V5-His 标签
112	多肽	人工	北美云杉 PPD + V5-His 标签
113	多肽	人工	江南卷柏 PPD + V5-His 标签
114	多肽	人工	拟南芥 PPD - 无标签
115	多肽	人工	白三叶草 PPD – 无标签

[0516]

116	多肽	人工	无油樟 PPD – 无标签
117	多肽	人工	小果野蕉 PPD – 无标签
118	多肽	人工	挪威云杉 PPD – 无标签
119	多肽	人工	江南卷柏 PPD – 无标签
120	多核苷酸	人工	拟南芥 PPD – 单子叶植物优化的核酸序列
121	多核苷酸	人工	白三叶草 PPD – 单子叶植物优化的核酸序列
122	多核苷酸	人工	无油樟 PPD – 单子叶植物优化的核酸序列
123	多核苷酸	人工	小果野蕉 PPD – 单子叶植物优化的核酸序列
124	多核苷酸	人工	北美云杉 PPD – 单子叶植物优化的核酸序列
125	多核苷酸	人工	江南卷柏 PPD – 单子叶植物优化的核酸序列
126	多核苷酸	人工	拟南芥 PPD – 双子叶植物优化的核酸序列
127	多核苷酸	人工	白三叶草 PPD – 双子叶植物优化的核酸序列
128	多核苷酸	人工	无油樟 PPD – 双子叶植物优化的核酸序列
129	多核苷酸	人工	小果野蕉 PPD – 双子叶植物优化的核酸序列
130	多核苷酸	人工	挪威云杉 PPD – 双子叶植物优化的核酸序列
131	多核苷酸	人工	江南卷柏 PPD – 双子叶植物优化的核酸序列
132	多核苷酸	人工	引物, ocs3'-1f
133	多核苷酸	人工	引物, ocs3'-1r
134	多核苷酸	人工	引物 , hpt-1
135	多核苷酸	人工	引物, hpt-2
136	多核苷酸	人工	引物, nos3'-1f
137	多核苷酸	人工	引物, nos3'-1r
138	多核苷酸	人工	引物, rgh1
139	多核苷酸	人工	引物, rgh5
140	多核苷酸	人工	引物, GrPPD1F
141	多核苷酸	人工	引物, GrPPD1R

[0001] SEQUENCE LISTING
[0002] <110> 农牧研究公司
[0003] <120> 用于植物改良的方法
[0004] <130> P44899MLI
[0005] <150> NZ 701643
[0006] <151> 2014-11-04
[0007] <160> 141
[0008] <170> PatentIn version 3.5
[0009] <210> 1
[0010] <211> 313
[0011] <212> PRT
[0012] <213> Arabidopsis thaliana
[0013] <400> 1

[0014] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu
[0015] 1 5 10 15
[0016] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0017] 20 25 30
[0018] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[0019] 35 40 45
[0020] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro
[0021] 50 55 60
[0022] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln
[0023] 65 70 75 80
[0024] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn
[0025] 85 90 95
[0026] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala
[0027] 100 105 110
[0028] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser
[0029] 115 120 125
[0030] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro
[0031] 130 135 140
[0032] Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe
[0033] 145 150 155 160
[0034] Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala
[0035] 165 170 175
[0036] Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn
[0037] 180 185 190
[0038] Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu

[0039] 195 200 205

[0040] Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser

[0041] 210 215 220

[0042] Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln

[0043] 225 230 235 240

[0044] Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys

[0045] 245 250 255

[0046] Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln

[0047] 260 265 270

[0048] Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser

[0049] 275 280 285

[0050] Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu

[0051] 290 295 300

[0052] Ser Val Asp Leu Asn Ser Glu Gly Ile

[0053] 305 310

[0054] <210> 2

[0055] <211> 315

[0056] <212> PRT

[0057] <213> Arabidopsis thaliana

[0058] <400> 2

[0059] Met Asp Val Gly Val Thr Thr Ala Lys Ser Ile Leu Glu Lys Pro Leu

[0060] 1 5 10 15

[0061] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[0062] 20 25 30

[0063] Arg Lys Phe Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[0064] 35 40 45

[0065] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro

[0066] 50 55 60

[0067] Gly Asp Asp Ser Gly Ala Gly Ile Leu Arg Lys Ile Leu Val Ser Gln

[0068] 65 70 75 80

[0069] Pro Pro Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Arg Asn

[0070] 85 90 95

[0071] Glu Leu Glu Ala Cys Gly Arg Ile Pro Leu Gln Glu Asp Asp Gly Ala

[0072] 100 105 110

[0073] Cys His Arg Arg Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Ser Ser

[0074] 115 120 125

[0075] Gly Gln Phe Val Ala Asp Lys Asp Ser His Lys Thr Val Ser Val Ser

[0076] 130 135 140

[0077] Pro Arg Ser Pro Ala Glu Thr Asn Ala Val Val Gly Gln Met Thr Ile

[0078] 145 150 155 160

[0079] Phe Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Val Pro Pro Glu Lys

[0080] 165 170 175

[0081] Ala Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu

[0082] 180 185 190

[0083] Asn Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Pro Met Ser Lys

[0084] 195 200 205

[0085] Glu Lys Met Val Glu Leu Pro Gln Tyr Gly Leu Glu Lys Ala Pro Ala

[0086] 210 215 220

[0087] Ser Arg Asp Ser Asp Val Glu Gly Gln Ala Asn Arg Lys Val Ser Leu

[0088] 225 230 235 240

[0089] Gln Arg Tyr Leu Glu Lys Arg Lys Asp Arg Arg Phe Ser Lys Thr Lys

[0090] 245 250 255

[0091] Lys Ala Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Arg

[0092] 260 265 270

[0093] Gln Pro Arg Met Asn Ala Ala Tyr Ser Gln Asn Leu Ser Gly Thr Gly

[0094] 275 280 285

[0095] His Cys Glu Ser Pro Glu Asn Gln Thr Lys Ser Pro Asn Ile Ser Val

[0096] 290 295 300

[0097] Asp Leu Asn Ser Asp Leu Asn Ser Glu Asp Asn

[0098] 305 310 315

[0099] <210> 3

[0100] <211> 375

[0101] <212> PRT

[0102] <213> Populus trichocarpa

[0103] <400> 3

[0104] Met Gln Pro Gly Glu Thr Val Phe Arg Ser Ala Leu Asp Lys Pro Leu

[0105] 1 5 10 15

[0106] His Gln Leu Thr Glu Asp Asp Ile Ser Gln Val Thr Arg Glu Asp Cys

[0107] 20 25 30

[0108] Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[0109] 35 40 45

[0110] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Thr Leu Leu Glu Ala

[0111] 50 55 60

[0112] Thr Pro Glu Thr Glu Ser Pro Arg Arg Arg Leu Tyr Ile Pro Arg Pro

[0113] 65 70 75 80

[0114] Pro Pro His Pro Pro Asp Asn Thr Pro Arg Val Arg Phe Ser Ala Val

[0115] 85 90 95

[0116] Pro Pro Asn Ser Ser Val Ser Glu Arg Gly Ala Ser Ala Glu Thr Pro

[0117] 100 105 110

[0118] Ile Ser Val Pro Ala Glu Glu Pro Val Pro Cys Arg Gln His Asp Pro

[0119] 115 120 125

[0120] Pro Asn Pro Asp Asp Pro Ala Asp Pro Leu Pro Pro Val His Ala Ala

[0121] 130 135 140

[0122] Val Thr Glu Asn Ala Ser Val Ser Pro Arg Thr Thr Gly Met Ala Glu

[0123] 145 150 155 160

[0124] Glu Ser Ala Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn Val

[0125] 165 170 175

[0126] Tyr Asp Asp Val Pro Gly Asp Lys Ala Gln Ala Ile Met His Leu Ala

[0127] 180 185 190

[0128] Ala Ser Pro Phe Ala Pro Pro Gln Asp Ala Ser Ser Asp Val Ile Pro

[0129] 195 200 205

[0130] Thr Leu Arg Pro Leu Gln Cys Gln Leu Asp Thr Pro Gly Val Lys Ala

[0131] 210 215 220

[0132] Ala Pro Asn Ser Ile Val Ala Asn Phe Pro Thr Leu Pro Thr Val Lys

[0133] 225 230 235 240

[0134] Gly Ala Asp Ser Gly Gln Leu Leu Trp Glu Glu Ser Asn Ile Ala Arg

[0135] 245 250 255

[0136] Glu Asp Asn Leu Glu Gly Ser Thr Ser Arg Lys Ala Ser Leu Gln Arg

[0137] 260 265 270

[0138] Tyr Phe Glu Lys Lys Lys Asp Arg Phe Lys Asn Lys Arg Lys Val Ala

[0139] 275 280 285

[0140] Val Pro Ser Ala Ser Leu Asp Val Phe Leu Ser His Leu Val Gly Asp

[0141] 290 295 300

[0142] Gln Ile Ser Asn Asp His Trp Asn Leu Asn Asp Ala Cys Ser Pro Ser

[0143] 305 310 315 320

[0144] Gln Pro Arg Pro Pro Gln Thr Pro Asn Arg Cys Asn Ser Val Asp Asn

[0145] 325 330 335

[0146] Val Ala Lys Asn Gly Ile Leu Lys Ala Asp Leu Asn Asn Lys Gly Asp

[0147] 340 345 350

[0148] Ala Asp Leu Ser Cys Cys Leu Asp Phe Ser Ser Lys Gln Ile Asn Ala

[0149] 355 360 365

[0150] Trp Cys Leu Cys Leu Gly Cys

[0151] 370 375

[0152] <210> 4

[0153] <211> 346

[0154] <212> PRT

[0155] <213> Picea abies

[0156] <400> 4

[0157] Met Arg Gly Gly Gly Gly Ala Asp Arg Leu Pro Ala Arg Ala Asn Leu

[0158] 1 5 10 15

[0159] Glu Lys Pro Leu Glu Asp Leu Ser His Glu Asp Ile Met Gln Leu Thr

[0160] 20 25 30

[0161] Arg Glu Asp Cys Arg Arg Tyr Leu Ile Glu Lys Gly Met Arg Arg Pro

[0162] 35 40 45

[0163] Ser Trp Asn Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Lys

[0164] 50 55 60

[0165] Leu Phe Glu Ser Gly Pro Asn Asp Glu Lys Arg Ser Ala Ala Thr Asn

[0166] 65 70 75 80

[0167] Arg Pro Asn Pro Asp Glu Asn Leu Lys Glu Ala Ala Ser Val Ser Leu

[0168] 85 90 95

[0169] Leu Tyr Gly Ser Gln Pro Glu Ser Pro Ser Val Val Phe Ala Ser Lys

[0170] 100 105 110

[0171] Asp Ser Asp Thr Phe Asn Leu Glu Trp Leu Ala Lys Thr Glu Leu Pro

[0172] 115 120 125

[0173] Val Leu Ala Ser Gln Pro Arg His Ile Ala Gln Gln Asn Val Phe Leu

[0174] 130 135 140

[0175] Ser Ser Leu Ser Ala Gln Gln Ser Gly Ala Gln Leu Thr Ile Phe Tyr

[0176] 145 150 155 160

[0177] Ser Gly Asn Val Asn Val Tyr Asp Asp Val Pro Ala Glu Lys Ala Gln

[0178] 165 170 175

[0179] Glu Ile Met Leu Leu Ala Gly Ser Gly Asn Tyr Pro Pro Ser Ser Thr

[0180] 180 185 190

[0181] Cys Gln Ser Thr Arg Asn Thr Gln Gln Asn Ala Val Arg Ala Ala Tyr

[0182] 195 200 205

[0183] Pro Ser Asn Pro Thr Asn Thr Pro Phe Ile His Gly Val Gly Pro Pro

[0184] 210 215 220

[0185] Leu Ala Thr Val Ala Ser Ser Ser Val Met Ser Ser Pro Ile His Lys

[0186] 225 230 235 240

[0187] Glu Ser Pro Ile Thr Arg Lys Ala Ser Leu Gln Arg Phe Leu Glu Lys

[0188] 245 250 255

[0189] Arg Lys Asp Arg Ser Arg Gly Lys Leu Gly Ala Pro Thr Ile Ser Lys

[0190] 260 265 270

[0191] Lys Pro Leu Leu Met Gly Met Phe Met His Pro Ser Ile Val His Arg

[0192] 275 280 285

[0193] Gln Tyr Trp Thr Asp Thr Ala Lys Arg Lys Ser Gly Lys Pro Asp Ile

[0194] 290 295 300

[0195] Pro Ala Ser Ile Ser Pro Thr Arg Pro Pro His Thr Pro Arg Arg Thr
[0196] 305 310 315 320
[0197] Ser Ser Asp Glu Gln Leu Ser Ala Arg His Ala Arg Gly Asp Ile Ser
[0198] 325 330 335
[0199] Ala Gln Gly Gly Ser Leu His Asn Ser Asn
[0200] 340 345
[0201] <210> 5
[0202] <211> 222
[0203] <212> PRT
[0204] <213> Picea sitchensis
[0205] <400> 5
[0206] Met Arg Gly Gly Glu Arg Ala Pro Gly Ser Arg Pro Ser Leu Asp Lys
[0207] 1 5 10 15
[0208] Pro Leu Glu Glu Leu Thr Glu Glu Asp Ile Phe Gln Leu Thr Arg Glu
[0209] 20 25 30
[0210] Asp Cys Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp
[0211] 35 40 45
[0212] Asn Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ser Leu Phe
[0213] 50 55 60
[0214] Glu Ser Lys Pro Asn Gln Gln Ser Lys Lys Pro Ser Lys His Lys Pro
[0215] 65 70 75 80
[0216] Ala Thr Leu Gln Phe Glu Thr Ala Arg Asp Ser Thr Phe Ala Gln Ser
[0217] 85 90 95
[0218] Ser Val Ser Gln Glu Gln Ser Leu Gly Phe Ser Trp Ser Lys Glu Val
[0219] 100 105 110
[0220] Leu Asp Lys Gly Thr Ala Glu Arg Gln Arg Leu Cys Ser Asp Ser Gln
[0221] 115 120 125
[0222] Glu Ala His Glu Ile Pro Arg Leu Gly Ser Lys Pro Pro Gln Ser Asn
[0223] 130 135 140
[0224] Thr Glu Gly Lys Arg Cys Ala His Asp Gly His Gly Arg Lys Ser Ala
[0225] 145 150 155 160
[0226] Gln Pro Leu Val Arg Leu Pro Ala Asn Phe Lys Asn Asp Cys Ser Asn
[0227] 165 170 175
[0228] Arg Gln Ser Ser His Thr Ser Glu Ser Gln Pro Asp Thr Leu Leu Arg
[0229] 180 185 190
[0230] Ser Asp Ser Phe Gln Gln Pro Thr Ala Gln Leu Thr Ile Phe Tyr Ala
[0231] 195 200 205
[0232] Gly Met Val Asn Val Tyr Asp Asp Val Pro Leu Asp Lys Ala
[0233] 210 215 220

[0234] <210> 6

[0235] <211> 365

[0236] <212> PRT

[0237] <213> Gossypium raimondii

[0238] <400> 6

[0239] Met Glu Ala Gly Val Thr Thr Thr Ala Thr Thr Thr Ala Ser Phe Ser

[0240] 1 5 10 15

[0241] Ser Ile Leu Asp Lys Pro Leu Ser Gln Leu Thr Glu Glu Asp Ile Ser

[0242] 20 25 30

[0243] Gln Leu Thr Arg Glu Asp Cys Arg Lys Phe Leu Lys Glu Lys Gly Met

[0244] 35 40 45

[0245] Arg Arg Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln Gln Val Ile Ser

[0246] 50 55 60

[0247] Phe Lys Ala Leu Leu Glu Ser Asn Glu Asp Ser Gly Ala Gly Ala Arg

[0248] 65 70 75 80

[0249] Arg Lys Ile Leu Val Cys Pro Pro Pro Ser His Phe Pro Pro Gln Asn

[0250] 85 90 95

[0251] Ala Val Ala Ser Asn Ser Gly Glu Ser Val Lys Glu Ala Val Phe Gly

[0252] 100 105 110

[0253] Glu Glu Glu Ser Leu Tyr Gly Gln Lys Asp Leu Ser Leu Lys Ala Ala

[0254] 115 120 125

[0255] Pro Val Val Gln Met Asn Cys Gln Gly Gly Asp Thr Asp Asp Lys Thr

[0256] 130 135 140

[0257] Leu Ser Pro Ser Leu Gly Ser Pro Arg Glu Tyr Ser Lys Leu Pro Gly

[0258] 145 150 155 160

[0259] Arg Ser Gln Cys Glu Thr Asn Glu Leu Gly Gly Gln Met Thr Ile Phe

[0260] 165 170 175

[0261] Tyr Cys Gly Lys Ile Asn Val Tyr Asp Gly Val Pro Leu Ala Lys Ala

[0262] 180 185 190

[0263] Arg Ala Ile Met His Leu Ala Ala Ser Pro Ile Asp Phe Pro Gln Gly

[0264] 195 200 205

[0265] Asn Leu Cys Asn Gln Asn Gly Ala Phe Arg Ser Phe Leu Gly His Val

[0266] 210 215 220

[0267] Gln Glu Ala Glu Asp Lys Asn Asp Leu Thr Ser Ser Ile Ala Leu Asn

[0268] 225 230 235 240

[0269] Leu Asn Ser His Thr Met His Thr Glu Lys Met Thr Glu Tyr Gln Gln

[0270] 245 250 255

[0271] Gln Phe Arg Gly Lys Ala Asn Ile Ser Arg Asp Ser Asp Val Asp Gly

[0272] 260 265 270

[0273] Gln Val Ser Arg Lys Glu Ser Leu Gln Arg Tyr Leu Glu Lys Arg Lys
[0274] 275 280 285
[0275] Asp Arg Gly Arg Phe Phe Lys Gly Arg Lys Asn Ala Gly Gln Ala Leu
[0276] 290 295 300
[0277] Ser Ser Ser Glu Met Tyr Leu Asn His Gln Ile Arg Ala His Tyr Leu
[0278] 305 310 315 320
[0279] Asn Gly Gln Thr Asn Gln Ser Arg Thr Ser Ser Pro Pro Gln Ser Gly
[0280] 325 330 335
[0281] Val Pro His Ala Phe Tyr Ser Ser Ala Asp Asn Gln Glu Leu Val Asn
[0282] 340 345 350
[0283] Phe Ser Val Asp Leu Asn Asp Glu Gly Gly Gln Glu His
[0284] 355 360 365
[0285] <210> 7
[0286] <211> 357
[0287] <212> PRT
[0288] <213> Aquilegia coerulea
[0289] <400> 7
[0290] Met Lys Pro Asp Glu Thr Val Ser Arg Ser Pro Leu Asp Lys Pro Leu
[0291] 1 5 10 15
[0292] Phe Gln Leu Thr Asp Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0293] 20 25 30
[0294] Arg Lys Phe Leu Arg Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[0295] 35 40 45
[0296] Ser Gln Ala Ile Glu Gln Val Ile Ser Leu Lys Thr Leu Leu Glu Pro
[0297] 50 55 60
[0298] Arg Thr Glu Ser Asp Thr Asn Ala Thr Gly Ile Arg Gln Lys Leu Leu
[0299] 65 70 75 80
[0300] Val Ser Arg Leu Glu Asn Ser Thr Gln Val Pro Leu Asn Asp Lys Thr
[0301] 85 90 95
[0302] Asn Ala Ser Asn Leu Lys Thr Ser Val Gln Ala Ile Asn Ser Gly Lys
[0303] 100 105 110
[0304] Ala Asp Ile His Gly Asp Arg Pro Cys Arg Val Pro Val Pro Val Pro
[0305] 115 120 125
[0306] Asp Asp Asn Thr Ile Thr Val Pro Val Pro Asp Asn Asn Thr Ile Thr
[0307] 130 135 140
[0308] Val Pro Val Pro Asp Asn Asn Ile Thr Ser Ser Arg Asn Leu Asn Ser
[0309] 145 150 155 160
[0310] Thr Asn Gly Leu Val Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val
[0311] 165 170 175

[0312] Ile Val Tyr Asp Asp Met Pro Ala Glu Lys Ala His Ala Ile Met Lys
[0313] 180 185 190
[0314] Phe Ala Gly Ser His Ile Asn Val Pro Glu Asp Ser Ser Pro Ala Gly
[0315] 195 200 205
[0316] Ala Ala Val Ile Gln Ser Phe Ala Cys Gln Leu Gln Ala Ala Ser Ile
[0317] 210 215 220
[0318] Arg His Gly Leu Ala Phe Pro Ser Ala Val Ser Pro Pro Leu His Asn
[0319] 225 230 235 240
[0320] Val Val Ala Asp Thr Ser Gln His Cys Arg Glu Glu Val Thr Val Ser
[0321] 245 250 255
[0322] Arg Glu Val Glu Pro Glu Gly Pro Val Ser Arg Lys Ala Ser Val Gln
[0323] 260 265 270
[0324] Arg Tyr Leu Glu Lys Arg Lys Asp Arg Gly Arg Phe Lys Asn Lys Arg
[0325] 275 280 285
[0326] Lys Ile Glu Ser Ser Ser Ser Leu Glu Ile Tyr Leu Asn His Gln Leu
[0327] 290 295 300
[0328] Gly Asp Gln Tyr Leu Asn Glu Lys Ser Ser Gln Ser Arg Ala Cys Ser
[0329] 305 310 315 320
[0330] Pro Pro Gln Pro Arg Ala Pro His Thr Pro Thr Arg Cys Ser Ser Val
[0331] 325 330 335
[0332] Glu Asn Gln Val Thr Asn Val Val Phe Ser Ile Asp Leu Asn Asp Asn
[0333] 340 345 350
[0334] Asp Val Arg Glu Gly
[0335] 355
[0336] <210> 8
[0337] <211> 347
[0338] <212> PRT
[0339] <213> Aquilegia coerulea
[0340] <400> 8
[0341] Met Lys Pro Asp Glu Thr Val Ser Arg Ser Pro Leu Asp Lys Pro Leu
[0342] 1 5 10 15
[0343] Phe Gln Leu Thr Asp Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0344] 20 25 30
[0345] Arg Lys Phe Leu Arg Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[0346] 35 40 45
[0347] Ser Gln Ala Ile Glu Gln Val Ile Ser Leu Lys Thr Leu Leu Glu Pro
[0348] 50 55 60
[0349] Arg Thr Glu Ser Asp Thr Asn Ala Thr Gly Ile Arg Gln Lys Leu Leu
[0350] 65 70 75 80

[0351] Val Ser Arg Leu Glu Asn Ser Thr Gln Val Pro Leu Asn Asp Lys Thr
[0352] 85 90 95
[0353] Asn Ala Ser Asn Leu Lys Thr Ser Val Gln Ala Ile Asn Ser Gly Glu
[0354] 100 105 110
[0355] Ala Asp Ile His Gly Asp Arg Pro Cys Arg Val Pro Val Pro Val Pro
[0356] 115 120 125
[0357] Asp Asp Asn Thr Ile Thr Val Pro Val Pro Asp Asn Asn Ile Thr Ser
[0358] 130 135 140
[0359] Ser Arg Asn Leu Asn Ser Thr Asn Gly Leu Val Gly Gln Met Thr Ile
[0360] 145 150 155 160
[0361] Phe Tyr Cys Gly Lys Val Ile Val Tyr Asp Gly Met Pro Ala Glu Lys
[0362] 165 170 175
[0363] Ala His Ala Ile Met Lys Phe Ala Gly Ser His Ile Asn Val Pro Glu
[0364] 180 185 190
[0365] Asp Ser Ser Pro Ala Gly Ala Ala Val Ile Gln Ser Phe Ala Cys Gln
[0366] 195 200 205
[0367] Leu Gln Ala Ala Ser Ile Arg His Gly Leu Ala Phe Pro Ser Ala Val
[0368] 210 215 220
[0369] Ser Pro Pro Leu His Asn Val Val Ala Asp Thr Ser Gln His Cys Arg
[0370] 225 230 235 240
[0371] Glu Glu Val Thr Val Ser Arg Glu Val Glu Pro Glu Gly Pro Val Ser
[0372] 245 250 255
[0373] Arg Lys Ala Ser Val Gln Arg Tyr Leu Glu Lys Arg Lys Asp Arg Gly
[0374] 260 265 270
[0375] Arg Phe Lys Asn Lys Arg Lys Ile Glu Ser Ser Ser Ser Leu Glu Ile
[0376] 275 280 285
[0377] Tyr Leu Asn His Gln Leu Gly Asp Gln Tyr Leu Asn Glu Lys Ser Ser
[0378] 290 295 300
[0379] Gln Ser Arg Ala Cys Ser Pro Pro Gln Pro Arg Ala Pro His Thr Pro
[0380] 305 310 315 320
[0381] Thr Arg Cys Ser Ser Val Glu Asn Gln Val Thr Asn Val Val Phe Ser
[0382] 325 330 335
[0383] Ile Asp Leu Asn Asp Asn Asp Val Arg Glu Gly
[0384] 340 345
[0385] <210> 9
[0386] <211> 328
[0387] <212> PRT
[0388] <213> Medicago truncatula
[0389] <400> 9

[0390] Met Asn Gly Gly Ser Thr Val Ser Phe Arg Ser Ile Leu Asp Arg Pro
[0391] 1 5 10 15
[0392] Leu Asn Gln Leu Thr Glu Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp
[0393] 20 25 30
[0394] Cys Arg Arg Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn
[0395] 35 40 45
[0396] Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu
[0397] 50 55 60
[0398] Pro Thr Asp Asp Asp Ile Pro Ala Thr Val Gly Val Gly Val Ser Ser
[0399] 65 70 75 80
[0400] Ala Ile His His His His His His His His Pro Pro Gln Pro Pro Pro Lys
[0401] 85 90 95
[0402] Ala Leu Asp Pro Glu Asp Thr Ala Leu Glu Leu Gln Lys Ser Thr Ser
[0403] 100 105 110
[0404] Pro Val Ala Glu Arg Pro Thr Glu Thr Asn Asp Ala Asn Val Val Asn
[0405] 115 120 125
[0406] Asn Pro Gly Gly Cys Ala Pro Ser Gly Ser Phe Gly Gln Met Thr Ile
[0407] 130 135 140
[0408] Phe Tyr Cys Gly Lys Val Asn Val Tyr Asp Gly Val Ser Pro Asp Lys
[0409] 145 150 155 160
[0410] Ala Arg Ser Ile Met Gln Leu Ala Ala Ala Cys Pro Ser Ser Phe Pro
[0411] 165 170 175
[0412] Gln Asp Asn Pro Ser Asn Lys Asn Ala Ala Val Trp Ala Ser Pro Cys
[0413] 180 185 190
[0414] Asn Leu Pro Ile Asp Lys Glu Val Leu Phe Pro Thr Asp Thr Ala Ile
[0415] 195 200 205
[0416] Leu Gln Val Ala Gln Thr Asp Lys Met Val Glu Tyr Pro Leu Gln Tyr
[0417] 210 215 220
[0418] Arg Glu Lys Gly Ser Thr Ala Arg Asp Ala Glu Gly Gln Ala Ser Arg
[0419] 225 230 235 240
[0420] Lys Val Ser Leu Gln Arg Tyr Leu Glu Lys Arg Lys Asp Arg Gly Arg
[0421] 245 250 255
[0422] Ser Lys Gly Lys Lys Leu Thr Gly Ile Thr Ser Ser Asn Phe Glu Met
[0423] 260 265 270
[0424] Tyr Leu Asn Leu Pro Val Lys Leu His Ala Ser Asn Gly Asn Ser Ser
[0425] 275 280 285
[0426] Arg Ser Ser Thr Asp Ser Pro Pro Gln Pro Arg Leu Pro Leu Val Ser
[0427] 290 295 300
[0428] Ser Gly Ser Ala Glu Asn Gln Pro Lys Val Thr Leu Pro Ile Asp Leu

[0429] 305 310 315 320

[0430] Asn Asp Lys Asp Val Gln Glu Cys

[0431] 325

[0432] <210> 10

[0433] <211> 339

[0434] <212> PRT

[0435] <213> Solanum lycopersicum

[0436] <400> 10

[0437] Met Ser Leu Glu Gln Thr Val Tyr Lys Ser Pro Leu Asp Lys Pro Leu

[0438] 1 5 10 15

[0439] Tyr Leu Leu Thr Asp Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[0440] 20 25 30

[0441] Arg Arg Phe Leu Lys Ala Lys Gly Met Arg Lys Pro Ser Trp Asn Lys

[0442] 35 40 45

[0443] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Phe Glu Thr

[0444] 50 55 60

[0445] Thr Pro Glu Ser Asp Thr Gly Gln Arg Lys Lys Arg His Ile Pro Arg

[0446] 65 70 75 80

[0447] Pro Asp Thr Ser Leu Gln Arg Val Gln Lys Glu Thr Ser Ile Asp Ala

[0448] 85 90 95

[0449] Glu Phe Ala Glu Ser Ala Glu Glu Thr Val Pro Tyr Gly Arg Lys Pro

[0450] 100 105 110

[0451] Pro Asn Lys Pro Asp Leu Ser Gly Asp Lys Ala Ala Ser Ala Val Ala

[0452] 115 120 125

[0453] Val Val Asn Asn Leu Ala Pro Ser Arg Thr Thr Asp Ser Gly Asn Ala

[0454] 130 135 140

[0455] Ser Ser Gly Gln Leu Thr Ile Phe Tyr Cys Gly Lys Val Asn Val Tyr

[0456] 145 150 155 160

[0457] Asp Asp Val Pro Ala Glu Lys Ala Glu Ala Ile Met His Leu Ala Ala

[0458] 165 170 175

[0459] Ser Pro Leu Phe Val Pro Ser Glu Thr Pro Leu Asp Ala Asn Arg Ala

[0460] 180 185 190

[0461] Ala Gln His Ser Glu Cys His Leu Gln Ala Ala Asn Val Lys Leu Gly

[0462] 195 200 205

[0463] Gln Asp Ser Pro Met Val Phe Met Pro Thr Met Gln Thr Gly Lys Ile

[0464] 210 215 220

[0465] Thr Glu Val Thr Arg Leu His Leu Glu Glu Ser Asn Thr Ser Tyr Glu

[0466] 225 230 235 240

[0467] Asp Asn Pro Glu Ala Val Asn His Val Ser Arg Lys Ala Leu Leu Glu

[0468] 245 250 255

[0469] Arg Tyr Arg Glu Lys Arg Lys Asp Arg Phe Lys Arg Lys Met Gly Met

[0470] 260 265 270

[0471] Pro Ser Ser Ala Ser Leu Asp Ile Tyr Leu Asn His Arg Thr Ile Asn

[0472] 275 280 285

[0473] His Thr Gln Ser Glu Leu Ser Ser Arg Ser Asn Thr Cys Ser Pro Pro

[0474] 290 295 300

[0475] Ala Ile Arg Leu Ser Ala Ala Pro Ala Pro Ser Gly Ser Met Asp Asn

[0476] 305 310 315 320

[0477] Ile Leu Gln Met Asp Ala Asn Ala Ser Gly Phe Leu Asp Asp Lys Asp

[0478] 325 330 335

[0479] Gly Lys Glu

[0480] <210> 11

[0481] <211> 338

[0482] <212> PRT

[0483] <213> Trifolium repens

[0484] <400> 11

[0485] Met Asn Gly Gly Ser Thr Val Ser Phe Arg Ser Ile Leu Asp Lys Pro

[0486] 1 5 10 15

[0487] Leu Asn Gln Leu Thr Glu Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp

[0488] 20 25 30

[0489] Cys Arg Arg Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn

[0490] 35 40 45

[0491] Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu

[0492] 50 55 60

[0493] Pro Thr Asp Asp Asp Leu Pro Ala Pro Val Gly Val Ser Ser Ala Ile

[0494] 65 70 75 80

[0495] His His His His His His His Pro Gln Pro Pro Gln Arg Asn Leu Asn

[0496] 85 90 95

[0497] Glu Ala Pro Val Lys Gly Ser Asp Leu Asp Asp Thr Gly Phe His Thr

[0498] 100 105 110

[0499] Ala Glu Asp Leu Asn Lys Ser Thr Ser Thr Ala Val Glu Ile Pro Thr

[0500] 115 120 125

[0501] Glu Thr Asn Asp Ala Asn Val Val Lys Ser Ser Gly Gly Cys Val Ala

[0502] 130 135 140

[0503] Ser Gly Ser Phe Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn

[0504] 145 150 155 160

[0505] Val Tyr Asp Gly Val Ser Pro Asp Lys Ala Arg Ser Ile Met Gln Leu

[0506] 165 170 175

[0507] Ala Ala Cys Pro Ser Ser Phe Pro Gln Asp Asn Leu Leu Asn Lys Asn
[0508] 180 185 190
[0509] Ala Ala Val Trp Ala Ser Pro Cys Asn Ile Pro Ile Asp Lys Asp Val
[0510] 195 200 205
[0511] Leu Phe Pro Asn Asp Thr Ala Ile Leu Gln Val Ala Gln Thr Asp Lys
[0512] 210 215 220
[0513] Met Val Glu Tyr Pro Leu Gln Tyr Arg Glu Lys Gly Ser Ile Ala Arg
[0514] 225 230 235 240
[0515] Asp Ala Asp Val Glu Gly Gln Ala Ser Arg Asn Ala Ser Leu Gln Arg
[0516] 245 250 255
[0517] Tyr Arg Glu Lys Arg Lys Asp Arg Gly Arg Ser Lys Gly Asn Lys Leu
[0518] 260 265 270
[0519] Thr Gly Ile Thr Ser Ser Asn Phe Glu Met Tyr Leu Asn Leu Pro Val
[0520] 275 280 285
[0521] Lys Leu His Ala Ser Asn Gly Asn Ser Ser Arg Ser Ser Thr Asp Ser
[0522] 290 295 300
[0523] Pro Pro Gln Pro Arg Leu Pro Leu Val Ser Gly Gly Ser Ala Glu Asn
[0524] 305 310 315 320
[0525] Gln Pro Lys Val Thr Leu Pro Ile Asp Leu Asn Asp Lys Asp Val Gln
[0526] 325 330 335
[0527] Glu Cys
[0528] <210> 12
[0529] <211> 311
[0530] <212> PRT
[0531] <213> Amborella trichopoda
[0532] <400> 12
[0533] Met Thr Ala Gly Asp Gly Ser Ile Arg Ser Ile Leu Asp Lys Pro Leu
[0534] 1 5 10 15
[0535] Glu Glu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0536] 20 25 30
[0537] Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[0538] 35 40 45
[0539] Tyr Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Gly Leu Leu Glu Gly
[0540] 50 55 60
[0541] Lys Pro Cys Asp Asp Asn Ser Asp Val Phe Ser His Arg Ser Pro Ile
[0542] 65 70 75 80
[0543] Thr Val Ile Pro Asn Val Gly Ser Met Arg Glu Lys Glu Lys Ala Val
[0544] 85 90 95
[0545] Asn Ile Ala Asp Pro Glu Ile Ser Gly Ser His Gln Pro Asn Phe Arg

[0546] 100 105 110

[0547] Arg Glu Ile His Glu Thr Thr Arg Glu Arg Ala Leu Pro Ala Ser Asp

[0548] 115 120 125

[0549] Trp Pro Pro Ser Gln Glu Pro Val Ser Gln Met Thr Ile Phe Tyr Ala

[0550] 130 135 140

[0551] Gly Ala Val Asn Val Tyr Asn Asp Ile Pro Glu Asp Lys Val Gln Ala

[0552] 145 150 155 160

[0553] Ile Ile Tyr Leu Ala Gly Lys Ser Asp Ser Leu Gln Gln Thr Asn Val

[0554] 165 170 175

[0555] Ile Arg Thr Gly Pro Asp Gln Cys Ile Ala Ser Ala Ala Ser Pro Ser

[0556] 180 185 190

[0557] Leu Asn Asp Leu His Ser Arg Arg Ile His Pro Thr Ser Asn Ile Thr

[0558] 195 200 205

[0559] Thr Ser Gln Ser Leu Arg Val Ala Thr Ser Leu Pro Val Gly Pro His

[0560] 210 215 220

[0561] Ser Glu Val Pro Lys Thr Arg Lys Thr Ser Val Gln Arg Phe Leu Glu

[0562] 225 230 235 240

[0563] Lys Arg Lys Asp Arg Gly Arg Leu Lys Gly Thr Leu Ala Ser Gly Gly

[0564] 245 250 255

[0565] Ser Ser Lys Arg Gly Ser Ser Cys Leu Glu Leu Tyr Ala Thr Ser Arg

[0566] 260 265 270

[0567] Leu Lys Ser Glu Gly Val Ala Thr Thr Thr Thr Gln Ser Asn Met Asn

[0568] 275 280 285

[0569] Asn Val Val Val Ser Pro Ser Asn Pro Arg Met Pro Leu Asn Pro Gly

[0570] 290 295 300

[0571] Ser Cys Ser Trp Val Glu Asn

[0572] 305 310

[0573] <210> 13

[0574] <211> 416

[0575] <212> PRT

[0576] <213> Selaginella moellendorffii

[0577] <400> 13

[0578] Met Ala Ala Ser Ile Leu Gly Cys Gly Ser Ser Asn Gly Val Ala Val

[0579] 1 5 10 15

[0580] Thr Gly Asn Pro Ala Pro Ala Ala Ala Ala Glu Val Pro Ala Pro Leu

[0581] 20 25 30

[0582] Arg Pro Leu Glu Glu Leu Thr Glu Leu Asp Ile Arg Gln Leu Thr Arg

[0583] 35 40 45

[0584] Glu Asp Cys Arg Arg Tyr Leu Lys Glu Arg Gly Met Arg Arg Pro Ser

[0585] 50 55 60

[0586] Trp Asn Lys Ala Gln Ala Ile Gln Gln Val Leu Ser Leu Arg Ser Leu

[0587] 65 70 75 80

[0588] Leu Cys Pro Ser Asn Pro Val Gly Pro Ser Ser Lys Asn Pro Gly Ser

[0589] 85 90 95

[0590] Ala Ala Asn Ala Pro Pro Ala Glu Ala Ala Ala Ala Gly His Thr Lys

[0591] 100 105 110

[0592] Gln Leu Leu Asp Lys Val Ser Gln Gln Ser Met Pro Asp Ser Cys Pro

[0593] 115 120 125

[0594] Ser Asn Asn Ala Ser Asp Pro Arg Pro Leu Ala Gly Cys Phe Gly Ser

[0595] 130 135 140

[0596] Leu Ala Pro Thr Leu Ser Val Leu Asn Pro Asp Ala Lys Arg Asn Pro

[0597] 145 150 155 160

[0598] Leu Ser Ser Lys Pro Ala Ser Thr Thr Lys Pro His Ser Ala Gln Leu

[0599] 165 170 175

[0600] Thr Ile Phe Tyr Ser Gly Ile Val Asn Val Tyr Asp Asp Val Pro Leu

[0601] 180 185 190

[0602] Asp Lys Ala Gln Ala Ile Met Leu Leu Ala Ala Ser Lys Thr Phe His

[0603] 195 200 205

[0604] Val Pro Thr Ser Ser Val Pro Gly His Pro Pro Phe Thr Ser Ala Thr

[0605] 210 215 220

[0606] Gln Gln Gln Gln Gln Gln Gln Arg Glu Leu Asn Gln Gln Thr Glu Ala

[0607] 225 230 235 240

[0608] Thr Gln Lys Tyr Pro Met Gln His Gln Gln Ala Pro Gln Ile Tyr Leu

[0609] 245 250 255

[0610] Ser Ser Gly Ser Ala Leu Pro Asp Glu Ser Cys Thr Glu Pro Gly Leu

[0611] 260 265 270

[0612] Pro Gln Val Arg Ser Ala Ser Leu Gln Arg Phe Leu Ala Lys Arg Arg

[0613] 275 280 285

[0614] Asp Arg Leu Ser Gly Asn Pro Ser Ser Ser Arg Arg Asn Asp Arg Ser

[0615] 290 295 300

[0616] Lys Lys Arg Arg Phe Ser Pro Pro Pro Ser Pro Leu Thr Ser Ala Ser

[0617] 305 310 315 320

[0618] Phe Gln Phe Pro Pro Ser Ala Arg Thr Ser Gln Val Leu Arg Tyr Ser

[0619] 325 330 335

[0620] Thr Thr Ser Thr Thr Thr Ile Thr Thr Ala Thr Ala Thr Ala Ala Thr

[0621] 340 345 350

[0622] Thr Thr Thr Thr Thr Gly Thr Thr Asn Gly Gly His Cys Ser Asn Ser

[0623] 355 360 365

[0624] Asn Gln Ala Ser Glu Asn Ala Gly Ser Asp Thr Ser Gly Gly Ser Ser
[0625] 370 375 380
[0626] Gly Thr Pro Asp Thr Ser Asp Thr Thr Arg Asp Asn Asp Asn Gly Arg
[0627] 385 390 395 400
[0628] Val Ser Asn Glu Asn Gly Arg Val Ser Thr Thr Cys Leu Ala Ala Thr
[0629] 405 410 415
[0630] <210> 14
[0631] <211> 234
[0632] <212> PRT
[0633] <213> Selaginella moellendorffii
[0634] <400> 14
[0635] Met Ser Ser Met Val Asp Phe Leu Gly Ile Glu Glu Lys Val Ser Thr
[0636] 1 5 10 15
[0637] Ser Val Ser Ala Glu Arg Leu Lys Lys Leu Glu Glu Leu Thr Asp Glu
[0638] 20 25 30
[0639] Asp Val Met Gln Leu Thr Arg Glu Asp Cys Arg Arg Tyr Leu Lys Glu
[0640] 35 40 45
[0641] Lys Gly Met Arg Arg Pro Ser Trp Asn Lys Ala Gln Ala Val Gln Gln
[0642] 50 55 60
[0643] Leu Leu Ser Leu Lys Ser Leu Cys Asp Pro Ser Pro Ala Ser Ser Gly
[0644] 65 70 75 80
[0645] Ala Ala Lys Arg Ser Pro Ser Pro Pro Leu Asp Glu Ala Pro Ala Lys
[0646] 85 90 95
[0647] Lys Pro Met Ala Met Thr Ser Ile Asp Leu Lys Ala Ala Ala Ala Val
[0648] 100 105 110
[0649] Asp Ala Ala Asn Leu Thr Met Phe Tyr Asp Gly Ala Val Ser Val Phe
[0650] 115 120 125
[0651] Asp Asp Val Ser Pro Asp Lys Ala Ser Leu Phe Pro Leu Ala Tyr Ala
[0652] 130 135 140
[0653] Ile Met Leu Leu Ala Gly Asn Val Lys Ser Trp Pro Ser Ile Asn Val
[0654] 145 150 155 160
[0655] Ala Ala Asn Thr Asn Lys Val Val Ile Ser Ser Tyr Glu Leu Pro Gln
[0656] 165 170 175
[0657] Ala Arg Lys Ala Ser Leu Gln Arg Phe Leu Gln Arg Arg Arg Glu Lys
[0658] 180 185 190
[0659] Thr Ala Lys Glu Ala Ala Ser Lys Gly Asn Ser Asn Lys Ser Pro Cys
[0660] 195 200 205
[0661] His Gly Glu Ser Ser Gly Lys His Ala Ser Asp Ala Thr Asp Pro Ala
[0662] 210 215 220

[0663] Thr Ser Pro Leu Leu Thr Glu Val Ser Ser
[0664] 225 230
[0665] <210> 15
[0666] <211> 271
[0667] <212> PRT
[0668] <213> Nicotiana tabacum
[0669] <400> 15
[0670] Met Pro Pro Glu Glu Thr Val Ser Lys Ser Pro Leu Asp Lys Pro Leu
[0671] 1 5 10 15
[0672] His Leu Leu Thr Asp Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0673] 20 25 30
[0674] Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[0675] 35 40 45
[0676] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Thr
[0677] 50 55 60
[0678] Thr Pro Asp Ser Asp Thr Gly Pro Arg Arg Lys Leu His Ile Pro Arg
[0679] 65 70 75 80
[0680] Pro Asp Thr Arg Val Gln Gln Val Gln Lys Gly Thr Asp Thr Asp Ala
[0681] 85 90 95
[0682] Glu Phe Ser Lys Ser Ala Glu Gly Met Val Pro Tyr Gly Arg Lys His
[0683] 100 105 110
[0684] Ser Lys Lys Pro Asp Ile Pro Gly Asp Ile Ala Ala Gly Ser Val Ala
[0685] 115 120 125
[0686] Val Ala Ala Gly Asn Asn Leu Ala Pro Ser Arg Thr Thr Asp Leu Gly
[0687] 130 135 140
[0688] Asn Thr Pro Ala Ser Gln Leu Thr Ile Phe Tyr Cys Gly Lys Val Asn
[0689] 145 150 155 160
[0690] Val Tyr Asp Asp Val Pro Ala Glu Lys Ala Gln Ala Ile Met His Leu
[0691] 165 170 175
[0692] Ala Ala Thr Pro Leu Phe Val Pro Ser Glu Thr Pro Leu Gly Ala Thr
[0693] 180 185 190
[0694] Leu Ala Ala Arg His Ser Glu Cys His Leu Gln Ala Ala Ser Val Lys
[0695] 195 200 205
[0696] Gln Gly Pro Asp Ser Ala Met Val Leu Met Pro Thr Met Gln Thr Gly
[0697] 210 215 220
[0698] Lys Met Ser Glu Val Thr Arg Leu Arg Leu Glu Glu Ser Asn Thr Phe
[0699] 225 230 235 240
[0700] Tyr Glu Asp Asn Ser Ala Asn Tyr Ala Glu Ala Val Glu Gly His Pro
[0701] 245 250 255

[0702] Ser Arg Lys Ala Ser Val Gln Arg Tyr Leu Glu Lys Arg Lys Asp
[0703] 260 265 270
[0704] <210> 16
[0705] <211> 327
[0706] <212> PRT
[0707] <213> Solanum tuberosum
[0708] <400> 16
[0709] Met Pro Pro Glu Glu Thr Val Ser Lys Ser Pro Leu Asp Lys Pro Leu
[0710] 1 5 10 15
[0711] Asn Gln Leu Thr Asp Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0712] 20 25 30
[0713] Arg Arg Tyr Leu Lys Gln Lys Gly Met Arg Lys Pro Ser Trp Asn Lys
[0714] 35 40 45
[0715] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Pro
[0716] 50 55 60
[0717] Asp Thr Asp Ala Gly Thr Arg Lys Lys Leu His Ile Pro Arg Ala Asp
[0718] 65 70 75 80
[0719] Thr His Val Gln Ser Gly Lys Asn Thr Tyr Gly Glu Pro Ser Glu Pro
[0720] 85 90 95
[0721] Val Pro Asp Arg Arg Asn Gln Gln Asp Arg Pro Asp Leu Ser Ser His
[0722] 100 105 110
[0723] Ile Thr Ala Leu Pro Val Ala Val Val Asp Asn Ser Ala Pro Ser Arg
[0724] 115 120 125
[0725] Thr Ile Gly Ser Ala Asp Lys Pro Val Gly Gln Met Thr Ile Phe Tyr
[0726] 130 135 140
[0727] Arg Gly Lys Val Asn Val Tyr Asp Asp Val Pro Ala Asp Lys Ala Gln
[0728] 145 150 155 160
[0729] Lys Ile Met Cys Leu Ala Ser Ser Pro Leu Cys Val Pro Ser Glu Thr
[0730] 165 170 175
[0731] Pro Ser Asn Ala Thr Val Ala Ala Arg His Ser Ala Cys Cys Leu Gln
[0732] 180 185 190
[0733] Ala Ala Asn Ser Lys Leu Arg Leu Asp Thr Asn Ile Val Pro Thr Ile
[0734] 195 200 205
[0735] Gln Thr Val Lys Met Ser Glu Val Ser Arg Val Pro Ile Glu Glu Ser
[0736] 210 215 220
[0737] Asn Arg Leu Tyr Asn Asp Asn Pro Glu Ala Val Glu Ser Pro Ala Ser
[0738] 225 230 235 240
[0739] Arg Lys Ala Ser Val Gln Arg Tyr Leu Glu Lys Arg Lys Glu Arg Phe
[0740] 245 250 255

[0741] Lys Trp Lys Arg Lys Val Glu Thr Thr Ser Ser Ala Ser Leu Asp Ile
[0742] 260 265 270
[0743] Tyr Leu Ser Asp Arg Ile Gly Thr Arg Thr Pro Ser Asp Tyr Ala Ser
[0744] 275 280 285
[0745] Gly Ala Asp Leu Cys Phe Thr Pro His Ile Thr Pro Thr Gly Ser Gly
[0746] 290 295 300
[0747] Pro Ile Gln Asp Asn Ile Gln Met Asn Pro Thr Phe Ser Ser Asp Leu
[0748] 305 310 315 320
[0749] Asn Asp Arg Asp Val Arg Glu
[0750] 325
[0751] <210> 17
[0752] <211> 348
[0753] <212> PRT
[0754] <213> Glycine max
[0755] <400> 17
[0756] Met Asn Gly Gly Ala Thr Thr Ala Thr Phe Arg Ser Ile Leu Asp Lys
[0757] 1 5 10 15
[0758] Pro Leu Asn Gln Leu Thr Glu Asp Asp Ile Ser Gln Leu Thr Arg Glu
[0759] 20 25 30
[0760] Asp Cys Arg Arg Phe Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp
[0761] 35 40 45
[0762] Asn Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu
[0763] 50 55 60
[0764] Glu Pro Ser Asp Asp Asp Thr Pro Pro Pro Thr Ala Met His His Arg
[0765] 65 70 75 80
[0766] Ser His Ala Pro Pro Pro Pro Pro Gln Pro Gln Ser Gln Val Asn Leu
[0767] 85 90 95
[0768] Thr Glu Pro Pro Pro Pro Pro Lys Ala Pro Pro Pro Glu Glu Ser Ser
[0769] 100 105 110
[0770] Phe His Ala Ala Glu Asp Ile Gln Lys Pro Ala Ser Ser Gly Glu Lys
[0771] 115 120 125
[0772] Pro Ser Glu Thr Asn Asp Thr Asn Thr Asn Val Ala Ser Pro Lys Gly
[0773] 130 135 140
[0774] Cys Ala Thr Ser Gly Ser Phe Gly Gln Met Thr Ile Phe Tyr Cys Gly
[0775] 145 150 155 160
[0776] Lys Val Asn Val Tyr Asp Gly Val Ser Pro Asp Lys Ala Arg Ala Ile
[0777] 165 170 175
[0778] Met Gln Leu Ala Val Ser Pro Val Gln Phe Thr Gln Asp Asp Pro Ser
[0779] 180 185 190

[0780] Asn Gly Asn Ala Ala Val Trp Pro Ser Pro Cys His Leu Pro Met Asp
[0781] 195 200 205
[0782] Lys Asp Val Leu Ile Pro Val Asp Thr Thr Ile Leu Gln Val Ala Gln
[0783] 210 215 220
[0784] Ser Asp Lys Met Met Glu Tyr Pro Leu Gln Tyr Arg Glu Lys Gly Ser
[0785] 225 230 235 240
[0786] Ile Ala Arg Asp Ala Glu Gly Gln Ala Ser Arg Lys Val Ser Leu Gln
[0787] 245 250 255
[0788] Arg Tyr Leu Glu Lys Arg Lys Asp Arg Gly Arg Leu Lys Gly Lys Lys
[0789] 260 265 270
[0790] Leu Thr Gly Ile Thr Ser Ser Asn Phe Glu Met Tyr Leu Asn Leu Pro
[0791] 275 280 285
[0792] Val Lys Val His Ala Ser Asn Gly Asn Ser Ser Arg Ser Ser Thr Ser
[0793] 290 295 300
[0794] Ser Pro Pro Gln Pro Arg Leu Pro Leu Val Ser Ser Gly Ser Ala Asp
[0795] 305 310 315 320
[0796] Asn Gln Leu Lys Val Ala Leu Pro Ile Asp Leu Asn Asp Lys Val Ser
[0797] 325 330 335
[0798] Leu Gln Met Phe Lys Asn Ala Lys Thr Leu Thr Arg
[0799] 340 345
[0800] <210> 18
[0801] <211> 338
[0802] <212> PRT
[0803] <213> Citrus clementine
[0804] <400> 18
[0805] Met Asp Val Asp Gly Gly Val Thr Ser Cys Arg Ser Ile Leu Glu Lys
[0806] 1 5 10 15
[0807] Pro Leu Ser Gln Leu Thr Glu Glu Asp Ile Thr Gln Leu Thr Arg Glu
[0808] 20 25 30
[0809] Asp Cys Arg Lys Phe Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp
[0810] 35 40 45
[0811] Asn Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu
[0812] 50 55 60
[0813] Glu Ser Ser Gly Asp Ser Gly Ser Gly Val Leu Arg Arg Val Leu Val
[0814] 65 70 75 80
[0815] Ser Pro Pro Glu Ser Met Pro Pro Arg Val Asn Val Thr Ser Asn Ser
[0816] 85 90 95
[0817] Ala Asp Leu Val Lys Glu Pro Thr Ile Ser Val Ser Gly Asp Gln Asn
[0818] 100 105 110

[0819] Ser Ala Tyr Arg Arg Lys Tyr Pro Arg Asn Cys Ala Val Asp Ala Asp
[0820] 115 120 125
[0821] Asn Lys Thr Ile Ser Asn Arg Asn Pro Cys Glu Ala Asn Gly Ser Ile
[0822] 130 135 140
[0823] Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn Val Tyr Glu Gly
[0824] 145 150 155 160
[0825] Val Pro Thr Asp Lys Ala Gln Glu Ile Met His Leu Ala Ala Thr Pro
[0826] 165 170 175
[0827] Ile Asp Phe Ser Gln Asn Gly Ser Phe Gly Gly Ile Thr Ala Tyr Arg
[0828] 180 185 190
[0829] Ala Ile Pro Cys His Leu Gln Val Thr Ser Asn Arg His Val Ser Leu
[0830] 195 200 205
[0831] Pro Leu Arg Pro Ala Ala Met Ile Ser Gln Phe Met Gln Thr Gly Lys
[0832] 210 215 220
[0833] Ile Ala Asp Tyr Ser Gln Glu Tyr Arg Glu Lys Ala Ile Ser Thr His
[0834] 225 230 235 240
[0835] Asp Ser Asp Val Asp Gly Gln Val Asn Arg Lys Val Ser Leu Gln Arg
[0836] 245 250 255
[0837] Tyr Leu Glu Lys Arg Lys Asp Arg Gly Arg Phe Phe Lys Gly Lys Lys
[0838] 260 265 270
[0839] Asn Thr Gly Pro Thr Pro Ser Leu Glu Met Tyr Leu Asn His Pro Gly
[0840] 275 280 285
[0841] Lys Thr His Ala Ser Asn Gly Gln Gln Ser Gln Ser Asn Thr Ser Ser
[0842] 290 295 300
[0843] Pro Thr Gln Pro Glu Leu Ser Asn Thr Leu Gly Thr Ser Pro Asp Asn
[0844] 305 310 315 320
[0845] Gln Ala Lys Thr Val Met Leu Pro Val Asp Leu Asn Asn Glu Asp Ile
[0846] 325 330 335
[0847] Gln Asp
[0848] <210> 19
[0849] <211> 335
[0850] <212> PRT
[0851] <213> Ricinus communis
[0852] <400> 19
[0853] Met Asp Ala Gly Val Thr Ser Phe Arg Ser Ile Leu Asp Lys Pro Leu
[0854] 1 5 10 15
[0855] Thr Gln Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0856] 20 25 30
[0857] Arg Lys Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[0858] 35 40 45

[0859] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Thr

[0860] 50 55 60

[0861] Ser Glu Asp Ser Gly Ala Gly Ala Leu Arg Arg Ile Leu Val Ser Lys

[0862] 65 70 75 80

[0863] Pro Pro Val Thr Ser Asn Ser Val Asp Ser Ala Lys Glu Pro Ser Asp

[0864] 85 90 95

[0865] Ser Asn Asn Asn Asn Leu Leu Asp Glu Thr Ala Pro His Asp Ser Pro

[0866] 100 105 110

[0867] Lys Ser Pro Pro Pro Ala Pro Ser Leu Asp Cys Pro Leu Glu Glu Ala

[0868] 115 120 125

[0869] Asp Asn Lys Val Ile Ser Ser Arg Ser Pro Gly Ala Thr Asp Gly Leu

[0870] 130 135 140

[0871] Val Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn Val Tyr Asp

[0872] 145 150 155 160

[0873] Gly Val Pro Pro Asp Lys Ala Gln Ala Ile Met His Leu Ala Ala Thr

[0874] 165 170 175

[0875] Pro Ile His Ser Pro Leu Asp Asp Pro Ile Arg Arg Pro Val Phe Ala

[0876] 180 185 190

[0877] Phe Pro Tyr His Leu Gln Thr Pro Ser Asp Lys His Val Phe Val Pro

[0878] 195 200 205

[0879] Ser Asn Ala Ala Ile Ser Pro Thr Thr Pro Thr Glu Lys Val Thr Glu

[0880] 210 215 220

[0881] Tyr Ser Gln Gln Cys Arg Glu Lys Gly Asn Val Thr Tyr Asp His Asp

[0882] 225 230 235 240

[0883] Val Glu Gly Gln Ala Asn Arg Lys Met Ser Leu Gln Arg Tyr Leu Glu

[0884] 245 250 255

[0885] Lys Lys Lys Asp Arg Gly Arg Phe Lys Gly Arg Lys Asn Leu Gly Pro

[0886] 260 265 270

[0887] Asn Ser Ser Ser Leu Asp Ala Tyr Leu Asn His Gln Met Arg Thr His

[0888] 275 280 285

[0889] Ile Ser Asn Glu Gln Ser Thr Arg Ser Ser Thr Ser Ser Pro Thr Gln

[0890] 290 295 300

[0891] Pro Gly Val Pro His Thr Ser Ser Asn Ser Ala Glu Asp Gln Leu Lys

[0892] 305 310 315 320

[0893] Thr Ala Ser Phe Ala Val Asp Leu Asn Glu Asp Val Gln Glu Pro

[0894] 325 330 335

[0895] <210> 20

[0896] <211> 393

[0897] <212> PRT

[0898] <213> Vitis vinifera

[0899] <400> 20

[0900] Met Asn Pro Gly Val Thr Thr Leu Arg Ser Ile Leu Asp Lys Pro Leu

[0901] 1 5 10 15

[0902] His Glu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[0903] 20 25 30

[0904] Arg Lys Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[0905] 35 40 45

[0906] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ser Leu Leu Glu Thr

[0907] 50 55 60

[0908] Ser Glu Gly Ser Gly Ala Gly Val Leu Arg Lys Ile Thr Asp Ser Pro

[0909] 65 70 75 80

[0910] Pro Ala Glu Asn Leu Pro Pro Val Thr Ser Asn Ser Ala Asp Ser Gly

[0911] 85 90 95

[0912] Lys Glu Leu Ser Ala Asp Ile Gln Ile Ser Val Ser Ala Asp Glu Leu

[0913] 100 105 110

[0914] Val Pro Leu Pro Pro Lys Asp His His Pro Glu Ser Thr Pro Ser Gly

[0915] 115 120 125

[0916] Glu Leu Ala Ser Arg Pro Pro Glu Ala Asp Thr Lys His Thr Cys Pro

[0917] 130 135 140

[0918] Arg Ser Pro Gly Ala Thr Asn Cys Leu Val Gly Gln Met Thr Ile Phe

[0919] 145 150 155 160

[0920] Tyr Cys Gly Lys Val Asn Val Tyr Asp Gly Val Pro Asp Asp Lys Ala

[0921] 165 170 175

[0922] Gln Ala Ile Met His Leu Ala Ala Ser Pro Phe His Leu Pro Ser Asp

[0923] 180 185 190

[0924] Asp Pro Phe Ser Gly Ala Ala Met Leu Cys Ser Ser Pro Cys His Leu

[0925] 195 200 205

[0926] His Thr Ala Asn Val Lys His Gly His Ile Pro Pro Arg Ala Met Val

[0927] 210 215 220

[0928] Ser Gln Thr Met Gln Thr Glu Lys Phe Thr Glu Tyr Ser Gln Gln Tyr

[0929] 225 230 235 240

[0930] Arg Glu Glu Val Asn Phe Thr Arg Gly His Gly Ser Glu Ala Leu Ser

[0931] 245 250 255

[0932] Gly Leu Arg Thr Val Gly Ser Pro Thr Ala Arg Pro Thr Glu Asp Met

[0933] 260 265 270

[0934] Glu Gln Thr Thr Cys Leu Thr Ile Trp Gly Thr Phe Arg Tyr Lys Val

[0935] 275 280 285

[0936] Met Pro Phe Glu Ile Tyr Glu Gly Ile Met Asp Val Glu Gly Gln Val
[0937] 290 295 300
[0938] Asp Arg Lys Leu Ser Leu Gln Arg Tyr Phe Glu Lys Arg Lys Asp Arg
[0939] 305 310 315 320
[0940] Phe Lys Ser Arg Lys Lys Ile Gly Leu Pro Ser Gly Ser Leu Glu Met
[0941] 325 330 335
[0942] Tyr Val Asn His Gln Ala Arg Thr Gln Pro Ser Asn Gly Gln Ser Ser
[0943] 340 345 350
[0944] Arg Ser Gly Thr Ser Ser Pro Pro Gln His Gly Leu Ser His Thr Leu
[0945] 355 360 365
[0946] Cys Ser Ser Ala Asp Asn His Thr Lys Asn Phe Thr Pro Phe Val Asp
[0947] 370 375 380
[0948] Leu Asn Ser Lys Asp Ile Gln Glu Ser
[0949] 385 390
[0950] <210> 21
[0951] <211> 343
[0952] <212> PRT
[0953] <213> Morus notabilis
[0954] <400> 21
[0955] Met Ser Ala Gly Thr Thr Ala Phe Arg Ser Ile Leu Asp Lys Pro Leu
[0956] 1 5 10 15
[0957] Asn Gln Leu Thr Glu Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[0958] 20 25 30
[0959] Arg Lys Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[0960] 35 40 45
[0961] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Pro
[0962] 50 55 60
[0963] Cys Asp Asp Ser Gly Ala Gly Ala Leu Arg Arg Ile Val Ala Ser Thr
[0964] 65 70 75 80
[0965] Pro Pro Pro Pro Pro Thr Gln Asn Ala Pro Arg Val Ser Thr Phe Ser
[0966] 85 90 95
[0967] Val Thr Ser Asn Ser Ala Asp Ser Gly Lys Glu Ala Ser Val Asp Val
[0968] 100 105 110
[0969] Gln Val Ser Ala Glu Glu Ser Gly Pro Cys Gln Arg Lys Glu Gln Ala
[0970] 115 120 125
[0971] Lys Ser Ala Pro Glu Thr Glu Glu Arg Pro Ala Asp Ala Gly Glu Arg
[0972] 130 135 140
[0973] Ala Ser Pro Arg Ser His Cys Ala Thr Asp Ala Leu Val Gly Gln Met
[0974] 145 150 155 160

[0975] Thr Ile Phe Tyr Cys Gly Lys Val Asn Val Tyr Glu Gly Val Pro Pro
[0976] 165 170 175
[0977] Glu Lys Ala Arg Ala Ile Met His Leu Ala Ala Ser Pro Ile Pro Leu
[0978] 180 185 190
[0979] Ser Arg Glu Asn Ser Phe Gly Val Leu Ala Ala Pro Arg Ser Phe Pro
[0980] 195 200 205
[0981] Trp His Leu His Ala Ala Ser Asp Lys Gly Gly Leu Leu Pro Pro Ser
[0982] 210 215 220
[0983] Ala Thr Ile Ser Gln Pro Met Gln Thr Asp Lys Leu Ala Asp Tyr Ser
[0984] 225 230 235 240
[0985] Gln Gln Cys Trp Glu Lys Glu Asn Asp Gly Gln Ala Ser Arg Lys Leu
[0986] 245 250 255
[0987] Ser Leu Gln Lys Tyr Arg Glu Lys Lys Lys Asp Arg Gly Arg Leu Lys
[0988] 260 265 270
[0989] Thr Lys Arg Ser Thr Gly Phe Asn Ser Ser Ser Met Glu Val Tyr Phe
[0990] 275 280 285
[0991] Asn His Gln Val Lys Thr His Met Ser Asn Gly Asn Ser Ser Arg Ser
[0992] 290 295 300
[0993] Ser Thr Ser Ser Pro Thr Gln Pro Gly Leu Pro Gln Thr Leu Cys Ser
[0994] 305 310 315 320
[0995] Thr Val Asp Asn Gln Pro Lys Ile Pro Cys Leu Pro Val Asp Leu Asn
[0996] 325 330 335
[0997] Glu Lys Leu Thr Ile Glu Met
[0998] 340
[0999] <210> 22
[1000] <211> 364
[1001] <212> PRT
[1002] <213> Phoenix dactylifera
[1003] <400> 22
[1004] Met Tyr Trp Val Gly Ser Ala Gln Glu Arg Arg Arg Asp Gly Gly Arg
[1005] 1 5 10 15
[1006] Ser Pro Leu Asp Lys Pro Leu Ser Leu Leu Thr Glu Glu Asp Ile Ala
[1007] 20 25 30
[1008] Gln Leu Thr Arg Glu Asp Cys Arg Arg Phe Leu Lys Glu Lys Gly Met
[1009] 35 40 45
[1010] Arg Arg Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln Gln Val Ile Ser
[1011] 50 55 60
[1012] Leu Lys Ala Leu Leu Glu Gly Arg Pro Glu Ser Gly Glu Leu Pro Val
[1013] 65 70 75 80

[1014] Gly Ala Gly Tyr Arg Gln Lys Pro Pro Pro Arg Arg Pro Ala Ser Leu
[1015] 85 90 95
[1016] Pro Ser Leu Gln Glu Ala Ala Gly Asp Ser Thr Ala Ala Ala Lys Glu
[1017] 100 105 110
[1018] Pro Ser Pro Ser Ser Ser Leu Ser Pro Tyr Arg Arg Arg Asp Pro Ile
[1019] 115 120 125
[1020] Pro Pro Ile Ile Ser Ala Gly Gly Pro Ser Cys Arg Phe Pro Val Ala
[1021] 130 135 140
[1022] Gly Arg Asp Gln Gln Pro Pro Glu Thr Pro Ser Pro Ser Leu Arg Val
[1023] 145 150 155 160
[1024] Thr Ala Glu Val Pro Ala Gly Gln Met Thr Ile Phe Tyr Asp Gly Lys
[1025] 165 170 175
[1026] Val Asn Val Tyr Ser Asp Val Thr Val Asp Lys Ala Arg Ala Ile Leu
[1027] 180 185 190
[1028] Leu Leu Ala Gly Arg Arg Asp Cys Tyr Gly Ala Ala Ala Leu Pro Gly
[1029] 195 200 205
[1030] Pro Val His Ser Pro Gln Pro Ala Phe Leu Gly Pro Gly Gln Gly Pro
[1031] 210 215 220
[1032] Val Pro Thr Ala Pro Pro Leu Ala Ala Ala Leu Pro Thr Ser Pro Ala
[1033] 225 230 235 240
[1034] Gly Arg Leu Ala His Arg Phe Glu Gly Pro Ser Gly Val Pro Arg Gly
[1035] 245 250 255
[1036] Lys Ser Ser Leu Val Arg Glu Arg Ser Thr Ser Pro Glu Gly Pro Thr
[1037] 260 265 270
[1038] Ser Arg Lys Ala Ser Leu Gln Arg Tyr Leu Glu Lys Arg Lys Asp Arg
[1039] 275 280 285
[1040] Leu Lys Gly Arg Lys Thr Leu Gly Gly Ala Ser Ser Ser Ser Met Glu
[1041] 290 295 300
[1042] Ile Met Phe Leu Ser Gln Lys Phe Gly Gly Gln Ile Pro Asn Glu Gln
[1043] 305 310 315 320
[1044] Leu Ser Arg Ser Asn Thr Ser Ser Pro Thr Gln Pro Arg Pro Pro Gly
[1045] 325 330 335
[1046] Thr Pro Thr Arg Cys Ser Ser Ile Glu Asn Gln Ala Gln Lys Asn His
[1047] 340 345 350
[1048] Leu Ser Val Asp Leu Asn Asp Asp Gly Cys Gly Asn
[1049] 355 360
[1050] <210> 23
[1051] <211> 354
[1052] <212> PRT

[1053] <213> Theobroma cacao

[1054] <400> 23

[1055] Met Glu Ala Gly Val Ala Thr Thr Thr Thr Thr Thr Glu Ser Phe Arg
[1056] 1 5 10 15
[1057] Ser Ile Leu Asp Lys Pro Leu Ser Gln Leu Thr Glu Glu Asp Ile Ser
[1058] 20 25 30
[1059] Gln Leu Thr Arg Glu Asp Cys Arg Lys Phe Leu Lys Glu Lys Gly Met
[1060] 35 40 45
[1061] Arg Arg Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln Gln Val Ile Ser
[1062] 50 55 60
[1063] Leu Lys Ala Leu Leu Glu Ser Asn Glu Asp Ser Gly Ala Gly Ala Ile
[1064] 65 70 75 80
[1065] Arg Lys Ile Leu Val Ser Pro Pro Ser Pro Ser Val Pro Pro Gln Asn
[1066] 85 90 95
[1067] Ala Ala Ala Arg Val Ala Ser Asn Ser Cys Asp Ser Val Lys Glu Ala
[1068] 100 105 110
[1069] Val Val Gly Glu Glu Gly Ser Pro Tyr Arg Arg Lys Asp Pro Pro Leu
[1070] 115 120 125
[1071] Lys Pro Ser Pro Val Gly Glu Ile Asn Cys Leu Gly Gly Asp Thr Asp
[1072] 130 135 140
[1073] Asn Lys Asn Leu Ser Pro Arg Ser Pro Cys Glu Ser Asn Glu Leu Gly
[1074] 145 150 155 160
[1075] Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn Val Tyr Asp Gly
[1076] 165 170 175
[1077] Val Pro Leu Asp Lys Ala Arg Ala Ile Met His Leu Ala Ala Thr Pro
[1078] 180 185 190
[1079] Ile Asp Phe Pro Gln Asp Asn Gln Cys Ser Gly Asn Ala Ala Leu Arg
[1080] 195 200 205
[1081] Ser Phe Met Cys His Val Gln Ala Val Gly Asp Lys Asn Gly Leu Val
[1082] 210 215 220
[1083] Ala Ser Thr Ala Leu Asn Ser His Thr Met Gln Thr Glu Lys Leu Thr
[1084] 225 230 235 240
[1085] Glu Tyr Gln His Gln Phe Arg Glu Lys Gly Asn Ile Ala Arg Asp Ala
[1086] 245 250 255
[1087] Asp Val Asp Gly Gln Val Asn Arg Lys Val Ser Leu Gln Arg Tyr Arg
[1088] 260 265 270
[1089] Glu Lys Arg Lys Asp Arg Gly Arg Phe Phe Lys Gly Arg Lys Asn Thr
[1090] 275 280 285
[1091] Gly Gln Ala Ser Ser Ser Leu Glu Met Tyr Leu Asn His Gln Ile Arg

[1092] 290 295 300
[1093] Thr His Asn Ser Asn Gly Gln Ser Ser Arg Ser Ser Thr Gly Ser Pro
[1094] 305 310 315 320
[1095] Pro Gln Ser Gly Leu Pro His Ala Phe Cys Ser Ser Ala Asp Asn Gln
[1096] 325 330 335
[1097] Ala Lys Leu Val Asn Leu Ser Val Asp Leu Asn Asp Lys Ser Val Gln
[1098] 340 345 350
[1099] Glu His
[1100] <210> 24
[1101] <211> 293
[1102] <212> PRT
[1103] <213> Spirodela polyrrhiza
[1104] <400> 24
[1105] Met Ala Gly Ser Glu Ala Ala Ala Pro Glu Glu Ala Gly Arg Ala Gly
[1106] 1 5 10 15
[1107] Glu Glu Glu Val Arg Ala Ala Ala Gly Ala Ala Ala Val Lys Ser Pro
[1108] 20 25 30
[1109] Leu Glu Lys Pro Leu Ser Glu Leu Thr Glu Glu Asp Ile Ala Gln Val
[1110] 35 40 45
[1111] Thr Arg Glu Asp Cys Arg Arg Phe Leu Lys Glu Lys Gly Met Arg Arg
[1112] 50 55 60
[1113] Pro Ser Trp Asn Lys Ser Gln Ala Val Gln Gln Val Ile Ser Leu Lys
[1114] 65 70 75 80
[1115] Ala Leu Leu Glu Pro Cys His Asp Ala Asp Asp Asp Ala Pro Ser Ala
[1116] 85 90 95
[1117] Gly Ala Val Pro Ser Ile Ser Ser Phe Phe Ser Lys Arg Pro Ser Asp
[1118] 100 105 110
[1119] Ala Leu Leu Pro Ala Ala Ala Ala Gln Phe Pro Val Ser Ser Pro Met
[1120] 115 120 125
[1121] Arg Gly Glu Pro Ala Gly Gly Ala Pro Gln Ile Val Ser Glu Arg Pro
[1122] 130 135 140
[1123] His Gly Arg Asp Pro Leu Ala Asn Val Phe Thr Cys Ser Asp Ala Leu
[1124] 145 150 155 160
[1125] Gly Arg Phe Pro Ala Thr Gly Asn Gly Ala Leu Pro Pro Asn Ser Ala
[1126] 165 170 175
[1127] Thr Leu Pro Pro Arg Gly Val Ala Ser Ala Glu Thr Leu Glu Gly Gln
[1128] 180 185 190
[1129] Leu Thr Ile Phe Tyr Asp Gly Lys Ile Asn Val Tyr Asp Gly Val Thr
[1130] 195 200 205

[1131] Pro Glu Lys Val Arg Ser Gly Gln Lys Gly Pro Thr Ser Arg Ala Ala
[1132] 210 215 220
[1133] Ser Leu Gln Arg Tyr Leu Glu Lys Arg Lys Asp Arg Arg Asp Pro Gly
[1134] 225 230 235 240
[1135] Pro Ala Ala Val Ala Thr Leu Tyr Arg Lys Val Phe Leu Ser Ala Thr
[1136] 245 250 255
[1137] Ala Leu Leu Ile Gly Cys Ser Ser Gly Ala Asn Val Val Leu Pro Arg
[1138] 260 265 270
[1139] Ala Glu Gly Pro Thr Ser Arg Ala Ala Ser Leu Gln Arg Tyr Leu Glu
[1140] 275 280 285
[1141] Lys Arg Lys Asp Arg
[1142] 290
[1143] <210> 25
[1144] <211> 293
[1145] <212> PRT
[1146] <213> Musa acuminata
[1147] <400> 25
[1148] Met Asn Pro Gly Glu Thr Thr Pro Pro Ser Pro Leu Asp Lys Pro Leu
[1149] 1 5 10 15
[1150] Ala Glu Leu Thr Glu Glu Asp Ile Ala Gln Leu Thr Arg Glu Asp Cys
[1151] 20 25 30
[1152] Arg Arg Phe Leu Lys Ala Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[1153] 35 40 45
[1154] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Gly
[1155] 50 55 60
[1156] Arg Pro Gly Cys Asp Asp Cys Pro Ala Gly Gly Gly Ile Leu Gln Lys
[1157] 65 70 75 80
[1158] Leu Leu Thr Ser Ser Pro Ser Glu Pro Leu Ser Pro Pro Gln Asp Ser
[1159] 85 90 95
[1160] Pro Pro Pro Ala Pro Lys Glu Gly Gly Ser Gly Ser Gln Pro Leu Ala
[1161] 100 105 110
[1162] Lys Glu Pro Ser Pro Tyr Arg Arg Arg Asp Pro Ile Pro Pro Pro Tyr
[1163] 115 120 125
[1164] Ser Ala Gly Asn Pro Thr Cys Gln Thr Pro Ile Ala Gly Ala Asp Leu
[1165] 130 135 140
[1166] Pro His Pro Pro Glu Lys Arg Cys Pro Ser Pro Arg Leu Thr Ala Glu
[1167] 145 150 155 160
[1168] Val Pro Val Gly Gln Met Thr Ile Phe Tyr Asp Gly Met Val Asn Val
[1169] 165 170 175

[1170] Tyr Asp Gly Val Ser Ala Asp Gln Ala Arg Ser Ile Met Glu Leu Ala
[1171] 180 185 190
[1172] Ala Ser Pro Val Cys Phe Asp Asp Pro Thr Gly Ala Phe Ser Pro Ala
[1173] 195 200 205
[1174] Arg Pro Pro Ala Phe Arg Phe Pro Pro Gly Leu Pro Arg Pro Ala Pro
[1175] 210 215 220
[1176] Val Pro Thr Ala Pro Ser Phe Val Gly Thr Phe Pro Ile Ser Pro Ala
[1177] 225 230 235 240
[1178] Gly Lys Arg Cys Tyr Ser Tyr Cys Ser Phe Arg Ser Ser Val Ser Leu
[1179] 245 250 255
[1180] Leu Thr Thr Thr Glu Gly Pro Thr Ser Arg Lys Ala Ser Leu Gln Arg
[1181] 260 265 270
[1182] Tyr Leu Glu Lys Arg Lys Asp Arg Tyr Gly His Leu Pro Thr Glu Ser
[1183] 275 280 285
[1184] Ile Leu Leu Val Ser
[1185] 290
[1186] <210> 26
[1187] <211> 171
[1188] <212> PRT
[1189] <213> Phalaenopsis aphrodite
[1190] <220>
[1191] <221> misc_feature
[1192] <222> (72)..(87)
[1193] <223> Xaa can be any naturally occurring amino acid
[1194] <400> 26
[1195] Met Asn Ser Asp Ala Ile Thr Met Gly Lys Ser Leu Leu Glu Lys Pro
[1196] 1 5 10 15
[1197] Leu Ser Leu Leu Thr Glu Asp Asp Ile Ala Gln Ile Thr Arg Glu Glu
[1198] 20 25 30
[1199] Cys Arg Arg Phe Leu Lys Asp Arg Gly Met Arg Arg Pro Ser Trp Asn
[1200] 35 40 45
[1201] Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Phe Glu
[1202] 50 55 60
[1203] Asn Arg Ser Asp Leu Glu Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
[1204] 65 70 75 80
[1205] Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Pro Glu His Ala Asp Leu Ser Ser
[1206] 85 90 95
[1207] Ile Ser Pro Thr Ala Glu Ala Lys Glu Pro Glu Lys Ala Gln Leu Thr
[1208] 100 105 110

[1209] Ile Phe Tyr Gly Gly Lys Val Leu Val Phe Asp Asn Phe Pro Val Asn
[1210] 115 120 125
[1211] Lys Ala Gln Asp Leu Met Gln Ile Ala Gly Lys Glu Gln Asn Gln Asn
[1212] 130 135 140
[1213] Tyr Gly Thr Ala Asn Thr Val Ala Pro Ser Ala Pro Ala Ala Asp Leu
[1214] 145 150 155 160
[1215] His Ser Leu Pro Leu Pro Ala Lys Pro Pro Ala
[1216] 165 170
[1217] <210> 27
[1218] <211> 46
[1219] <212> PRT
[1220] <213> Artificial Sequence
[1221] <220>
[1222] <223> Consensus sequence
[1223] <400> 27
[1224] Leu Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp
[1225] 1 5 10 15
[1226] Cys Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn
[1227] 20 25 30
[1228] Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu
[1229] 35 40 45
[1230] <210> 28
[1231] <211> 46
[1232] <212> PRT
[1233] <213> Artificial Sequence
[1234] <220>
[1235] <223> Consensus sequence
[1236] <220>
[1237] <221> misc_feature
[1238] <222> (2)..(3)
[1239] <223> Xaa can be any naturally occurring amino acid
[1240] <220>
[1241] <221> misc_feature
[1242] <222> (5)..(7)
[1243] <223> Xaa can be any naturally occurring amino acid
[1244] <220>
[1245] <221> misc_feature
[1246] <222> (9)..(10)
[1247] <223> Xaa can be any naturally occurring amino acid

[1248] <220>
[1249] <221> misc_feature
[1250] <222> (12)..(12)
[1251] <223> Xaa can be any naturally occurring amino acid
[1252] <220>
[1253] <221> misc_feature
[1254] <222> (16)..(16)
[1255] <223> Xaa can be any naturally occurring amino acid
[1256] <220>
[1257] <221> misc_feature
[1258] <222> (19)..(20)
[1259] <223> Xaa can be any naturally occurring amino acid
[1260] <220>
[1261] <221> misc_feature
[1262] <222> (22)..(24)
[1263] <223> Xaa can be any naturally occurring amino acid
[1264] <220>
[1265] <221> misc_feature
[1266] <222> (28)..(28)
[1267] <223> Xaa can be any naturally occurring amino acid
[1268] <220>
[1269] <221> misc_feature
[1270] <222> (34)..(34)
[1271] <223> Xaa can be any naturally occurring amino acid
[1272] <220>
[1273] <221> misc_feature
[1274] <222> (37)..(38)
[1275] <223> Xaa can be any naturally occurring amino acid
[1276] <220>
[1277] <221> misc_feature
[1278] <222> (40)..(41)
[1279] <223> Xaa can be any naturally occurring amino acid
[1280] <220>
[1281] <221> misc_feature
[1282] <222> (43)..(45)
[1283] <223> Xaa can be any naturally occurring amino acid
[1284] <400> 28
[1285] Leu Xaa Xaa Leu Xaa Xaa Xaa Asp Xaa Xaa Gln Xaa Thr Arg Glu Xaa
[1286] 1 5 10 15

[1287] Cys Arg Xaa Xaa Leu Xaa Xaa Xaa Gly Met Arg Xaa Pro Ser Trp Asn
[1288] 20 25 30
[1289] Lys Xaa Gln Ala Xaa Xaa Gln Xaa Xaa Ser Xaa Xaa Xaa Leu
[1290] 35 40 45
[1291] <210> 29
[1292] <211> 46
[1293] <212> PRT
[1294] <213> Artificial Sequence
[1295] <220>
[1296] <223> Consensus sequence
[1297] <220>
[1298] <221> MISC_FEATURE
[1299] <222> (2)..(2)
[1300] <223> Xaa is Glu, Phe, His, Tyr, Asn, Trp, Ser, Lys or Thr
[1301] <220>
[1302] <221> MISC_FEATURE
[1303] <222> (3)..(3)
[1304] <223> Xaa is Glu, Gln or Leu
[1305] <220>
[1306] <221> MISC_FEATURE
[1307] <222> (5)..(5)
[1308] <223> Xaa is Thr or Ser
[1309] <220>
[1310] <221> MISC_FEATURE
[1311] <222> (6)..(6)
[1312] <223> Xaa is Glu or Asp
[1313] <220>
[1314] <221> MISC_FEATURE
[1315] <222> (7)..(7)
[1316] <223> Xaa is Glu, Leu or Asp
[1317] <220>
[1318] <221> MISC_FEATURE
[1319] <222> (9)..(9)
[1320] <223> Xaa is Ile or Val
[1321] <220>
[1322] <221> MISC_FEATURE
[1323] <222> (10)..(10)
[1324] <223> Xaa is Ser, Phe, Arg, Met or Thr
[1325] <220>

[1326] <221> MISC_FEATURE
[1327] <222> (12)..(12)
[1328] <223> Xaa is Leu or Val
[1329] <220>
[1330] <221> MISC_FEATURE
[1331] <222> (16)..(16)
[1332] <223> Xaa is Asp or Glu
[1333] <220>
[1334] <221> MISC_FEATURE
[1335] <222> (19)..(19)
[1336] <223> Xaa is Arg or Lys
[1337] <220>
[1338] <221> MISC_FEATURE
[1339] <222> (20)..(20)
[1340] <223> Xaa is Tyr or Phe
[1341] <220>
[1342] <221> MISC_FEATURE
[1343] <222> (22)..(22)
[1344] <223> Xaa is Lys or Arg
[1345] <220>
[1346] <221> MISC_FEATURE
[1347] <222> (23)..(23)
[1348] <223> Xaa is Glu, Asp, Gln or Ala
[1349] <220>
[1350] <221> MISC_FEATURE
[1351] <222> (24)..(24)
[1352] <223> Xaa is Lys or Arg
[1353] <220>
[1354] <221> MISC_FEATURE
[1355] <222> (28)..(28)
[1356] <223> Xaa is Lys or Arg
[1357] <220>
[1358] <221> MISC_FEATURE
[1359] <222> (34)..(34)
[1360] <223> Xaa is Tyr, Ser or Ala
[1361] <220>
[1362] <221> MISC_FEATURE
[1363] <222> (37)..(37)
[1364] <223> Xaa is Ile or Val

[1365] <220>
[1366] <221> MISC_FEATURE
[1367] <222> (38)..(38)
[1368] <223> Xaa is Gln or Glu
[1369] <220>
[1370] <221> MISC_FEATURE
[1371] <222> (40)..(40)
[1372] <223> Xaa is Val or Leu
[1373] <220>
[1374] <221> MISC_FEATURE
[1375] <222> (41)..(41)
[1376] <223> Xaa is Leu or Ile
[1377] <220>
[1378] <221> MISC_FEATURE
[1379] <222> (43)..(43)
[1380] <223> Xaa is Leu or Phe
[1381] <220>
[1382] <221> MISC_FEATURE
[1383] <222> (44)..(44)
[1384] <223> Xaa is Lys or Arg
[1385] <220>
[1386] <221> MISC_FEATURE
[1387] <222> (45)..(45)
[1388] <223> Xaa is Gly, Ser, Thr or Ala
[1389] <400> 29
[1390] Leu Xaa Xaa Leu Xaa Xaa Xaa Asp Xaa Xaa Gln Xaa Thr Arg Glu Xaa
[1391] 1 5 10 15
[1392] Cys Arg Xaa Xaa Leu Xaa Xaa Xaa Gly Met Arg Xaa Pro Ser Trp Asn
[1393] 20 25 30
[1394] Lys Xaa Gln Ala Xaa Xaa Gln Xaa Xaa Ser Xaa Xaa Xaa Leu
[1395] 35 40 45
[1396] <210> 30
[1397] <211> 27
[1398] <212> PRT
[1399] <213> Artificial Sequence
[1400] <220>
[1401] <223> Consensus sequence
[1402] <400> 30
[1403] Thr Arg Glu Asp Cys Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg

[1404] 1 5 10 15

[1405] Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln Gln

[1406] 20 25

[1407] <210> 31

[1408] <211> 27

[1409] <212> PRT

[1410] <213> Artificial Sequence

[1411] <220>

[1412] <223> Consensus sequence

[1413] <220>

[1414] <221> misc_feature

[1415] <222> (4)..(4)

[1416] <223> Xaa can be any naturally occurring amino acid

[1417] <220>

[1418] <221> misc_feature

[1419] <222> (7)..(8)

[1420] <223> Xaa can be any naturally occurring amino acid

[1421] <220>

[1422] <221> misc_feature

[1423] <222> (10)..(12)

[1424] <223> Xaa can be any naturally occurring amino acid

[1425] <220>

[1426] <221> misc_feature

[1427] <222> (16)..(16)

[1428] <223> Xaa can be any naturally occurring amino acid

[1429] <220>

[1430] <221> misc_feature

[1431] <222> (22)..(22)

[1432] <223> Xaa can be any naturally occurring amino acid

[1433] <220>

[1434] <221> misc_feature

[1435] <222> (25)..(26)

[1436] <223> Xaa can be any naturally occurring amino acid

[1437] <400> 31

[1438] Thr Arg Glu Xaa Cys Arg Xaa Xaa Leu Xaa Xaa Xaa Gly Met Arg Xaa

[1439] 1 5 10 15

[1440] Pro Ser Trp Asn Lys Xaa Gln Ala Xaa Xaa Gln

[1441] 20 25

[1442] <210> 32

[1443] <211> 27

[1444] <212> PRT

[1445] <213> Artificial Sequence

[1446] <220>

[1447] <223> Consensus sequence

[1448] <220>

[1449] <221> MISC_FEATURE

[1450] <222> (4)..(4)

[1451] <223> Xaa is Asp or Glu

[1452] <220>

[1453] <221> MISC_FEATURE

[1454] <222> (7)..(7)

[1455] <223> Xaa is Lys or Arg

[1456] <220>

[1457] <221> MISC_FEATURE

[1458] <222> (8)..(8)

[1459] <223> Xaa is Phe or Tyr

[1460] <220>

[1461] <221> MISC_FEATURE

[1462] <222> (10)..(10)

[1463] <223> Xaa is Lys or Arg

[1464] <220>

[1465] <221> MISC_FEATURE

[1466] <222> (11)..(11)

[1467] <223> Xaa is Asp, Ala, Glu or Gln

[1468] <220>

[1469] <221> MISC_FEATURE

[1470] <222> (12)..(12)

[1471] <223> Xaa is Lys or Arg

[1472] <220>

[1473] <221> MISC_FEATURE

[1474] <222> (16)..(16)

[1475] <223> Xaa is Lys or Arg

[1476] <220>

[1477] <221> MISC_FEATURE

[1478] <222> (22)..(22)

[1479] <223> Xaa is Tyr, Ser or Ala

[1480] <220>

[1481] <221> MISC_FEATURE

[1482] <222> (25)..(25)
[1483] <223> Xaa is Ile or Val
[1484] <220>
[1485] <221> MISC_FEATURE
[1486] <222> (26)..(26)
[1487] <223> Xaa is Gln or Glu
[1488] <400> 32
[1489] Thr Arg Glu Xaa Cys Arg Xaa Xaa Leu Xaa Xaa Xaa Gly Met Arg Xaa
[1490] 1 5 10 15
[1491] Pro Ser Trp Asn Lys Xaa Gln Ala Xaa Xaa Gln
[1492] 20 25
[1493] <210> 33
[1494] <211> 6
[1495] <212> PRT
[1496] <213> Artificial Sequence
[1497] <220>
[1498] <223> Consensus sequence
[1499] <400> 33
[1500] Thr Ile Phe Tyr Ser Gly
[1501] 1 5
[1502] <210> 34
[1503] <211> 6
[1504] <212> PRT
[1505] <213> Artificial Sequence
[1506] <220>
[1507] <223> Consensus sequence
[1508] <220>
[1509] <221> misc_feature
[1510] <222> (2)..(2)
[1511] <223> Xaa can be any naturally occurring amino acid
[1512] <220>
[1513] <221> misc_feature
[1514] <222> (5)..(5)
[1515] <223> Xaa can be any naturally occurring amino acid
[1516] <400> 34
[1517] Thr Xaa Phe Tyr Xaa Gly
[1518] 1 5
[1519] <210> 35
[1520] <211> 6

[1521] <212> PRT
[1522] <213> Artificial Sequence
[1523] <220>
[1524] <223> Consensus sequence
[1525] <220>
[1526] <221> MISC_FEATURE
[1527] <222> (2)..(2)
[1528] <223> Xaa is Ile or Met
[1529] <220>
[1530] <221> MISC_FEATURE
[1531] <222> (5)..(5)
[1532] <223> Xaa is Ala, Ser, Asp, Cys, Arg or Gly
[1533] <400> 35
[1534] Thr Xaa Phe Tyr Xaa Gly
[1535] 1 5
[1536] <210> 36
[1537] <211> 355
[1538] <212> PRT
[1539] <213> Artificial Sequence
[1540] <220>
[1541] <223> Consensus sequence
[1542] <400> 36
[1543] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu
[1544] 1 5 10 15
[1545] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[1546] 20 25 30
[1547] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[1548] 35 40 45
[1549] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro
[1550] 50 55 60
[1551] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln
[1552] 65 70 75 80
[1553] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn
[1554] 85 90 95
[1555] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala
[1556] 100 105 110
[1557] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser
[1558] 115 120 125
[1559] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro

[1560] 130 135 140

[1561] Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe

[1562] 145 150 155 160

[1563] Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala

[1564] 165 170 175

[1565] Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn

[1566] 180 185 190

[1567] Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu

[1568] 195 200 205

[1569] Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser

[1570] 210 215 220

[1571] Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln

[1572] 225 230 235 240

[1573] Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys

[1574] 245 250 255

[1575] Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln

[1576] 260 265 270

[1577] Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser

[1578] 275 280 285

[1579] Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu

[1580] 290 295 300

[1581] Ser Val Asp Leu Asn Ser Glu Gly Ile Gly Ser Gly Gly Gly Ser Ala

[1582] 305 310 315 320

[1583] Lys Gly Glu Leu Arg Gly His Pro Phe Glu Gly Lys Pro Ile Pro Asn

[1584] 325 330 335

[1585] Pro Leu Leu Gly Leu Asp Ser Thr Arg Thr Gly His His His His His

[1586] 340 345 350

[1587] His Gly Ser

[1588] 355

[1589] <210> 37

[1590] <211> 42

[1591] <212> PRT

[1592] <213> Artificial Sequence

[1593] <220>

[1594] <223> Consensus sequence

[1595] <400> 37

[1596] Gly Ser Gly Gly Gly Ser Ala Lys Gly Glu Leu Arg Gly His Pro Phe

[1597] 1 5 10 15

[1598] Glu Gly Lys Pro Ile Pro Asn Pro Leu Leu Gly Leu Asp Ser Thr Arg

[1599] 20 25 30

[1600] Thr Gly His His His His His His Gly Ser

[1601] 35 40

[1602] <210> 38

[1603] <211> 315

[1604] <212> PRT

[1605] <213> Artificial Sequence

[1606] <220>

[1607] <223> Consensus sequence

[1608] <400> 38

[1609] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu

[1610] 1 5 10 15

[1611] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[1612] 20 25 30

[1613] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[1614] 35 40 45

[1615] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro

[1616] 50 55 60

[1617] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln

[1618] 65 70 75 80

[1619] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn

[1620] 85 90 95

[1621] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala

[1622] 100 105 110

[1623] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser

[1624] 115 120 125

[1625] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro

[1626] 130 135 140

[1627] Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe

[1628] 145 150 155 160

[1629] Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala

[1630] 165 170 175

[1631] Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn

[1632] 180 185 190

[1633] Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu

[1634] 195 200 205

[1635] Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser

[1636] 210 215 220

[1637] Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln

[1638] 225 230 235 240
[1639] Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys
[1640] 245 250 255
[1641] Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln
[1642] 260 265 270
[1643] Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser
[1644] 275 280 285
[1645] Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu
[1646] 290 295 300
[1647] Ser Val Asp Leu Asn Ser Glu Gly Ile Gly Ser
[1648] 305 310 315
[1649] <210> 39
[1650] <211> 86
[1651] <212> DNA
[1652] <213> Lolium perenne
[1653] <400> 39
[1654] gtaatgttca gctctgctat agtgtgtgcc accctgcttg tttaataatg cgttctcttc 60
[1655] gtttttatga tatcttattc ttccag 86
[1656] <210> 40
[1657] <211> 1157
[1658] <212> DNA
[1659] <213> Artificial Sequence
[1660] <220>
[1661] <223> Consensus sequence
[1662] <400> 40
[1663] atggacgtgg gcgtgtcccc ggccaagtct attctcgcca agccggtaat gttcagctct 60
[1664] gctatagtgt gtgccaccct gcttgtttaa taatgcgttc tcttcgtttt tatgatatct 120
[1665] tattcttcca gctcaagctc ctcaccgagg aggacatctc tcagctcaca agagaggact 180
[1666] gccgcaagtt cctgaaggac aaggggatga gaaggccttc ctggaacaag tcccaggcca 240
[1667] tccagcaagt gctcagcctc aaggcccttt acgagccagg cgacgactcc ggcgctggca 300
[1668] ttttcagaaa gatcctcgtg tcccagccgg tgaacccacc aagggtgacc accacactca 360
[1669] tcgagccgtc caatgagctt gaggcttgcg gcagagtgtc ctacccagag gataatggcg 420
[1670] cctgccacag gatggattct ccaaggtctg ctgagttctc tggcggctcc ggccatttcg 480
[1671] tgtctgagaa ggatggccac aagaccacca tctccccaag atccccagcc gagacatctg 540
[1672] agcttgtggg ccagatgacc atcttctact ccggcaaggt gaacgtgtac gacggcatcc 600
[1673] caccagagaa ggcccgctcc attatgcact tcgccgccaa cccaatcgac ctcccagaga 660
[1674] atggcatctt cgcctccagc cgcatgatct ccaagctcat ctccaaggag aagatgatgg 720
[1675] agctgccgca gaagggcctc gagaaggcta attcctctcg cgactccggc atggagggcc 780
[1676] aggctaatag aaaggtgtcc ctccaacgct accgcgagaa gaggaaggac cgcaagttct 840

[1677] ccaaggccaa gaagtgccca ggcgttgcct cttccagcct cgagatgttc ctcaactgcc 900
[1678] agccgagaat gaaggccgcc tactcccaaa atctcggctg cacaggctcc ccactccatt 960
[1679] ctcagtcccc agagtctcag accaagtccc cgaacctctc cgtggacctt aactccgagg 1020
[1680] gcatcggatc cggcggcggc tctgctaagg gcgagctgag gggccacccg ttcgagggca 1080
[1681] agccaattcc aaatccactc ctcggcctcg actctaccag gaccggccac catcaccatc 1140
[1682] accacggatc ctaatga 1157
[1683] <210> 41
[1684] <211> 2921
[1685] <212> DNA
[1686] <213> Artificial Sequence
[1687] <220>
[1688] <223> Consensus sequence
[1689] <400> 41
[1690] gcggccgctc tagaactagt ccccttattg tacttcaatt aattatcatt atatcagcat 60
[1691] aaacattata ataagtttct tgcgtgttgg aacgtcattt tagttattct aaagaggaaa 120
[1692] tagtttcttt tttgctcatg acatcagaca tctggactac tatactggag tttacctttt 180
[1693] cttctcctct ttttcttatt gttcctctaa aaaaaattat cacttttaa atgcattagt 240
[1694] taaacttatc tcaacaacgt ttaaaattca tttcttgaat gcccattaca atgtaatagt 300
[1695] ataacttaat tagtcgtctc catgaaccat taatacgtac ggagtaatat aaaacaccat 360
[1696] tggggagttc aatttgcaat aatttcttgc aaaaatgtaa agtacctttt tgttcttgca 420
[1697] aaattttaca aataaaaatt tgcagctctt ttttttctct ctctccaaat actagctcaa 480
[1698] aacccacaaa tatttttgaa tttatggcat acttttagaa tgcgtttgat gcaactattt 540
[1699] tcctttagga aatattcaca acaatctaag acaatcaaaa agtagaaaat agtttgtaaa 600
[1700] aagggatgtg gaggacatct taatcaaata ttttcagttt aaaacttgaa aatgaaaaaa 660
[1701] cacccgaaag gaaatgattc gttctttaat atgtcctaca caatgtgaat ttgaattagt 720
[1702] ttggtcatac ggtatatcat atgattataa ataaaaaaaa ttagcaaaag aatataattt 780
[1703] attaaatatt ttacaccata ccaaacacaa ccgcattata tataatctta attatcatta 840
[1704] tcaccagcat caacattata atgattcccc tatgcgttgg aacgtcatta tagttattct 900
[1705] aaacaagaaa gaaatttgtt cttgacatca gacatctagt attataactc tagtggagct 960
[1706] tacctttct tttccttctt ttttttcttc ttaaaaaaat tatcactttt taaatcttgt 1020
[1707] atattagtta agcttatcta aacaaagttt taaattcatt tcttaaacgt ccattacaat 1080
[1708] gtaatataac ttagtcgtct caattaaacc attaatgtga aatataaatc aaaaaaagcc 1140
[1709] aaagggcggt gggacggcgc caatcatttg tcctagtcca ctcaaataag gcccatggtc 1200
[1710] ggcaaaacca aacacaaaat gtgttatttt taatttttc ctcttttatt gttaaagttg 1260
[1711] caaaatgtgt tatttttggt aagaccctat ggatatataa agacaggtta tgtgaaactt 1320
[1712] ggaaaaccat caagttttaa gcaaaaccct cttaagaact taaattgagc ttcttttggg 1380
[1713] gcatttttct agtgagaact aaaaacaagt ttgtacaaaa aagcaggcta aaaaaaacca 1440
[1714] tggacgtggg cgtgtccccg gccaagtcta ttctcgccaa gccggtaatg ttcagctctg 1500
[1715] ctatagtgtg tgccaccctg cttgtttaat aatgcgttct cttcgttttt atgatatctt 1560

[1716] attcttccag ctcaagctcc tcaccgagga ggacatctct cagctcacaa gagaggactg 1620
[1717] ccgcaagttc ctgaaggaca aggggatgag aaggccttcc tggaacaagt cccaggccat 1680
[1718] ccagcaagtg ctcagcctca aggcccttta cgagccaggc gacgactccg gcgctggcat 1740
[1719] tttcagaaag atcctcgtgt cccagccggt gaacccacca agggtgacca ccacactcat 1800
[1720] cgagccgtcc aatgagcttg aggcttgcgg cagagtgtcc tacccagagg ataatggcgc 1860
[1721] ctgccacagg atggattctc caaggtctgc tgagttctct ggcggctccg gccatttcgt 1920
[1722] gtctgagaag gatggccaca agaccaccat ctccccaaga tccccagccg agacatctga 1980
[1723] gcttgtgggc cagatgacca tcttctactc cggcaaggtg aacgtgtacg acggcatccc 2040
[1724] accagagaag gcccgctcca ttatgcactt cgccgccaac ccaatcgacc tcccagagaa 2100
[1725] tggcatcttc gcctccagcc gcatgatctc caagctcatc tccaaggaga agatgatgga 2160
[1726] gctgccgcag aagggcctcg agaaggctaa ttcctctcgc gactccggca tggagggcca 2220
[1727] ggctaataga aaggtgtccc tccaacgcta ccgcgagaag aggaaggacc gcaagttctc 2280
[1728] caaggccaag aagtgcccag gcgttgcctc ttccagcctc gagatgttcc tcaactgcca 2340
[1729] gccgagaatg aaggccgcct actcccaaaa tctcggctgc acaggctccc cactccattc 2400
[1730] tcagtcccca gagtctcaga ccaagtcccc gaacctctcc gtggacctta actccgaggg 2460
[1731] catcggatcc ggcggcggct ctgctaaggg cgagctgagg ggccacccgt tcgagggcaa 2520
[1732] gccaattcca aatccactcc tcggcctcga ctctaccagg accggccacc atcaccatca 2580
[1733] ccacggatcc taatgaaccc agctttcttg tacaaagtgg tctagtgggt accgcgaatt 2640
[1734] tccccgatcg ttcaaacatt tggcaataaa gtttcttaag attgaatcct gttgccggtc 2700
[1735] ttgcgatgat tatcatataa tttctgttga attacgttaa gcatgtaata attaacatgt 2760
[1736] aatgcatgac gttatttatg agatgggttt ttatgattag agtcccgcaa ttatacattt 2820
[1737] aatacgcgat agaaaacaaa atatagcgcg caaactagga taaattatcg cgcgcggtgt 2880
[1738] catctatgtt actagatcga agcggccgct ctagaactag t 2921
[1739] <210> 42
[1740] <211> 2249
[1741] <212> DNA
[1742] <213> Artificial Sequence
[1743] <220>
[1744] <223> Consensus sequence
[1745] <400> 42
[1746] gcggccgctc tagaactagt gtcctacaca atgtgaattt gaattagttt ggtcatacgg 60
[1747] tatatcatat gattataaat aaaaaaaatt agcaaaagaa tataatttat taaatatttt 120
[1748] acaccatacc aaacacaacc gcattatata taatcttaat tatcattatc accagcatca 180
[1749] acattataat gattccccta tgcgttggaa cgtcattata gttattctaa acaagaaaga 240
[1750] aatttgttct tgacatcaga catctagtat tataactcta gtggagctta ccttttcttt 300
[1751] tccttctttt ttttcttctt aaaaaaatta tcacttttta aatcttgtat attagttaag 360
[1752] cttatctaaa caaagtttta aattcatttc ttaaacgtcc attacaatgt aatataactt 420
[1753] agtcgtctca attaaaccat taatgtgaaa tataaatcaa aaaaagccaa agggcggtgg 480
[1754] gacggcgcca atcatttgtc ctagtccact caaataaggc ccatggtcgg caaaaccaaa 540

[1755] cacaaaatgt gttattttta atttttcct cttttattgt taaagttgca aaatgtgtta 600
[1756] tttttggtaa gaccctatgg atatataaag acaggttatg tgaaacttgg aaaaccatca 660
[1757] agttttaagc aaaaccctct taagaactta aattgagctt cttttggggc atttttctag 720
[1758] tgagaactaa aaacaagttt gtacaaaaaa gcaggctaaa aaaaaccatg gacgtgggcg 780
[1759] tgtccccggc caagtctatt ctcgccaagc cggtaatgtt cagctctgct atagtgtgtg 840
[1760] ccaccctgct tgtttaataa tgcgttctct tcgttttat gatatcttat tcttccagct 900
[1761] caagctcctc accgaggagg acatctctca gctcacaaga gaggactgcc gcaagttcct 960
[1762] gaaggacaag gggatgagaa ggccttcctg gaacaagtcc caggccatcc agcaagtgct 1020
[1763] cagcctcaag gccctttacg agccaggcga cgactccggc gctggcattt tcagaaagat 1080
[1764] cctcgtgtcc cagccggtga acccaccaag ggtgaccacc acactcatcg agccgtccaa 1140
[1765] tgagcttgag gcttgcggca gagtgtccta cccagaggat aatggcgcct gccacaggat 1200
[1766] ggattctcca aggtctgctg agttctctgg cggctccggc catttcgtgt ctgagaagga 1260
[1767] tggccacaag accaccatct ccccaagatc cccagccgag acatctgagc ttgtgggcca 1320
[1768] gatgaccatc ttctactccg gcaaggtgaa cgtgtacgac ggcatcccac cagagaaggc 1380
[1769] ccgctccatt atgcacttcg ccgccaaccc aatcgacctc ccagagaatg gcatcttcgc 1440
[1770] ctccagccgc atgatctcca agctcatctc caaggagaag atgatggagc tgccgcagaa 1500
[1771] gggcctcgag aaggctaatt cctctcgcga ctccggcatg gagggccagg ctaatagaaa 1560
[1772] ggtgtccctc caacgctacc gcgagaagag gaaggaccgc aagttctcca aggccaagaa 1620
[1773] gtgcccaggc gttgcctctt ccagcctcga gatgttcctc aactgccagc cgagaatgaa 1680
[1774] ggccgcctac tcccaaaatc tcggctgcac aggctcccca ctccattctc agtccccaga 1740
[1775] gtctcagacc aagtccccga acctctccgt ggaccttaac tccgagggca tcggatccgg 1800
[1776] cggcggctct gctaagggcg agctgagggg ccacccgttc gagggcaagc caattccaaa 1860
[1777] tccactcctc ggcctcgact ctaccaggac cggccaccat caccatcacc acggatccta 1920
[1778] atgaacccag ctttcttgta caaagtggtc tagtgggtac cgcgaatttc cccgatcgtt 1980
[1779] caaacatttg gcaataaagt ttcttaagat tgaatcctgt tgccggtctt gcgatgatta 2040
[1780] tcatataatt tctgttgaat tacgttaagc atgtaataat taacatgtaa tgcatgacgt 2100
[1781] tatttatgag atgggttttt atgattagag tcccgcaatt atacatttaa tacgcgatag 2160
[1782] aaaacaaaat atagcgcgca aactaggata aattatcgcg cgcggtgtca tctatgttac 2220
[1783] tagatcgaag cggccgctct agaactagt 2249
[1784] <210> 43
[1785] <211> 2852
[1786] <212> DNA
[1787] <213> Artificial Sequence
[1788] <220>
[1789] <223> Consensus sequence
[1790] <400> 43
[1791] gcggccgctc tagaactagt tcacgtggaa cgcgccgcag taaacggagc ggtggatcaa 60
[1792] acttttcgtc cgtttgatca aacagaagag aactagtcaa tgctctttct tcatatcaca 120
[1793] atttaatagt ctcaagacga ttacgccaca taaccatttt ctcgtgattt cgacatcaaa 180

[1794] atttaataaa aggaactgat tgattggtca tcatgttaca agtgtcaaat gagctaatcc 240
[1795] gttttacagt ggcatagttt acgatcaatt tacaaatttt tggttttata acatacttgt 300
[1796] agttaaaact atttataagc tatttatagt gagttagctt ataaaaccct attcttttat 360
[1797] ctaaaattat gttttgactc gtttcatgat aaaattttat ccttttcatc ggaataaaaa 420
[1798] actttattat ttatttggca aaataattgg tgtaaaaatt atgtatatgt taataacaaa 480
[1799] aaatattaat ctgattcata atcttaaaaa agaaaaattt cttgaaataa actttagaca 540
[1800] ttgtaaataa aaaaacatta tttttatata atgggatgtt tatatgtaat tttttataaa 600
[1801] aaaataaaag ttgtttacta gtaatccgat tggctttaac tatcgtcgcc aaaagaataa 660
[1802] tgtagaactg actttgaggt aaaactaaaa gaaatttgta agataatagt cacattaaat 720
[1803] gctaaaatta atacatactg atatatcgta taaaatttat gaaaactaca ccttaacctg 780
[1804] aatcatacac tgtaataaaa aaaacaaatt atatataaac cctaaaaact aatcataaat 840
[1805] cccaaacggt gtactctcta ttagctttga aaggattgcc caattgtttg ttaaaaattt 900
[1806] ctaataatag tacaatgttt tgtttcattt ttccttttcg tcaacctgtt acccaatagc 960
[1807] aaatgaagtt tttatgtgtg tgtgtgtgtg tgaatttcca tgaaaatgaa acgggcttag 1020
[1808] aatcccggtg tattatgggt cgggtcgtaa ccgggcaatg acgcaggatc tgacgtaaaa 1080
[1809] ctcccaagaa ttttttaaa aagtctccgg aaaataaaat caaagttcat taacttaaaa 1140
[1810] agaaaaaaca aaatcggtcc acgtcccaaa ccctttttat aggagagtct tatgttctgg 1200
[1811] cagaagactt cacagactct ttcttaatct ctctctcttt caaccaaacc cctaaacaaa 1260
[1812] aaaaaaatac attttctgat ctctctaaaa atctttctcc ttcgttaatc tcgtgatctc 1320
[1813] tttctttttc tatatacaag tttgtacaaa aaagcaggct aaaaaaaacc atggacgtgg 1380
[1814] gcgtgtcccc ggccaagtct attctcgcca agccggtaat gttcagctct gctatagtgt 1440
[1815] gtgccaccct gcttgtttaa taatgcgttc tcttcgtttt tatgatatct tattcttcca 1500
[1816] gctcaagctc ctcaccgagg aggacatctc tcagctcaca agagaggact gccgcaagtt 1560
[1817] cctgaaggac aaggggatga gaaggccttc ctggaacaag tcccaggcca tccagcaagt 1620
[1818] gctcagcctc aaggcccttt acgagccagg cgacgactcc ggcgctggca ttttcagaaa 1680
[1819] gatcctcgtg tcccagccgg tgaacccacc aagggtgacc accacactca tcgagccgtc 1740
[1820] caatgagctt gaggcttgcg gcagagtgtc ctacccagag gataatggcg cctgccacag 1800
[1821] gatggattct ccaaggtctg ctgagttctc tggcggctcc ggccatttcg tgtctgagaa 1860
[1822] ggatggccac aagaccacca tctccccaag atccccagcc gagacatctg agcttgtggg 1920
[1823] ccagatgacc atcttctact ccggcaaggt gaacgtgtac gacggcatcc caccagagaa 1980
[1824] ggcccgctcc attatgcact tcgccgccaa cccaatcgac ctcccagaga atggcatctt 2040
[1825] cgcctccagc cgcatgatct ccaagctcat ctccaaggag aagatgatgg agctgccgca 2100
[1826] gaagggcctc gagaaggcta attcctctcg cgactccggc atggagggcc aggctaatag 2160
[1827] aaaggtgtcc ctccaacgct accgcgagaa gaggaaggac cgcaagttct ccaaggccaa 2220
[1828] gaagtgccca ggcgttgcct cttccagcct cgagatgttc ctcaactgcc agccgagaat 2280
[1829] gaaggccgcc tactcccaaa atctcggctg cacaggctcc ccactccatt ctcagtcccc 2340
[1830] agagtctcag accaagtccc cgaacctctc cgtggacctt aactccgagg gcatcggatc 2400
[1831] cggcggcggc tctgctaagg gcgagctgag gggccacccg ttcgagggca agccaattcc 2460
[1832] aaatccactc ctcggcctcg actctaccag gaccggccac catcaccatc accacggatc 2520

[1833] ctaatgaacc cagctttctt gtacaaagtg gtctagtggg taccgcgaat ttccccgatc 2580
[1834] gttcaaacat ttggcaataa agtttcttaa gattgaatcc tgttgccggt cttgcgatga 2640
[1835] ttatcatata atttctgttg aattacgtta agcatgtaat aattaacatg taatgcatga 2700
[1836] cgttatttat gagatgggtt tttatgatta gagtcccgca attatacatt taatacgcga 2760
[1837] tagaaaacaa aatatagcgc gcaaactagg ataaattatc gcgcgcggtg tcatctatgt 2820
[1838] tactagatcg aagcggccgc tctagaacta gt 2852
[1839] <210> 44
[1840] <211> 2801
[1841] <212> DNA
[1842] <213> Artificial Sequence
[1843] <220>
[1844] <223> Consensus sequence
[1845] <400> 44
[1846] gcggccgctc tagaactagt ccccttattg tacttcaatt aattatcatt atatcagcat 60
[1847] aaacattata ataagtttct tgcgtgttgg aacgtcattt tagttattct aaagaggaaa 120
[1848] tagtttcttt tttgctcatg acatcagaca tctggactac tatactggag tttacctttt 180
[1849] cttctcctct ttttcttatt gttcctctaa aaaaaattat cacttttaa atgcattagt 240
[1850] taaacttatc tcaacaacgt ttaaaattca tttcttgaat gcccattaca atgtaatagt 300
[1851] ataacttaat tagtcgtctc catgaaccat taatacgtac ggagtaatat aaaacaccat 360
[1852] tggggagttc aatttgcaat aatttcttgc aaaaatgtaa agtacctttt tgttcttgca 420
[1853] aaattttaca aataaaaatt tgcagctctt ttttttctct ctctccaaat actagctcaa 480
[1854] aacccacaaa tatttttgaa tttatggcat acttttagaa tgcgtttgat gcaactattt 540
[1855] tcctttagga aatattcaca acaatctaag acaatcaaaa agtagaaaat agtttgtaaa 600
[1856] aagggatgtg gaggacatct taatcaaata ttttcagttt aaaacttgaa aatgaaaaaa 660
[1857] cacccgaaag gaaatgattc gttctttaat atgtcctaca caatgtgaat ttgaattagt 720
[1858] ttggtcatac ggtatatcat atgattataa ataaaaaaaa ttagcaaaag aatataattt 780
[1859] attaaatatt ttacaccata ccaaacacaa ccgcattata tataatctta attatcatta 840
[1860] tcaccagcat caacattata atgattcccc tatgcgttgg aacgtcatta tagttattct 900
[1861] aaacaagaaa gaaatttgtt cttgacatca gacatctagt attataactc tagtggagct 960
[1862] tacctttct tttccttctt ttttttcttc ttaaaaaaat tatcactttt taaatcttgt 1020
[1863] atattagtta agcttatcta aacaaagttt taaattcatt tcttaaacgt ccattacaat 1080
[1864] gtaatataac ttagtcgtct caattaaacc attaatgtga aatataaatc aaaaaaagcc 1140
[1865] aaagggcggt gggacggcgc caatcatttg tcctagtcca ctcaaataag gcccatggtc 1200
[1866] ggcaaaacca aacacaaaat gtgttatttt taatttttc ctcttttatt gttaaagttg 1260
[1867] caaaatgtgt tatttttggt aagaccctat ggatatataa agacaggtta tgtgaaactt 1320
[1868] ggaaaaccat caagttttaa gcaaaaccct cttaagaact taaattgagc ttcttttggg 1380
[1869] gcatttttct agtgagaact aaaaacaagt ttgtacaaaa aagcaggcta aaaaaaacca 1440
[1870] tggacgtggg cgtgtccccg gccaagtcta ttctcgccaa gccggtaatg ttcagctctg 1500
[1871] ctatagtgtg tgccaccctg cttgtttaat aatgcgttct cttcgttttt atgatatctt 1560

[1872] attcttccag ctcaagctcc tcaccgagga ggacatctct cagctcacaa gagaggactg 1620
[1873] ccgcaagttc ctgaaggaca aggggatgag aaggccttcc tggaacaagt cccaggccat 1680
[1874] ccagcaagtg ctcagcctca aggcccttta cgagccaggc gacgactccg gcgctggcat 1740
[1875] tttcagaaag atcctcgtgt cccagccggt gaacccacca agggtgacca ccacactcat 1800
[1876] cgagccgtcc aatgagcttg aggcttgcgg cagagtgtcc tacccagagg ataatggcgc 1860
[1877] ctgccacagg atggattctc caaggtctgc tgagttctct ggcggctccg gccatttcgt 1920
[1878] gtctgagaag gatggccaca agaccaccat ctccccaaga tccccagccg agacatctga 1980
[1879] gcttgtgggc cagatgacca tcttctactc cggcaaggtg aacgtgtacg acggcatccc 2040
[1880] accagagaag gcccgctcca ttatgcactt cgccgccaac ccaatcgacc tcccagagaa 2100
[1881] tggcatcttc gcctccagcc gcatgatctc caagctcatc tccaaggaga agatgatgga 2160
[1882] gctgccgcag aagggcctcg agaaggctaa ttcctctcgc gactccggca tggagggcca 2220
[1883] ggctaataga aaggtgtccc tccaacgcta ccgcgagaag aggaaggacc gcaagttctc 2280
[1884] caaggccaag aagtgcccag gcgttgcctc ttccagcctc gagatgttcc tcaactgcca 2340
[1885] gccgagaatg aaggccgcct actcccaaaa tctcggctgc acaggctccc cactccattc 2400
[1886] tcagtcccca gagtctcaga ccaagtcccc gaacctctcc gtggacctta actccgaggg 2460
[1887] catcggatcc taatgaaccc agctttcttg tacaaagtgg tctagtgggt accgcgaatt 2520
[1888] tccccgatcg ttcaaacatt tggcaataaa gtttcttaag attgaatcct gttgccggtc 2580
[1889] ttgcgatgat tatcatataa tttctgttga attacgttaa gcatgtaata attaacatgt 2640
[1890] aatgcatgac gttatttatg agatgggttt ttatgattag agtcccgcaa ttatacattt 2700
[1891] aatacgcgat agaaaacaaa atatagcgcg caaactagga taaattatcg cgcgcggtgt 2760
[1892] catctatgtt actagatcga agcggccgct ctagaactag t 2801
[1893] <210> 45
[1894] <211> 2129
[1895] <212> DNA
[1896] <213> Artificial Sequence
[1897] <220>
[1898] <223> Consensus sequence
[1899] <400> 45
[1900] gcggccgctc tagaactagt gtcctacaca atgtgaattt gaattagttt ggtcatacgg 60
[1901] tatatcatat gattataaat aaaaaaaatt agcaaaagaa tataatttat taaatatttt 120
[1902] acaccatacc aaacacaacc gcattatata taatcttaat tatcattatc accagcatca 180
[1903] acattataat gattccccta tgcgttggaa cgtcattata gttattctaa acaagaaaga 240
[1904] aatttgttct tgacatcaga catctagtat tataactcta gtggagctta ccttttcttt 300
[1905] tccttctttt ttttcttctt aaaaaaatta tcacttttta aatcttgtat attagttaag 360
[1906] cttatctaaa caaagtttta aattcatttc ttaaacgtcc attacaatgt aatataactt 420
[1907] agtcgtctca attaaaccat taatgtgaaa tataaatcaa aaaaagccaa agggcggtgg 480
[1908] gacggcgcca atcatttgtc ctagtccact caaataaggc ccatggtcgg caaaaccaaa 540
[1909] cacaaaatgt gttatttta attttttcct cttttattgt taaagttgca aaatgtgtta 600
[1910] tttttggtaa gaccctatgg atatataaag acaggttatg tgaaacttgg aaaaccatca 660

[1911] agttttaagc aaaaccctct taagaactta aattgagctt cttttggggc atttttctag 720
[1912] tgagaactaa aaacaagttt gtacaaaaaa gcaggctaaa aaaaaccatg gacgtgggcg 780
[1913] tgtccccggc caagtctatt ctcgccaagc cggtaatgtt cagctctgct atagtgtgtg 840
[1914] ccaccctgct tgtttaataa tgcgttctct tcgtttttat gatatcttat tcttccagct 900
[1915] caagctcctc accgaggagg acatctctca gctcacaaga gaggactgcc gcaagttcct 960
[1916] gaaggacaag gggatgagaa ggccttcctg gaacaagtcc caggccatcc agcaagtgct 1020
[1917] cagcctcaag gccctttacg agccaggcga cgactccggc gctggcattt tcagaaagat 1080
[1918] cctcgtgtcc cagccggtga acccaccaag ggtgaccacc acactcatcg agccgtccaa 1140
[1919] tgagcttgag gcttgcggca gagtgtccta cccagaggat aatggcgcct gccacaggat 1200
[1920] ggattctcca aggtctgctg agttctctgg cggctccggc catttcgtgt ctgagaagga 1260
[1921] tggccacaag accaccatct ccccaagatc cccagccgag acatctgagc ttgtgggcca 1320
[1922] gatgaccatc ttctactccg gcaaggtgaa cgtgtacgac ggcatcccac cagagaaggc 1380
[1923] ccgctccatt atgcacttcg ccgccaaccc aatcgacctc ccagagaatg gcatcttcgc 1440
[1924] ctccagccgc atgatctcca agctcatctc caaggagaag atgatggagc tgccgcagaa 1500
[1925] gggcctcgag aaggctaatt cctctcgcga ctccggcatg gagggccagg ctaatagaaa 1560
[1926] ggtgtccctc caacgctacc gcgagaagag gaaggaccgc aagttctcca aggccaagaa 1620
[1927] gtgcccaggc gttgcctctt ccagcctcga gatgttcctc aactgccagc cgagaatgaa 1680
[1928] ggccgcctac tcccaaaatc tcggctgcac aggctcccca ctccattctc agtccccaga 1740
[1929] gtctcagacc aagtccccga acctctccgt ggaccttaac tccgagggca tcggatccta 1800
[1930] atgaacccag ctttcttgta caaagtggtc tagtgggtac cgcgaatttc cccgatcgtt 1860
[1931] caaacatttg gcaataaagt ttcttaagat tgaatcctgt tgccggtctt gcgatgatta 1920
[1932] tcatataatt tctgttgaat tacgttaagc atgtaataat taacatgtaa tgcatgacgt 1980
[1933] tatttatgag atgggttttt atgattagag tcccgcaatt atacatttaa tacgcgatag 2040
[1934] aaaacaaaat atagcgcgca aactaggata aattatcgcg cgcggtgtca tctatgttac 2100
[1935] tagatcgaag cggccgctct agaactagt 2129
[1936] <210> 46
[1937] <211> 2732
[1938] <212> DNA
[1939] <213> Artificial Sequence
[1940] <220>
[1941] <223> Consensus sequence
[1942] <400> 46
[1943] gcggccgctc tagaactagt tcacgtggaa cgcgccgcag taaacggagc ggtggatcaa 60
[1944] acttttcgtc cgtttgatca aacagaagag aactagtcaa tgctctttct tcatatcaca 120
[1945] atttaatagt ctcaagacga ttacgccaca taaccatttt ctcgtgattt cgacatcaaa 180
[1946] atttaataaa aggaactgat tgattggtca tcatgttaca agtgtcaaat gagctaatcc 240
[1947] gttttacagt ggcatagttt acgatcaatt tacaaatttt tggttttata acatacttgt 300
[1948] agttaaaact atttataagc tatttatagt gagttagctt ataaaaccct attcttttat 360
[1949] ctaaaattat gttttgactc gtttcatgat aaaattttat ccttttcatc ggaataaaaa 420

[1950] actttattat ttatttggca aaataattgg tgtaaaaatt atgtatatgt taataacaaa 480
[1951] aaatattaat ctgattcata atcttaaaaa agaaaaattt cttgaaataa actttagaca 540
[1952] ttgtaaataa aaaaacatta tttttatata atgggatgtt tatatgtaat tttttataaa 600
[1953] aaaataaaag ttgtttacta gtaatccgat tggctttaac tatcgtcgcc aaaagaataa 660
[1954] tgtagaactg actttgaggt aaaactaaaa gaaatttgta agataatagt cacattaaat 720
[1955] gctaaaatta atacatactg atatatcgta taaaatttat gaaaactaca ccttaacctg 780
[1956] aatcatacac tgtaataaaa aaaacaaatt atatataaac cctaaaaact aatcataaat 840
[1957] cccaaacggt gtactctcta ttagctttga aaggattgcc caattgtttg ttaaaaattt 900
[1958] ctaataatag tacaatgttt tgtttcattt ttccttttcg tcaacctgtt acccaatagc 960
[1959] aaatgaagtt tttatgtgtg tgtgtgtgtg tgaatttcca tgaaaatgaa acgggcttag 1020
[1960] aatcccggtg tattatgggt cgggtcgtaa ccgggcaatg acgcaggatc tgacgtaaaa 1080
[1961] ctcccaagaa ttttttaaa aagtctccgg aaaataaaat caaagttcat taacttaaaa 1140
[1962] agaaaaaaca aaatcggtcc acgtcccaaa ccctttttat aggagagtct tatgttctgg 1200
[1963] cagaagactt cacagactct ttcttaatct ctctctcttt caaccaaacc cctaaacaaa 1260
[1964] aaaaaaatac attttctgat ctctctaaaa atctttctcc ttcgttaatc tcgtgatctc 1320
[1965] tttctttttc tatatacaag tttgtacaaa aaagcaggct aaaaaaaacc atggacgtgg 1380
[1966] gcgtgtcccc ggccaagtct attctcgcca agccggtaat gttcagctct gctatagtgt 1440
[1967] gtgccaccct gcttgtttaa taatgcgttc tcttcgtttt tatgatatct tattcttcca 1500
[1968] gctcaagctc ctcaccgagg aggacatctc tcagctcaca agagaggact gccgcaagtt 1560
[1969] cctgaaggac aaggggatga gaaggccttc ctggaacaag tcccaggcca tccagcaagt 1620
[1970] gctcagcctc aaggcccttt acgagccagg cgacgactcc ggcgctggca ttttcagaaa 1680
[1971] gatcctcgtg tcccagccgg tgaacccacc aagggtgacc accacactca tcgagccgtc 1740
[1972] caatgagctt gaggcttgcg gcagagtgtc ctacccagag gataatggcg cctgccacag 1800
[1973] gatggattct ccaaggtctg ctgagttctc tggcggctcc ggccatttcg tgtctgagaa 1860
[1974] ggatggccac aagaccacca tctccccaag atccccagcc gagacatctg agcttgtggg 1920
[1975] ccagatgacc atcttctact ccggcaaggt gaacgtgtac gacggcatcc caccagagaa 1980
[1976] ggcccgctcc attatgcact tcgccgccaa cccaatcgac ctcccagaga atggcatctt 2040
[1977] cgcctccagc cgcatgatct ccaagctcat ctccaaggag aagatgatgg agctgccgca 2100
[1978] gaagggcctc gagaaggcta attcctctcg cgactccggc atggagggcc aggctaatag 2160
[1979] aaaggtgtcc ctccaacgct accgcgagaa gaggaaggac cgcaagttct ccaaggccaa 2220
[1980] gaagtgccca ggcgttgcct cttccagcct cgagatgttc ctcaactgcc agccgagaat 2280
[1981] gaaggccgcc tactcccaaa atctcggctg cacaggctcc ccactccatt ctcagtcccc 2340
[1982] agagtctcag accaagtccc cgaacctctc cgtggacctt aactccgagg gcatcggatc 2400
[1983] ctaatgaacc cagctttctt gtacaaagtg gtctagtggg taccgcgaat ttccccgatc 2460
[1984] gttcaaacat ttggcaataa agtttcttaa gattgaatcc tgttgccggt cttgcgatga 2520
[1985] ttatcatata atttctgttg aattacgtta agcatgtaat aattaacatg taatgcatga 2580
[1986] cgttatttat gagatgggtt tttatgatta gagtcccgca attatacatt taatacgcga 2640
[1987] tagaaaacaa aatatagcgc gcaaactagg ataaattatc gcgcgcggtg tcatctatgt 2700
[1988] tactagatcg aagcggccgc tctagaacta gt 2732

[1989] <210> 47

[1990] <211> 102

[1991] <212> DNA

[1992] <213> Arabidopsis thaliana

[1993] <400> 47

[1994] gtaaaagaag atgtttttta tttccagcaa tgttacattg ttatacgtat aatgatgagt 60

[1995] ttagtgatca agttcctctt tgattcttct ttcttgttgc ag 102

[1996] <210> 48

[1997] <211> 1173

[1998] <212> DNA

[1999] <213> Artificial Sequence

[2000] <220>

[2001] <223> Consensus sequence

[2002] <400> 48

[2003] atggatgtcg gagtttcacc ggcgaagtct atacttgcga aacctctgaa gctactcact 60

[2004] gaagaggaca tttctcagct cactcgcgaa gactgcgtaa aagaagatgt tttttatttc 120

[2005] cagcaatgtt acattgttat acgtataatg atgagtttag tgatcaagtt cctctttgat 180

[2006] tcttctttct tgttgcagcg caaattcctc aaagacaaag gaatgcgaag accgtcgtgg 240

[2007] aacaaatctc aggcgatcca gcaagtttta tctcttaaag ctctctatga gcctggagac 300

[2008] gattccggcg ccggtatctt ccgcaagatc ctcgtttctc agccagtaaa tccgcctcgc 360

[2009] gtcacaacaa cgttgattga gccaagcaac gagctggaag cttgtggccg ggtttcttat 420

[2010] ccggaagata acggcgcgtg ccatagaatg gattctccaa gatcagctga gttttccggt 480

[2011] gggtctggtc actttgtatc cgagaaagat ggccacaaga cgactatttc tcccagaagc 540

[2012] ccagctgaaa caagtgagct cgttgggcaa atgacgatat tctatagtgg aaaagtgaat 600

[2013] gtgtatgatg gaataccacc tgaaaaggcc cggtcaatca tgcactttgc agccaatcca 660

[2014] attgatttgc ctgaaaacgg tatttttgct tccagtagaa tgatttcaaa gctcataagt 720

[2015] aaagagaaga tgatggaact tccccaaaaa ggccttgaga aggcgaattc ttctcgtgat 780

[2016] tctggtatgg agggccaggc gaacagaaag gtatctttgc aaagatatcg tgaaaagcgg 840

[2017] aaagacagaa aattctcaaa ggccaaaaag tgtccaggag ttgcgtcctc tagcttggag 900

[2018] atgtttctga attgtcagcc acggatgaaa gctgcatatt cgcaaaacct aggctgcacc 960

[2019] ggatctccac tgcatagcca gtcacctgaa agccagacaa aaagtcccaa tctttcagtt 1020

[2020] gatctaaaca gtgaaggcat tggatccgga ggtggatctg ctaagggaga acttagagga 1080

[2021] catccatttg aaggaaagcc aattccaaat ccacttcttg gacttgattc tactagaact 1140

[2022] ggacatcacc atcaccatca tggatcctaa tga 1173

[2023] <210> 49

[2024] <211> 1173

[2025] <212> DNA

[2026] <213> Artificial Sequence

[2027] <220>

[2028] <223> Consensus sequence

[2029] <400> 49

[2030] atggatgtcg gagtttcacc ggtaaaagaa gatgtttttt atttccagca atgttacatt 60

[2031] gttatacgta taatgatgag tttagtgatc aagttcctct ttgattcttc tttcttgttg 120

[2032] caggcgaagt ctatacttgc gaaacctctg aagctactca ctgaagagga catttctcag 180

[2033] ctcactcgcg aagactgccg caaattcctc aaagacaaag gaatgcgaag accgtcgtgg 240

[2034] aacaaatctc aggcgatcca gcaagtttta tctcttaaag ctctctatga gcctggagac 300

[2035] gattccggcg ccggtatctt ccgcaagatc ctcgtttctc agccagtaaa tccgcctcgc 360

[2036] gtcacaacaa cgttgattga gccaagcaac gagctggaag cttgtggccg ggtttcttat 420

[2037] ccggaagata acggcgcgtg ccatagaatg gattctccaa gatcagctga gttttccggt 480

[2038] gggtctggtc actttgtatc cgagaaagat ggccacaaga cgactatttc tcccagaagc 540

[2039] ccagctgaaa caagtgagct cgttgggcaa atgacgatat tctatagtgg aaaagtgaat 600

[2040] gtgtatgatg gaataccacc tgaaaaggcc cggtcaatca tgcactttgc agccaatcca 660

[2041] attgatttgc ctgaaaacgg tatttttgct tccagtagaa tgatttcaaa gctcataagt 720

[2042] aaagagaaga tgatggaact tccccaaaaa ggccttgaga aggcgaattc ttctcgtgat 780

[2043] tctggtatgg agggccaggc gaacagaaag gtatctttgc aaagatatcg tgaaaagcgg 840

[2044] aaagacagaa aattctcaaa ggccaaaaag tgtccaggag ttgcgtcctc tagcttggag 900

[2045] atgtttctga attgtcagcc acggatgaaa gctgcatatt cgcaaaacct aggctgcacc 960

[2046] ggatctccac tgcatagcca gtcacctgaa agccagacaa aaagtcccaa tctttcagtt 1020

[2047] gatctaaaca gtgaaggcat tggatccgga ggtggatctg ctaagggaga acttagagga 1080

[2048] catccatttg aaggaaagcc aattccaaat ccacttcttg gacttgattc tactagaact 1140

[2049] ggacatcacc atcaccatca tggatcctaa tga 1173

[2050] <210> 50

[2051] <211> 2897

[2052] <212> DNA

[2053] <213> Artificial Sequence

[2054] <220>

[2055] <223> Consensus sequence

[2056] <400> 50

[2057] ccccttattg tacttcaatt aattatcatt atatcagcat aaacattata ataagtttct 60

[2058] tgcgtgttgg aacgtcattt tagttattct aaagaggaaa tagtttcttt tttgctcatg 120

[2059] acatcagaca tctggactac tatactggag tttacctttt cttctcctct ttttcttatt 180

[2060] gttcctctaa aaaaaattat cacttttaa atgcattagt taaacttatc tcaacaacgt 240

[2061] ttaaaattca tttcttgaat gcccattaca atgtaatagt ataacttaat tagtcgtctc 300

[2062] catgaaccat taatacgtac ggagtaatat aaaacaccat tggggagttc aatttgcaat 360

[2063] aatttcttgc aaaaatgtaa agtacctttt tgttcttgca aaattttaca aataaaaatt 420

[2064] tgcagctctt ttttttctct ctctccaaat actagctcaa aacccacaaa tatttttgaa 480

[2065] tttatggcat acttttagaa tgcgtttgat gcaactattt tcctttagga aatattcaca 540

[2066] acaatctaag acaatcaaaa agtagaaaat agtttgtaaa aagggatgtg gaggacatct 600

[2067] taatcaaata ttttcagttt aaaacttgaa aatgaaaaaa cacccgaaag gaaatgattc 660
[2068] gttctttaat atgtcctaca caatgtgaat ttgaattagt ttggtcatac ggtatatcat 720
[2069] atgattataa ataaaaaaaa ttagcaaaag aatataattt attaaatatt ttacaccata 780
[2070] ccaaacacaa ccgcattata tataatctta attatcatta tcaccagcat caacattata 840
[2071] atgattcccc tatgcgttgg aacgtcatta tagttattct aaacaagaaa gaaatttgtt 900
[2072] cttgacatca gacatctagt attataactc tagtggagct tacctttct tttccttctt 960
[2073] ttttttcttc ttaaaaaaat tatcactttt taaatcttgt atattagtta agcttatcta 1020
[2074] aacaaagttt taaattcatt tcttaaacgt ccattacaat gtaatataac ttagtcgtct 1080
[2075] caattaaacc attaatgtga aatataaatc aaaaaaagcc aaagggcggt gggacggcgc 1140
[2076] caatcatttg tcctagtcca ctcaaataag gcccatggtc ggcaaaacca aacacaaaat 1200
[2077] gtgttatttt taatttttc ctcttttatt gttaaagttg caaaatgtgt tatttttggt 1260
[2078] aagaccctat ggatatataa agacaggtta tgtgaaactt ggaaaaccat caagttttaa 1320
[2079] gcaaaaccct cttaagaact taaattgagc ttcttttggg gcatttttct agtgagaact 1380
[2080] aaaaacaagt ttgtacaaaa aagcaggcta aaaaaaacca tggatgtcgg agtttcaccg 1440
[2081] gcgaagtcta tacttgcgaa acctctgaag ctactcactg aagaggacat ttctcagctc 1500
[2082] actcgcgaag actgcgtaaa agaagatgtt ttttatttcc agcaatgtta cattgttata 1560
[2083] cgtataatga tgagtttagt gatcaagttc ctctttgatt cttctttctt gttgcagcgc 1620
[2084] aaattcctca aagacaaagg aatgcgaaga ccgtcgtgga acaaatctca ggcgatccag 1680
[2085] caagttttat ctcttaaagc tctctatgag cctggagacg attccggcgc cggtatcttc 1740
[2086] cgcaagatcc tcgtttctca gccagtaaat ccgcctcgcg tcacaacaac gttgattgag 1800
[2087] ccaagcaacg agctggaagc ttgtggccgg gtttcttatc cggaagataa cggcgcgtgc 1860
[2088] catagaatgg attctccaag atcagctgag ttttccggtg ggtctggtca ctttgtatcc 1920
[2089] gagaaagatg gccacaagac gactatttct cccagaagcc cagctgaaac aagtgagctc 1980
[2090] gttgggcaaa tgacgatatt ctatagtgga aaagtgaatg tgtatgatgg aataccacct 2040
[2091] gaaaaggccc ggtcaatcat gcactttgca gccaatccaa ttgatttgcc tgaaaacggt 2100
[2092] atttttgctt ccagtagaat gatttcaaag ctcataagta aagagaagat gatggaactt 2160
[2093] ccccaaaaag gccttgagaa ggcgaattct tctcgtgatt ctggtatgga gggccaggcg 2220
[2094] aacagaaagg tatctttgca aagatatcgt gaaaagcgga aagacagaaa attctcaaag 2280
[2095] gccaaaaagt gtccaggagt tgcgtcctct agcttggaga tgtttctgaa ttgtcagcca 2340
[2096] cggatgaaag ctgcatattc gcaaaaccta ggctgcaccg gatctccact gcatagccag 2400
[2097] tcacctgaaa gccagacaaa aagtcccaat ctttcagttg atctaaacag tgaaggcatt 2460
[2098] ggatccggag gtggatctgc taagggagaa cttagaggac atccatttga aggaaagcca 2520
[2099] attccaaatc cacttcttgg acttgattct actagaactg gacatcacca tcaccatcat 2580
[2100] ggatcctaat gaacccagct ttcttgtaca aagtggtcta gtgggtaccg cgaatttccc 2640
[2101] cgatcgttca aacatttggc aataaagttt cttaagattg aatcctgttg ccggtcttgc 2700
[2102] gatgattatc atataatttc tgttgaatta cgttaagcat gtaataatta acatgtaatg 2760
[2103] catgacgtta tttatgagat gggtttttat gattagagtc ccgcaattat acatttaata 2820
[2104] cgcgatagaa aacaaaatat agcgcgcaaa ctaggataaa ttatcgcgcg cggtgtcatc 2880
[2105] tatgttacta gatcgaa 2897

[2106] <210> 51

[2107] <211> 2225

[2108] <212> DNA

[2109] <213> Artificial Sequence

[2110] <220>

[2111] <223> Consensus sequence

[2112] <400> 51

[2113] gtcctacaca atgtgaattt gaattagttt ggtcatacgg tatatcatat gattataaat 60

[2114] aaaaaaaatt agcaaaagaa tataatttat taaatatttt acaccatacc aaacacaacc 120

[2115] gcattatata taatcttaat tatcattatc accagcatca acattataat gattccccta 180

[2116] tgcgttggaa cgtcattata gttattctaa acaagaaaga aatttgttct tgacatcaga 240

[2117] catctagtat tataactcta gtggagctta ccttttcttt tccttctttt ttttcttctt 300

[2118] aaaaaaatta tcactttta aatcttgtat attagttaag cttatctaaa caaagtttta 360

[2119] aattcatttc ttaaacgtcc attacaatgt aatataactt agtcgtctca attaaaccat 420

[2120] taatgtgaaa tataaatcaa aaaaagccaa agggcggtgg gacggcgcca atcatttgtc 480

[2121] ctagtccact caaataaggc ccatggtcgg caaaaccaaa cacaaaatgt gttattttta 540

[2122] atttttttcct cttttattgt taaagttgca aaatgtgtta tttttggtaa gaccctatgg 600

[2123] atatataaag acaggttatg tgaaacttgg aaaaccatca agttttaagc aaaaccctct 660

[2124] taagaactta aattgagctt cttttggggc atttttctag tgagaactaa aaacaagttt 720

[2125] gtacaaaaaa gcaggctaaa aaaaaccatg gatgtcggag tttcaccggc gaagtctata 780

[2126] cttgcgaaac ctctgaagct actcactgaa gaggacattt ctcagctcac tcgcgaagac 840

[2127] tgcgtaaaag aagatgtttt ttatttccag caatgttaca ttgttatacg tataatgatg 900

[2128] agtttagtga tcaagttcct ctttgattct tctttcttgt tgcagcgcaa attcctcaaa 960

[2129] gacaaaggaa tgcgaagacc gtcgtggaac aaatctcagg cgatccagca agttttatct 1020

[2130] cttaaagctc tctatgagcc tggagacgat tccggcgccg gtatcttccg caagatcctc 1080

[2131] gtttctcagc cagtaaatcc gcctcgcgtc acaacaacgt tgattgagcc aagcaacgag 1140

[2132] ctggaagctt gtggccgggt ttcttatccg gaagataacg gcgcgtgcca tagaatggat 1200

[2133] tctccaagat cagctgagtt ttccggtggg tctggtcact ttgtatccga gaaagatggc 1260

[2134] cacaagacga ctatttctcc cagaagccca gctgaaacaa gtgagctcgt tgggcaaatg 1320

[2135] acgatattct atagtggaaa agtgaatgtg tatgatggaa taccacctga aaaggcccgg 1380

[2136] tcaatcatgc actttgcagc caatccaatt gatttgcctg aaaacggtat ttttgcttcc 1440

[2137] agtagaatga tttcaaagct cataagtaaa gagaagatga tggaacttcc ccaaaaaggc 1500

[2138] cttgagaagg cgaattcttc tcgtgattct ggtatggagg gccaggcgaa cagaaaggta 1560

[2139] tctttgcaaa gatatcgtga aaagcggaaa gacagaaaat tctcaaaggc caaaaagtgt 1620

[2140] ccaggagttg cgtcctctag cttggagatg tttctgaatt gtcagccacg gatgaaagct 1680

[2141] gcatattcgc aaaacctagg ctgcaccgga tctccactgc atagccagtc acctgaaagc 1740

[2142] cagacaaaaa gtcccaatct ttcagttgat ctaaacagtg aaggcattgg atccggaggt 1800

[2143] ggatctgcta agggagaact tagaggacat ccatttgaag gaaagccaat tccaaatcca 1860

[2144] cttcttggac ttgattctac tagaactgga catcaccatc accatcatgg atcctaatga 1920

[2145] acccagcttt cttgtacaaa gtggtctagt gggtaccgcg aatttccccg atcgttcaaa 1980
[2146] catttggcaa taaagtttct taagattgaa tcctgttgcc ggtcttgcga tgattatcat 2040
[2147] ataatttctg ttgaattacg ttaagcatgt aataattaac atgtaatgca tgacgttatt 2100
[2148] tatgagatgg gtttttatga ttagagtccc gcaattatac atttaatacg cgatagaaaa 2160
[2149] caaaatatag cgcgcaaact aggataaatt atcgcgcgcg gtgtcatcta tgttactaga 2220
[2150] tcgaa 2225
[2151] <210> 52
[2152] <211> 2828
[2153] <212> DNA
[2154] <213> Artificial Sequence
[2155] <220>
[2156] <223> Consensus sequence
[2157] <400> 52
[2158] tcacgtggaa cgcgccgcag taaacggagc ggtggatcaa acttttcgtc cgtttgatca 60
[2159] aacagaagag aactagtcaa tgctctttct tcatatcaca atttaatagt ctcaagacga 120
[2160] ttacgccaca taaccatttt ctcgtgattt cgacatcaaa atttaataaa aggaactgat 180
[2161] tgattggtca tcatgttaca agtgtcaaat gagctaatcc gttttacagt ggcatagttt 240
[2162] acgatcaatt tacaaatttt tggttttata acatacttgt agttaaaact atttataagc 300
[2163] tatttatagt gagttagctt ataaaaccct attcttttat ctaaaattat gttttgactc 360
[2164] gtttcatgat aaaattttat ccttttcatc ggaataaaaa actttattat ttatttggca 420
[2165] aaataattgg tgtaaaaatt atgtatatgt taataacaaa aaatattaat ctgattcata 480
[2166] atcttaaaaa agaaaaattt cttgaaataa actttagaca ttgtaaataa aaaaacatta 540
[2167] tttttatata atgggatgtt tatatgtaat tttttataaa aaaataaaag ttgtttacta 600
[2168] gtaatccgat tggctttaac tatcgtcgcc aaaagaataa tgtagaactg actttgaggt 660
[2169] aaaactaaaa gaaatttgta agataatagt cacattaaat gctaaaatta atacatactg 720
[2170] atatatcgta taaaatttat gaaaactaca ccttaacctg aatcatacac tgtaataaaa 780
[2171] aaaacaaatt atatataaac cctaaaaact aatcataaat cccaaacggt gtactctcta 840
[2172] ttagctttga aaggattgcc caattgtttg ttaaaaattt ctaataatag tacaatgttt 900
[2173] tgtttcattt ttccttttcg tcaacctgtt acccaatagc aaatgaagtt tttatgtgtg 960
[2174] tgtgtgtgtg tgaatttcca tgaaaatgaa acgggcttag aatcccggtg tattatgggt 1020
[2175] cgggtcgtaa ccgggcaatg acgcaggatc tgacgtaaaa ctcccaagaa ttttttaaa 1080
[2176] aagtctccgg aaaataaaat caaagttcat taacttaaaa agaaaaaaca aaatcggtcc 1140
[2177] acgtcccaaa ccctttttat aggagagtct tatgttctgg cagaagactt cacagactct 1200
[2178] ttcttaatct ctctctcttt caaccaaacc cctaaacaaa aaaaaaatac attttctgat 1260
[2179] ctctctaaaa atctttctcc ttcgttaatc tcgtgatctc tttctttttc tatatacaag 1320
[2180] tttgtacaaa aaagcaggct aaaaaaaacc atggatgtcg gagtttcacc ggtaaaagaa 1380
[2181] gatgtttttt atttccagca atgttacatt gttatacgta taatgatgag tttagtgatc 1440
[2182] aagttcctct ttgattcttc tttcttgttg caggcgaagt ctatacttgc gaaacctctg 1500
[2183] aagctactca ctgaagagga catttctcag ctcactcgcg aagactgccg caaattcctc 1560

[2184] aaagacaaag gaatgcgaag accgtcgtgg aacaaatctc aggcgatcca gcaagtttta 1620
[2185] tctcttaaag ctctctatga gcctggagac gattccggcg ccggtatctt ccgcaagatc 1680
[2186] ctcgtttctc agccagtaaa tccgcctcgc gtcacaacaa cgttgattga gccaagcaac 1740
[2187] gagctggaag cttgtggccg ggtttcttat ccggaagata acggcgcgtg ccatagaatg 1800
[2188] gattctccaa gatcagctga gttttccggt gggtctggtc actttgtatc cgagaaagat 1860
[2189] ggccacaaga cgactatttc tcccagaagc ccagctgaaa caagtgagct cgttgggcaa 1920
[2190] atgacgatat tctatagtgg aaaagtgaat gtgtatgatg gaataccacc tgaaaaggcc 1980
[2191] cggtcaatca tgcactttgc agccaatcca attgatttgc ctgaaaacgg tatttttgct 2040
[2192] tccagtagaa tgatttcaaa gctcataagt aaagagaaga tgatggaact tccccaaaaa 2100
[2193] ggccttgaga aggcgaattc ttctcgtgat tctggtatgg agggccaggc gaacagaaag 2160
[2194] gtatctttgc aaagatatcg tgaaaagcgg aaagacagaa aattctcaaa ggccaaaaag 2220
[2195] tgtccaggag ttgcgtcctc tagcttggag atgtttctga attgtcagcc acggatgaaa 2280
[2196] gctgcatatt cgcaaaacct aggctgcacc ggatctccac tgcatagcca gtcacctgaa 2340
[2197] agccagacaa aaagtcccaa tctttcagtt gatctaaaca gtgaaggcat tggatccgga 2400
[2198] ggtggatctg ctaagggaga acttagagga catccatttg aaggaaagcc aattccaaat 2460
[2199] ccacttcttg gacttgattc tactagaact ggacatcacc atcaccatca tggatcctaa 2520
[2200] tgaacccagc tttcttgtac aaagtggtct agtgggtacc gcgaatttcc ccgatcgttc 2580
[2201] aaacatttgg caataaagtt tcttaagatt gaatcctgtt gccggtcttg cgatgattat 2640
[2202] catataattt ctgttgaatt acgttaagca tgtaataatt aacatgtaat gcatgacgtt 2700
[2203] atttatgaga tgggttttta tgattagagt cccgcaatta tacatttaat acgcgataga 2760
[2204] aaacaaaata tagcgcgcaa actaggataa attatcgcgc gcggtgtcat ctatgttact 2820
[2205] agatcgaa 2828
[2206] <210> 53
[2207] <211> 2777
[2208] <212> DNA
[2209] <213> Artificial Sequence
[2210] <220>
[2211] <223> Consensus sequence
[2212] <400> 53
[2213] ccccttattg tacttcaatt aattatcatt atatcagcat aaacattata ataagtttct 60
[2214] tgcgtgttgg aacgtcattt tagttattct aaagaggaaa tagtttcttt tttgctcatg 120
[2215] acatcagaca tctggactac tatactggag tttacctttt cttctcctct ttttcttatt 180
[2216] gttcctctaa aaaaaattat cacttttaa atgcattagt taaacttatc tcaacaacgt 240
[2217] ttaaaattca tttcttgaat gcccattaca atgtaatagt ataacttaat tagtcgtctc 300
[2218] catgaaccat taatacgtac ggagtaatat aaaacaccat tggggagttc aatttgcaat 360
[2219] aatttcttgc aaaaatgtaa agtacctttt tgttcttgca aaattttaca aataaaaatt 420
[2220] tgcagctctt ttttttctct ctctccaaat actagctcaa aacccacaaa tatttttgaa 480
[2221] tttatggcat acttttagaa tgcgtttgat gcaactattt tcctttagga aatattcaca 540
[2222] acaatctaag acaatcaaaa agtagaaaat agtttgtaaa aagggatgtg gaggacatct 600

[2223] taatcaaata ttttcagttt aaaacttgaa aatgaaaaaa cacccgaaag gaaatgattc 660
[2224] gttctttaat atgtcctaca caatgtgaat ttgaattagt ttggtcatac ggtatatcat 720
[2225] atgattataa ataaaaaaaa ttagcaaaag aatataattt attaaatatt ttacaccata 780
[2226] ccaaacacaa ccgcattata tataatctta attatcatta tcaccagcat caacattata 840
[2227] atgattcccc tatgcgttgg aacgtcatta tagttattct aaacaagaaa gaaatttgtt 900
[2228] cttgacatca gacatctagt attataactc tagtggagct tacctttct tttccttctt 960
[2229] ttttttcttc ttaaaaaaat tatcactttt taaatcttgt atattagtta agcttatcta 1020
[2230] aacaaagttt taaattcatt tcttaaacgt ccattacaat gtaatataac ttagtcgtct 1080
[2231] caattaaacc attaatgtga aatataaatc aaaaaaagcc aaagggcggt gggacggcgc 1140
[2232] caatcatttg tcctagtcca ctcaaataag gcccatggtc ggcaaaacca aacacaaaat 1200
[2233] gtgttatttt taatttttc ctcttttatt gttaaagttg caaaatgtgt tatttttggt 1260
[2234] aagaccctat ggatatataa agacaggtta tgtgaaactt ggaaaaccat caagttttaa 1320
[2235] gcaaaaccct cttaagaact taaattgagc ttcttttggg gcatttttct agtgagaact 1380
[2236] aaaaacaagt ttgtacaaaa aagcaggcta aaaaaaacca tggatgtcgg agtttcaccg 1440
[2237] gcgaagtcta tacttgcgaa acctctgaag ctactcactg aagaggacat ttctcagctc 1500
[2238] actcgcgaag actgcgtaaa agaagatgtt ttttatttcc agcaatgtta cattgttata 1560
[2239] cgtataatga tgagtttagt gatcaagttc ctctttgatt cttctttctt gttgcagcgc 1620
[2240] aaattcctca aagacaaagg aatgcgaaga ccgtcgtgga acaaatctca ggcgatccag 1680
[2241] caagttttat ctcttaaagc tctctatgag cctggagacg attccggcgc cggtatcttc 1740
[2242] cgcaagatcc tcgtttctca gccagtaaat ccgcctcgcg tcacaacaac gttgattgag 1800
[2243] ccaagcaacg agctggaagc ttgtggccgg gtttcttatc cggaagataa cggcgcgtgc 1860
[2244] catagaatgg attctccaag atcagctgag ttttccggtg ggtctggtca ctttgtatcc 1920
[2245] gagaaagatg gccacaagac gactatttct cccagaagcc cagctgaaac aagtgagctc 1980
[2246] gttgggcaaa tgacgatatt ctatagtgga aaagtgaatg tgtatgatgg aataccacct 2040
[2247] gaaaaggccc ggtcaatcat gcactttgca gccaatccaa ttgatttgcc tgaaaacggt 2100
[2248] atttttgctt ccagtagaat gatttcaaag ctcataagta aagagaagat gatggaactt 2160
[2249] ccccaaaaag gccttgagaa ggcgaattct tctcgtgatt ctggtatgga gggccaggcg 2220
[2250] aacagaaagg tatctttgca aagatatcgt gaaaagcgga aagacagaaa attctcaaag 2280
[2251] gccaaaaagt gtccaggagt tgcgtcctct agcttggaga tgtttctgaa ttgtcagcca 2340
[2252] cggatgaaag ctgcatattc gcaaaaccta ggctgcaccg gatctccact gcatagccag 2400
[2253] tcacctgaaa gccagacaaa aagtcccaat ctttcagttg atctaaacag tgaaggcatt 2460
[2254] ggatcctaat gaacccagct ttcttgtaca aagtggtcta gtgggtaccg cgaatttccc 2520
[2255] cgatcgttca aacatttggc aataaagttt cttaagattg aatcctgttg ccggtcttgc 2580
[2256] gatgattatc atataatttc tgttgaatta cgttaagcat gtaataatta acatgtaatg 2640
[2257] catgacgtta tttatgagat gggtttttat gattagagtc ccgcaattat acatttaata 2700
[2258] cgcgatagaa aacaaaatat agcgcgcaaa ctaggataaa ttatcgcgcg cggtgtcatc 2760
[2259] tatgttacta gatcgaa 2777
[2260] <210> 54
[2261] <211> 2105

[2262] <212> DNA

[2263] <213> Artificial Sequence

[2264] <220>

[2265] <223> Consensus sequence

[2266] <400> 54

[2267] gtcctacaca atgtgaattt gaattagttt ggtcatacgg tatatcatat gattataaat 60

[2268] aaaaaaaatt agcaaaagaa tataatttat taaatatttt acaccatacc aaacacaacc 120

[2269] gcattatata taatcttaat tatcattatc accagcatca acattataat gattccccta 180

[2270] tgcgttggaa cgtcattata gttattctaa acaagaaaga aatttgttct tgacatcaga 240

[2271] catctagtat tataactcta gtggagctta ccttttcttt tccttctttt ttttcttctt 300

[2272] aaaaaaatta tcacttttta aatcttgtat attagttaag cttatctaaa caaagtttta 360

[2273] aattcatttc ttaaacgtcc attacaatgt aatataactt agtcgtctca attaaaccat 420

[2274] taatgtgaaa tataaatcaa aaaaagccaa agggcggtgg gacggcgcca atcatttgtc 480

[2275] ctagtccact caaataaggc ccatggtcgg caaaaccaaa cacaaaatgt gttatttta 540

[2276] atttttcct cttttattgt taaagttgca aaatgtgtta tttttggtaa gaccctatgg 600

[2277] atatataaag acaggttatg tgaaacttgg aaaaccatca agttttaagc aaaaccctct 660

[2278] taagaactta aattgagctt cttttggggc atttttctag tgagaactaa aaacaagttt 720

[2279] gtacaaaaaa gcaggctaaa aaaaaccatg gatgtcggag tttcaccggc gaagtctata 780

[2280] cttgcgaaac ctctgaagct actcactgaa gaggacattt ctcagctcac tcgcgaagac 840

[2281] tgcgtaaaag aagatgtttt ttatttccag caatgttaca ttgttatacg tataatgatg 900

[2282] agtttagtga tcaagttcct ctttgattct tctttcttgt tgcagcgcaa attcctcaaa 960

[2283] gacaaaggaa tgcgaagacc gtcgtggaac aaatctcagg cgatccagca agttttatct 1020

[2284] cttaaagctc tctatgagcc tggagacgat tccggcgccg gtatcttccg caagatcctc 1080

[2285] gtttctcagc cagtaaatcc gcctcgcgtc acaacaacgt tgattgagcc aagcaacgag 1140

[2286] ctggaagctt gtggccgggt ttcttatccg gaagataacg gcgcgtgcca tagaatggat 1200

[2287] tctccaagat cagctgagtt ttccggtggg tctggtcact ttgtatccga gaaagatggc 1260

[2288] cacaagacga ctatttctcc cagaagccca gctgaaacaa gtgagctcgt tgggcaaatg 1320

[2289] acgatattct atagtggaaa agtgaatgtg tatgatggaa taccacctga aaaggcccgg 1380

[2290] tcaatcatgc actttgcagc caatccaatt gatttgcctg aaaacggtat ttttgcttcc 1440

[2291] agtagaatga tttcaaagct cataagtaaa gagaagatga tggaacttcc ccaaaaaggc 1500

[2292] cttgagaagg cgaattcttc tcgtgattct ggtatggagg gccaggcgaa cagaaaggta 1560

[2293] tctttgcaaa gatatcgtga aaagcggaaa gacagaaaat tctcaaaggc caaaaagtgt 1620

[2294] ccaggagttg cgtcctctag cttggagatg tttctgaatt gtcagccacg gatgaaagct 1680

[2295] gcatattcgc aaaacctagg ctgcaccgga tctccactgc atagccagtc acctgaaagc 1740

[2296] cagacaaaaa gtcccaatct ttcagttgat ctaaacagtg aaggcattgg atcctaatga 1800

[2297] acccagcttt cttgtacaaa gtggtctagt gggtaccgcg aatttccccg atcgttcaaa 1860

[2298] catttggcaa taaagtttct taagattgaa tcctgttgcc ggtcttgcga tgattatcat 1920

[2299] ataatttctg ttgaattacg ttaagcatgt aataattaac atgtaatgca tgacgttatt 1980

[2300] tatgagatgg gtttttatga ttagagtccc gcaattatac atttaatacg cgatagaaaa 2040

[2301] caaaatatag cgcgcaaact aggataaatt atcgcgcgcg gtgtcatcta tgttactaga 2100

[2302] tcgaa 2105

[2303] <210> 55

[2304] <211> 2708

[2305] <212> DNA

[2306] <213> Artificial Sequence

[2307] <220>

[2308] <223> Consensus sequence

[2309] <400> 55

[2310] tcacgtggaa cgcgccgcag taaacggagc ggtggatcaa acttttcgtc cgtttgatca 60

[2311] aacagaagag aactagtcaa tgctctttct tcatatcaca atttaatagt ctcaagacga 120

[2312] ttacgccaca taaccatttt ctcgtgattt cgacatcaaa atttaataaa aggaactgat 180

[2313] tgattggtca tcatgttaca agtgtcaaat gagctaatcc gttttacagt ggcatagttt 240

[2314] acgatcaatt tacaaatttt tggttttata acatacttgt agttaaaact atttataagc 300

[2315] tatttatagt gagttagctt ataaaaccct attcttttat ctaaaattat gttttgactc 360

[2316] gtttcatgat aaaattttat ccttttcatc ggaataaaaa actttattat ttatttggca 420

[2317] aaataattgg tgtaaaaatt atgtatatgt taataacaaa aaatattaat ctgattcata 480

[2318] atcttaaaaa agaaaaattt cttgaaataa actttagaca ttgtaaataa aaaaacatta 540

[2319] tttttatata atgggatgtt tatatgtaat tttttataaa aaaataaaag ttgtttacta 600

[2320] gtaatccgat tggctttaac tatcgtcgcc aaaagaataa tgtagaactg actttgaggt 660

[2321] aaaactaaaa gaaatttgta agataatagt cacattaaat gctaaaatta atacatactg 720

[2322] atatatcgta taaaatttat gaaaactaca ccttaacctg aatcatacac tgtaataaaa 780

[2323] aaaacaaatt atatataaac cctaaaaact aatcataaat cccaaacggt gtactctcta 840

[2324] ttagctttga aaggattgcc caattgtttg ttaaaaattt ctaataatag tacaatgttt 900

[2325] tgtttcattt ttccttttcg tcaacctgtt acccaatagc aaatgaagtt tttatgtgtg 960

[2326] tgtgtgtgtg tgaatttcca tgaaaatgaa acgggcttag aatcccggtg tattatgggt 1020

[2327] cgggtcgtaa ccgggcaatg acgcaggatc tgacgtaaaa ctcccaagaa ttttttaaa 1080

[2328] aagtctccgg aaaataaaat caaagttcat taacttaaaa agaaaaaaca aaatcggtcc 1140

[2329] acgtcccaaa ccctttttat aggagagtct tatgttctgg cagaagactt cacagactct 1200

[2330] ttcttaatct ctctctcttt caaccaaacc cctaaacaaa aaaaaaatac attttctgat 1260

[2331] ctctctaaaa atctttctcc ttcgttaatc tcgtgatctc tttctttttc tatatacaag 1320

[2332] tttgtacaaa aaagcaggct aaaaaaaacc atggatgtcg gagtttcacc ggtaaaagaa 1380

[2333] gatgtttttt atttccagca atgttacatt gttatacgta taatgatgag tttagtgatc 1440

[2334] aagttcctct ttgattcttc tttcttgttg caggcgaagt ctatacttgc gaaacctctg 1500

[2335] aagctactca ctgaagagga catttctcag ctcactcgcg aagactgccg caaattcctc 1560

[2336] aaagacaaag gaatgcgaag accgtcgtgg aacaaatctc aggcgatcca gcaagtttta 1620

[2337] tctcttaaag ctctctatga gcctggagac gattccggcg ccggtatctt ccgcaagatc 1680

[2338] ctcgtttctc agccagtaaa tccgcctcgc gtcacaacaa cgttgattga gccaagcaac 1740

[2339] gagctggaag cttgtggccg ggtttcttat ccggaagata acggcgcgtg ccatagaatg 1800

[2340] gattctccaa gatcagctga gttttccggt gggtctggtc actttgtatc cgagaaagat 1860
[2341] ggccacaaga cgactatttc tcccagaagc ccagctgaaa caagtgagct cgttgggcaa 1920
[2342] atgacgatat tctatagtgg aaaagtgaat gtgtatgatg gaataccacc tgaaaaggcc 1980
[2343] cggtcaatca tgcactttgc agccaatcca attgatttgc ctgaaaacgg tatttttgct 2040
[2344] tccagtagaa tgatttcaaa gctcataagt aaagagaaga tgatggaact tccccaaaaa 2100
[2345] ggccttgaga aggcgaattc ttctcgtgat tctggtatgg agggccaggc gaacagaaag 2160
[2346] gtatctttgc aaagatatcg tgaaaagcgg aaagacagaa aattctcaaa ggccaaaaag 2220
[2347] tgtccaggag ttgcgtcctc tagcttggag atgtttctga attgtcagcc acggatgaaa 2280
[2348] gctgcatatt cgcaaaacct aggctgcacc ggatctccac tgcatagcca gtcacctgaa 2340
[2349] agccagacaa aaagtcccaa tctttcagtt gatctaaaca gtgaaggcat tggatcctaa 2400
[2350] tgaacccagc tttcttgtac aaagtggtct agtgggtacc gcgaatttcc ccgatcgttc 2460
[2351] aaacatttgg caataaagtt tcttaagatt gaatcctgtt gccggtcttg cgatgattat 2520
[2352] catataattt ctgttgaatt acgttaagca tgtaataatt aacatgtaat gcatgacgtt 2580
[2353] atttatgaga tgggttttta tgattagagt cccgcaatta tacatttaat acgcgataga 2640
[2354] aaacaaaata tagcgcgcaa actaggataa attatcgcgc gcggtgtcat ctatgttact 2700
[2355] agatcgaa 2708
[2356] <210> 56
[2357] <211> 161
[2358] <212> PRT
[2359] <213> Artificial Sequence
[2360] <220>
[2361] <223> Consensus sequence
[2362] <400> 56
[2363] Met Lys Leu Leu Ser Ser Ile Glu Glu Ala Cys Asn Ile Cys Arg Leu
[2364] 1 5 10 15
[2365] Lys Lys Leu Lys Cys Ser Lys Glu Lys Pro Lys Cys Ala Lys Cys Leu
[2366] 20 25 30
[2367] Lys Asn Asn Trp Glu Cys Arg Tyr Ser Pro Lys Thr Lys Arg Ser Pro
[2368] 35 40 45
[2369] Leu Thr Arg Ala His Leu Thr Glu Val Glu Ser Arg Leu Glu Arg Leu
[2370] 50 55 60
[2371] Glu Gln Leu Phe Leu Leu Ile Phe Pro Arg Glu Asn Leu Asn Met Ile
[2372] 65 70 75 80
[2373] Leu Lys Met Asp Ser Leu Gln Asp Ile Lys Ala Leu Leu Thr Gly Leu
[2374] 85 90 95
[2375] Phe Val Gln Asp Asn Val Asn Lys Asp Ala Val Thr Asp Arg Leu Ala
[2376] 100 105 110
[2377] Ser Val Glu Thr Asp Met Pro Leu Thr Leu Arg Gln His Arg Ile Ser
[2378] 115 120 125

[2379] Ala Thr Ser Ser Ser Glu Glu Ser Ser Asn Lys Gly Gln Arg Gln Leu
[2380] 130 135 140
[2381] Thr Val Ser Ser Arg Ser Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly
[2382] 145 150 155 160
[2383] Ser
[2384] <210> 57
[2385] <211> 139
[2386] <212> PRT
[2387] <213> Artificial Sequence
[2388] <220>
[2389] <223> Consensus sequence
[2390] <400> 57
[2391] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[2392] 1 5 10 15
[2393] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[2394] 20 25 30
[2395] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[2396] 35 40 45
[2397] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[2398] 50 55 60
[2399] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[2400] 65 70 75 80
[2401] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[2402] 85 90 95
[2403] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[2404] 100 105 110
[2405] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[2406] 115 120 125
[2407] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser
[2408] 130 135
[2409] <210> 58
[2410] <211> 474
[2411] <212> PRT
[2412] <213> Artificial Sequence
[2413] <220>
[2414] <223> Consensus sequence
[2415] <400> 58
[2416] Met Lys Leu Leu Ser Ser Ile Glu Glu Ala Cys Asn Ile Cys Arg Leu
[2417] 1 5 10 15

[2418] Lys Lys Leu Lys Cys Ser Lys Glu Lys Pro Lys Cys Ala Lys Cys Leu
[2419] 20 25 30
[2420] Lys Asn Asn Trp Glu Cys Arg Tyr Ser Pro Lys Thr Lys Arg Ser Pro
[2421] 35 40 45
[2422] Leu Thr Arg Ala His Leu Thr Glu Val Glu Ser Arg Leu Glu Arg Leu
[2423] 50 55 60
[2424] Glu Gln Leu Phe Leu Leu Ile Phe Pro Arg Glu Asn Leu Asn Met Ile
[2425] 65 70 75 80
[2426] Leu Lys Met Asp Ser Leu Gln Asp Ile Lys Ala Leu Leu Thr Gly Leu
[2427] 85 90 95
[2428] Phe Val Gln Asp Asn Val Asn Lys Asp Ala Val Thr Asp Arg Leu Ala
[2429] 100 105 110
[2430] Ser Val Glu Thr Asp Met Pro Leu Thr Leu Arg Gln His Arg Ile Ser
[2431] 115 120 125
[2432] Ala Thr Ser Ser Ser Glu Glu Ser Ser Asn Lys Gly Gln Arg Gln Leu
[2433] 130 135 140
[2434] Thr Val Ser Ser Arg Ser Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly
[2435] 145 150 155 160
[2436] Ser Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro
[2437] 165 170 175
[2438] Leu Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp
[2439] 180 185 190
[2440] Cys Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn
[2441] 195 200 205
[2442] Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu
[2443] 210 215 220
[2444] Pro Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser
[2445] 225 230 235 240
[2446] Gln Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser
[2447] 245 250 255
[2448] Asn Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly
[2449] 260 265 270
[2450] Ala Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly
[2451] 275 280 285
[2452] Ser Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser
[2453] 290 295 300
[2454] Pro Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile
[2455] 305 310 315 320
[2456] Phe Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys

[2457] 325 330 335
[2458] Ala Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu
[2459] 340 345 350
[2460] Asn Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys
[2461] 355 360 365
[2462] Glu Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser
[2463] 370 375 380
[2464] Ser Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu
[2465] 385 390 395 400
[2466] Gln Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys
[2467] 405 410 415
[2468] Lys Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys
[2469] 420 425 430
[2470] Gln Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly
[2471] 435 440 445
[2472] Ser Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn
[2473] 450 455 460
[2474] Leu Ser Val Asp Leu Asn Ser Glu Gly Ile
[2475] 465 470
[2476] <210> 59
[2477] <211> 452
[2478] <212> PRT
[2479] <213> Artificial Sequence
[2480] <220>
[2481] <223> Consensus sequence
[2482] <400> 59
[2483] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[2484] 1 5 10 15
[2485] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[2486] 20 25 30
[2487] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[2488] 35 40 45
[2489] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[2490] 50 55 60
[2491] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[2492] 65 70 75 80
[2493] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[2494] 85 90 95
[2495] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu

[2496] 100 105 110
[2497] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[2498] 115 120 125
[2499] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Met Asp Val Gly Val
[2500] 130 135 140
[2501] Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu Lys Leu Leu Thr Glu
[2502] 145 150 155 160
[2503] Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys Arg Lys Phe Leu Lys
[2504] 165 170 175
[2505] Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln
[2506] 180 185 190
[2507] Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro Gly Asp Asp Ser Gly
[2508] 195 200 205
[2509] Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln Pro Val Asn Pro Pro
[2510] 210 215 220
[2511] Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn Glu Leu Glu Ala Cys
[2512] 225 230 235 240
[2513] Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala Cys His Arg Met Asp
[2514] 245 250 255
[2515] Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser Gly His Phe Val Ser
[2516] 260 265 270
[2517] Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro Arg Ser Pro Ala Glu
[2518] 275 280 285
[2519] Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe Tyr Ser Gly Lys Val
[2520] 290 295 300
[2521] Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala Arg Ser Ile Met His
[2522] 305 310 315 320
[2523] Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn Gly Ile Phe Ala Ser
[2524] 325 330 335
[2525] Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu Lys Met Met Glu Leu
[2526] 340 345 350
[2527] Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser Arg Asp Ser Gly Met
[2528] 355 360 365
[2529] Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln Arg Tyr Arg Glu Lys
[2530] 370 375 380
[2531] Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys Cys Pro Gly Val Ala
[2532] 385 390 395 400
[2533] Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln Pro Arg Met Lys Ala
[2534] 405 410 415

[2535] Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser Pro Leu His Ser Gln
[2536] 420 425 430
[2537] Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu Ser Val Asp Leu Asn
[2538] 435 440 445
[2539] Ser Glu Gly Ile
[2540] 450
[2541] <210> 60
[2542] <211> 391
[2543] <212> PRT
[2544] <213> Artificial Sequence
[2545] <220>
[2546] <223> Consensus sequence
[2547] <400> 60
[2548] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[2549] 1 5 10 15
[2550] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[2551] 20 25 30
[2552] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[2553] 35 40 45
[2554] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[2555] 50 55 60
[2556] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[2557] 65 70 75 80
[2558] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[2559] 85 90 95
[2560] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[2561] 100 105 110
[2562] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[2563] 115 120 125
[2564] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Tyr Glu Pro Gly Asp
[2565] 130 135 140
[2566] Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln Pro Val
[2567] 145 150 155 160
[2568] Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn Glu Leu
[2569] 165 170 175
[2570] Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala Cys His
[2571] 180 185 190
[2572] Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser Gly His
[2573] 195 200 205

[2574] Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro Arg Ser
[2575] 210 215 220
[2576] Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe Tyr Ser
[2577] 225 230 235 240
[2578] Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala Arg Ser
[2579] 245 250 255
[2580] Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn Gly Ile
[2581] 260 265 270
[2582] Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu Lys Met
[2583] 275 280 285
[2584] Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser Arg Asp
[2585] 290 295 300
[2586] Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln Arg Tyr
[2587] 305 310 315 320
[2588] Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys Cys Pro
[2589] 325 330 335
[2590] Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln Pro Arg
[2591] 340 345 350
[2592] Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser Pro Leu
[2593] 355 360 365
[2594] His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu Ser Val
[2595] 370 375 380
[2596] Asp Leu Asn Ser Glu Gly Ile
[2597] 385 390
[2598] <210> 61
[2599] <211> 427
[2600] <212> PRT
[2601] <213> Artificial Sequence
[2602] <220>
[2603] <223> Consensus sequence
[2604] <400> 61
[2605] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[2606] 1 5 10 15
[2607] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[2608] 20 25 30
[2609] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[2610] 35 40 45
[2611] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[2612] 50 55 60

[2613] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[2614] 65 70 75 80
[2615] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[2616] 85 90 95
[2617] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[2618] 100 105 110
[2619] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[2620] 115 120 125
[2621] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Met Asp Val Gly Val
[2622] 130 135 140
[2623] Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu Lys Leu Leu Thr Glu
[2624] 145 150 155 160
[2625] Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys Arg Lys Phe Leu Lys
[2626] 165 170 175
[2627] Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln
[2628] 180 185 190
[2629] Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro Gly Asp Asp Ser Gly
[2630] 195 200 205
[2631] Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln Pro Val Asn Pro Pro
[2632] 210 215 220
[2633] Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn Glu Leu Glu Ala Cys
[2634] 225 230 235 240
[2635] Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala Cys His Arg Met Asp
[2636] 245 250 255
[2637] Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser Gly His Phe Val Ser
[2638] 260 265 270
[2639] Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro Arg Ser Pro Ala Glu
[2640] 275 280 285
[2641] Thr Ser Glu Leu Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro
[2642] 290 295 300
[2643] Glu Asn Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser
[2644] 305 310 315 320
[2645] Lys Glu Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn
[2646] 325 330 335
[2647] Ser Ser Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser
[2648] 340 345 350
[2649] Leu Gln Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala
[2650] 355 360 365
[2651] Lys Lys Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn

[2652] 370 375 380
[2653] Cys Gln Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr
[2654] 385 390 395 400
[2655] Gly Ser Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro
[2656] 405 410 415
[2657] Asn Leu Ser Val Asp Leu Asn Ser Glu Gly Ile
[2658] 420 425
[2659] <210> 62
[2660] <211> 368
[2661] <212> PRT
[2662] <213> Artificial Sequence
[2663] <220>
[2664] <223> Consensus sequence
[2665] <400> 62
[2666] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[2667] 1 5 10 15
[2668] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[2669] 20 25 30
[2670] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[2671] 35 40 45
[2672] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[2673] 50 55 60
[2674] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[2675] 65 70 75 80
[2676] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[2677] 85 90 95
[2678] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[2679] 100 105 110
[2680] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[2681] 115 120 125
[2682] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Met Asp Val Gly Val
[2683] 130 135 140
[2684] Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu Lys Leu Leu Thr Glu
[2685] 145 150 155 160
[2686] Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys Arg Lys Phe Leu Lys
[2687] 165 170 175
[2688] Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys Ser Gln Ala Ile Gln
[2689] 180 185 190
[2690] Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro Gly Asp Asp Ser Gly

[2691] 195 200 205

[2692] Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln Pro Val Asn Pro Pro

[2693] 210 215 220

[2694] Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn Glu Leu Glu Ala Cys

[2695] 225 230 235 240

[2696] Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala Cys His Arg Met Asp

[2697] 245 250 255

[2698] Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser Gly His Phe Val Ser

[2699] 260 265 270

[2700] Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro Arg Ser Pro Ala Glu

[2701] 275 280 285

[2702] Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe Tyr Ser Gly Lys Val

[2703] 290 295 300

[2704] Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala Arg Ser Ile Met His

[2705] 305 310 315 320

[2706] Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn Gly Ile Phe Ala Ser

[2707] 325 330 335

[2708] Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu Lys Met Met Glu Leu

[2709] 340 345 350

[2710] Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser Arg Asp Ser Gly Met

[2711] 355 360 365

[2712] <210> 63

[2713] <211> 1131

[2714] <212> PRT

[2715] <213> Artificial Sequence

[2716] <220>

[2717] <223> Consensus sequence

[2718] <400> 63

[2719] Met Ser Ser Leu Ser Arg Glu Leu Val Phe Leu Ile Leu Gln Phe Leu

[2720] 1 5 10 15

[2721] Asp Glu Glu Lys Phe Lys Glu Thr Val His Lys Leu Glu Gln Glu Ser

[2722] 20 25 30

[2723] Gly Phe Phe Phe Asn Met Lys Tyr Phe Glu Asp Glu Val His Asn Gly

[2724] 35 40 45

[2725] Asn Trp Asp Glu Val Glu Lys Tyr Leu Ser Gly Phe Thr Lys Val Asp

[2726] 50 55 60

[2727] Asp Asn Arg Tyr Ser Met Lys Ile Phe Phe Glu Ile Arg Lys Gln Lys

[2728] 65 70 75 80

[2729] Tyr Leu Glu Ala Leu Asp Lys His Asp Arg Pro Lys Ala Val Asp Ile

[2730] 85 90 95
[2731] Leu Val Lys Asp Leu Lys Val Phe Ser Thr Phe Asn Glu Glu Leu Phe
[2732] 100 105 110
[2733] Lys Glu Ile Thr Gln Leu Leu Thr Leu Glu Asn Phe Arg Glu Asn Glu
[2734] 115 120 125
[2735] Gln Leu Ser Lys Tyr Gly Asp Thr Lys Ser Ala Arg Ala Ile Met Leu
[2736] 130 135 140
[2737] Val Glu Leu Lys Lys Leu Ile Glu Ala Asn Pro Leu Phe Arg Asp Lys
[2738] 145 150 155 160
[2739] Leu Gln Phe Pro Thr Leu Arg Asn Ser Arg Leu Arg Thr Leu Ile Asn
[2740] 165 170 175
[2741] Gln Ser Leu Asn Trp Gln His Gln Leu Cys Lys Asn Pro Arg Pro Asn
[2742] 180 185 190
[2743] Pro Asp Ile Lys Thr Leu Phe Val Asp His Ser Cys Gly Pro Pro Asn
[2744] 195 200 205
[2745] Gly Ala Arg Ala Pro Ser Pro Val Asn Asn Pro Leu Leu Gly Gly Ile
[2746] 210 215 220
[2747] Pro Lys Ala Gly Gly Phe Pro Pro Leu Gly Ala His Gly Pro Phe Gln
[2748] 225 230 235 240
[2749] Pro Thr Ala Ser Pro Val Pro Thr Pro Leu Ala Gly Trp Met Ser Ser
[2750] 245 250 255
[2751] Pro Ser Ser Val Pro His Pro Ala Val Ser Ala Gly Ala Ile Ala Leu
[2752] 260 265 270
[2753] Gly Gly Pro Ser Ile Pro Ala Ala Leu Lys His Pro Arg Thr Pro Pro
[2754] 275 280 285
[2755] Thr Asn Ala Ser Leu Asp Tyr Pro Ser Ala Asp Ser Glu His Val Ser
[2756] 290 295 300
[2757] Lys Arg Thr Arg Pro Met Gly Ile Ser Asp Glu Val Asn Leu Gly Val
[2758] 305 310 315 320
[2759] Asn Met Leu Pro Met Ser Phe Ser Gly Gln Ala His Gly His Ser Pro
[2760] 325 330 335
[2761] Ala Phe Lys Ala Pro Asp Asp Leu Pro Lys Thr Val Ala Arg Thr Leu
[2762] 340 345 350
[2763] Ser Gln Gly Ser Ser Pro Met Ser Met Asp Phe His Pro Ile Lys Gln
[2764] 355 360 365
[2765] Thr Leu Leu Leu Val Gly Thr Asn Val Gly Asp Ile Gly Leu Trp Glu
[2766] 370 375 380
[2767] Val Gly Ser Arg Glu Arg Leu Val Gln Lys Thr Phe Lys Val Trp Asp
[2768] 385 390 395 400

[2769] Leu Ser Lys Cys Ser Met Pro Leu Gln Ala Ala Leu Val Lys Glu Pro
[2770] 405 410 415
[2771] Val Val Ser Val Asn Arg Val Ile Trp Ser Pro Asp Gly Ser Leu Phe
[2772] 420 425 430
[2773] Gly Val Ala Tyr Ser Arg His Ile Val Gln Leu Tyr Ser Tyr His Gly
[2774] 435 440 445
[2775] Gly Glu Asp Met Arg Gln His Leu Glu Ile Asp Ala His Val Gly Gly
[2776] 450 455 460
[2777] Val Asn Asp Ile Ser Phe Ser Thr Pro Asn Lys Gln Leu Cys Val Ile
[2778] 465 470 475 480
[2779] Thr Cys Gly Asp Asp Lys Thr Ile Lys Val Trp Asp Ala Ala Thr Gly
[2780] 485 490 495
[2781] Val Lys Arg His Thr Phe Glu Gly His Glu Ala Pro Val Tyr Ser Val
[2782] 500 505 510
[2783] Cys Pro His Tyr Lys Glu Asn Ile Gln Phe Ile Phe Ser Thr Ala Leu
[2784] 515 520 525
[2785] Asp Gly Lys Ile Lys Ala Trp Leu Tyr Asp Asn Met Gly Ser Arg Val
[2786] 530 535 540
[2787] Asp Tyr Asp Ala Pro Gly Arg Trp Cys Thr Thr Met Ala Tyr Ser Ala
[2788] 545 550 555 560
[2789] Asp Gly Thr Arg Leu Phe Ser Cys Gly Thr Ser Lys Asp Gly Glu Ser
[2790] 565 570 575
[2791] Phe Ile Val Glu Trp Asn Glu Ser Glu Gly Ala Val Lys Arg Thr Tyr
[2792] 580 585 590
[2793] Gln Gly Phe His Lys Arg Ser Leu Gly Val Val Gln Phe Asp Thr Thr
[2794] 595 600 605
[2795] Lys Asn Arg Tyr Leu Ala Ala Gly Asp Asp Phe Ser Ile Lys Phe Trp
[2796] 610 615 620
[2797] Asp Met Asp Ala Val Gln Leu Leu Thr Ala Ile Asp Gly Asp Gly Gly
[2798] 625 630 635 640
[2799] Leu Gln Ala Ser Pro Arg Ile Arg Phe Asn Lys Glu Gly Ser Leu Leu
[2800] 645 650 655
[2801] Ala Val Ser Gly Asn Glu Asn Val Ile Lys Ile Met Ala Asn Ser Asp
[2802] 660 665 670
[2803] Gly Leu Arg Leu Leu His Thr Phe Glu Asn Ile Ser Ser Glu Ser Ser
[2804] 675 680 685
[2805] Lys Pro Ala Ile Asn Ser Ile Ala Ala Ala Ala Ala Ala Ala Ala Thr
[2806] 690 695 700
[2807] Ser Ala Gly His Ala Asp Arg Ser Ala Asn Val Val Ser Ile Gln Gly

[2808] 705 710 715 720
[2809] Met Asn Gly Asp Ser Arg Asn Met Val Asp Val Lys Pro Val Ile Thr
[2810] 725 730 735
[2811] Glu Glu Ser Asn Asp Lys Ser Lys Ile Trp Lys Leu Thr Glu Val Ser
[2812] 740 745 750
[2813] Glu Pro Ser Gln Cys Arg Ser Leu Arg Leu Pro Glu Asn Leu Arg Val
[2814] 755 760 765
[2815] Ala Lys Ile Ser Arg Leu Ile Phe Thr Asn Ser Gly Asn Ala Ile Leu
[2816] 770 775 780
[2817] Ala Leu Ala Ser Asn Ala Ile His Leu Leu Trp Lys Trp Gln Arg Asn
[2818] 785 790 795 800
[2819] Glu Arg Asn Ala Thr Gly Lys Ala Thr Ala Ser Leu Pro Pro Gln Gln
[2820] 805 810 815
[2821] Trp Gln Pro Ala Ser Gly Ile Leu Met Thr Asn Asp Val Ala Glu Thr
[2822] 820 825 830
[2823] Asn Pro Glu Glu Ala Val Pro Cys Phe Ala Leu Ser Lys Asn Asp Ser
[2824] 835 840 845
[2825] Tyr Val Met Ser Ala Ser Gly Gly Lys Ile Ser Leu Phe Asn Met Met
[2826] 850 855 860
[2827] Thr Phe Lys Thr Met Ala Thr Phe Met Pro Pro Pro Pro Ala Ala Thr
[2828] 865 870 875 880
[2829] Phe Leu Ala Phe His Pro Gln Asp Asn Asn Ile Ile Ala Ile Gly Met
[2830] 885 890 895
[2831] Asp Asp Ser Thr Ile Gln Ile Tyr Asn Val Arg Val Asp Glu Val Lys
[2832] 900 905 910
[2833] Ser Lys Leu Lys Gly His Ser Lys Arg Ile Thr Gly Leu Ala Phe Ser
[2834] 915 920 925
[2835] Asn Val Leu Asn Val Leu Val Ser Ser Gly Ala Asp Ala Gln Leu Cys
[2836] 930 935 940
[2837] Val Trp Asn Thr Asp Gly Trp Glu Lys Gln Arg Ser Lys Val Leu Pro
[2838] 945 950 955 960
[2839] Leu Pro Gln Gly Arg Pro Asn Ser Ala Pro Ser Asp Thr Arg Val Gln
[2840] 965 970 975
[2841] Phe His Gln Asp Gln Ala His Phe Leu Val Val His Glu Thr Gln Leu
[2842] 980 985 990
[2843] Ala Ile Tyr Glu Thr Thr Lys Leu Glu Cys Met Lys Gln Trp Ala Val
[2844] 995 1000 1005
[2845] Arg Glu Ser Leu Ala Pro Ile Thr His Ala Thr Phe Ser Cys Asp
[2846] 1010 1015 1020

[2847] Ser Gln Leu Val Tyr Ala Ser Phe Met Asp Ala Thr Val Cys Val
[2848] 1025 1030 1035
[2849] Phe Ser Ser Ala Asn Leu Arg Leu Arg Cys Arg Val Asn Pro Ser
[2850] 1040 1045 1050
[2851] Ala Tyr Leu Pro Ala Ser Leu Ser Asn Ser Asn Val His Pro Leu
[2852] 1055 1060 1065
[2853] Val Ile Ala Ala His Pro Gln Glu Pro Asn Met Phe Ala Val Gly
[2854] 1070 1075 1080
[2855] Leu Ser Asp Gly Gly Val His Ile Phe Glu Pro Leu Glu Ser Glu
[2856] 1085 1090 1095
[2857] Gly Lys Trp Gly Val Ala Pro Pro Ala Glu Asn Gly Ser Ala Ser
[2858] 1100 1105 1110
[2859] Gly Ala Pro Thr Ala Pro Ser Val Gly Ala Ser Ala Ser Asp Gln
[2860] 1115 1120 1125
[2861] Pro Gln Arg
[2862] 1130
[2863] <210> 64
[2864] <211> 1292
[2865] <212> PRT
[2866] <213> Artificial Sequence
[2867] <220>
[2868] <223> Consensus sequence
[2869] <400> 64
[2870] Met Lys Leu Leu Ser Ser Ile Glu Glu Ala Cys Asn Ile Cys Arg Leu
[2871] 1 5 10 15
[2872] Lys Lys Leu Lys Cys Ser Lys Glu Lys Pro Lys Cys Ala Lys Cys Leu
[2873] 20 25 30
[2874] Lys Asn Asn Trp Glu Cys Arg Tyr Ser Pro Lys Thr Lys Arg Ser Pro
[2875] 35 40 45
[2876] Leu Thr Arg Ala His Leu Thr Glu Val Glu Ser Arg Leu Glu Arg Leu
[2877] 50 55 60
[2878] Glu Gln Leu Phe Leu Leu Ile Phe Pro Arg Glu Asn Leu Asn Met Ile
[2879] 65 70 75 80
[2880] Leu Lys Met Asp Ser Leu Gln Asp Ile Lys Ala Leu Leu Thr Gly Leu
[2881] 85 90 95
[2882] Phe Val Gln Asp Asn Val Asn Lys Asp Ala Val Thr Asp Arg Leu Ala
[2883] 100 105 110
[2884] Ser Val Glu Thr Asp Met Pro Leu Thr Leu Arg Gln His Arg Ile Ser
[2885] 115 120 125

[2886] Ala Thr Ser Ser Ser Glu Glu Ser Ser Asn Lys Gly Gln Arg Gln Leu
[2887] 130 135 140
[2888] Thr Val Ser Ser Arg Ser Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly
[2889] 145 150 155 160
[2890] Ser Met Ser Ser Leu Ser Arg Glu Leu Val Phe Leu Ile Leu Gln Phe
[2891] 165 170 175
[2892] Leu Asp Glu Glu Lys Phe Lys Glu Thr Val His Lys Leu Glu Gln Glu
[2893] 180 185 190
[2894] Ser Gly Phe Phe Phe Asn Met Lys Tyr Phe Glu Asp Glu Val His Asn
[2895] 195 200 205
[2896] Gly Asn Trp Asp Glu Val Glu Lys Tyr Leu Ser Gly Phe Thr Lys Val
[2897] 210 215 220
[2898] Asp Asp Asn Arg Tyr Ser Met Lys Ile Phe Phe Glu Ile Arg Lys Gln
[2899] 225 230 235 240
[2900] Lys Tyr Leu Glu Ala Leu Asp Lys His Asp Arg Pro Lys Ala Val Asp
[2901] 245 250 255
[2902] Ile Leu Val Lys Asp Leu Lys Val Phe Ser Thr Phe Asn Glu Glu Leu
[2903] 260 265 270
[2904] Phe Lys Glu Ile Thr Gln Leu Leu Thr Leu Glu Asn Phe Arg Glu Asn
[2905] 275 280 285
[2906] Glu Gln Leu Ser Lys Tyr Gly Asp Thr Lys Ser Ala Arg Ala Ile Met
[2907] 290 295 300
[2908] Leu Val Glu Leu Lys Lys Leu Ile Glu Ala Asn Pro Leu Phe Arg Asp
[2909] 305 310 315 320
[2910] Lys Leu Gln Phe Pro Thr Leu Arg Asn Ser Arg Leu Arg Thr Leu Ile
[2911] 325 330 335
[2912] Asn Gln Ser Leu Asn Trp Gln His Gln Leu Cys Lys Asn Pro Arg Pro
[2913] 340 345 350
[2914] Asn Pro Asp Ile Lys Thr Leu Phe Val Asp His Ser Cys Gly Pro Pro
[2915] 355 360 365
[2916] Asn Gly Ala Arg Ala Pro Ser Pro Val Asn Asn Pro Leu Leu Gly Gly
[2917] 370 375 380
[2918] Ile Pro Lys Ala Gly Gly Phe Pro Pro Leu Gly Ala His Gly Pro Phe
[2919] 385 390 395 400
[2920] Gln Pro Thr Ala Ser Pro Val Pro Thr Pro Leu Ala Gly Trp Met Ser
[2921] 405 410 415
[2922] Ser Pro Ser Ser Val Pro His Pro Ala Val Ser Ala Gly Ala Ile Ala
[2923] 420 425 430
[2924] Leu Gly Gly Pro Ser Ile Pro Ala Ala Leu Lys His Pro Arg Thr Pro

[2925] 435 440 445
[2926] Pro Thr Asn Ala Ser Leu Asp Tyr Pro Ser Ala Asp Ser Glu His Val
[2927] 450 455 460
[2928] Ser Lys Arg Thr Arg Pro Met Gly Ile Ser Asp Glu Val Asn Leu Gly
[2929] 465 470 475 480
[2930] Val Asn Met Leu Pro Met Ser Phe Ser Gly Gln Ala His Gly His Ser
[2931] 485 490 495
[2932] Pro Ala Phe Lys Ala Pro Asp Asp Leu Pro Lys Thr Val Ala Arg Thr
[2933] 500 505 510
[2934] Leu Ser Gln Gly Ser Ser Pro Met Ser Met Asp Phe His Pro Ile Lys
[2935] 515 520 525
[2936] Gln Thr Leu Leu Leu Val Gly Thr Asn Val Gly Asp Ile Gly Leu Trp
[2937] 530 535 540
[2938] Glu Val Gly Ser Arg Glu Arg Leu Val Gln Lys Thr Phe Lys Val Trp
[2939] 545 550 555 560
[2940] Asp Leu Ser Lys Cys Ser Met Pro Leu Gln Ala Ala Leu Val Lys Glu
[2941] 565 570 575
[2942] Pro Val Val Ser Val Asn Arg Val Ile Trp Ser Pro Asp Gly Ser Leu
[2943] 580 585 590
[2944] Phe Gly Val Ala Tyr Ser Arg His Ile Val Gln Leu Tyr Ser Tyr His
[2945] 595 600 605
[2946] Gly Gly Glu Asp Met Arg Gln His Leu Glu Ile Asp Ala His Val Gly
[2947] 610 615 620
[2948] Gly Val Asn Asp Ile Ser Phe Ser Thr Pro Asn Lys Gln Leu Cys Val
[2949] 625 630 635 640
[2950] Ile Thr Cys Gly Asp Asp Lys Thr Ile Lys Val Trp Asp Ala Ala Thr
[2951] 645 650 655
[2952] Gly Val Lys Arg His Thr Phe Glu Gly His Glu Ala Pro Val Tyr Ser
[2953] 660 665 670
[2954] Val Cys Pro His Tyr Lys Glu Asn Ile Gln Phe Ile Phe Ser Thr Ala
[2955] 675 680 685
[2956] Leu Asp Gly Lys Ile Lys Ala Trp Leu Tyr Asp Asn Met Gly Ser Arg
[2957] 690 695 700
[2958] Val Asp Tyr Asp Ala Pro Gly Arg Trp Cys Thr Thr Met Ala Tyr Ser
[2959] 705 710 715 720
[2960] Ala Asp Gly Thr Arg Leu Phe Ser Cys Gly Thr Ser Lys Asp Gly Glu
[2961] 725 730 735
[2962] Ser Phe Ile Val Glu Trp Asn Glu Ser Glu Gly Ala Val Lys Arg Thr
[2963] 740 745 750

[2964] Tyr Gln Gly Phe His Lys Arg Ser Leu Gly Val Val Gln Phe Asp Thr
[2965] 755 760 765
[2966] Thr Lys Asn Arg Tyr Leu Ala Ala Gly Asp Asp Phe Ser Ile Lys Phe
[2967] 770 775 780
[2968] Trp Asp Met Asp Ala Val Gln Leu Leu Thr Ala Ile Asp Gly Asp Gly
[2969] 785 790 795 800
[2970] Gly Leu Gln Ala Ser Pro Arg Ile Arg Phe Asn Lys Glu Gly Ser Leu
[2971] 805 810 815
[2972] Leu Ala Val Ser Gly Asn Glu Asn Val Ile Lys Ile Met Ala Asn Ser
[2973] 820 825 830
[2974] Asp Gly Leu Arg Leu Leu His Thr Phe Glu Asn Ile Ser Ser Glu Ser
[2975] 835 840 845
[2976] Ser Lys Pro Ala Ile Asn Ser Ile Ala Ala Ala Ala Ala Ala Ala Ala
[2977] 850 855 860
[2978] Thr Ser Ala Gly His Ala Asp Arg Ser Ala Asn Val Val Ser Ile Gln
[2979] 865 870 875 880
[2980] Gly Met Asn Gly Asp Ser Arg Asn Met Val Asp Val Lys Pro Val Ile
[2981] 885 890 895
[2982] Thr Glu Glu Ser Asn Asp Lys Ser Lys Ile Trp Lys Leu Thr Glu Val
[2983] 900 905 910
[2984] Ser Glu Pro Ser Gln Cys Arg Ser Leu Arg Leu Pro Glu Asn Leu Arg
[2985] 915 920 925
[2986] Val Ala Lys Ile Ser Arg Leu Ile Phe Thr Asn Ser Gly Asn Ala Ile
[2987] 930 935 940
[2988] Leu Ala Leu Ala Ser Asn Ala Ile His Leu Leu Trp Lys Trp Gln Arg
[2989] 945 950 955 960
[2990] Asn Glu Arg Asn Ala Thr Gly Lys Ala Thr Ala Ser Leu Pro Pro Gln
[2991] 965 970 975
[2992] Gln Trp Gln Pro Ala Ser Gly Ile Leu Met Thr Asn Asp Val Ala Glu
[2993] 980 985 990
[2994] Thr Asn Pro Glu Glu Ala Val Pro Cys Phe Ala Leu Ser Lys Asn Asp
[2995] 995 1000 1005
[2996] Ser Tyr Val Met Ser Ala Ser Gly Gly Lys Ile Ser Leu Phe Asn
[2997] 1010 1015 1020
[2998] Met Met Thr Phe Lys Thr Met Ala Thr Phe Met Pro Pro Pro Pro
[2999] 1025 1030 1035
[3000] Ala Ala Thr Phe Leu Ala Phe His Pro Gln Asp Asn Asn Ile Ile
[3001] 1040 1045 1050
[3002] Ala Ile Gly Met Asp Asp Ser Thr Ile Gln Ile Tyr Asn Val Arg

[3003] 1055 1060 1065

[3004] Val Asp Glu Val Lys Ser Lys Leu Lys Gly His Ser Lys Arg Ile

[3005] 1070 1075 1080

[3006] Thr Gly Leu Ala Phe Ser Asn Val Leu Asn Val Leu Val Ser Ser

[3007] 1085 1090 1095

[3008] Gly Ala Asp Ala Gln Leu Cys Val Trp Asn Thr Asp Gly Trp Glu

[3009] 1100 1105 1110

[3010] Lys Gln Arg Ser Lys Val Leu Pro Leu Pro Gln Gly Arg Pro Asn

[3011] 1115 1120 1125

[3012] Ser Ala Pro Ser Asp Thr Arg Val Gln Phe His Gln Asp Gln Ala

[3013] 1130 1135 1140

[3014] His Phe Leu Val Val His Glu Thr Gln Leu Ala Ile Tyr Glu Thr

[3015] 1145 1150 1155

[3016] Thr Lys Leu Glu Cys Met Lys Gln Trp Ala Val Arg Glu Ser Leu

[3017] 1160 1165 1170

[3018] Ala Pro Ile Thr His Ala Thr Phe Ser Cys Asp Ser Gln Leu Val

[3019] 1175 1180 1185

[3020] Tyr Ala Ser Phe Met Asp Ala Thr Val Cys Val Phe Ser Ser Ala

[3021] 1190 1195 1200

[3022] Asn Leu Arg Leu Arg Cys Arg Val Asn Pro Ser Ala Tyr Leu Pro

[3023] 1205 1210 1215

[3024] Ala Ser Leu Ser Asn Ser Asn Val His Pro Leu Val Ile Ala Ala

[3025] 1220 1225 1230

[3026] His Pro Gln Glu Pro Asn Met Phe Ala Val Gly Leu Ser Asp Gly

[3027] 1235 1240 1245

[3028] Gly Val His Ile Phe Glu Pro Leu Glu Ser Glu Gly Lys Trp Gly

[3029] 1250 1255 1260

[3030] Val Ala Pro Pro Ala Glu Asn Gly Ser Ala Ser Gly Ala Pro Thr

[3031] 1265 1270 1275

[3032] Ala Pro Ser Val Gly Ala Ser Ala Ser Asp Gln Pro Gln Arg

[3033] 1280 1285 1290

[3034] <210> 65

[3035] <211> 425

[3036] <212> PRT

[3037] <213> Artificial Sequence

[3038] <220>

[3039] <223> Consensus sequence

[3040] <400> 65

[3041] Met Asp Asp Asp Asn Gly Leu Glu Leu Ser Leu Gly Leu Ser Cys Gly

[3042] 1 5 10 15

[3043] Gly Ser Thr Gly Lys Ala Lys Gly Asn Asn Asn Asn Asn Ala Gly Ser

[3044] 20 25 30

[3045] Ser Ser Glu Asn Tyr Arg Ala Glu Gly Gly Asp Arg Ser Ala Lys Val

[3046] 35 40 45

[3047] Ile Asp Asp Phe Lys Asn Phe Leu His Pro Thr Ser Gln Arg Pro Ala

[3048] 50 55 60

[3049] Glu Pro Ser Ser Gly Ser Gln Arg Ser Asp Ser Gly Gln Gln Pro Pro

[3050] 65 70 75 80

[3051] Gln Asn Phe Phe Asn Asp Leu Ser Lys Ala Pro Thr Thr Glu Ala Glu

[3052] 85 90 95

[3053] Ala Ser Thr Lys Pro Leu Trp Val Glu Asp Glu Ser Arg Lys Glu Ala

[3054] 100 105 110

[3055] Gly Asn Lys Arg Lys Phe Gly Phe Pro Gly Met Asn Asp Asp Lys Lys

[3056] 115 120 125

[3057] Lys Glu Lys Asp Ser Ser His Val Asp Met His Glu Lys Lys Thr Lys

[3058] 130 135 140

[3059] Ala Ser His Val Ser Thr Ala Thr Asp Glu Gly Ser Thr Ala Glu Asn

[3060] 145 150 155 160

[3061] Glu Asp Val Ala Glu Ser Glu Val Gly Gly Gly Ser Ser Ser Asn His

[3062] 165 170 175

[3063] Ala Lys Glu Val Val Arg Pro Pro Thr Asp Thr Asn Ile Val Asp Asn

[3064] 180 185 190

[3065] Leu Thr Gly Gln Arg Arg Ser Asn His Gly Gly Ser Gly Thr Glu Glu

[3066] 195 200 205

[3067] Phe Thr Met Arg Asn Met Ser Tyr Thr Val Pro Phe Thr Val His Pro

[3068] 210 215 220

[3069] Gln Asn Val Val Thr Ser Met Pro Tyr Ser Leu Pro Thr Lys Glu Ser

[3070] 225 230 235 240

[3071] Gly Gln His Ala Ala Ala Thr Ser Leu Leu Gln Pro Asn Ala Asn Ala

[3072] 245 250 255

[3073] Gly Asn Leu Pro Ile Met Phe Gly Tyr Ser Pro Val Gln Leu Pro Met

[3074] 260 265 270

[3075] Leu Asp Lys Asp Gly Ser Gly Gly Ile Val Ala Leu Ser Gln Ser Pro

[3076] 275 280 285

[3077] Phe Ala Gly Arg Val Pro Ser Asn Ser Ala Thr Ala Lys Gly Glu Gly

[3078] 290 295 300

[3079] Lys Gln Pro Val Ala Glu Glu Gly Ser Ser Glu Asp Ala Ser Glu Arg

[3080] 305 310 315 320

[3081] Pro Thr Gly Asp Asn Ser Asn Leu Asn Thr Ala Phe Ser Phe Asp Phe
[3082] 325 330 335
[3083] Ser Ala Ile Lys Pro Gly Met Ala Ala Asp Val Lys Phe Gly Gly Ser
[3084] 340 345 350
[3085] Gly Ala Arg Pro Asn Leu Pro Trp Val Ser Thr Thr Gly Ser Gly Pro
[3086] 355 360 365
[3087] His Gly Arg Thr Ile Ser Gly Val Thr Tyr Arg Tyr Asn Ala Asn Gln
[3088] 370 375 380
[3089] Ile Lys Ile Val Cys Ala Cys His Gly Ser His Met Ser Pro Glu Glu
[3090] 385 390 395 400
[3091] Phe Val Arg His Ala Ser Glu Glu Tyr Val Ser Pro Glu Ser Ser Met
[3092] 405 410 415
[3093] Gly Met Thr Ala Ala Ser Ala His Thr
[3094] 420 425
[3095] <210> 66
[3096] <211> 564
[3097] <212> PRT
[3098] <213> Artificial Sequence
[3099] <220>
[3100] <223> Consensus sequence
[3101] <400> 66
[3102] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[3103] 1 5 10 15
[3104] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[3105] 20 25 30
[3106] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[3107] 35 40 45
[3108] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[3109] 50 55 60
[3110] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[3111] 65 70 75 80
[3112] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[3113] 85 90 95
[3114] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[3115] 100 105 110
[3116] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[3117] 115 120 125
[3118] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Met Asp Asp Asp Asn
[3119] 130 135 140

[3120] Gly Leu Glu Leu Ser Leu Gly Leu Ser Cys Gly Gly Ser Thr Gly Lys
[3121] 145 150 155 160
[3122] Ala Lys Gly Asn Asn Asn Asn Asn Ala Gly Ser Ser Ser Glu Asn Tyr
[3123] 165 170 175
[3124] Arg Ala Glu Gly Gly Asp Arg Ser Ala Lys Val Ile Asp Asp Phe Lys
[3125] 180 185 190
[3126] Asn Phe Leu His Pro Thr Ser Gln Arg Pro Ala Glu Pro Ser Ser Gly
[3127] 195 200 205
[3128] Ser Gln Arg Ser Asp Ser Gly Gln Gln Pro Pro Gln Asn Phe Phe Asn
[3129] 210 215 220
[3130] Asp Leu Ser Lys Ala Pro Thr Thr Glu Ala Glu Ala Ser Thr Lys Pro
[3131] 225 230 235 240
[3132] Leu Trp Val Glu Asp Glu Ser Arg Lys Glu Ala Gly Asn Lys Arg Lys
[3133] 245 250 255
[3134] Phe Gly Phe Pro Gly Met Asn Asp Asp Lys Lys Lys Glu Lys Asp Ser
[3135] 260 265 270
[3136] Ser His Val Asp Met His Glu Lys Lys Thr Lys Ala Ser His Val Ser
[3137] 275 280 285
[3138] Thr Ala Thr Asp Glu Gly Ser Thr Ala Glu Asn Glu Asp Val Ala Glu
[3139] 290 295 300
[3140] Ser Glu Val Gly Gly Gly Ser Ser Ser Asn His Ala Lys Glu Val Val
[3141] 305 310 315 320
[3142] Arg Pro Pro Thr Asp Thr Asn Ile Val Asp Asn Leu Thr Gly Gln Arg
[3143] 325 330 335
[3144] Arg Ser Asn His Gly Gly Ser Gly Thr Glu Glu Phe Thr Met Arg Asn
[3145] 340 345 350
[3146] Met Ser Tyr Thr Val Pro Phe Thr Val His Pro Gln Asn Val Val Thr
[3147] 355 360 365
[3148] Ser Met Pro Tyr Ser Leu Pro Thr Lys Glu Ser Gly Gln His Ala Ala
[3149] 370 375 380
[3150] Ala Thr Ser Leu Leu Gln Pro Asn Ala Asn Ala Gly Asn Leu Pro Ile
[3151] 385 390 395 400
[3152] Met Phe Gly Tyr Ser Pro Val Gln Leu Pro Met Leu Asp Lys Asp Gly
[3153] 405 410 415
[3154] Ser Gly Gly Ile Val Ala Leu Ser Gln Ser Pro Phe Ala Gly Arg Val
[3155] 420 425 430
[3156] Pro Ser Asn Ser Ala Thr Ala Lys Gly Glu Gly Lys Gln Pro Val Ala
[3157] 435 440 445
[3158] Glu Glu Gly Ser Ser Glu Asp Ala Ser Glu Arg Pro Thr Gly Asp Asn

[3159] 450 455 460
[3160] Ser Asn Leu Asn Thr Ala Phe Ser Phe Asp Phe Ser Ala Ile Lys Pro
[3161] 465 470 475 480
[3162] Gly Met Ala Ala Asp Val Lys Phe Gly Gly Ser Gly Ala Arg Pro Asn
[3163] 485 490 495
[3164] Leu Pro Trp Val Ser Thr Thr Gly Ser Gly Pro His Gly Arg Thr Ile
[3165] 500 505 510
[3166] Ser Gly Val Thr Tyr Arg Tyr Asn Ala Asn Gln Ile Lys Ile Val Cys
[3167] 515 520 525
[3168] Ala Cys His Gly Ser His Met Ser Pro Glu Glu Phe Val Arg His Ala
[3169] 530 535 540
[3170] Ser Glu Glu Tyr Val Ser Pro Glu Ser Ser Met Gly Met Thr Ala Ala
[3171] 545 550 555 560
[3172] Ser Ala His Thr
[3173] <210> 67
[3174] <211> 475
[3175] <212> PRT
[3176] <213> Artificial Sequence
[3177] <220>
[3178] <223> Consensus sequence
[3179] <400> 67
[3180] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[3181] 1 5 10 15
[3182] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[3183] 20 25 30
[3184] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[3185] 35 40 45
[3186] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[3187] 50 55 60
[3188] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[3189] 65 70 75 80
[3190] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[3191] 85 90 95
[3192] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[3193] 100 105 110
[3194] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[3195] 115 120 125
[3196] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Met Thr Ser Asp Gly
[3197] 130 135 140

[3198] Ala Thr Ser Thr Ser Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala
[3199] 145 150 155 160
[3200] Arg Arg Lys Pro Ser Trp Arg Glu Arg Glu Asn Asn Arg Arg Arg Glu
[3201] 165 170 175
[3202] Arg Arg Arg Arg Ala Val Ala Ala Lys Ile Tyr Thr Gly Leu Arg Ala
[3203] 180 185 190
[3204] Gln Gly Asp Tyr Asn Leu Pro Lys His Cys Asp Asn Asn Glu Val Leu
[3205] 195 200 205
[3206] Lys Ala Leu Cys Val Glu Ala Gly Trp Val Val Glu Glu Asp Gly Thr
[3207] 210 215 220
[3208] Thr Tyr Arg Lys Gly Cys Lys Pro Leu Pro Gly Glu Ile Ala Gly Thr
[3209] 225 230 235 240
[3210] Ser Ser Arg Val Thr Pro Tyr Ser Ser Gln Asn Gln Ser Pro Leu Ser
[3211] 245 250 255
[3212] Ser Ala Phe Gln Ser Pro Ile Pro Ser Tyr Gln Val Ser Pro Ser Ser
[3213] 260 265 270
[3214] Ser Ser Phe Pro Ser Pro Ser Arg Gly Glu Pro Asn Asn Asn Met Ser
[3215] 275 280 285
[3216] Ser Thr Phe Phe Pro Phe Leu Arg Asn Gly Gly Ile Pro Ser Ser Leu
[3217] 290 295 300
[3218] Pro Ser Leu Arg Ile Ser Asn Ser Cys Pro Val Thr Pro Pro Val Ser
[3219] 305 310 315 320
[3220] Ser Pro Thr Ser Lys Asn Pro Lys Pro Leu Pro Asn Trp Glu Ser Ile
[3221] 325 330 335
[3222] Ala Lys Gln Ser Met Ala Ile Ala Lys Gln Ser Met Ala Ser Phe Asn
[3223] 340 345 350
[3224] Tyr Pro Phe Tyr Ala Val Ser Ala Pro Ala Ser Pro Thr His Arg His
[3225] 355 360 365
[3226] Gln Phe His Thr Pro Ala Thr Ile Pro Glu Cys Asp Glu Ser Asp Ser
[3227] 370 375 380
[3228] Ser Thr Val Asp Ser Gly His Trp Ile Ser Phe Gln Lys Phe Ala Gln
[3229] 385 390 395 400
[3230] Gln Gln Pro Phe Ser Ala Ser Met Val Pro Thr Ser Pro Thr Phe Asn
[3231] 405 410 415
[3232] Leu Val Lys Pro Ala Pro Gln Gln Met Ser Pro Asn Thr Ala Ala Phe
[3233] 420 425 430
[3234] Gln Glu Ile Gly Gln Ser Ser Glu Phe Lys Phe Glu Asn Ser Gln Val
[3235] 435 440 445
[3236] Lys Pro Trp Glu Gly Glu Arg Ile His Asp Val Gly Met Glu Asp Leu

[3237] 450 455 460

[3238] Glu Leu Thr Leu Gly Asn Gly Lys Ala Arg Gly

[3239] 465 470 475

[3240] <210> 68

[3241] <211> 587

[3242] <212> PRT

[3243] <213> Artificial Sequence

[3244] <220>

[3245] <223> Consensus sequence

[3246] <400> 68

[3247] Met Lys Arg Asp His His Gln Phe Gln Gly Arg Leu Ser Asn His Gly

[3248] 1 5 10 15

[3249] Thr Ser Ser Ser Ser Ser Ser Ile Ser Lys Asp Lys Met Met Met Val

[3250] 20 25 30

[3251] Lys Lys Glu Glu Asp Gly Gly Gly Asn Met Asp Asp Glu Leu Leu Ala

[3252] 35 40 45

[3253] Val Leu Gly Tyr Lys Val Arg Ser Ser Glu Met Ala Glu Val Ala Leu

[3254] 50 55 60

[3255] Lys Leu Glu Gln Leu Glu Thr Met Met Ser Asn Val Gln Glu Asp Gly

[3256] 65 70 75 80

[3257] Leu Ser His Leu Ala Thr Asp Thr Val His Tyr Asn Pro Ser Glu Leu

[3258] 85 90 95

[3259] Tyr Ser Trp Leu Asp Asn Met Leu Ser Glu Leu Asn Pro Pro Pro Leu

[3260] 100 105 110

[3261] Pro Ala Ser Ser Asn Gly Leu Asp Pro Val Leu Pro Ser Pro Glu Ile

[3262] 115 120 125

[3263] Cys Gly Phe Pro Ala Ser Asp Tyr Asp Leu Lys Val Ile Pro Gly Asn

[3264] 130 135 140

[3265] Ala Ile Tyr Gln Phe Pro Ala Ile Asp Ser Ser Ser Ser Ser Asn Asn

[3266] 145 150 155 160

[3267] Gln Asn Lys Arg Leu Lys Ser Cys Ser Ser Pro Asp Ser Met Val Thr

[3268] 165 170 175

[3269] Ser Thr Ser Thr Gly Thr Gln Ile Gly Gly Val Ile Gly Thr Thr Val

[3270] 180 185 190

[3271] Thr Thr Thr Thr Thr Thr Thr Thr Ala Ala Gly Glu Ser Thr Arg Ser

[3272] 195 200 205

[3273] Val Ile Leu Val Asp Ser Gln Glu Asn Gly Val Arg Leu Val His Ala

[3274] 210 215 220

[3275] Leu Met Ala Cys Ala Glu Ala Ile Gln Gln Asn Asn Leu Thr Leu Ala

[3276] 225 230 235 240
[3277] Glu Ala Leu Val Lys Gln Ile Gly Cys Leu Ala Val Ser Gln Ala Gly
[3278] 245 250 255
[3279] Ala Met Arg Lys Val Ala Thr Tyr Phe Ala Glu Ala Leu Ala Arg Arg
[3280] 260 265 270
[3281] Ile Tyr Arg Leu Ser Pro Pro Gln Asn Gln Ile Asp His Cys Leu Ser
[3282] 275 280 285
[3283] Asp Thr Leu Gln Met His Phe Tyr Glu Thr Cys Pro Tyr Leu Lys Phe
[3284] 290 295 300
[3285] Ala His Phe Thr Ala Asn Gln Ala Ile Leu Glu Ala Phe Glu Gly Lys
[3286] 305 310 315 320
[3287] Lys Arg Val His Val Ile Asp Phe Ser Met Asn Gln Gly Leu Gln Trp
[3288] 325 330 335
[3289] Pro Ala Leu Met Gln Ala Leu Ala Leu Arg Glu Gly Gly Pro Pro Thr
[3290] 340 345 350
[3291] Phe Arg Leu Thr Gly Ile Gly Pro Pro Ala Pro Asp Asn Ser Asp His
[3292] 355 360 365
[3293] Leu His Glu Val Gly Cys Lys Leu Ala Gln Leu Ala Glu Ala Ile His
[3294] 370 375 380
[3295] Val Glu Phe Glu Tyr Arg Gly Phe Val Ala Asn Ser Leu Ala Asp Leu
[3296] 385 390 395 400
[3297] Asp Ala Ser Met Leu Glu Leu Arg Pro Ser Asp Thr Glu Ala Val Ala
[3298] 405 410 415
[3299] Val Asn Ser Val Phe Glu Leu His Lys Leu Leu Gly Arg Pro Gly Gly
[3300] 420 425 430
[3301] Ile Glu Lys Val Leu Gly Val Val Lys Gln Ile Lys Pro Val Ile Phe
[3302] 435 440 445
[3303] Thr Val Val Glu Gln Glu Ser Asn His Asn Gly Pro Val Phe Leu Asp
[3304] 450 455 460
[3305] Arg Phe Thr Glu Ser Leu His Tyr Tyr Ser Thr Leu Phe Asp Ser Leu
[3306] 465 470 475 480
[3307] Glu Gly Val Pro Asn Ser Gln Asp Lys Val Met Ser Glu Val Tyr Leu
[3308] 485 490 495
[3309] Gly Lys Gln Ile Cys Asn Leu Val Ala Cys Glu Gly Pro Asp Arg Val
[3310] 500 505 510
[3311] Glu Arg His Glu Thr Leu Ser Gln Trp Gly Asn Arg Phe Gly Ser Ser
[3312] 515 520 525
[3313] Gly Leu Ala Pro Ala His Leu Gly Ser Asn Ala Phe Lys Gln Ala Ser
[3314] 530 535 540

[3315] Met Leu Leu Ser Val Phe Asn Ser Gly Gln Gly Tyr Arg Val Glu Glu
[3316] 545 550 555 560
[3317] Ser Asn Gly Cys Leu Met Leu Gly Trp His Thr Arg Pro Leu Ile Thr
[3318] 565 570 575
[3319] Thr Ser Ala Trp Lys Leu Ser Thr Ala Ala Tyr
[3320] 580 585
[3321] <210> 69
[3322] <211> 726
[3323] <212> PRT
[3324] <213> Artificial Sequence
[3325] <220>
[3326] <223> Consensus sequence
[3327] <400> 69
[3328] Met Pro Lys Lys Lys Arg Lys Val Ser Ser Gly Ala Asn Phe Asn Gln
[3329] 1 5 10 15
[3330] Ser Gly Asn Ile Ala Asp Ser Ser Leu Ser Phe Thr Phe Thr Asn Ser
[3331] 20 25 30
[3332] Ser Asn Gly Pro Asn Leu Ile Thr Thr Gln Thr Asn Ser Gln Ala Leu
[3333] 35 40 45
[3334] Ser Gln Pro Ile Ala Ser Ser Asn Val His Asp Asn Phe Met Asn Asn
[3335] 50 55 60
[3336] Glu Ile Thr Ala Ser Lys Ile Asp Asp Gly Asn Asn Ser Lys Pro Leu
[3337] 65 70 75 80
[3338] Ser Pro Gly Trp Thr Asp Gln Thr Ala Tyr Asn Ala Phe Gly Ile Thr
[3339] 85 90 95
[3340] Thr Gly Met Phe Asn Thr Thr Thr Met Asp Asp Val Tyr Asn Tyr Leu
[3341] 100 105 110
[3342] Phe Asp Asp Glu Asp Thr Pro Pro Asn Pro Lys Lys Glu Gly Gly Ser
[3343] 115 120 125
[3344] Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly Ser Met Lys Arg Asp His
[3345] 130 135 140
[3346] His Gln Phe Gln Gly Arg Leu Ser Asn His Gly Thr Ser Ser Ser Ser
[3347] 145 150 155 160
[3348] Ser Ser Ile Ser Lys Asp Lys Met Met Met Val Lys Lys Glu Glu Asp
[3349] 165 170 175
[3350] Gly Gly Gly Asn Met Asp Asp Glu Leu Leu Ala Val Leu Gly Tyr Lys
[3351] 180 185 190
[3352] Val Arg Ser Ser Glu Met Ala Glu Val Ala Leu Lys Leu Glu Gln Leu
[3353] 195 200 205

[3354] Glu Thr Met Met Ser Asn Val Gln Glu Asp Gly Leu Ser His Leu Ala
[3355] 210 215 220
[3356] Thr Asp Thr Val His Tyr Asn Pro Ser Glu Leu Tyr Ser Trp Leu Asp
[3357] 225 230 235 240
[3358] Asn Met Leu Ser Glu Leu Asn Pro Pro Pro Leu Pro Ala Ser Ser Asn
[3359] 245 250 255
[3360] Gly Leu Asp Pro Val Leu Pro Ser Pro Glu Ile Cys Gly Phe Pro Ala
[3361] 260 265 270
[3362] Ser Asp Tyr Asp Leu Lys Val Ile Pro Gly Asn Ala Ile Tyr Gln Phe
[3363] 275 280 285
[3364] Pro Ala Ile Asp Ser Ser Ser Ser Ser Asn Asn Gln Asn Lys Arg Leu
[3365] 290 295 300
[3366] Lys Ser Cys Ser Ser Pro Asp Ser Met Val Thr Ser Thr Ser Thr Gly
[3367] 305 310 315 320
[3368] Thr Gln Ile Gly Gly Val Ile Gly Thr Thr Val Thr Thr Thr Thr Thr
[3369] 325 330 335
[3370] Thr Thr Thr Ala Ala Gly Glu Ser Thr Arg Ser Val Ile Leu Val Asp
[3371] 340 345 350
[3372] Ser Gln Glu Asn Gly Val Arg Leu Val His Ala Leu Met Ala Cys Ala
[3373] 355 360 365
[3374] Glu Ala Ile Gln Gln Asn Asn Leu Thr Leu Ala Glu Ala Leu Val Lys
[3375] 370 375 380
[3376] Gln Ile Gly Cys Leu Ala Val Ser Gln Ala Gly Ala Met Arg Lys Val
[3377] 385 390 395 400
[3378] Ala Thr Tyr Phe Ala Glu Ala Leu Ala Arg Arg Ile Tyr Arg Leu Ser
[3379] 405 410 415
[3380] Pro Pro Gln Asn Gln Ile Asp His Cys Leu Ser Asp Thr Leu Gln Met
[3381] 420 425 430
[3382] His Phe Tyr Glu Thr Cys Pro Tyr Leu Lys Phe Ala His Phe Thr Ala
[3383] 435 440 445
[3384] Asn Gln Ala Ile Leu Glu Ala Phe Glu Gly Lys Lys Arg Val His Val
[3385] 450 455 460
[3386] Ile Asp Phe Ser Met Asn Gln Gly Leu Gln Trp Pro Ala Leu Met Gln
[3387] 465 470 475 480
[3388] Ala Leu Ala Leu Arg Glu Gly Gly Pro Pro Thr Phe Arg Leu Thr Gly
[3389] 485 490 495
[3390] Ile Gly Pro Pro Ala Pro Asp Asn Ser Asp His Leu His Glu Val Gly
[3391] 500 505 510
[3392] Cys Lys Leu Ala Gln Leu Ala Glu Ala Ile His Val Glu Phe Glu Tyr

[3393] 515 520 525

[3394] Arg Gly Phe Val Ala Asn Ser Leu Ala Asp Leu Asp Ala Ser Met Leu

[3395] 530 535 540

[3396] Glu Leu Arg Pro Ser Asp Thr Glu Ala Val Ala Val Asn Ser Val Phe

[3397] 545 550 555 560

[3398] Glu Leu His Lys Leu Leu Gly Arg Pro Gly Gly Ile Glu Lys Val Leu

[3399] 565 570 575

[3400] Gly Val Val Lys Gln Ile Lys Pro Val Ile Phe Thr Val Val Glu Gln

[3401] 580 585 590

[3402] Glu Ser Asn His Asn Gly Pro Val Phe Leu Asp Arg Phe Thr Glu Ser

[3403] 595 600 605

[3404] Leu His Tyr Tyr Ser Thr Leu Phe Asp Ser Leu Glu Gly Val Pro Asn

[3405] 610 615 620

[3406] Ser Gln Asp Lys Val Met Ser Glu Val Tyr Leu Gly Lys Gln Ile Cys

[3407] 625 630 635 640

[3408] Asn Leu Val Ala Cys Glu Gly Pro Asp Arg Val Glu Arg His Glu Thr

[3409] 645 650 655

[3410] Leu Ser Gln Trp Gly Asn Arg Phe Gly Ser Ser Gly Leu Ala Pro Ala

[3411] 660 665 670

[3412] His Leu Gly Ser Asn Ala Phe Lys Gln Ala Ser Met Leu Leu Ser Val

[3413] 675 680 685

[3414] Phe Asn Ser Gly Gln Gly Tyr Arg Val Glu Glu Ser Asn Gly Cys Leu

[3415] 690 695 700

[3416] Met Leu Gly Trp His Thr Arg Pro Leu Ile Thr Thr Ser Ala Trp Lys

[3417] 705 710 715 720

[3418] Leu Ser Thr Ala Ala Tyr

[3419] 725

[3420] <210> 70

[3421] <211> 413

[3422] <212> PRT

[3423] <213> Artificial Sequence

[3424] <220>

[3425] <223> Consensus sequence

[3426] <400> 70

[3427] Met Lys Leu Leu Ser Ser Ile Glu Glu Ala Cys Asn Ile Cys Arg Leu

[3428] 1 5 10 15

[3429] Lys Lys Leu Lys Cys Ser Lys Glu Lys Pro Lys Cys Ala Lys Cys Leu

[3430] 20 25 30

[3431] Lys Asn Asn Trp Glu Cys Arg Tyr Ser Pro Lys Thr Lys Arg Ser Pro

[3432] 35 40 45

[3433] Leu Thr Arg Ala His Leu Thr Glu Val Glu Ser Arg Leu Glu Arg Leu

[3434] 50 55 60

[3435] Glu Gln Leu Phe Leu Leu Ile Phe Pro Arg Glu Asn Leu Asn Met Ile

[3436] 65 70 75 80

[3437] Leu Lys Met Asp Ser Leu Gln Asp Ile Lys Ala Leu Leu Thr Gly Leu

[3438] 85 90 95

[3439] Phe Val Gln Asp Asn Val Asn Lys Asp Ala Val Thr Asp Arg Leu Ala

[3440] 100 105 110

[3441] Ser Val Glu Thr Asp Met Pro Leu Thr Leu Arg Gln His Arg Ile Ser

[3442] 115 120 125

[3443] Ala Thr Ser Ser Ser Glu Glu Ser Ser Asn Lys Gly Gln Arg Gln Leu

[3444] 130 135 140

[3445] Thr Val Ser Ser Arg Ser Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly

[3446] 145 150 155 160

[3447] Ser Tyr Glu Pro Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile

[3448] 165 170 175

[3449] Leu Val Ser Gln Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile

[3450] 180 185 190

[3451] Glu Pro Ser Asn Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu

[3452] 195 200 205

[3453] Asp Asn Gly Ala Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe

[3454] 210 215 220

[3455] Ser Gly Gly Ser Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr

[3456] 225 230 235 240

[3457] Thr Ile Ser Pro Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln

[3458] 245 250 255

[3459] Met Thr Ile Phe Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro

[3460] 260 265 270

[3461] Pro Glu Lys Ala Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp

[3462] 275 280 285

[3463] Leu Pro Glu Asn Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu

[3464] 290 295 300

[3465] Ile Ser Lys Glu Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys

[3466] 305 310 315 320

[3467] Ala Asn Ser Ser Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys

[3468] 325 330 335

[3469] Val Ser Leu Gln Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser

[3470] 340 345 350

[3471] Lys Ala Lys Lys Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe
[3472] 355 360 365
[3473] Leu Asn Cys Gln Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly
[3474] 370 375 380
[3475] Cys Thr Gly Ser Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys
[3476] 385 390 395 400
[3477] Ser Pro Asn Leu Ser Val Asp Leu Asn Ser Glu Gly Ile
[3478] 405 410
[3479] <210> 71
[3480] <211> 449
[3481] <212> PRT
[3482] <213> Artificial Sequence
[3483] <220>
[3484] <223> Consensus sequence
[3485] <400> 71
[3486] Met Lys Leu Leu Ser Ser Ile Glu Glu Ala Cys Asn Ile Cys Arg Leu
[3487] 1 5 10 15
[3488] Lys Lys Leu Lys Cys Ser Lys Glu Lys Pro Lys Cys Ala Lys Cys Leu
[3489] 20 25 30
[3490] Lys Asn Asn Trp Glu Cys Arg Tyr Ser Pro Lys Thr Lys Arg Ser Pro
[3491] 35 40 45
[3492] Leu Thr Arg Ala His Leu Thr Glu Val Glu Ser Arg Leu Glu Arg Leu
[3493] 50 55 60
[3494] Glu Gln Leu Phe Leu Leu Ile Phe Pro Arg Glu Asn Leu Asn Met Ile
[3495] 65 70 75 80
[3496] Leu Lys Met Asp Ser Leu Gln Asp Ile Lys Ala Leu Leu Thr Gly Leu
[3497] 85 90 95
[3498] Phe Val Gln Asp Asn Val Asn Lys Asp Ala Val Thr Asp Arg Leu Ala
[3499] 100 105 110
[3500] Ser Val Glu Thr Asp Met Pro Leu Thr Leu Arg Gln His Arg Ile Ser
[3501] 115 120 125
[3502] Ala Thr Ser Ser Ser Glu Glu Ser Ser Asn Lys Gly Gln Arg Gln Leu
[3503] 130 135 140
[3504] Thr Val Ser Ser Arg Ser Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly
[3505] 145 150 155 160
[3506] Ser Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro
[3507] 165 170 175
[3508] Leu Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp
[3509] 180 185 190

[3510] Cys Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn
[3511] 195 200 205
[3512] Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu
[3513] 210 215 220
[3514] Pro Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser
[3515] 225 230 235 240
[3516] Gln Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser
[3517] 245 250 255
[3518] Asn Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly
[3519] 260 265 270
[3520] Ala Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly
[3521] 275 280 285
[3522] Ser Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser
[3523] 290 295 300
[3524] Pro Arg Ser Pro Ala Glu Thr Ser Glu Leu Ile Met His Phe Ala Ala
[3525] 305 310 315 320
[3526] Asn Pro Ile Asp Leu Pro Glu Asn Gly Ile Phe Ala Ser Ser Arg Met
[3527] 325 330 335
[3528] Ile Ser Lys Leu Ile Ser Lys Glu Lys Met Met Glu Leu Pro Gln Lys
[3529] 340 345 350
[3530] Gly Leu Glu Lys Ala Asn Ser Ser Arg Asp Ser Gly Met Glu Gly Gln
[3531] 355 360 365
[3532] Ala Asn Arg Lys Val Ser Leu Gln Arg Tyr Arg Glu Lys Arg Lys Asp
[3533] 370 375 380
[3534] Arg Lys Phe Ser Lys Ala Lys Lys Cys Pro Gly Val Ala Ser Ser Ser
[3535] 385 390 395 400
[3536] Leu Glu Met Phe Leu Asn Cys Gln Pro Arg Met Lys Ala Ala Tyr Ser
[3537] 405 410 415
[3538] Gln Asn Leu Gly Cys Thr Gly Ser Pro Leu His Ser Gln Ser Pro Glu
[3539] 420 425 430
[3540] Ser Gln Thr Lys Ser Pro Asn Leu Ser Val Asp Leu Asn Ser Glu Gly
[3541] 435 440 445
[3542] Ile
[3543] <210> 72
[3544] <211> 390
[3545] <212> PRT
[3546] <213> Artificial Sequence
[3547] <220>
[3548] <223> Consensus sequence

[3549] <400> 72

[3550] Met Lys Leu Leu Ser Ser Ile Glu Glu Ala Cys Asn Ile Cys Arg Leu
[3551] 1 5 10 15

[3552] Lys Lys Leu Lys Cys Ser Lys Glu Lys Pro Lys Cys Ala Lys Cys Leu
[3553] 20 25 30

[3554] Lys Asn Asn Trp Glu Cys Arg Tyr Ser Pro Lys Thr Lys Arg Ser Pro
[3555] 35 40 45

[3556] Leu Thr Arg Ala His Leu Thr Glu Val Glu Ser Arg Leu Glu Arg Leu
[3557] 50 55 60

[3558] Glu Gln Leu Phe Leu Leu Ile Phe Pro Arg Glu Asn Leu Asn Met Ile
[3559] 65 70 75 80

[3560] Leu Lys Met Asp Ser Leu Gln Asp Ile Lys Ala Leu Leu Thr Gly Leu
[3561] 85 90 95

[3562] Phe Val Gln Asp Asn Val Asn Lys Asp Ala Val Thr Asp Arg Leu Ala
[3563] 100 105 110

[3564] Ser Val Glu Thr Asp Met Pro Leu Thr Leu Arg Gln His Arg Ile Ser
[3565] 115 120 125

[3566] Ala Thr Ser Ser Ser Glu Glu Ser Ser Asn Lys Gly Gln Arg Gln Leu
[3567] 130 135 140

[3568] Thr Val Ser Ser Arg Ser Asn Gln Thr Ser Leu Tyr Lys Lys Ala Gly
[3569] 145 150 155 160

[3570] Ser Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro
[3571] 165 170 175

[3572] Leu Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp
[3573] 180 185 190

[3574] Cys Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn
[3575] 195 200 205

[3576] Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu
[3577] 210 215 220

[3578] Pro Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser
[3579] 225 230 235 240

[3580] Gln Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser
[3581] 245 250 255

[3582] Asn Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly
[3583] 260 265 270

[3584] Ala Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly
[3585] 275 280 285

[3586] Ser Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser
[3587] 290 295 300

[3588] Pro Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile
[3589] 305 310 315 320
[3590] Phe Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys
[3591] 325 330 335
[3592] Ala Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu
[3593] 340 345 350
[3594] Asn Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys
[3595] 355 360 365
[3596] Glu Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser
[3597] 370 375 380
[3598] Ser Arg Asp Ser Gly Met
[3599] 385 390
[3600] <210> 73
[3601] <211> 142
[3602] <212> PRT
[3603] <213> Artificial Sequence
[3604] <220>
[3605] <223> Consensus sequence
[3606] <400> 73
[3607] Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
[3608] 1 5 10 15
[3609] Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly
[3610] 20 25 30
[3611] Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Asp Asp Gly Asn
[3612] 35 40 45
[3613] Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu Val Asn
[3614] 50 55 60
[3615] Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu
[3616] 65 70 75 80
[3617] Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn Val Tyr Ile Thr
[3618] 85 90 95
[3619] Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[3620] 100 105 110
[3621] Asn Ile Glu Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu Gly Pro Arg
[3622] 115 120 125
[3623] Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly
[3624] 130 135 140
[3625] <210> 74
[3626] <211> 111

[3627] <212> PRT
[3628] <213> Artificial Sequence
[3629] <220>
[3630] <223> Consensus sequence
[3631] <400> 74
[3632] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[3633] 1 5 10 15
[3634] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn
[3635] 20 25 30
[3636] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu
[3637] 35 40 45
[3638] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His
[3639] 50 55 60
[3640] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met
[3641] 65 70 75 80
[3642] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro
[3643] 85 90 95
[3644] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly
[3645] 100 105 110
[3646] <210> 75
[3647] <211> 568
[3648] <212> PRT
[3649] <213> Artificial Sequence
[3650] <220>
[3651] <223> Consensus sequence
[3652] <400> 75
[3653] Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
[3654] 1 5 10 15
[3655] Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly
[3656] 20 25 30
[3657] Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Asp Asp Gly Asn
[3658] 35 40 45
[3659] Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu Val Asn
[3660] 50 55 60
[3661] Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu
[3662] 65 70 75 80
[3663] Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn Val Tyr Ile Thr
[3664] 85 90 95
[3665] Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His

[3666] 100 105 110
[3667] Asn Ile Glu Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu Gly Pro Arg
[3668] 115 120 125
[3669] Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser Met
[3670] 130 135 140
[3671] Asp Asp Asp Asn Gly Leu Glu Leu Ser Leu Gly Leu Ser Cys Gly Gly
[3672] 145 150 155 160
[3673] Ser Thr Gly Lys Ala Lys Gly Asn Asn Asn Asn Asn Ala Gly Ser Ser
[3674] 165 170 175
[3675] Ser Glu Asn Tyr Arg Ala Glu Gly Gly Asp Arg Ser Ala Lys Val Ile
[3676] 180 185 190
[3677] Asp Asp Phe Lys Asn Phe Leu His Pro Thr Ser Gln Arg Pro Ala Glu
[3678] 195 200 205
[3679] Pro Ser Ser Gly Ser Gln Arg Ser Asp Ser Gly Gln Gln Pro Pro Gln
[3680] 210 215 220
[3681] Asn Phe Phe Asn Asp Leu Ser Lys Ala Pro Thr Thr Glu Ala Glu Ala
[3682] 225 230 235 240
[3683] Ser Thr Lys Pro Leu Trp Val Glu Asp Glu Ser Arg Lys Glu Ala Gly
[3684] 245 250 255
[3685] Asn Lys Arg Lys Phe Gly Phe Pro Gly Met Asn Asp Asp Lys Lys Lys
[3686] 260 265 270
[3687] Glu Lys Asp Ser Ser His Val Asp Met His Glu Lys Lys Thr Lys Ala
[3688] 275 280 285
[3689] Ser His Val Ser Thr Ala Thr Asp Glu Gly Ser Thr Ala Glu Asn Glu
[3690] 290 295 300
[3691] Asp Val Ala Glu Ser Glu Val Gly Gly Gly Ser Ser Ser Asn His Ala
[3692] 305 310 315 320
[3693] Lys Glu Val Val Arg Pro Pro Thr Asp Thr Asn Ile Val Asp Asn Leu
[3694] 325 330 335
[3695] Thr Gly Gln Arg Arg Ser Asn His Gly Gly Ser Gly Thr Glu Glu Phe
[3696] 340 345 350
[3697] Thr Met Arg Asn Met Ser Tyr Thr Val Pro Phe Thr Val His Pro Gln
[3698] 355 360 365
[3699] Asn Val Val Thr Ser Met Pro Tyr Ser Leu Pro Thr Lys Glu Ser Gly
[3700] 370 375 380
[3701] Gln His Ala Ala Ala Thr Ser Leu Leu Gln Pro Asn Ala Asn Ala Gly
[3702] 385 390 395 400
[3703] Asn Leu Pro Ile Met Phe Gly Tyr Ser Pro Val Gln Leu Pro Met Leu
[3704] 405 410 415

[3705] Asp Lys Asp Gly Ser Gly Gly Ile Val Ala Leu Ser Gln Ser Pro Phe
[3706] 420 425 430
[3707] Ala Gly Arg Val Pro Ser Asn Ser Ala Thr Ala Lys Gly Glu Gly Lys
[3708] 435 440 445
[3709] Gln Pro Val Ala Glu Glu Gly Ser Ser Glu Asp Ala Ser Glu Arg Pro
[3710] 450 455 460
[3711] Thr Gly Asp Asn Ser Asn Leu Asn Thr Ala Phe Ser Phe Asp Phe Ser
[3712] 465 470 475 480
[3713] Ala Ile Lys Pro Gly Met Ala Ala Asp Val Lys Phe Gly Gly Ser Gly
[3714] 485 490 495
[3715] Ala Arg Pro Asn Leu Pro Trp Val Ser Thr Thr Gly Ser Gly Pro His
[3716] 500 505 510
[3717] Gly Arg Thr Ile Ser Gly Val Thr Tyr Arg Tyr Asn Ala Asn Gln Ile
[3718] 515 520 525
[3719] Lys Ile Val Cys Ala Cys His Gly Ser His Met Ser Pro Glu Glu Phe
[3720] 530 535 540
[3721] Val Arg His Ala Ser Glu Glu Tyr Val Ser Pro Glu Ser Ser Met Gly
[3722] 545 550 555 560
[3723] Met Thr Ala Ala Ser Ala His Thr
[3724] 565
[3725] <210> 76
[3726] <211> 479
[3727] <212> PRT
[3728] <213> Artificial Sequence
[3729] <220>
[3730] <223> Consensus sequence
[3731] <400> 76
[3732] Met Val Ser Lys Gly Glu Glu Leu Phe Thr Gly Val Val Pro Ile Leu
[3733] 1 5 10 15
[3734] Val Glu Leu Asp Gly Asp Val Asn Gly His Lys Phe Ser Val Ser Gly
[3735] 20 25 30
[3736] Glu Gly Glu Gly Asp Ala Thr Tyr Gly Lys Leu Thr Asp Asp Gly Asn
[3737] 35 40 45
[3738] Tyr Lys Thr Arg Ala Glu Val Lys Phe Glu Gly Asp Thr Leu Val Asn
[3739] 50 55 60
[3740] Arg Ile Glu Leu Lys Gly Ile Asp Phe Lys Glu Asp Gly Asn Ile Leu
[3741] 65 70 75 80
[3742] Gly His Lys Leu Glu Tyr Asn Tyr Asn Ser His Asn Val Tyr Ile Thr
[3743] 85 90 95

[3744] Ala Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[3745] 100 105 110
[3746] Asn Ile Glu Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu Gly Pro Arg
[3747] 115 120 125
[3748] Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser Met
[3749] 130 135 140
[3750] Thr Ser Asp Gly Ala Thr Ser Thr Ser Ala Ala Ala Ala Ala Ala Ala
[3751] 145 150 155 160
[3752] Ala Ala Ala Ala Arg Arg Lys Pro Ser Trp Arg Glu Arg Glu Asn Asn
[3753] 165 170 175
[3754] Arg Arg Arg Glu Arg Arg Arg Arg Ala Val Ala Ala Lys Ile Tyr Thr
[3755] 180 185 190
[3756] Gly Leu Arg Ala Gln Gly Asp Tyr Asn Leu Pro Lys His Cys Asp Asn
[3757] 195 200 205
[3758] Asn Glu Val Leu Lys Ala Leu Cys Val Glu Ala Gly Trp Val Val Glu
[3759] 210 215 220
[3760] Glu Asp Gly Thr Thr Tyr Arg Lys Gly Cys Lys Pro Leu Pro Gly Glu
[3761] 225 230 235 240
[3762] Ile Ala Gly Thr Ser Ser Arg Val Thr Pro Tyr Ser Ser Gln Asn Gln
[3763] 245 250 255
[3764] Ser Pro Leu Ser Ser Ala Phe Gln Ser Pro Ile Pro Ser Tyr Gln Val
[3765] 260 265 270
[3766] Ser Pro Ser Ser Ser Ser Phe Pro Ser Pro Ser Arg Gly Glu Pro Asn
[3767] 275 280 285
[3768] Asn Asn Met Ser Ser Thr Phe Phe Pro Phe Leu Arg Asn Gly Gly Ile
[3769] 290 295 300
[3770] Pro Ser Ser Leu Pro Ser Leu Arg Ile Ser Asn Ser Cys Pro Val Thr
[3771] 305 310 315 320
[3772] Pro Pro Val Ser Ser Pro Thr Ser Lys Asn Pro Lys Pro Leu Pro Asn
[3773] 325 330 335
[3774] Trp Glu Ser Ile Ala Lys Gln Ser Met Ala Ile Ala Lys Gln Ser Met
[3775] 340 345 350
[3776] Ala Ser Phe Asn Tyr Pro Phe Tyr Ala Val Ser Ala Pro Ala Ser Pro
[3777] 355 360 365
[3778] Thr His Arg His Gln Phe His Thr Pro Ala Thr Ile Pro Glu Cys Asp
[3779] 370 375 380
[3780] Glu Ser Asp Ser Ser Thr Val Asp Ser Gly His Trp Ile Ser Phe Gln
[3781] 385 390 395 400
[3782] Lys Phe Ala Gln Gln Gln Pro Phe Ser Ala Ser Met Val Pro Thr Ser

[3783] 405 410 415

[3784] Pro Thr Phe Asn Leu Val Lys Pro Ala Pro Gln Gln Met Ser Pro Asn

[3785] 420 425 430

[3786] Thr Ala Ala Phe Gln Glu Ile Gly Gln Ser Ser Glu Phe Lys Phe Glu

[3787] 435 440 445

[3788] Asn Ser Gln Val Lys Pro Trp Glu Gly Glu Arg Ile His Asp Val Gly

[3789] 450 455 460

[3790] Met Glu Asp Leu Glu Leu Thr Leu Gly Asn Gly Lys Ala Arg Gly

[3791] 465 470 475

[3792] <210> 77

[3793] <211> 425

[3794] <212> PRT

[3795] <213> Artificial Sequence

[3796] <220>

[3797] <223> Consensus sequence

[3798] <400> 77

[3799] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His

[3800] 1 5 10 15

[3801] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn

[3802] 20 25 30

[3803] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu

[3804] 35 40 45

[3805] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His

[3806] 50 55 60

[3807] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met

[3808] 65 70 75 80

[3809] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro

[3810] 85 90 95

[3811] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser

[3812] 100 105 110

[3813] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu

[3814] 115 120 125

[3815] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[3816] 130 135 140

[3817] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[3818] 145 150 155 160

[3819] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro

[3820] 165 170 175

[3821] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln

[3822] 180 185 190

[3823] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn

[3824] 195 200 205

[3825] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala

[3826] 210 215 220

[3827] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser

[3828] 225 230 235 240

[3829] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro

[3830] 245 250 255

[3831] Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe

[3832] 260 265 270

[3833] Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala

[3834] 275 280 285

[3835] Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn

[3836] 290 295 300

[3837] Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu

[3838] 305 310 315 320

[3839] Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser

[3840] 325 330 335

[3841] Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln

[3842] 340 345 350

[3843] Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys

[3844] 355 360 365

[3845] Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln

[3846] 370 375 380

[3847] Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser

[3848] 385 390 395 400

[3849] Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu

[3850] 405 410 415

[3851] Ser Val Asp Leu Asn Ser Glu Gly Ile

[3852] 420 425

[3853] <210> 78

[3854] <211> 537

[3855] <212> PRT

[3856] <213> Artificial Sequence

[3857] <220>

[3858] <223> Consensus sequence

[3859] <400> 78

[3860] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His

[3861] 1 5 10 15

[3862] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn

[3863] 20 25 30

[3864] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu

[3865] 35 40 45

[3866] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His

[3867] 50 55 60

[3868] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met

[3869] 65 70 75 80

[3870] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro

[3871] 85 90 95

[3872] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser

[3873] 100 105 110

[3874] Met Asp Asp Asp Asn Gly Leu Glu Leu Ser Leu Gly Leu Ser Cys Gly

[3875] 115 120 125

[3876] Gly Ser Thr Gly Lys Ala Lys Gly Asn Asn Asn Asn Asn Ala Gly Ser

[3877] 130 135 140

[3878] Ser Ser Glu Asn Tyr Arg Ala Glu Gly Gly Asp Arg Ser Ala Lys Val

[3879] 145 150 155 160

[3880] Ile Asp Asp Phe Lys Asn Phe Leu His Pro Thr Ser Gln Arg Pro Ala

[3881] 165 170 175

[3882] Glu Pro Ser Ser Gly Ser Gln Arg Ser Asp Ser Gly Gln Gln Pro Pro

[3883] 180 185 190

[3884] Gln Asn Phe Phe Asn Asp Leu Ser Lys Ala Pro Thr Thr Glu Ala Glu

[3885] 195 200 205

[3886] Ala Ser Thr Lys Pro Leu Trp Val Glu Asp Glu Ser Arg Lys Glu Ala

[3887] 210 215 220

[3888] Gly Asn Lys Arg Lys Phe Gly Phe Pro Gly Met Asn Asp Asp Lys Lys

[3889] 225 230 235 240

[3890] Lys Glu Lys Asp Ser Ser His Val Asp Met His Glu Lys Lys Thr Lys

[3891] 245 250 255

[3892] Ala Ser His Val Ser Thr Ala Thr Asp Glu Gly Ser Thr Ala Glu Asn

[3893] 260 265 270

[3894] Glu Asp Val Ala Glu Ser Glu Val Gly Gly Gly Ser Ser Ser Asn His

[3895] 275 280 285

[3896] Ala Lys Glu Val Val Arg Pro Pro Thr Asp Thr Asn Ile Val Asp Asn

[3897] 290 295 300

[3898] Leu Thr Gly Gln Arg Arg Ser Asn His Gly Gly Ser Gly Thr Glu Glu

[3899] 305 310 315 320

[3900] Phe Thr Met Arg Asn Met Ser Tyr Thr Val Pro Phe Thr Val His Pro
[3901] 325 330 335
[3902] Gln Asn Val Val Thr Ser Met Pro Tyr Ser Leu Pro Thr Lys Glu Ser
[3903] 340 345 350
[3904] Gly Gln His Ala Ala Ala Thr Ser Leu Leu Gln Pro Asn Ala Asn Ala
[3905] 355 360 365
[3906] Gly Asn Leu Pro Ile Met Phe Gly Tyr Ser Pro Val Gln Leu Pro Met
[3907] 370 375 380
[3908] Leu Asp Lys Asp Gly Ser Gly Gly Ile Val Ala Leu Ser Gln Ser Pro
[3909] 385 390 395 400
[3910] Phe Ala Gly Arg Val Pro Ser Asn Ser Ala Thr Ala Lys Gly Glu Gly
[3911] 405 410 415
[3912] Lys Gln Pro Val Ala Glu Glu Gly Ser Ser Glu Asp Ala Ser Glu Arg
[3913] 420 425 430
[3914] Pro Thr Gly Asp Asn Ser Asn Leu Asn Thr Ala Phe Ser Phe Asp Phe
[3915] 435 440 445
[3916] Ser Ala Ile Lys Pro Gly Met Ala Ala Asp Val Lys Phe Gly Gly Ser
[3917] 450 455 460
[3918] Gly Ala Arg Pro Asn Leu Pro Trp Val Ser Thr Thr Gly Ser Gly Pro
[3919] 465 470 475 480
[3920] His Gly Arg Thr Ile Ser Gly Val Thr Tyr Arg Tyr Asn Ala Asn Gln
[3921] 485 490 495
[3922] Ile Lys Ile Val Cys Ala Cys His Gly Ser His Met Ser Pro Glu Glu
[3923] 500 505 510
[3924] Phe Val Arg His Ala Ser Glu Glu Tyr Val Ser Pro Glu Ser Ser Met
[3925] 515 520 525
[3926] Gly Met Thr Ala Ala Ser Ala His Thr
[3927] 530 535
[3928] <210> 79
[3929] <211> 448
[3930] <212> PRT
[3931] <213> Artificial Sequence
[3932] <220>
[3933] <223> Consensus sequence
[3934] <400> 79
[3935] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[3936] 1 5 10 15
[3937] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn
[3938] 20 25 30

[3939] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu
[3940] 35 40 45
[3941] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His
[3942] 50 55 60
[3943] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met
[3944] 65 70 75 80
[3945] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro
[3946] 85 90 95
[3947] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser
[3948] 100 105 110
[3949] Met Thr Ser Asp Gly Ala Thr Ser Thr Ser Ala Ala Ala Ala Ala Ala
[3950] 115 120 125
[3951] Ala Ala Ala Ala Ala Arg Arg Lys Pro Ser Trp Arg Glu Arg Glu Asn
[3952] 130 135 140
[3953] Asn Arg Arg Arg Glu Arg Arg Arg Arg Ala Val Ala Ala Lys Ile Tyr
[3954] 145 150 155 160
[3955] Thr Gly Leu Arg Ala Gln Gly Asp Tyr Asn Leu Pro Lys His Cys Asp
[3956] 165 170 175
[3957] Asn Asn Glu Val Leu Lys Ala Leu Cys Val Glu Ala Gly Trp Val Val
[3958] 180 185 190
[3959] Glu Glu Asp Gly Thr Thr Tyr Arg Lys Gly Cys Lys Pro Leu Pro Gly
[3960] 195 200 205
[3961] Glu Ile Ala Gly Thr Ser Ser Arg Val Thr Pro Tyr Ser Ser Gln Asn
[3962] 210 215 220
[3963] Gln Ser Pro Leu Ser Ser Ala Phe Gln Ser Pro Ile Pro Ser Tyr Gln
[3964] 225 230 235 240
[3965] Val Ser Pro Ser Ser Ser Ser Phe Pro Ser Pro Ser Arg Gly Glu Pro
[3966] 245 250 255
[3967] Asn Asn Asn Met Ser Ser Thr Phe Phe Pro Phe Leu Arg Asn Gly Gly
[3968] 260 265 270
[3969] Ile Pro Ser Ser Leu Pro Ser Leu Arg Ile Ser Asn Ser Cys Pro Val
[3970] 275 280 285
[3971] Thr Pro Pro Val Ser Ser Pro Thr Ser Lys Asn Pro Lys Pro Leu Pro
[3972] 290 295 300
[3973] Asn Trp Glu Ser Ile Ala Lys Gln Ser Met Ala Ile Ala Lys Gln Ser
[3974] 305 310 315 320
[3975] Met Ala Ser Phe Asn Tyr Pro Phe Tyr Ala Val Ser Ala Pro Ala Ser
[3976] 325 330 335
[3977] Pro Thr His Arg His Gln Phe His Thr Pro Ala Thr Ile Pro Glu Cys

[3978] 340 345 350
[3979] Asp Glu Ser Asp Ser Ser Thr Val Asp Ser Gly His Trp Ile Ser Phe
[3980] 355 360 365
[3981] Gln Lys Phe Ala Gln Gln Gln Pro Phe Ser Ala Ser Met Val Pro Thr
[3982] 370 375 380
[3983] Ser Pro Thr Phe Asn Leu Val Lys Pro Ala Pro Gln Gln Met Ser Pro
[3984] 385 390 395 400
[3985] Asn Thr Ala Ala Phe Gln Glu Ile Gly Gln Ser Ser Glu Phe Lys Phe
[3986] 405 410 415
[3987] Glu Asn Ser Gln Val Lys Pro Trp Glu Gly Glu Arg Ile His Asp Val
[3988] 420 425 430
[3989] Gly Met Glu Asp Leu Glu Leu Thr Leu Gly Asn Gly Lys Ala Arg Gly
[3990] 435 440 445
[3991] <210> 80
[3992] <211> 364
[3993] <212> PRT
[3994] <213> Artificial Sequence
[3995] <220>
[3996] <223> Consensus sequence
[3997] <400> 80
[3998] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[3999] 1 5 10 15
[4000] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn
[4001] 20 25 30
[4002] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu
[4003] 35 40 45
[4004] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His
[4005] 50 55 60
[4006] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met
[4007] 65 70 75 80
[4008] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro
[4009] 85 90 95
[4010] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser
[4011] 100 105 110
[4012] Tyr Glu Pro Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu
[4013] 115 120 125
[4014] Val Ser Gln Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu
[4015] 130 135 140
[4016] Pro Ser Asn Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp

[4017] 145 150 155 160
[4018] Asn Gly Ala Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser
[4019] 165 170 175
[4020] Gly Gly Ser Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr
[4021] 180 185 190
[4022] Ile Ser Pro Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met
[4023] 195 200 205
[4024] Thr Ile Phe Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro
[4025] 210 215 220
[4026] Glu Lys Ala Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu
[4027] 225 230 235 240
[4028] Pro Glu Asn Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile
[4029] 245 250 255
[4030] Ser Lys Glu Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala
[4031] 260 265 270
[4032] Asn Ser Ser Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val
[4033] 275 280 285
[4034] Ser Leu Gln Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys
[4035] 290 295 300
[4036] Ala Lys Lys Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu
[4037] 305 310 315 320
[4038] Asn Cys Gln Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys
[4039] 325 330 335
[4040] Thr Gly Ser Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser
[4041] 340 345 350
[4042] Pro Asn Leu Ser Val Asp Leu Asn Ser Glu Gly Ile
[4043] 355 360
[4044] <210> 81
[4045] <211> 400
[4046] <212> PRT
[4047] <213> Artificial Sequence
[4048] <220>
[4049] <223> Consensus sequence
[4050] <400> 81
[4051] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[4052] 1 5 10 15
[4053] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn
[4054] 20 25 30
[4055] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu

[4056] 35 40 45

[4057] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His

[4058] 50 55 60

[4059] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met

[4060] 65 70 75 80

[4061] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro

[4062] 85 90 95

[4063] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser

[4064] 100 105 110

[4065] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu

[4066] 115 120 125

[4067] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[4068] 130 135 140

[4069] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[4070] 145 150 155 160

[4071] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro

[4072] 165 170 175

[4073] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln

[4074] 180 185 190

[4075] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn

[4076] 195 200 205

[4077] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala

[4078] 210 215 220

[4079] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser

[4080] 225 230 235 240

[4081] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro

[4082] 245 250 255

[4083] Arg Ser Pro Ala Glu Thr Ser Glu Leu Ile Met His Phe Ala Ala Asn

[4084] 260 265 270

[4085] Pro Ile Asp Leu Pro Glu Asn Gly Ile Phe Ala Ser Ser Arg Met Ile

[4086] 275 280 285

[4087] Ser Lys Leu Ile Ser Lys Glu Lys Met Met Glu Leu Pro Gln Lys Gly

[4088] 290 295 300

[4089] Leu Glu Lys Ala Asn Ser Ser Arg Asp Ser Gly Met Glu Gly Gln Ala

[4090] 305 310 315 320

[4091] Asn Arg Lys Val Ser Leu Gln Arg Tyr Arg Glu Lys Arg Lys Asp Arg

[4092] 325 330 335

[4093] Lys Phe Ser Lys Ala Lys Lys Cys Pro Gly Val Ala Ser Ser Ser Leu

[4094] 340 345 350

[4095] Glu Met Phe Leu Asn Cys Gln Pro Arg Met Lys Ala Ala Tyr Ser Gln
[4096] 355 360 365
[4097] Asn Leu Gly Cys Thr Gly Ser Pro Leu His Ser Gln Ser Pro Glu Ser
[4098] 370 375 380
[4099] Gln Thr Lys Ser Pro Asn Leu Ser Val Asp Leu Asn Ser Glu Gly Ile
[4100] 385 390 395 400
[4101] <210> 82
[4102] <211> 341
[4103] <212> PRT
[4104] <213> Artificial Sequence
[4105] <220>
[4106] <223> Consensus sequence
[4107] <400> 82
[4108] Met Asp Lys Gln Lys Asn Gly Ile Lys Ala Asn Phe Lys Ile Arg His
[4109] 1 5 10 15
[4110] Asn Ile Glu Asp Gly Gly Val Gln Leu Ala Asp His Tyr Gln Gln Asn
[4111] 20 25 30
[4112] Thr Pro Ile Gly Asp Gly Pro Val Leu Leu Pro Asp Asn His Tyr Leu
[4113] 35 40 45
[4114] Ser Tyr Gln Ser Ala Leu Ser Lys Asp Pro Asn Glu Lys Arg Asp His
[4115] 50 55 60
[4116] Met Val Leu Leu Glu Phe Val Thr Ala Ala Gly Ile Thr Leu Gly Met
[4117] 65 70 75 80
[4118] Asp Glu Leu Tyr Lys Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Gly Pro
[4119] 85 90 95
[4120] Arg Pro Thr Ser Gly Ser Val Asp Leu Glu Gly Thr Ala Pro Gly Ser
[4121] 100 105 110
[4122] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu
[4123] 115 120 125
[4124] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[4125] 130 135 140
[4126] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[4127] 145 150 155 160
[4128] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro
[4129] 165 170 175
[4130] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln
[4131] 180 185 190
[4132] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn
[4133] 195 200 205

[4134] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala
[4135] 210 215 220
[4136] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser
[4137] 225 230 235 240
[4138] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro
[4139] 245 250 255
[4140] Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe
[4141] 260 265 270
[4142] Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala
[4143] 275 280 285
[4144] Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn
[4145] 290 295 300
[4146] Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu
[4147] 305 310 315 320
[4148] Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser
[4149] 325 330 335
[4150] Arg Asp Ser Gly Met
[4151] 340
[4152] <210> 83
[4153] <211> 942
[4154] <212> DNA
[4155] <213> Arabidopsis thaliana
[4156] <400> 83
[4157] atggatgtcg gagtttcacc ggcgaagtct atacttgcga aacctctgaa gctactcact 60
[4158] gaagaggaca tttctcagct cactcgcgaa gactgccgca aattcctcaa agacaaagga 120
[4159] atgcgaagac cgtcgtggaa caaatctcag gcgatccagc aagttttatc tcttaaagct 180
[4160] ctctatgagc ctggagacga ttccggcgcc ggtatcttcc gcaagatcct cgtttctcag 240
[4161] ccagtaaatc cgcctcgcgt cacaacaacg ttgattgagc caagcaacga gctggaagct 300
[4162] tgtggccggg tttcttatcc ggaagataac ggcgcgtgcc atagaatgga ttctccaaga 360
[4163] tcagctgagt tttccggtgg gtctggtcac tttgtatccg agaaagatgg ccacaagacg 420
[4164] actatttctc ccagaagccc agctgaaaca agtgagctcg ttgggcaaat gacgatattc 480
[4165] tatagtggaa aagtgaatgt gtatgatgga ataccacctg aaaaggcccg gtcaatcatg 540
[4166] cactttgcag ccaatccaat tgatttgcct gaaaacggta tttttgcttc cagtagaatg 600
[4167] atttcaaagc tcataagtaa agagaagatg atggaacttc cccaaaaagg ccttgagaag 660
[4168] gcgaattctt ctcgtgattc tggtatggag ggccaggcga acagaaaggt atctttgcaa 720
[4169] agatatcgtg aaaagcggaa agacagaaaa ttctcaaagg ccaaaaagtg tccaggagtt 780
[4170] gcgtcctcta gcttggagat gtttctgaat tgtcagccac ggatgaaagc tgcatattcg 840
[4171] caaaacctag gctgcaccgg atctccactg catagccagt cacctgaaag ccagacaaaa 900
[4172] agtcccaatc tttcagttga tctaaacagt gaaggcattt aa 942

[4173] <210> 84

[4174] <211> 950

[4175] <212> DNA

[4176] <213> Arabidopsis thaliana

[4177] <400> 84

[4178] agggatatgg atgtaggagt tactacggcg aagtctatac ttgagaagcc tctgaagctt 60

[4179] ctcactgaag aagacatttc tcagcttact cgcgaagatt gccgcaaatt cctcaaagag 120

[4180] aaaggaatgc gcaggccttc gtggaataaa tctcaggcga tccagcaagt tttatctctt 180

[4181] aaagctctct atgaacctgg agatgattcc ggcgccggaa tcctccgcaa gatccttgtt 240

[4182] tctcagccgc caaatccgcc tcgcgttaca acaacgttga ttgagccaag gaacgagctc 300

[4183] gaagcttgtg gaaggattcc tttacaggaa gatgatggtg cgtgccatag aagggattct 360

[4184] ccaagatcag ctgagttttc tggtagttct ggtcagtttg ttgcggataa agatagccac 420

[4185] aagactgttt ctgtttcccc cagaagccca gctgaaacaa atgcggtggt tgggcaaatg 480

[4186] acgatatttt atagtggcaa agtgaatgta tatgatggag taccacctga aaaggcccgg 540

[4187] tctatcatgc attttgcagc caatccaatt gatttgcctg aaaatggtat ttttgcttct 600

[4188] agtagaatga tttcgaaacc catgagtaaa gagaagatgg tggagcttcc ccaatatgga 660

[4189] cttgaaaagg cacctgcttc tcgtgattct gatgttgagg gtcaggcgaa cagaaaagta 720

[4190] tcgttgcaaa gatatcttga aaagcggaaa gacagaagat tttctaagac caagaaggct 780

[4191] ccaggagttg cgtcctctag cttggagatg tttctgaatc gtcagccacg gatgaacgct 840

[4192] gcatattcac aaaaccttag tggcacaggg cattgcgagt cacctgaaaa tcaaacaaaa 900

[4193] agtcccaata tctcagttga tctaaacagt gatctaaaca gcgaagataa 950

[4194] <210> 85

[4195] <211> 1128

[4196] <212> DNA

[4197] <213> Populus trichocarpa

[4198] <400> 85

[4199] atgcagccgg gagagacagt tttccggtca gctctggaca aacccctaca ccagctaaca 60

[4200] gaagatgata tttctcaggt cactcgcgaa gattgccgcc gttacctcaa agaaaaaggt 120

[4201] atgagaaggc cgtcgtggaa caaatcgcag gcaatacagc aagtgatttc actcaaaaca 180

[4202] ctcctggaag cgacgccgga gactgaatct ccaaggcgac gactctacat tccccgccct 240

[4203] cctcctcatc ctcctgataa tactcctcgt gtgcgtttct ctgccgtccc tccaaattcc 300

[4204] tctgtttcag agaggggagc aagtgctgaa acgccgatct cggtgccagc cgaggagcca 360

[4205] gttccgtgcc ggcaacacga tcctccaaat cccgatgatc ctgccgatcc tctgcctcct 420

[4206] gtccatgccg ccgtcaccga gaatgcttcg gtttcaccaa gaactacagg catggcagaa 480

[4207] gaatcagcag gacagatgac aatttttac tgtgggaagg taaacgtcta tgatgatgta 540

[4208] ccgggagaca aggcgcaagc aataatgcat cttgctgcaa gcccatttgc tccacctcag 600

[4209] gatgcttctt cagatgtaat tcctacatta aggcctttac aatgccagtt agacactcca 660

[4210] ggtgtcaaag ctgctccaaa ttcaattgtg gcgaactttc caaccctgcc aacagtgaaa 720

[4211] ggggcagata gtggtcagct tctctgggaa gaaagcaaca tagctcgtga agacaaccta 780

[4212] gaaggctcta caagcagaaa agcatcctta caaagatatt ttgagaagaa gaaagacagg 840
[4213] ttcaagaaca agagaaaggt ggcagtgcct tctgctagct tggacgtctt cttaagccat 900
[4214] ctggttggag atcaaatctc aaatgatcat tggaacctaa atgatgcctg ctctccttcc 960
[4215] caacccaggc ctccccaaac gcctaaccgg tgcaactctg ttgacaatgt agcaaaaaat 1020
[4216] ggcatcctca aagctgacct taacaacaaa ggtgatgcag atttatcttg ttgtcttgac 1080
[4217] tttagttcca agcagattaa tgcgtggtgc ttatgcttgg gatgttga 1128
[4218] <210> 86
[4219] <211> 2114
[4220] <212> DNA
[4221] <213> Picea abies
[4222] <400> 86
[4223] atgcgaggag gaggaggcgc ggacagactc cccgctagag ctaacctcga gaaacccttg 60
[4224] gaagatctca gccatgaaga cattatgcag ctcaccaggg aagactgccg gcgatacttg 120
[4225] atagaaaaag gtagcttcca aaatcttttg ctttctcctc aaataacgct ttgctctgag 180
[4226] taaatatatg aatataaatg aatgtaatct agtaatcgag ccctaagcgc gacatttaaa 240
[4227] gtatttgtaa aggtctgcgg ctgttttggc tttgtctacg gagacaaaaa tctttttcc 300
[4228] gttgggttga gctcagaatc aatggcggtt cttctcgtgg atttgatttt gtttcgtttg 360
[4229] gcttgacttt tgccagtatt tacgccctgc cttgtcctaa aatgctttta cagaaaaaat 420
[4230] taaatcctct aaattttctt taaacctttc cagtgttaac ctctgaacat tgccaataaa 480
[4231] agcgtatagg aaaattttca attaaagctt tatataccgt aaggccatgt agaatctttt 540
[4232] aatttttgcc gtttcagaaa acggtttaaa gggataaatt tcttagaagc tcttaaaata 600
[4233] gaaaatagag cttgaaatac cactgatcca atgccagaat tgtatataat ttgacttcag 660
[4234] accttaaata ctgcttattc ggacggacat ttgctcagaa atcgttttaa tatttatgca 720
[4235] taacagattt taaatttctt tgtaggcatg cgacggcctt cgtggaacaa gtctcaggcg 780
[4236] attcagcagg tactctcgtt gaagaaattg tttgaatccg ggccgaacga tgaaaagagg 840
[4237] tcggcggcaa caaatcggcc gaatccggat gaaaacttaa atgaaaagag gtcggcggca 900
[4238] acaaatcggc cgaatccgga tgaaaactta aaggaagctg cgtccgtttc tttgctttac 960
[4239] ggttcacagc ctgaaagtcc ttcggtaggc tttttctttt aaacaatgtc gtctaatcga 1020
[4240] gcttaaacct gcagaaacgc tggcattgtc tttaatttgg ctaggtattt caaagttgaa 1080
[4241] catttctgtc tccattgtaa tgtttgttca ggttgtcttc gccagtaaag actcagacac 1140
[4242] ttttaatttg gagtggttgg cgaagacaga gttgccagta ttagcaagcc aaccccgaca 1200
[4243] catagcacag cagaatgttt tcttaagctc tttatctgct cagcaatccg gagctcagct 1260
[4244] caccattttt tactcgggaa atgttaatgt ctacgacgat gtgcctgcag aaaaggtatc 1320
[4245] tacagattta cagttcgatt ctcgtaaaga tgtgcttaaa atttccaatg atataggctt 1380
[4246] aaaattctca agatctatat ttgcaggcac aagaaataat gctgttggcc gggagcggaa 1440
[4247] attatcctcc gtcgtcgacg tgtcagtcca cacgaaatac acaacaaaac gcagtacgtg 1500
[4248] cggcgtatcc atcaaatcct acgaatacgc cgttcattca cggagtaggg ccgcctcttg 1560
[4249] caactgtggc gagctcttcc gtcatgagca gtccaataca taaaggtatc gtccattgta 1620
[4250] tcccaatgcg gaatgaaacg aaactaaaaa attgacccaa atttatcaaa atttgggcgt 1680

[4251] ccgaacataa tttggttgtt tccgatgcag agagtccgat tacaagaaaa gcatcgctgc 1740
[4252] aaagatttct ggagaaaaga aaggacaggt acagatagaa aaggttttac tccattatca 1800
[4253] tgagattcgt ggttaaaaat gcaatgaatg caattaaata tttttgattg caggagtcgt 1860
[4254] ggcaagttgg gggctcccac tatatcgaaa aagcctctgc tgatgggtat gtttatgcat 1920
[4255] ccctccattg ttcatcgtca gtattggact gatacggcca agaggaaatc cggaaaaccg 1980
[4256] gacatacctg cttctatttc tccgacccgg cctcctcaca cgccgcgtcg gacttcgtcg 2040
[4257] gacgaacaac ttagtgcacg ccatgctcgt ggtgatataa gtgcgcaggg ggggtcgcta 2100
[4258] cataattcca acta 2114
[4259] <210> 87
[4260] <211> 1098
[4261] <212> DNA
[4262] <213> Gossypium raimondii
[4263] <400> 87
[4264] atggaggctg gggtaacgac gacggcgact acaacagcgt cgttcagttc gatacttgat 60
[4265] aaacccctca gccaactaac cgaagaagac atttctcaac tcactcgcga agactgtcgc 120
[4266] aaattcctca aagaaaaagg aatgcgtagg ccgtcatgga acaaatcgca ggcgatccag 180
[4267] caagtgattt cgttcaaggc gttgttggaa agcaacgaag attccggcgc cggagctcgc 240
[4268] cggaaaatcc ttgtttgtcc accaccgtca cattttcctc cgcaaaatgc ggtagcttca 300
[4269] aattctggtg agtcagtaaa agaagcagtc tttggagaag aagaaagcct gtacggccaa 360
[4270] aaagatcttt ctttgaaagc tgctccggtg gtgcagatga attgtcaggg cggtgacacg 420
[4271] gatgacaaga ctctttcgcc tagtttaggc tctccacggg agtattcaaa attgcctggc 480
[4272] agaagtcaat gtgaaacaaa tgagttgggt gggcaaatga caatttttta ctgtggaaag 540
[4273] atcaatgtgt acgatggtgt accacttgct aaggcacgag caatcatgca cctggcagct 600
[4274] tctcctattg attttcctca gggcaatcta tgtaatcaaa atggtgcctt taggtccttt 660
[4275] ctgggtcatg tacaagaagc cgaagacaaa aacgacctta cttcatctat tgctttgaac 720
[4276] ttgaattctc ataccatgca cactgagaag atgacagaat atcagcagca gtttagggga 780
[4277] aaagcaaaca tcagtcgtga ttctgatgta gatggacagg tgagcagaaa agaatcattg 840
[4278] cagcgatatc ttgaaaagcg aaaagacagg ggaagattct ttaaaggcag gaaaaatgca 900
[4279] ggacaagctt tgtctagctc ggagatgtac ctgaaccatc agataagagc tcactactta 960
[4280] aatggacaaa caaaccagag cagaacaagt tctccaccac agtctggagt gccacatgca 1020
[4281] ttttatagct cagctgacaa ccaagagctt gtgaattttt ctgtagatct caatgatgaa 1080
[4282] ggtggtcaag aacactga 1098
[4283] <210> 88
[4284] <211> 1074
[4285] <212> DNA
[4286] <213> Aquilegia coerulea
[4287] <400> 88
[4288] atgaaacctg acgagacagt ttcccggtca ccacttgata aacctttgtt tcaacttact 60
[4289] gatgaagata tttcacagct cactcgtgaa gattgccgga aatttctcag agacaaaggt 120

[4290] atgagacgtc cttcatggaa caaatctcag gcgattgaac aagtgatctc acttaaaacg 180
[4291] ttgctagaac caagaacgga atctgataca aatgccaccg gaatccggca gaaattactt 240
[4292] gtttctcggc tagaaaattc tacccaagta cctttaaatg acaagacaaa tgcctcaaat 300
[4293] ttaaagacat ctgttcaggc aataaactcc gggaaagccg atattcatgg tgacaggccg 360
[4294] tgtcgggtcc ctgttccagt ccctgacgat aacacaatca ctgttccagt ccctgacaat 420
[4295] aacacaatca ctgttccagt ccctgacaat aacatcactt catccagaaa cctgaactcc 480
[4296] accaatggac tggttggtca gatgacaatt ttctactgcg gcaaggtgat cgtctacgat 540
[4297] gatatgcctg ctgagaaggc acatgcaatc atgaaatttg caggaagcca tatcaatgtg 600
[4298] cctgaggatt cttcaccagc tggagctgca gtaattcaat cctttgcatg ccaattacag 660
[4299] gcagcatcca tcagacatgg acttgctttc ccgtcagcgg tctctccacc cttgcacaat 720
[4300] gtggtagccg atacttctca gcattgcagg gaggaagtga cagtttctcg tgaagttgaa 780
[4301] cccgagggtc cagtgagtag aaaagcatct gtacaaagat atttggagaa gcgaaaagac 840
[4302] agggggcggt ttaagaacaa gcgaaagata gagtcatctt ctagcttaga gatatacttg 900
[4303] aaccatcaac tgggggatca gtaccttaat gagaaatcaa gtcagagcag ggcatgttcc 960
[4304] ccaccccaac ctagagcacc acacactccc actcgttgca gttcagttga gaaccaggtc 1020
[4305] acaaatgtcg tgttctccat tgatctcaat gataacgatg ttcgggaagg ctga 1074
[4306] <210> 89
[4307] <211> 1044
[4308] <212> DNA
[4309] <213> Aquilegia coerulea
[4310] <400> 89
[4311] atgaaacctg acgagacagt ttcccggtca ccacttgata aacctttgtt tcaacttact 60
[4312] gatgaagata tttcacagct cactcgtgaa gattgccgga aatttctcag agacaaaggt 120
[4313] atgagacgtc cttcatggaa caaatctcag gcgattgaac aagtgatctc acttaaaacg 180
[4314] ttgctagaac caagaacgga atctgacaca aatgccaccg gaatccggca gaaattactt 240
[4315] gtttctcggc tagaaaattc tacccaagta cctttaaatg acaagacaaa tgcctcaaat 300
[4316] ttaaagacat ctgttcaggc aataaactcc ggggaagccg atattcatgg tgacaggccg 360
[4317] tgtcgggtcc ctgttccagt ccctgacgat aacacaatca ctgttccagt ccctgacaat 420
[4318] aacatcactt catccagaaa cctgaactcc accaatggac tggttggtca gatgacaatt 480
[4319] ttctactgcg gcaaggtgat cgtctacgat ggtatgcctg ctgagaaggc acatgcaatc 540
[4320] atgaaatttg caggaagcca tatcaatgtg cctgaggatt cttcaccagc tggagctgca 600
[4321] gtaattcaat cctttgcatg ccaattacag gcagcatcca tcagacatgg acttgctttc 660
[4322] ccgtcagcgg tctctccacc cttgcacaat gtggtagccg atacttctca gcattgcagg 720
[4323] gaggaagtga cagtttctcg tgaagttgaa cccgagggtc cagtgagtag aaaagcatct 780
[4324] gtacaaagat atttggagaa gcgaaaagac agggggcggt ttaagaacaa gcgaaagata 840
[4325] gagtcatctt ctagcttaga gatatacttg aaccatcaac tgggggatca gtaccttaat 900
[4326] gagaaatcaa gtcagagcag ggcatgttcc ccaccccaac ctagagcacc acacactccc 960
[4327] actcgttgca gttcagttga gaaccaggtc acaaatgtcg tgttctccat tgatctcaat 1020
[4328] gataacgatg ttcgggaagg ctga 1044

[4329] <210> 90

[4330] <211> 987

[4331] <212> DNA

[4332] <213> Medicago truncatula

[4333] <400> 90

[4334] atgaacggcg gaagcaccgt ttccttccga tccatcctcg acagacctct taaccaactc 60

[4335] actgaagatg acatttctca actcactcgc gaagactgtc gcagattcct caaagataaa 120

[4336] gggatgcgca ggccttcctg gaacaaatca caggcgatcc agcaggtgat ttctctcaaa 180

[4337] gcgcttctag aacctaccga cgatgatatc ccggctaccg tcggcgttgg tgtctcctcc 240

[4338] gccattcacc accatcacca ccaccaccct cctcaacctc cgccgaaggc tttggatccc 300

[4339] gaagatactg ctttggaact acagaaatcc acttcacctg ttgctgagag acccacggaa 360

[4340] accaatgatg ccaatgttgt taacaatccc ggagggtgcg cacctagtgg gtcatttggg 420

[4341] caaatgacaa ttttctactg tggtaaggtg aatgtctatg atggagtctc gccggataag 480

[4342] gcacgatcaa tcatgcagct tgctgctgca tgtccgtcct cctttcctca ggataatcct 540

[4343] tcaaataaaa atgcagcagt ttgggcttct ccttgcaact tacctattga taaggaagtc 600

[4344] ctcttcccta ctgacacagc aatccttcaa gttgctcaaa cagataagat ggtggaatac 660

[4345] cctctgcaat acagggagaa aggaagcaca gctcgtgatg ctgagggtca ggcaagcaga 720

[4346] aaagtgtcac tgcagcgata tcttgaaaag cgaaaggaca ggggaagatc gaagggcaag 780

[4347] aaactgactg gcataacttc atctaacttt gagatgtatt tgaaccttcc agtgaagctc 840

[4348] catgcctcaa atgggaattc aagtcgtagt agcactgact ctccaccaca gcctagactg 900

[4349] cctttagttt ccagtggctc agctgaaaac cagccaaaag ttacccttcc cattgatttg 960

[4350] aatgataaag atgttcaaga atgctaa 987

[4351] <210> 91

[4352] <211> 1020

[4353] <212> DNA

[4354] <213> Solanum lycopersicum

[4355] <400> 91

[4356] atgtcgctgg aacaaactgt ttacaagtct cctctggaca aaccgcttta cctacttacc 60

[4357] gatgacgaca tttctcagct cactcgcgaa gattgccgac gttttcttaa agctaaagga 120

[4358] atgagaaagc cgtcatggaa taaatcacag gcgattcagc aggtgatttc actgaaggcg 180

[4359] ttgtttgaga cgacgccgga atccgacacc ggtcagcgga aaaagcgtca cattcctcgc 240

[4360] ccggacacta gtttacagcg agtccagaaa gaaacgagta tcgatgcaga atttgctgaa 300

[4361] tcggctgaag aaacggtgcc gtacggtaga aaacctccca ataaacctga tctttccggc 360

[4362] gacaaagctg caagtgctgt tgccgttgtc aataacttag ctccttctag aaccacagat 420

[4363] tcaggaaatg catcatcagg tcaattgaca atcttctatt gtggcaaggt gaatgtgtat 480

[4364] gatgatgtac ctgctgaaaa ggcagaagca atcatgcatc ttgctgcaag cccactcttt 540

[4365] gtcccttcag aaactccatt ggatgctaac agagcagctc aacattccga atgccatttg 600

[4366] caagctgcaa atgttaaact gggtcaagat tctcctatgg tgttcatgcc aaccatgcaa 660

[4367] acagggaaaa taactgaagt tactcgcctg catttggagg aaagcaacac ttcctatgaa 720

[4368] gacaatcctg aagcagtgaa ccacgtaagc aggaaagcat tactggaaag atatcgtgag 780
[4369] aagcggaaag acaggttcaa gagaaagatg ggaatgcctt catctgctag cttggacatc 840
[4370] tatttgaacc atcgaaccat aaatcatacc caaagcgagc tctcaagtag gagcaacact 900
[4371] tgttccccgc ccgcaattag attatctgct gcgcctgctc caagtggttc aatggataac 960
[4372] attctccaaa tggatgccaa tgcttctggt tttctcgacg acaaagatgg taaagagtga 1020
[4373] <210> 92
[4374] <211> 1018
[4375] <212> DNA
[4376] <213> Trifolium repens
[4377] <400> 92
[4378] atgaacggcg gaagcaccgt ttccttccga tccatcctcg acaaacccct taaccagctc 60
[4379] accgaagatg acatttctca actcactcgt gaagactgtc gcagattcct caaagataaa 120
[4380] gggatgcgca ggccttcctg gaacaaatct caggcgatcc agcaagtcat ttctctcaaa 180
[4381] gcacttctag aacctaccga cgatgatctc cctgctcccg tcggtgtctc ctccgccatt 240
[4382] caccaccatc atcaccacca ccctcaacct cctcagagga atttgaatga agctccggtg 300
[4383] aagggctccg atctcgatga taccggtttt catactgcgg aggatcttaa caaatctact 360
[4384] tcaactgctg tggaaattcc tactgaaacg aatgatgcca atgttgttaa atcctctggg 420
[4385] gggtgcgtag ctagtgggtc gtttgggcaa atgacaattt tctactgtgg taaggtgaat 480
[4386] gtctatgatg gagtctcacc ggataaggca cgatcaatca tgcagcttgc tgcatgtcca 540
[4387] tcctcgtttc ctcaggataa tcttttaaat aaaaatgcag cagtgtgggc ttctccttgc 600
[4388] aacataccaa ttgataagga tgtcctcttt cccaatgaca cagcaatcct tcaggttgct 660
[4389] caaacagata agatggtgga atatcctctg caatacaggg agaaagggag catagctcgt 720
[4390] gatgctgatg tagagggtca ggcaagcaga aatgcgtcgc tgcagcgata tcgtgaaaag 780
[4391] cgaaaggaca ggggaagatc gaaaggcaac aaactgactg gcataacttc atctaacttt 840
[4392] gagatgtatt tgaaccttcc agtgaagctc catgcctcaa atggtaattc aagtcgtagt 900
[4393] agcactgact ctccaccaca gcctagactg cctctagttt ccggtggctc agctgaaaac 960
[4394] cagccaaaag ttacccttcc cattgatttg aatgataaag atgttcaaga atgctaat 1018
[4395] <210> 93
[4396] <211> 936
[4397] <212> DNA
[4398] <213> Amborella trichopoda
[4399] <400> 93
[4400] atgacggccg gtgatggctc catacgatca atattggaca agcccttgga agagctcacg 60
[4401] gaggaggaca tctcgcagct cactcgtgaa gactgtcgca ggtacctcaa agaaaaaggg 120
[4402] atgcgaaggc cttcgtggaa caagtatcag gcaattcagc aggttctctc tctaaaaggc 180
[4403] ctcttagagg ggaagccttg cgatgacaac agcgatgttt tcagtcaccg atcaccgatc 240
[4404] acggtcattc ccaatgttgg gagcatgaga gagaaagaaa aggccgtaaa tattgcggat 300
[4405] ccggagatat cggggtctca tcagccgaat tttcgccgag aaattcacga aaccacccgg 360
[4406] gaaagagctt taccggcttc cgactggcca ccttctcagg agccggtatc tcagatgacc 420

[4407] attttctatg ctggagccgt taacgtatac aacgacattc ctgaagataa ggtgcaagcc 480
[4408] atcatttatc ttgctgggaa gtcagactcc ttacagcaaa ctaatgttat cagaacggga 540
[4409] ccggaccaat gcatagcatc tgctgcaagc ccctcattga acgatctcca cagtagacga 600
[4410] atccacccaa cttcaaacat caccacttct cagtctcttc gtgttgcaac ttcccttcct 660
[4411] gttgggcctc attcagaggt tcctaagacg aggaaaacct cggtgcagcg attcttggag 720
[4412] aagcggaagg acaggggggcg cttgaaggga acattggcga gtggtgggag ctctaagagg 780
[4413] ggttcctcat gcctagaatt gtatgcaact tcaagattaa agagtgaggg ggtggccacg 840
[4414] actacaactc aatccaatat gaacaatgtg gtcgtatcac cttctaaccc aagaatgcct 900
[4415] ctaaatcccg ggagttgcag ctgggttgag aactaa 936
[4416] <210> 94
[4417] <211> 1251
[4418] <212> DNA
[4419] <213> Selaginella moellendorffii
[4420] <400> 94
[4421] atggcggcct cgattctagg ttgcggttct agcaatggcg tcgcggtcac cggtaatcct 60
[4422] gctccagccg cggcggccga ggtgcccgcg cctctcaggc cgctggagga gctcacggag 120
[4423] ctggatatca ggcagctcac gcgggaggac tgtagacgct atctcaagga acggggaatg 180
[4424] cgcaggccgt cttggaacaa ggcacaggcg atccagcaag tgctgtcttt gaggagtttg 240
[4425] ctttgtcctt ccaatccggt aggcccttcc tccaagaacc cgggaagtgc cgcgaacgcc 300
[4426] cctccggctg aagcagctgc tgctggtcac accaaacaat tactggacaa ggtctctcag 360
[4427] caaagcatgc cagattcttg tccatctaac aacgcctctg atcctaggcc gctcgccgga 420
[4428] tgctttggat ctcttgcccc gacgttatca gttctcaatc ccgatgcgaa acgtaacccg 480
[4429] ctgagttcta aacccgcgtc aacgacaaag cctcacagtg cccagctgac cattttctac 540
[4430] tccggtattg tgaacgtgta cgacgatgtc ccgcttgaca aggcacaagc tataatgctt 600
[4431] cttgccgcga gtaaaacgtt tcacgttccg acaagttcag tgcctggcca tccgccgttt 660
[4432] acgagtgcaa cccaacaaca acaacaacaa caacgagagc ttaaccaaca aaccgaagcc 720
[4433] acgcaaaagt acccgatgca gcaccaacaa gctcctcaaa tatatctaag ctcgggttca 780
[4434] gctctacccg acgaaagctg cacggaacct gggcttccac aggtcagaag tgcatcgcta 840
[4435] cagagattcc tggctaaacg acgagacagg ttgtcaggga atccttcctc gtctaggcgg 900
[4436] aacgacagat ccaaaaagcg gaggttctcc ccgccaccgt caccgttaac ttcggcttcg 960
[4437] ttccagtttc ctccaagtgc tagaacatcg caagttttaa gatactccac tacttctaca 1020
[4438] actacgatca ctactgccac tgctactgcc gctactacca ctactactac gggtaccacg 1080
[4439] aatggtggac actgttccaa ttccaatcaa gcaagcgaga atgcaggcag cgatacctcc 1140
[4440] ggtggaagtt ctggaacgcc ggacacaagc gacacaacaa gggacaacga caatggacga 1200
[4441] gtttccaacg aaaatggacg agtgtccacc acttgtctcg cagcaacgtg a 1251
[4442] <210> 95
[4443] <211> 705
[4444] <212> DNA
[4445] <213> Selaginella moellendorffii

[4446] <400> 95

[4447] atgtctagca tggtcgattt cctggggatc gaggagaagg tgtccaccag cgtcagcgcc 60

[4448] gagaggttga agaagctgga ggagctcacg gacgaggacg tgatgcagct cactcgggag 120

[4449] gattgccggc gctacctcaa ggagaaggga atgcgtcgtc cgtcttggaa caaggcccag 180

[4450] gccgtgcagc aacttctctc gctcaagagc ctgtgcgatc cttccccggc ttccagtgga 240

[4451] gccgccaaga ggagcccatc tccgccgctc gacgaggctc cagcgaagaa acccatggca 300

[4452] atgacaagca tcgatctcaa ggctgccgct gctgtggacg ccgccaatct tacgatgttt 360

[4453] tatgatggag cagtgtccgt gtttgacgac gtttcgccag acaaggcatc tcttttccct 420

[4454] ttggcttatg cgatcatgct cctggccggg aatgtgaagt cgtggccttc gatcaacgtt 480

[4455] gctgctaaca ccaacaaagt tgtgatctct tcttatgagt tgccacaggc gcgaaaggca 540

[4456] tcactccagc gttttcttca gagacgccgt gagaaaactg cgaaagaggc agcatccaaa 600

[4457] gggaactcta ataagtcgcc ttgtcatggc gagagctcgg ggaagcacgc atcggatgct 660

[4458] actgatccag ccacttctcc cttgctcacg gaggtctctt cctag 705

[4459] <210> 96

[4460] <211> 813

[4461] <212> DNA

[4462] <213> Nicotiana tabacum

[4463] <400> 96

[4464] atgccgccgg aagaaacagt ttccaaatca cctctggaca aaccgctcca cctacttacc 60

[4465] gatgacgaca tttctcagct tactcgcgaa gattgccgcc gttaccttaa agaaaaagga 120

[4466] atgagaaggc cgtcatggaa taaatcacag gcgattcagc aggtgatttc actgaaggcg 180

[4467] cttctcgaga cgacaccgga ttccgacacc ggccctcgga gaaaacttca cattcctcgc 240

[4468] ccagacacta gagtacaaca agtccagaaa ggaacggata ccgatgcaga attttcgaaa 300

[4469] tctgctgaag ggatggtgcc atacggaaga aaacattcga aaaaacctga tattcccggt 360

[4470] gatatagctg ccggttcagt tgccgttgcc gccggcaata acttagctcc ttctagaacc 420

[4471] acagatttgg gaaacacacc agcaagtcaa ttgacaatct tctattgtgg caaggtgaat 480

[4472] gtgtacgatg atgtgcccgc tgaaaaggca caagcaatca tgcatcttgc tgcaactcca 540

[4473] ctctttgtgc cttcagaaac tccattgggt gctaccttag cggctcgaca ttccgaatgc 600

[4474] catttgcaag ctgcaagtgt taaacagggt ccagattctg ctatggtgct catgccaacc 660

[4475] atgcaaacag ggaaaatgag tgaagtgact cgcctgcgtc tggaggaaag caataccttc 720

[4476] tatgaagaca actctgccaa ttatgcagaa gcagtggaag gccacccaag caggaaagca 780

[4477] tcagtacaaa gatatcttga gaagcggaaa gac 813

[4478] <210> 97

[4479] <211> 984

[4480] <212> DNA

[4481] <213> Solanum tuberosum

[4482] <400> 97

[4483] atgccgccgg aagaaacagt ttccaagtca cctctcgata aacctctcaa tcaactcact 60

[4484] gacgatgaca tttctcagct cacacgcgaa gactgccgtc gttacctcaa acaaaaagga 120

[4485] atgagaaagc cgtcatggaa taaatcacag gcgattcagc aagttatatc gttgaaggct 180
[4486] ctcctcgagc cggatactga cgccggaact cggaagaaac ttcacattcc tcgtgcagat 240
[4487] actcatgtcc agagcgggaa aaatacctat ggcgaacctt ctgaaccagt gcctgataga 300
[4488] agaaatcagc aggacagacc tgatctttcc agtcatatta ctgcccttcc ggtcgctgtt 360
[4489] gtggataatt cagctccttc tagaacaata ggttcagcag ataaaccagt aggacaaatg 420
[4490] acaatcttct atagaggcaa ggtgaatgtc tatgatgatg tgcctgccga caaggcacaa 480
[4491] aaaatcatgt gtcttgcttc aagccctctt tgtgtgcctt cagaaactcc atcgaatgcc 540
[4492] actgtagcag ctcgacattc agcatgctgc ttacaagctg caaatagtaa actacgccta 600
[4493] gatactaata ttgtaccgac tattcaaaca gtgaaaatga gtgaggtttc tcgagttcct 660
[4494] atagaagaaa gcaaccgctt atacaatgat aatcctgaag cagtggagag ccccgcaagc 720
[4495] aggaaagcat cagtacaaag atatcttgag aagcgaaaag aaaggttcaa gtggaagaga 780
[4496] aaggtagaaa caacttcatc agctagcttg gatatctatt taagtgatcg aattgggact 840
[4497] cgtacgccaa gtgactatgc aagtggggct gatctttgct tcacacccca cattacacct 900
[4498] acaggaagtg gtcctataca agacaatatt cagatgaatc ccacttttc tagtgatctc 960
[4499] aatgacagag atgttagaga gtga 984
[4500] <210> 98
[4501] <211> 1047
[4502] <212> DNA
[4503] <213> Glycine max
[4504] <400> 98
[4505] atgaacggcg gtgccaccac cgccaccttc cgatccatcc tcgacaagcc cctcaaccag 60
[4506] ctcaccgagg atgacatttc tcagctcact cgcgaagact gtcgcagatt cctcaaagaa 120
[4507] aaagggatgc gcaggccttc ctggaacaaa tcgcaggcga tccaacaggt catttccctg 180
[4508] aaagcgctgc tggaaccttc cgacgatgat actcctcctc ctaccgccat gcaccaccgt 240
[4509] agtcatgctc ctccccctcc acctcaacct caatctcaag tgaatttgac tgaacctcct 300
[4510] cctccgccca aggctccgcc acctgaagaa tcctcttttc atgctgctga agacattcag 360
[4511] aaacctgcgt cgtctgggga aaaaccttcg gaaactaatg acaccaacac caacgttgct 420
[4512] agccccaaag ggtgtgcaac tagtggatca tttgggcaaa tgacaatttt ctattgtggt 480
[4513] aaggtgaatg tctatgatgg agtctcgcct gataaggcac gagcaatcat gcagcttgcg 540
[4514] gtgagtcctg tccagtttac tcaagatgat ccttcaaatg gaaatgcagc tgtttggcct 600
[4515] tctccttgcc acttaccaat ggataaggat gtcctcattc ctgtagatac aacaatcctt 660
[4516] caggttgctc aatcagataa gatgatggaa tatcctctgc aatatagaga gaaaggtagc 720
[4517] atagctcgtg atgctgaggg tcaggcaagc agaaaagtgt cattgcagcg atatcttgaa 780
[4518] aagcgtaagg acaggggggag attgaaaggc aagaaattga ctgggataac ttcatctaac 840
[4519] ttcgagatgt atttgaacct tccagtgaag gtccatgcct caaatgggaa ttcaagccgt 900
[4520] agcagtacta gctctccacc acagcctaga ctgcctctag tatctagtgg ttcagctgac 960
[4521] aaccagctaa aggttgccct tcccattgat ctcaatgaca aagtgtcatt gcagatgttc 1020
[4522] aagaatgcta aaactctaac tagatag 1047
[4523] <210> 99

[4524] <211> 1017

[4525] <212> DNA

[4526] <213> Citrus clementine

[4527] <400> 99

[4528] atggacgtgg acggtggcgt gacgtcgtgc cggtcaatac tcgagaaacc tctcagtcag 60

[4529] ctcactgaag aggacattac gcagctcaca cgcgaagatt gccgcaaatt tctcaaggag 120

[4530] aaaggaatgc gcagaccatc gtggaacaaa tcgcaggcga tccagcaggt gatctctctc 180

[4531] aaagctttgc tcgagtccag cggcgattcc ggctcaggtg ttttacgcag agtactcgtc 240

[4532] tcgcctccgg aaagtatgcc gccgcgcgtg aatgtgactt caaattcagc tgatttagta 300

[4533] aaggaaccga ccatctcagt ttctggagac caaaacagtg cgtataggcg gaagtaccct 360

[4534] cgcaactgtg ctgttgatgc agataacaag accatctcta acagaaatcc ctgtgaagca 420

[4535] aatgggtcca tagggcagat gacgattttc tattgtggca aggtgaacgt gtacgaagga 480

[4536] gtgccaactg ataaggcaca ggagattatg caccttgcag caactccaat tgatttttcc 540

[4537] cagaacggtt catttggtgg aattacggca tatagggcca ttccatgcca tttacaagtg 600

[4538] acaagcaaca gacatgtgtc tctccctctt cgtcctgctg ccatgatctc tcagttcatg 660

[4539] caaacaggga agatagcaga ttattctcag gagtataggg agaaagcgat tagtactcat 720

[4540] gactctgatg tggatggtca ggttaaccga aaagtctcgt tgcagaggta tcttgaaaag 780

[4541] cggaaagaca ggggaaggtt tttcaaggga aagaaaaata caggaccaac tcctagtttg 840

[4542] gagatgtacc tgaaccatcc ggggaagaca catgcctcca atggacaaca gagccagagc 900

[4543] aacacaagct ctccgaccca gcctgagttg tccaacacat tggggacctc cccagacaac 960

[4544] caggcgaaga ctgtcatgct tccggttgat ctcaacaatg aagatattca agactga 1017

[4545] <210> 100

[4546] <211> 1008

[4547] <212> DNA

[4548] <213> Ricinus communis

[4549] <400> 100

[4550] atggacgccg gagtgacgtc gttcaggtca atactagata aacccctaac tcagctaact 60

[4551] gaagaagaca tttctcaact cacacgcgaa gattgccgca aatacctcaa agaaaaagga 120

[4552] atgcgaagac cttcatggaa caaatcgcaa gcgatccagc aagtgatttc tctaaaagca 180

[4553] cttcttgaaa ctagtgaaga ttccggtgcc ggtgctctcc gtagaatctt agtttctaaa 240

[4554] cctccggtta cttcaaattc tgttgattca gctaaggaac caagtgatag caacaataat 300

[4555] aacttactag atgagacagc tcctcatgat tctcccaaat ctcctcctcc ggcgccatcg 360

[4556] ttggattgtc cactggaaga ggcagataat aaagtcattt cttcaagaag tcctggtgca 420

[4557] acagatgggt tggtcgggca aatgacgatt ttctattgtg gaaaggtgaa tgtttatgat 480

[4558] ggagtcccac ccgataaggc ccaggcgatc atgcatcttg cagcgactcc aattcactca 540

[4559] cctttagacg atccaattcg tagacctgta tttgcttttc cgtatcattt acagacccca 600

[4560] agtgacaaac atgtctttgt tccttctaat gctgcaattt ctccaaccac accaacagag 660

[4561] aaggtgacag aatattctca gcagtgtagg gagaaaggaa atgtaactta tgatcatgat 720

[4562] gtagagggtc aagcaaaccg aaaaatgtca ttgcagagat atctggagaa gaaaaaggat 780

[4563] aggggaagat tcaagggtag gaaaaattta gggcctaatt cgtctagctt ggatgcatat 840
[4564] ttgaaccatc aaatgaggac acatatctca aacgagcaat caaccaggag cagtacaagc 900
[4565] tctccaaccc agcctggagt gccacatact tcgagtaact cggccgaaga tcagctgaag 960
[4566] actgccagtt ttgctgttga tcttaatgaa gatgtccaag aaccttga 1008
[4567] <210> 101
[4568] <211> 1182
[4569] <212> DNA
[4570] <213> Vitis vinifera
[4571] <400> 101
[4572] atgaatcccg gcgtcaccac tctccgctct atactggaca aacccttca cgaactcacc 60
[4573] gaagaagaca tttctcagct cactcgtgaa gattgtcgca aatacctcaa agaaaaagga 120
[4574] atgcgtcgtc cttcctggaa caaatcgcag gcgatccagc aggttatttc gcttaaatcg 180
[4575] ttgctcgaaa ccagtgaggg cagcggtgcc ggagttttga ggaagatcac cgattcaccg 240
[4576] ccggcggaaa atctacctcc ggttacctcc aattcagctg attcaggcaa ggagctgagt 300
[4577] gctgatatcc agatctcagt atcagctgat gaactggttc cccttccgcc aaaagatcat 360
[4578] catccagaat ccacccccttc tggcgaatta gccagccggc ctccagaggc agacaccaag 420
[4579] catacttgtc ccagaagtcc aggtgcaaca aattgtttgg ttgggcagat gacaattttc 480
[4580] tactgtggaa aggtgaatgt gtatgatgga gttccagatg ataaggcaca agcaatcatg 540
[4581] catcttgcag caagcccatt ccatttgcct tcagatgacc cctttagtgg tgctgctatg 600
[4582] ctttgctcct ctccatgcca tttgcatact gccaatgtta aacatggcca tattcctcct 660
[4583] cgagccatgg tttctcagac tatgcaaaca gagaaattta ctgaatattc tcaacagtac 720
[4584] agagaagaag tgaactttac ccgtggacat ggatcggaag cactttctgg gcttaggacg 780
[4585] gtaggaagcc caacggccag gcctaccgaa gatatggaac agaccacttg tctcactata 840
[4586] tggggtacct tccgctacaa ggttatgcca ttcgagatat atgagggcat catggatgtt 900
[4587] gaaggtcagg ttgacagaaa attatcattg caaagatatt tcgaaaagcg aaaagacaga 960
[4588] tttaagagca ggaaaaaaat aggactacct tctggtagct tggagatgta tgtgaaccat 1020
[4589] caagcaagga cacaaccctc gaatgggcaa tcaagccgga gtggcacaag ctctccaccc 1080
[4590] cagcatggat tgtcgcacac cctgtgcagc tcagctgaca accatacaaa gaatttcact 1140
[4591] ccttttgttg atctaaacag taaagatatc caagaaagtt ga 1182
[4592] <210> 102
[4593] <211> 1029
[4594] <212> DNA
[4595] <213> Morus notabilis
[4596] <400> 102
[4597] atgagcgccg gcacgacggc gtttcggtcc atactggaca agcccctgaa ccagctcacc 60
[4598] gaggatgaca tttctcagct cacccgtgaa gattgccgca aatacctcaa ggaaaaaggg 120
[4599] atgcgaaggc cgtcgtggaa caaatcgcag gcgatccagc aagtgatttc gctcaaggct 180
[4600] ttgttggagc cctgcgacga ttccggcgcc ggagccctaa ggaggatcgt cgcttcgacg 240
[4601] ccgccgccac cgccgacaca aaacgcgcca cgtgtctcca ctttcagtgt tacttcgaac 300

[4602] tcggcagatt cgggtaagga agcaagtgtt gatgtccagg tttcggcgga ggaatcggga 360
[4603] ccgtgtcaga ggaaggagca ggcgaaatct gctccggaga ctgaggaaag accggctgat 420
[4604] gcgggtgaga gggcaagtcc aagaagtcat tgtgcaactg atgcattggt cggacaaatg 480
[4605] acaattttct attgtggcaa agtgaatgtg tacgaagggg ttccacctga gaaggcacga 540
[4606] gcaatcatgc accttgctgc aagtccaatc cctttatctc gagaaaattc atttggggtc 600
[4607] cttgcagcac ctagatcttt tccatggcat ttacatgctg cgagtgacaa gggtggcctt 660
[4608] ctccctccta gtgccacaat atcacaaccc atgcagacag ataagctagc cgactacagc 720
[4609] caacagtgct gggagaaaga aaatgatggt caggcgagca gaaaactctc attgcagaaa 780
[4610] taccgtgaaa agaaaaaaga taggggggagg ttgaagacca agagaagcac gggatttaat 840
[4611] tcttctagca tggaggtcta ttttaaccac caggtaaaga cccacatgtc aaatggtaat 900
[4612] tcaagtcgaa gtagcacaag ctctccgacc cagcctggac taccacaaac attgtgtagc 960
[4613] acagtcgaca atcagccaaa gattccctgt cttcctgttg atctcaatga aaaactaact 1020
[4614] attgagatg 1029
[4615] <210> 103
[4616] <211> 1095
[4617] <212> DNA
[4618] <213> Phoenix dactylifera
[4619] <400> 103
[4620] atgtattggg ttggatcggc tcaagaacgc cgccgagacg ggggccggtc gccgctcgac 60
[4621] aagccactca gcctgctcac agaggaggat atcgcccagc tcacccgcga ggactgccgc 120
[4622] cgattcctca aagagaaagg catgcgacgg ccgtcctgga ataagtcgca ggcgatccaa 180
[4623] caggtcatct ccctcaaggc cctcctcgag ggacgaccgg agtccggcga actccccgtc 240
[4624] ggcgccggct accgccagaa gcctcccccc cggcggccgg cctctcttcc ttcgctgcag 300
[4625] gaggcggccg gcgactcgac ggcggcggcg aaggagccgt cgccgtcgtc gtcgctgtct 360
[4626] ccgtaccgga gaagagatcc gatcccgccg atcatctccg ccggcgggcc gtcttgccgg 420
[4627] ttcccggtcg ccggcaggga ccaacaaccg ccagagaccc cctccccctc gctcagggtg 480
[4628] acggcggaag taccggcggg tcagatgacg atcttctacg acggcaaggt gaacgtctac 540
[4629] agcgacgtga cggtcgataa ggcgcgggcg atcctgctgc tcgcggggag acgagactgc 600
[4630] tacggcgctg cggctctacc gggtccggtt cactcgcccc agccggcttt tctcggaccg 660
[4631] ggtcagggcc cggtccccac cgctcccccg ctggccgctg ctttacccac ctcgccagct 720
[4632] gggaggttag cccaccgttt cgagggaccg agtggagtgc cgcgcgggaa atcgagcctg 780
[4633] gtaagagagc ggagcacgtc accggagggt ccaacaagta gaaaagcatc attgcagcgg 840
[4634] tacctggaga aaaggaagga caggttaaaa ggtagaaaaa ctcttggagg ggcatcttct 900
[4635] tcaagcatgg aaataatgtt cttgagccaa aaatttgggg gtcagatacc aaatgagcag 960
[4636] ttaagtagga gcaacactag ctcccctacc caacccagac cacctggcac accaactaga 1020
[4637] tgcagttcaa tagagaacca ggctcagaaa aatcatctct cagttgatct caatgatgat 1080
[4638] ggttgcggca actga 1095
[4639] <210> 104
[4640] <211> 1065

[4641] <212> DNA

[4642] <213> Theobroma cacao

[4643] <400> 104

[4644] atggaggcgg gggtagcgac gacgacgaca acgacggagt cgtttaggtc gatacttgat 60

[4645] aaacccctca gccaactaac agaagaagac atttctcagc tcactcggga agattgtcga 120

[4646] aaattcctca aggaaaaagg aatgcggagg ccgtcgtgga acaaatcgca ggcgatccag 180

[4647] caagtaattt cactcaaggc gttgttggag agcaacgaag attccggcgc cggagctatc 240

[4648] cggaagatcc tcgtttctcc accatcaccg tcagtgcctc cgcaaaatgc agcggcgcgt 300

[4649] gtggcttcca attcatgtga ttcagtaaaa gaagcggttg tcggagaaga aggaagcccg 360

[4650] tatcggcgaa aagatcctcc tttgaaacct tctccggtgg gggagataaa ttgccttggc 420

[4651] ggtgacacgg ataacaagaa tctctctcct agaagtccat gtgaatcaaa tgagttgggt 480

[4652] gggcaaatga caattttcta ctgtggaaag gtcaatgtgt atgatggagt accacttgat 540

[4653] aaggcacggg caatcatgca tctggcagcg actcctattg attttcctca ggacaatcaa 600

[4654] tgtagtggaa atgcagccct taggtccttt atgtgccatg tccaagcagt cggtgacaaa 660

[4655] aatggccttg ttgcttctac tgccttgaac tctcatacca tgcaaacaga gaagttgaca 720

[4656] gaatatcagc atcagtttag ggaaaaagga aatatcgctc gtgacgctga tgtagatggg 780

[4657] caggtgaaca gaaaagtatc attgcagaga tatcgtgaaa agcgaaaaga caggggaaga 840

[4658] ttttttaagg gcaggaagaa tacaggacaa gcttcctcta gcttggagat gtacctgaac 900

[4659] catcagataa gaactcacaa ctcaaatgga caatcaagcc ggagcagcac gggttctcca 960

[4660] ccacagtctg gattgccaca tgcattttgt agctcagctg acaaccaagc aaaacttgtg 1020

[4661] aatctttctg tagatctcaa tgacaaaagt gttcaagaac actga 1065

[4662] <210> 105

[4663] <211> 3789

[4664] <212> DNA

[4665] <213> Spirodela polyrrhiza

[4666] <400> 105

[4667] atggccggga gcgaggcggc ggcgccggag gaggccggaa gggcggggga ggaggaggtg 60

[4668] agagcggcgg cgggggctgc ggcggtgaag tcgccgctgg agaagccgct gtcggagctc 120

[4669] acggaggagg acatcgcgca ggtcacgcgc gaggactgcc gtcggttcct caaggaaaaa 180

[4670] ggtgctctag tccttttcct ttggttttcc tccttgtttc tcttcttttc ctttggaggt 240

[4671] cgcggtggag ctgatctcga tatccacgtg gccgcccgcg gtgacggcgg ctcccgtttt 300

[4672] ctctgtgcaa acgaatgcag gtatgcgccg cccttcgtgg aacaagtcgc aggccgtcca 360

[4673] gcaggtcatc tccctcaagg cgctcctgga gccctgccac gatgcagacg acgacgcacc 420

[4674] ttccgccggt gctgttccct ccatctcctc cttcttctcg aaaaggccgt ccgacgccct 480

[4675] gcttccggcc gccgcggcgc aggtgaggag gggtatcctg ttccaaactt ccgtcgcctt 540

[4676] ctcttctagc tcgagctggc aacattttgt gaaattgttc cttctcgatt tagttggaga 600

[4677] aacgcgtgtg gtttattgtg ttctgtttac ttctcagttt cccgtctctt ctccaatgag 660

[4678] gggtgaacct gccggcggcg cgccccaaat tgtctccgaa cgtccccacg gaagggaccc 720

[4679] gctggcgaac gtcttcacct gctccgacgc cctcggtcga ttcccggcaa cggggaacgg 780

[4680] tgctcttccg ccaaacagtg ccaccctccc gcccaggtgc gtcccttctc agcacaacgc 840
[4681] cccctctatt caactctttt atttccccgg attgtccctc agatgttaac gggcgcccat 900
[4682] ggtgttgtag aggggttgct tccgctgaga cgctggaggg acagctgaca atcttctacg 960
[4683] atggcaagat taatgtctat gatggtgtga cgccggagaa ggtgaggtcc ggtcagagta 1020
[4684] agttggcggt gacccccttcc tgtggtagat ctaggcactc atggcagtgt atttcccgtc 1080
[4685] tttgaaggcg cgggtgatcg tacaatttgc ggggagcccg agctgctacg atatgccgcc 1140
[4686] gatgccttcg ccgtctttct acccaaaccg acccccctaaa tgccacgacc tggctctgcc 1200
[4687] agcgttatct caagcgacag gtggtggttc cttcaatccg ccaccgcctc cgccgccgtt 1260
[4688] gcagccaccg ccgtctcatc ctgcccagcc tatcggctat tcccaggttc cccagaacgc 1320
[4689] tggtacgttt ttttctccgt catgactttc ctgcgggttc gcctatgctt gatcacgttc 1380
[4690] acgataacgc cctgcggtgg ccctcctgct cacgttgagt tctattgccc tggcaggaag 1440
[4691] gttcccgcag caatttcggg aaggcatgga agagtggaga agctcgcgag aagttgaacc 1500
[4692] aggtgagaga ccttggaccc ttttcttcag tatcagtcgt tattctcgtt tctctctgct 1560
[4693] taactgacct atgcacccgg cctgaacagg cagggtatgc tgggtgattg aggagattac 1620
[4694] gcctatatgt cagtctatta ccatgctact gtttaagggt gtccttctgt ctaagttaac 1680
[4695] tagagtgacc ttaagctcct ggatttctta acctaccaca ccctgatggt acatggtaca 1740
[4696] ctcacagttg acctcaaagc ctttctcatt cctgcggggg aagagggtgg gggtgggcgt 1800
[4697] tgactgagaa aattttgaaa gcaaattgct aatttctgtt gttctttata atgacatttt 1860
[4698] aggcattgcg cgcaagatag ctctttttc ctttttaaga actgtgcttc ttgattccat 1920
[4699] tagcccggga tttaggttcc gttcattgct tagttagcct ccccaattgg cgctgtttat 1980
[4700] gaacgattgg cctcgaccct cttcagcatc cttatcaggg atcttgagat tgagcttaat 2040
[4701] cttatcgcct cttctcaaat gattatggct gccgcgtttt tttccaattt ccagttgatt 2100
[4702] tacctatttt ttggggagag gatgactggt acagtatggc aacttatcca gttttgaatt 2160
[4703] gatgctgata ctgttcttct ttataaggcc tagaaattga tggtaattaa agtaacgtgt 2220
[4704] cagtgattcc atggatcaca ttaatgccct aaacttctgt gtcttatgct attccaaatc 2280
[4705] tgaaaacctt atgaatcaga ccaacaatag tatgaagaaa atttatttca tgctagggtc 2340
[4706] catggtgttc tattcaagaa ctacccttt tttggatcat gcagatgatc tattaagaga 2400
[4707] acaaaatgca gtagaaataa gttaacgaaa gacaacaagg tcatgtcatt tgacgaatga 2460
[4708] agaatttcag aatcaaattg aagcacatta catcttctca tgagttaaaa aaaatgctca 2520
[4709] tgcactgctt ttaatgctcc tttataatac ctgtcatagg ctgaattatt tcaaagtttc 2580
[4710] cttgtatggg aagttctact gggtggttct tttgtatgaa tcttcgtaaa taatcaaagc 2640
[4711] ctgtttattg ttcttcatga cgtggaaata attatttta tgtatcactc acgaaatgga 2700
[4712] tacagcacct atggttacat gatatttaac ttacgtccgc tcaaataaat gagcaataat 2760
[4713] aagataacct accatttctc tccttcattc ccattttgca aagcgtctgt tggtcgtatg 2820
[4714] ggaaaccaca tttctacaag aggaatccat catcttctat cacatctccc ttgagtgggc 2880
[4715] gcattttatg tggatccaaa tatctcaatt aataataatg tttactggat cattatatag 2940
[4716] tttttttat gcattcctct gatgatctta gtggctctcg gaaatttttt attcatgaat 3000
[4717] agaaattttg tcatccctga aagctgctgc tcctttgcgt tcatcatttc tattctatta 3060
[4718] ttctcccttc ttcctgtatg gcctcctgaa gagttcttct tcatgcgaga gaaaaactat 3120

[4719] ggtcttaccc gaatagggtg ggatatttgt atgatcttcc caaggttttg tgtgggcccc 3180
[4720] atatgggggc ggtggcgaag cgggctttcg ggccggcgag cctagagaga cccgggcccg 3240
[4721] gcggctgttg ctaccctcta tagaaaagtt ttcctcagtg ctaccgcgct actgattggt 3300
[4722] tgctcttctg gtgccaatgt cgtcttgccg cgagcagagg gccccaccag cagagccgca 3360
[4723] tcgctccagc ggtacctgga gaaacggaag gataggtaaa gatggtgggc gtgggggttt 3420
[4724] gaccgactgg ttgactgccg ccgccgctgg ctgacttcgc cctctttccc tgtcggaagg 3480
[4725] ttcaagtgca agaagcacgc cggcgggggc tcttccggcg tggagctcct cctgagccag 3540
[4726] cggatcaggg accagattcc ggccgcccac ctctcatgcg gagagatgta cgcggcggcg 3600
[4727] ccgccggccc cgcggcccccc tcccccgccg gcccgctgta gcgccgccgg ccacctccgc 3660
[4728] ttctccatcg acctcaacga cggcggtgag cgctctctct atctctctca cctcttttc 3720
[4729] atcgcctctg cttttgaaga gagtacccat gccaccgccg cctgcgtttc agatgtccgg 3780
[4730] gaagcttga 3789
[4731] <210> 106
[4732] <211> 882
[4733] <212> DNA
[4734] <213> Musa acuminata
[4735] <400> 106
[4736] atgaaccccg gggagaccac gcccccgtcg ccgctcgaca agcccctcgc cgagctcacc 60
[4737] gaggaggaca tcgcccagct cacccgcgag gactgccgcc gcttcctcaa agcgaaaggc 120
[4738] atgcgacggc cgtcgtggaa caagtcgcag gcgatccagc aggtcatctc tctcaaggcc 180
[4739] cttctcgagg ggcggcccgg ctgtgacgac tgccctgctg gcggcggaat cctccaaaag 240
[4740] ctgctcactt cttctccttc ggagccgcta tcgccaccgc aggactcacc tcctcccgcg 300
[4741] ccgaaggagg gcggtagcgg atcacagccg ctggcgaagg agccgtcgcc gtatcgaagg 360
[4742] agggacccga tcccaccgcc ctattcagcc ggaaatccga cgtgccagac cccaattgcc 420
[4743] ggagctgacc ttccccaccc gccggagaag cgctgcccct cccccaggtt gacggcggaa 480
[4744] gtaccggtcg gccagatgac gatcttctac gacgggatgg tcaacgtata cgacggcgtc 540
[4745] tcggccgatc aggccaggtc gatcatggaa cttgcggcca gcccggtctg cttcgacgat 600
[4746] ccgaccggtg cattctctcc ggcccggccg ccggccttcc gcttccctcc gggtctcccc 660
[4747] cgaccggccc cggtccccac cgctccctcg ttcgtgggga ccttcccgat ctcgccggct 720
[4748] ggtaaacgtt gctactccta ctgttcgttc cggtcaagcg tcagcctttt aaccacaaca 780
[4749] gagggcccaa caagcagaaa agcatcattg cagagatact tggagaaaag gaaagacagg 840
[4750] tatggtcatt taccaacaga aagtatacta cttgttagct ga 882
[4751] <210> 107
[4752] <211> 498
[4753] <212> DNA
[4754] <213> Phalaenopsis aphrodite
[4755] <220>
[4756] <221> misc_feature
[4757] <222> (214)..(243)

[4758] <223> n is a, c, g, or t

[4759] <400> 107

[4760] atgaactccg atgcaataac catggggaaa tctctgcttg agaaacccct tagccttcta 60

[4761] accgaagacg atatcgcaca gattacaaga gaagaatgcc gtagattcct caaagataga 120

[4762] ggcatgcgtc gcccctcttg gaacaagtcg caggcgatcc agcaagtgat ttctctcaaa 180

[4763] gccctgttcg aaaaccgatc agatctagaa gatnnnnnnn nnnnnnnnnn nnnnnnnnnn 240

[4764] nnntttcccg aacacgcaga tctcagttcg atctcgccga ctgcggaggc caaggaacca 300

[4765] gagaaagctc agctcactat attctacggg gggaaggtgc ttgtgttcga caattttccg 360

[4766] gttaataagg cacaggattt gatgcagatt gcaggaaaag agcagaatca aaattacggg 420

[4767] acagcaaaca ctgtggctcc atctgcccct gcagcagacc tccatagttt acctctgccg 480

[4768] gctaagcctc cggcgtaa 498

[4769] <210> 108

[4770] <211> 238

[4771] <212> DNA

[4772] <213> Arabidopsis thaliana

[4773] <220>

[4774] <221> misc_feature

[4775] <222> (31)..(31)

[4776] <223> n is a, c, g, or t

[4777] <220>

[4778] <221> misc_feature

[4779] <222> (52)..(52)

[4780] <223> n is a, c, g, or t

[4781] <220>

[4782] <221> misc_feature

[4783] <222> (59)..(59)

[4784] <223> n is a, c, g, or t

[4785] <220>

[4786] <221> misc_feature

[4787] <222> (68)..(68)

[4788] <223> n is a, c, g, or t

[4789] <220>

[4790] <221> misc_feature

[4791] <222> (110)..(110)

[4792] <223> n is a, c, g, or t

[4793] <220>

[4794] <221> misc_feature

[4795] <222> (123)..(123)

[4796] <223> n is a, c, g, or t

[4797] <220>
[4798] <221> misc_feature
[4799] <222> (125)..(125)
[4800] <223> n is a, c, g, or t
[4801] <220>
[4802] <221> misc_feature
[4803] <222> (143)..(143)
[4804] <223> n is a, c, g, or t
[4805] <220>
[4806] <221> misc_feature
[4807] <222> (153)..(153)
[4808] <223> n is a, c, g, or t
[4809] <220>
[4810] <221> misc_feature
[4811] <222> (180)..(180)
[4812] <223> n is a, c, g, or t
[4813] <220>
[4814] <221> misc_feature
[4815] <222> (189)..(189)
[4816] <223> n is a, c, g, or t
[4817] <220>
[4818] <221> misc_feature
[4819] <222> (202)..(202)
[4820] <223> n is a, c, g, or t
[4821] <220>
[4822] <221> misc_feature
[4823] <222> (206)..(206)
[4824] <223> n is a, c, g, or t
[4825] <220>
[4826] <221> misc_feature
[4827] <222> (223)..(223)
[4828] <223> n is a, c, g, or t
[4829] <400> 108
[4830] mdvgvsaksa kktdstrdcr kkdkgmrrsw nksavskayg ddsgagrkvs vnrvtttsna 60
[4831] cgrvsydnga chrmdsrsas ggsghvskdg hkttsrsats vgmtysgkvn vydgkarsmh 120
[4832] aandngassr mskskkmmkg kanssrdsgm ganrkvsryr krkdrkskak kcgvasssmn 180
[4833] crmkaaysng ctgshssstk snsvdnsggs gggsakgrgh gkngdstrtg hhhhhhgs 238
[4834] <210> 109
[4835] <211> 380

[4836] <212> PRT

[4837] <213> Trifolium repens

[4838] <400> 109

[4839] Met Asn Gly Gly Ser Thr Val Ser Phe Arg Ser Ile Leu Asp Lys Pro
[4840] 1 5 10 15

[4841] Leu Asn Gln Leu Thr Glu Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp
[4842] 20 25 30

[4843] Cys Arg Arg Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn
[4844] 35 40 45

[4845] Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu
[4846] 50 55 60

[4847] Pro Thr Asp Asp Asp Leu Pro Ala Pro Val Gly Val Ser Ser Ala Ile
[4848] 65 70 75 80

[4849] His His His His His His His Pro Gln Pro Pro Gln Arg Asn Leu Asn
[4850] 85 90 95

[4851] Glu Ala Pro Val Lys Gly Ser Asp Leu Asp Asp Thr Gly Phe His Thr
[4852] 100 105 110

[4853] Ala Glu Asp Leu Asn Lys Ser Thr Ser Thr Ala Val Glu Ile Pro Thr
[4854] 115 120 125

[4855] Glu Thr Asn Asp Ala Asn Val Val Lys Ser Ser Gly Gly Cys Val Ala
[4856] 130 135 140

[4857] Ser Gly Ser Phe Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn
[4858] 145 150 155 160

[4859] Val Tyr Asp Gly Val Ser Pro Asp Lys Ala Arg Ser Ile Met Gln Leu
[4860] 165 170 175

[4861] Ala Ala Cys Pro Ser Ser Phe Pro Gln Asp Asn Leu Leu Asn Lys Asn
[4862] 180 185 190

[4863] Ala Ala Val Trp Ala Ser Pro Cys Asn Ile Pro Ile Asp Lys Asp Val
[4864] 195 200 205

[4865] Leu Phe Pro Asn Asp Thr Ala Ile Leu Gln Val Ala Gln Thr Asp Lys
[4866] 210 215 220

[4867] Met Val Glu Tyr Pro Leu Gln Tyr Arg Glu Lys Gly Ser Ile Ala Arg
[4868] 225 230 235 240

[4869] Asp Ala Asp Val Glu Gly Gln Ala Ser Arg Asn Ala Ser Leu Gln Arg
[4870] 245 250 255

[4871] Tyr Arg Glu Lys Arg Lys Asp Arg Gly Arg Ser Lys Gly Asn Lys Leu
[4872] 260 265 270

[4873] Thr Gly Ile Thr Ser Ser Asn Phe Glu Met Tyr Leu Asn Leu Pro Val
[4874] 275 280 285

[4875] Lys Leu His Ala Ser Asn Gly Asn Ser Ser Arg Ser Ser Thr Asp Ser
[4876] 290 295 300
[4877] Pro Pro Gln Pro Arg Leu Pro Leu Val Ser Gly Gly Ser Ala Glu Asn
[4878] 305 310 315 320
[4879] Gln Pro Lys Val Thr Leu Pro Ile Asp Leu Asn Asp Lys Asp Val Gln
[4880] 325 330 335
[4881] Glu Cys Gly Ser Gly Gly Gly Ser Ala Lys Gly Glu Leu Arg Gly His
[4882] 340 345 350
[4883] Pro Phe Glu Gly Lys Pro Ile Pro Asn Pro Leu Leu Gly Leu Asp Ser
[4884] 355 360 365
[4885] Thr Arg Thr Gly His His His His His His Gly Ser
[4886] 370 375 380
[4887] <210> 110
[4888] <211> 353
[4889] <212> PRT
[4890] <213> Amborella trichopoda
[4891] <400> 110
[4892] Met Thr Ala Gly Asp Gly Ser Ile Arg Ser Ile Leu Asp Lys Pro Leu
[4893] 1 5 10 15
[4894] Glu Glu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[4895] 20 25 30
[4896] Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[4897] 35 40 45
[4898] Tyr Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Gly Leu Leu Glu Gly
[4899] 50 55 60
[4900] Lys Pro Cys Asp Asp Asn Ser Asp Val Phe Ser His Arg Ser Pro Ile
[4901] 65 70 75 80
[4902] Thr Val Ile Pro Asn Val Gly Ser Met Arg Glu Lys Glu Lys Ala Val
[4903] 85 90 95
[4904] Asn Ile Ala Asp Pro Glu Ile Ser Gly Ser His Gln Pro Asn Phe Arg
[4905] 100 105 110
[4906] Arg Glu Ile His Glu Thr Thr Arg Glu Arg Ala Leu Pro Ala Ser Asp
[4907] 115 120 125
[4908] Trp Pro Pro Ser Gln Glu Pro Val Ser Gln Met Thr Ile Phe Tyr Ala
[4909] 130 135 140
[4910] Gly Ala Val Asn Val Tyr Asn Asp Ile Pro Glu Asp Lys Val Gln Ala
[4911] 145 150 155 160
[4912] Ile Ile Tyr Leu Ala Gly Lys Ser Asp Ser Leu Gln Gln Thr Asn Val
[4913] 165 170 175

[4914] Ile Arg Thr Gly Pro Asp Gln Cys Ile Ala Ser Ala Ala Ser Pro Ser
[4915] 180 185 190
[4916] Leu Asn Asp Leu His Ser Arg Arg Ile His Pro Thr Ser Asn Ile Thr
[4917] 195 200 205
[4918] Thr Ser Gln Ser Leu Arg Val Ala Thr Ser Leu Pro Val Gly Pro His
[4919] 210 215 220
[4920] Ser Glu Val Pro Lys Thr Arg Lys Thr Ser Val Gln Arg Phe Leu Glu
[4921] 225 230 235 240
[4922] Lys Arg Lys Asp Arg Gly Arg Leu Lys Gly Thr Leu Ala Ser Gly Gly
[4923] 245 250 255
[4924] Ser Ser Lys Arg Gly Ser Ser Cys Leu Glu Leu Tyr Ala Thr Ser Arg
[4925] 260 265 270
[4926] Leu Lys Ser Glu Gly Val Ala Thr Thr Thr Thr Gln Ser Asn Met Asn
[4927] 275 280 285
[4928] Asn Val Val Val Ser Pro Ser Asn Pro Arg Met Pro Leu Asn Pro Gly
[4929] 290 295 300
[4930] Ser Cys Ser Trp Val Glu Asn Gly Ser Gly Gly Gly Ser Ala Lys Gly
[4931] 305 310 315 320
[4932] Glu Leu Arg Gly His Pro Phe Glu Gly Lys Pro Ile Pro Asn Pro Leu
[4933] 325 330 335
[4934] Leu Gly Leu Asp Ser Thr Arg Thr Gly His His His His His His Gly
[4935] 340 345 350
[4936] Ser
[4937] <210> 111
[4938] <211> 335
[4939] <212> PRT
[4940] <213> Musa acuminata
[4941] <400> 111
[4942] Met Asn Pro Gly Glu Thr Thr Pro Pro Ser Pro Leu Asp Lys Pro Leu
[4943] 1 5 10 15
[4944] Ala Glu Leu Thr Glu Glu Asp Ile Ala Gln Leu Thr Arg Glu Asp Cys
[4945] 20 25 30
[4946] Arg Arg Phe Leu Lys Ala Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[4947] 35 40 45
[4948] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Gly
[4949] 50 55 60
[4950] Arg Pro Gly Cys Asp Asp Cys Pro Ala Gly Gly Gly Ile Leu Gln Lys
[4951] 65 70 75 80
[4952] Leu Leu Thr Ser Ser Pro Ser Glu Pro Leu Ser Pro Pro Gln Asp Ser

[4953] 85 90 95
[4954] Pro Pro Pro Ala Pro Lys Glu Gly Gly Ser Gly Ser Gln Pro Leu Ala
[4955] 100 105 110
[4956] Lys Glu Pro Ser Pro Tyr Arg Arg Arg Asp Pro Ile Pro Pro Pro Tyr
[4957] 115 120 125
[4958] Ser Ala Gly Asn Pro Thr Cys Gln Thr Pro Ile Ala Gly Ala Asp Leu
[4959] 130 135 140
[4960] Pro His Pro Pro Glu Lys Arg Cys Pro Ser Pro Arg Leu Thr Ala Glu
[4961] 145 150 155 160
[4962] Val Pro Val Gly Gln Met Thr Ile Phe Tyr Asp Gly Met Val Asn Val
[4963] 165 170 175
[4964] Tyr Asp Gly Val Ser Ala Asp Gln Ala Arg Ser Ile Met Glu Leu Ala
[4965] 180 185 190
[4966] Ala Ser Pro Val Cys Phe Asp Asp Pro Thr Gly Ala Phe Ser Pro Ala
[4967] 195 200 205
[4968] Arg Pro Pro Ala Phe Arg Phe Pro Pro Gly Leu Pro Arg Pro Ala Pro
[4969] 210 215 220
[4970] Val Pro Thr Ala Pro Ser Phe Val Gly Thr Phe Pro Ile Ser Pro Ala
[4971] 225 230 235 240
[4972] Gly Lys Arg Cys Tyr Ser Tyr Cys Ser Phe Arg Ser Ser Val Ser Leu
[4973] 245 250 255
[4974] Leu Thr Thr Thr Glu Gly Pro Thr Ser Arg Lys Ala Ser Leu Gln Arg
[4975] 260 265 270
[4976] Tyr Leu Glu Lys Arg Lys Asp Arg Tyr Gly His Leu Pro Thr Glu Ser
[4977] 275 280 285
[4978] Ile Leu Leu Val Ser Gly Ser Gly Gly Gly Ser Ala Lys Gly Glu Leu
[4979] 290 295 300
[4980] Arg Gly His Pro Phe Glu Gly Lys Pro Ile Pro Asn Pro Leu Leu Gly
[4981] 305 310 315 320
[4982] Leu Asp Ser Thr Arg Thr Gly His His His His His His Gly Ser
[4983] 325 330 335
[4984] <210> 112
[4985] <211> 264
[4986] <212> PRT
[4987] <213> Picea sitchensis
[4988] <400> 112
[4989] Met Arg Gly Gly Glu Arg Ala Pro Gly Ser Arg Pro Ser Leu Asp Lys
[4990] 1 5 10 15
[4991] Pro Leu Glu Glu Leu Thr Glu Glu Asp Ile Phe Gln Leu Thr Arg Glu

[4992] 20 25 30
[4993] Asp Cys Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp
[4994] 35 40 45
[4995] Asn Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ser Leu Phe
[4996] 50 55 60
[4997] Glu Ser Lys Pro Asn Gln Gln Ser Lys Lys Pro Ser Lys His Lys Pro
[4998] 65 70 75 80
[4999] Ala Thr Leu Gln Phe Glu Thr Ala Arg Asp Ser Thr Phe Ala Gln Ser
[5000] 85 90 95
[5001] Ser Val Ser Gln Glu Gln Ser Leu Gly Phe Ser Trp Ser Lys Glu Val
[5002] 100 105 110
[5003] Leu Asp Lys Gly Thr Ala Glu Arg Gln Arg Leu Cys Ser Asp Ser Gln
[5004] 115 120 125
[5005] Glu Ala His Glu Ile Pro Arg Leu Gly Ser Lys Pro Pro Gln Ser Asn
[5006] 130 135 140
[5007] Thr Glu Gly Lys Arg Cys Ala His Asp Gly His Gly Arg Lys Ser Ala
[5008] 145 150 155 160
[5009] Gln Pro Leu Val Arg Leu Pro Ala Asn Phe Lys Asn Asp Cys Ser Asn
[5010] 165 170 175
[5011] Arg Gln Ser Ser His Thr Ser Glu Ser Gln Pro Asp Thr Leu Leu Arg
[5012] 180 185 190
[5013] Ser Asp Ser Phe Gln Gln Pro Thr Ala Gln Leu Thr Ile Phe Tyr Ala
[5014] 195 200 205
[5015] Gly Met Val Asn Val Tyr Asp Asp Val Pro Leu Asp Lys Ala Gly Ser
[5016] 210 215 220
[5017] Gly Gly Gly Ser Ala Lys Gly Glu Leu Arg Gly His Pro Phe Glu Gly
[5018] 225 230 235 240
[5019] Lys Pro Ile Pro Asn Pro Leu Leu Gly Leu Asp Ser Thr Arg Thr Gly
[5020] 245 250 255
[5021] His His His His His His Gly Ser
[5022] 260
[5023] <210> 113
[5024] <211> 276
[5025] <212> PRT
[5026] <213> Selaginella moellendorffii
[5027] <400> 113
[5028] Met Ser Ser Met Val Asp Phe Leu Gly Ile Glu Glu Lys Val Ser Thr
[5029] 1 5 10 15
[5030] Ser Val Ser Ala Glu Arg Leu Lys Lys Leu Glu Glu Leu Thr Asp Glu

[5031] 20 25 30
[5032] Asp Val Met Gln Leu Thr Arg Glu Asp Cys Arg Arg Tyr Leu Lys Glu
[5033] 35 40 45
[5034] Lys Gly Met Arg Arg Pro Ser Trp Asn Lys Ala Gln Ala Val Gln Gln
[5035] 50 55 60
[5036] Leu Leu Ser Leu Lys Ser Leu Cys Asp Pro Ser Pro Ala Ser Ser Gly
[5037] 65 70 75 80
[5038] Ala Ala Lys Arg Ser Pro Ser Pro Pro Leu Asp Glu Ala Pro Ala Lys
[5039] 85 90 95
[5040] Lys Pro Met Ala Met Thr Ser Ile Asp Leu Lys Ala Ala Ala Ala Val
[5041] 100 105 110
[5042] Asp Ala Ala Asn Leu Thr Met Phe Tyr Asp Gly Ala Val Ser Val Phe
[5043] 115 120 125
[5044] Asp Asp Val Ser Pro Asp Lys Ala Ser Leu Phe Pro Leu Ala Tyr Ala
[5045] 130 135 140
[5046] Ile Met Leu Leu Ala Gly Asn Val Lys Ser Trp Pro Ser Ile Asn Val
[5047] 145 150 155 160
[5048] Ala Ala Asn Thr Asn Lys Val Val Ile Ser Ser Tyr Glu Leu Pro Gln
[5049] 165 170 175
[5050] Ala Arg Lys Ala Ser Leu Gln Arg Phe Leu Gln Arg Arg Arg Glu Lys
[5051] 180 185 190
[5052] Thr Ala Lys Glu Ala Ala Ser Lys Gly Asn Ser Asn Lys Ser Pro Cys
[5053] 195 200 205
[5054] His Gly Glu Ser Ser Gly Lys His Ala Ser Asp Ala Thr Asp Pro Ala
[5055] 210 215 220
[5056] Thr Ser Pro Leu Leu Thr Glu Val Ser Ser Gly Ser Gly Gly Gly Ser
[5057] 225 230 235 240
[5058] Ala Lys Gly Glu Leu Arg Gly His Pro Phe Glu Gly Lys Pro Ile Pro
[5059] 245 250 255
[5060] Asn Pro Leu Leu Gly Leu Asp Ser Thr Arg Thr Gly His His His His
[5061] 260 265 270
[5062] His His Gly Ser
[5063] 275
[5064] <210> 114
[5065] <211> 315
[5066] <212> PRT
[5067] <213> Arabidopsis thaliana
[5068] <400> 114
[5069] Met Asp Val Gly Val Ser Pro Ala Lys Ser Ile Leu Ala Lys Pro Leu

[5070] 1 5 10 15

[5071] Lys Leu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys

[5072] 20 25 30

[5073] Arg Lys Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn Lys

[5074] 35 40 45

[5075] Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ala Leu Tyr Glu Pro

[5076] 50 55 60

[5077] Gly Asp Asp Ser Gly Ala Gly Ile Phe Arg Lys Ile Leu Val Ser Gln

[5078] 65 70 75 80

[5079] Pro Val Asn Pro Pro Arg Val Thr Thr Thr Leu Ile Glu Pro Ser Asn

[5080] 85 90 95

[5081] Glu Leu Glu Ala Cys Gly Arg Val Ser Tyr Pro Glu Asp Asn Gly Ala

[5082] 100 105 110

[5083] Cys His Arg Met Asp Ser Pro Arg Ser Ala Glu Phe Ser Gly Gly Ser

[5084] 115 120 125

[5085] Gly His Phe Val Ser Glu Lys Asp Gly His Lys Thr Thr Ile Ser Pro

[5086] 130 135 140

[5087] Arg Ser Pro Ala Glu Thr Ser Glu Leu Val Gly Gln Met Thr Ile Phe

[5088] 145 150 155 160

[5089] Tyr Ser Gly Lys Val Asn Val Tyr Asp Gly Ile Pro Pro Glu Lys Ala

[5090] 165 170 175

[5091] Arg Ser Ile Met His Phe Ala Ala Asn Pro Ile Asp Leu Pro Glu Asn

[5092] 180 185 190

[5093] Gly Ile Phe Ala Ser Ser Arg Met Ile Ser Lys Leu Ile Ser Lys Glu

[5094] 195 200 205

[5095] Lys Met Met Glu Leu Pro Gln Lys Gly Leu Glu Lys Ala Asn Ser Ser

[5096] 210 215 220

[5097] Arg Asp Ser Gly Met Glu Gly Gln Ala Asn Arg Lys Val Ser Leu Gln

[5098] 225 230 235 240

[5099] Arg Tyr Arg Glu Lys Arg Lys Asp Arg Lys Phe Ser Lys Ala Lys Lys

[5100] 245 250 255

[5101] Cys Pro Gly Val Ala Ser Ser Ser Leu Glu Met Phe Leu Asn Cys Gln

[5102] 260 265 270

[5103] Pro Arg Met Lys Ala Ala Tyr Ser Gln Asn Leu Gly Cys Thr Gly Ser

[5104] 275 280 285

[5105] Pro Leu His Ser Gln Ser Pro Glu Ser Gln Thr Lys Ser Pro Asn Leu

[5106] 290 295 300

[5107] Ser Val Asp Leu Asn Ser Glu Gly Ile Gly Ser

[5108] 305 310 315

[5109] <210> 115

[5110] <211> 340

[5111] <212> PRT

[5112] <213> Trifolium repens

[5113] <400> 115

[5114] Met Asn Gly Gly Ser Thr Val Ser Phe Arg Ser Ile Leu Asp Lys Pro

[5115] 1 5 10 15

[5116] Leu Asn Gln Leu Thr Glu Asp Asp Ile Ser Gln Leu Thr Arg Glu Asp

[5117] 20 25 30

[5118] Cys Arg Arg Phe Leu Lys Asp Lys Gly Met Arg Arg Pro Ser Trp Asn

[5119] 35 40 45

[5120] Lys Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu

[5121] 50 55 60

[5122] Pro Thr Asp Asp Asp Leu Pro Ala Pro Val Gly Val Ser Ser Ala Ile

[5123] 65 70 75 80

[5124] His His His His His His His Pro Gln Pro Pro Gln Arg Asn Leu Asn

[5125] 85 90 95

[5126] Glu Ala Pro Val Lys Gly Ser Asp Leu Asp Asp Thr Gly Phe His Thr

[5127] 100 105 110

[5128] Ala Glu Asp Leu Asn Lys Ser Thr Ser Thr Ala Val Glu Ile Pro Thr

[5129] 115 120 125

[5130] Glu Thr Asn Asp Ala Asn Val Val Lys Ser Ser Gly Gly Cys Val Ala

[5131] 130 135 140

[5132] Ser Gly Ser Phe Gly Gln Met Thr Ile Phe Tyr Cys Gly Lys Val Asn

[5133] 145 150 155 160

[5134] Val Tyr Asp Gly Val Ser Pro Asp Lys Ala Arg Ser Ile Met Gln Leu

[5135] 165 170 175

[5136] Ala Ala Cys Pro Ser Ser Phe Pro Gln Asp Asn Leu Leu Asn Lys Asn

[5137] 180 185 190

[5138] Ala Ala Val Trp Ala Ser Pro Cys Asn Ile Pro Ile Asp Lys Asp Val

[5139] 195 200 205

[5140] Leu Phe Pro Asn Asp Thr Ala Ile Leu Gln Val Ala Gln Thr Asp Lys

[5141] 210 215 220

[5142] Met Val Glu Tyr Pro Leu Gln Tyr Arg Glu Lys Gly Ser Ile Ala Arg

[5143] 225 230 235 240

[5144] Asp Ala Asp Val Glu Gly Gln Ala Ser Arg Asn Ala Ser Leu Gln Arg

[5145] 245 250 255

[5146] Tyr Arg Glu Lys Arg Lys Asp Arg Gly Arg Ser Lys Gly Asn Lys Leu

[5147] 260 265 270

[5148] Thr Gly Ile Thr Ser Ser Asn Phe Glu Met Tyr Leu Asn Leu Pro Val
[5149] 275 280 285
[5150] Lys Leu His Ala Ser Asn Gly Asn Ser Ser Arg Ser Ser Thr Asp Ser
[5151] 290 295 300
[5152] Pro Pro Gln Pro Arg Leu Pro Leu Val Ser Gly Gly Ser Ala Glu Asn
[5153] 305 310 315 320
[5154] Gln Pro Lys Val Thr Leu Pro Ile Asp Leu Asn Asp Lys Asp Val Gln
[5155] 325 330 335
[5156] Glu Cys Gly Ser
[5157] 340
[5158] <210> 116
[5159] <211> 313
[5160] <212> PRT
[5161] <213> Amborella trichopoda
[5162] <400> 116
[5163] Met Thr Ala Gly Asp Gly Ser Ile Arg Ser Ile Leu Asp Lys Pro Leu
[5164] 1 5 10 15
[5165] Glu Glu Leu Thr Glu Glu Asp Ile Ser Gln Leu Thr Arg Glu Asp Cys
[5166] 20 25 30
[5167] Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[5168] 35 40 45
[5169] Tyr Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Gly Leu Leu Glu Gly
[5170] 50 55 60
[5171] Lys Pro Cys Asp Asp Asn Ser Asp Val Phe Ser His Arg Ser Pro Ile
[5172] 65 70 75 80
[5173] Thr Val Ile Pro Asn Val Gly Ser Met Arg Glu Lys Glu Lys Ala Val
[5174] 85 90 95
[5175] Asn Ile Ala Asp Pro Glu Ile Ser Gly Ser His Gln Pro Asn Phe Arg
[5176] 100 105 110
[5177] Arg Glu Ile His Glu Thr Thr Arg Glu Arg Ala Leu Pro Ala Ser Asp
[5178] 115 120 125
[5179] Trp Pro Pro Ser Gln Glu Pro Val Ser Gln Met Thr Ile Phe Tyr Ala
[5180] 130 135 140
[5181] Gly Ala Val Asn Val Tyr Asn Asp Ile Pro Glu Asp Lys Val Gln Ala
[5182] 145 150 155 160
[5183] Ile Ile Tyr Leu Ala Gly Lys Ser Asp Ser Leu Gln Gln Thr Asn Val
[5184] 165 170 175
[5185] Ile Arg Thr Gly Pro Asp Gln Cys Ile Ala Ser Ala Ala Ser Pro Ser
[5186] 180 185 190

[5187] Leu Asn Asp Leu His Ser Arg Arg Ile His Pro Thr Ser Asn Ile Thr
[5188] 195 200 205
[5189] Thr Ser Gln Ser Leu Arg Val Ala Thr Ser Leu Pro Val Gly Pro His
[5190] 210 215 220
[5191] Ser Glu Val Pro Lys Thr Arg Lys Thr Ser Val Gln Arg Phe Leu Glu
[5192] 225 230 235 240
[5193] Lys Arg Lys Asp Arg Gly Arg Leu Lys Gly Thr Leu Ala Ser Gly Gly
[5194] 245 250 255
[5195] Ser Ser Lys Arg Gly Ser Ser Cys Leu Glu Leu Tyr Ala Thr Ser Arg
[5196] 260 265 270
[5197] Leu Lys Ser Glu Gly Val Ala Thr Thr Thr Thr Gln Ser Asn Met Asn
[5198] 275 280 285
[5199] Asn Val Val Val Ser Pro Ser Asn Pro Arg Met Pro Leu Asn Pro Gly
[5200] 290 295 300
[5201] Ser Cys Ser Trp Val Glu Asn Gly Ser
[5202] 305 310
[5203] <210> 117
[5204] <211> 295
[5205] <212> PRT
[5206] <213> Musa acuminata
[5207] <400> 117
[5208] Met Asn Pro Gly Glu Thr Thr Pro Pro Ser Pro Leu Asp Lys Pro Leu
[5209] 1 5 10 15
[5210] Ala Glu Leu Thr Glu Glu Asp Ile Ala Gln Leu Thr Arg Glu Asp Cys
[5211] 20 25 30
[5212] Arg Arg Phe Leu Lys Ala Lys Gly Met Arg Arg Pro Ser Trp Asn Lys
[5213] 35 40 45
[5214] Ser Gln Ala Ile Gln Gln Val Ile Ser Leu Lys Ala Leu Leu Glu Gly
[5215] 50 55 60
[5216] Arg Pro Gly Cys Asp Asp Cys Pro Ala Gly Gly Gly Ile Leu Gln Lys
[5217] 65 70 75 80
[5218] Leu Leu Thr Ser Ser Pro Ser Glu Pro Leu Ser Pro Pro Gln Asp Ser
[5219] 85 90 95
[5220] Pro Pro Pro Ala Pro Lys Glu Gly Gly Ser Gly Ser Gln Pro Leu Ala
[5221] 100 105 110
[5222] Lys Glu Pro Ser Pro Tyr Arg Arg Arg Asp Pro Ile Pro Pro Pro Tyr
[5223] 115 120 125
[5224] Ser Ala Gly Asn Pro Thr Cys Gln Thr Pro Ile Ala Gly Ala Asp Leu
[5225] 130 135 140

[5226] Pro His Pro Pro Glu Lys Arg Cys Pro Ser Pro Arg Leu Thr Ala Glu
[5227] 145 150 155 160
[5228] Val Pro Val Gly Gln Met Thr Ile Phe Tyr Asp Gly Met Val Asn Val
[5229] 165 170 175
[5230] Tyr Asp Gly Val Ser Ala Asp Gln Ala Arg Ser Ile Met Glu Leu Ala
[5231] 180 185 190
[5232] Ala Ser Pro Val Cys Phe Asp Asp Pro Thr Gly Ala Phe Ser Pro Ala
[5233] 195 200 205
[5234] Arg Pro Pro Ala Phe Arg Phe Pro Pro Gly Leu Pro Arg Pro Ala Pro
[5235] 210 215 220
[5236] Val Pro Thr Ala Pro Ser Phe Val Gly Thr Phe Pro Ile Ser Pro Ala
[5237] 225 230 235 240
[5238] Gly Lys Arg Cys Tyr Ser Tyr Cys Ser Phe Arg Ser Ser Val Ser Leu
[5239] 245 250 255
[5240] Leu Thr Thr Thr Glu Gly Pro Thr Ser Arg Lys Ala Ser Leu Gln Arg
[5241] 260 265 270
[5242] Tyr Leu Glu Lys Arg Lys Asp Arg Tyr Gly His Leu Pro Thr Glu Ser
[5243] 275 280 285
[5244] Ile Leu Leu Val Ser Gly Ser
[5245] 290 295
[5246] <210> 118
[5247] <211> 224
[5248] <212> PRT
[5249] <213> Picea abies
[5250] <400> 118
[5251] Met Arg Gly Gly Glu Arg Ala Pro Gly Ser Arg Pro Ser Leu Asp Lys
[5252] 1 5 10 15
[5253] Pro Leu Glu Glu Leu Thr Glu Glu Asp Ile Phe Gln Leu Thr Arg Glu
[5254] 20 25 30
[5255] Asp Cys Arg Arg Tyr Leu Lys Glu Lys Gly Met Arg Arg Pro Ser Trp
[5256] 35 40 45
[5257] Asn Lys Ser Gln Ala Ile Gln Gln Val Leu Ser Leu Lys Ser Leu Phe
[5258] 50 55 60
[5259] Glu Ser Lys Pro Asn Gln Gln Ser Lys Lys Pro Ser Lys His Lys Pro
[5260] 65 70 75 80
[5261] Ala Thr Leu Gln Phe Glu Thr Ala Arg Asp Ser Thr Phe Ala Gln Ser
[5262] 85 90 95
[5263] Ser Val Ser Gln Glu Gln Ser Leu Gly Phe Ser Trp Ser Lys Glu Val
[5264] 100 105 110

[5265] Leu Asp Lys Gly Thr Ala Glu Arg Gln Arg Leu Cys Ser Asp Ser Gln
[5266] 115 120 125
[5267] Glu Ala His Glu Ile Pro Arg Leu Gly Ser Lys Pro Pro Gln Ser Asn
[5268] 130 135 140
[5269] Thr Glu Gly Lys Arg Cys Ala His Asp Gly His Gly Arg Lys Ser Ala
[5270] 145 150 155 160
[5271] Gln Pro Leu Val Arg Leu Pro Ala Asn Phe Lys Asn Asp Cys Ser Asn
[5272] 165 170 175
[5273] Arg Gln Ser Ser His Thr Ser Glu Ser Gln Pro Asp Thr Leu Leu Arg
[5274] 180 185 190
[5275] Ser Asp Ser Phe Gln Gln Pro Thr Ala Gln Leu Thr Ile Phe Tyr Ala
[5276] 195 200 205
[5277] Gly Met Val Asn Val Tyr Asp Asp Val Pro Leu Asp Lys Ala Gly Ser
[5278] 210 215 220
[5279] <210> 119
[5280] <211> 236
[5281] <212> PRT
[5282] <213> Selaginella moellendorffii
[5283] <400> 119
[5284] Met Ser Ser Met Val Asp Phe Leu Gly Ile Glu Glu Lys Val Ser Thr
[5285] 1 5 10 15
[5286] Ser Val Ser Ala Glu Arg Leu Lys Lys Leu Glu Glu Leu Thr Asp Glu
[5287] 20 25 30
[5288] Asp Val Met Gln Leu Thr Arg Glu Asp Cys Arg Arg Tyr Leu Lys Glu
[5289] 35 40 45
[5290] Lys Gly Met Arg Arg Pro Ser Trp Asn Lys Ala Gln Ala Val Gln Gln
[5291] 50 55 60
[5292] Leu Leu Ser Leu Lys Ser Leu Cys Asp Pro Ser Pro Ala Ser Ser Gly
[5293] 65 70 75 80
[5294] Ala Ala Lys Arg Ser Pro Ser Pro Pro Leu Asp Glu Ala Pro Ala Lys
[5295] 85 90 95
[5296] Lys Pro Met Ala Met Thr Ser Ile Asp Leu Lys Ala Ala Ala Ala Val
[5297] 100 105 110
[5298] Asp Ala Ala Asn Leu Thr Met Phe Tyr Asp Gly Ala Val Ser Val Phe
[5299] 115 120 125
[5300] Asp Asp Val Ser Pro Asp Lys Ala Ser Leu Phe Pro Leu Ala Tyr Ala
[5301] 130 135 140
[5302] Ile Met Leu Leu Ala Gly Asn Val Lys Ser Trp Pro Ser Ile Asn Val
[5303] 145 150 155 160

[5304] Ala Ala Asn Thr Asn Lys Val Val Ile Ser Ser Tyr Glu Leu Pro Gln
[5305] 165 170 175
[5306] Ala Arg Lys Ala Ser Leu Gln Arg Phe Leu Gln Arg Arg Arg Glu Lys
[5307] 180 185 190
[5308] Thr Ala Lys Glu Ala Ala Ser Lys Gly Asn Ser Asn Lys Ser Pro Cys
[5309] 195 200 205
[5310] His Gly Glu Ser Ser Gly Lys His Ala Ser Asp Ala Thr Asp Pro Ala
[5311] 210 215 220
[5312] Thr Ser Pro Leu Leu Thr Glu Val Ser Ser Gly Ser
[5313] 225 230 235
[5314] <210> 120
[5315] <211> 1226
[5316] <212> DNA
[5317] <213> Arabidopsis thaliana
[5318] <400> 120
[5319] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatgg acgtgggcgt gtccccggcc 60
[5320] aagtctattc tcgccaagcc ggtaatgttc agctctgcta tagtgtgtgc caccctgctt 120
[5321] gtttaataat gcgttctctt cgtttttatg atatcttatt cttccagctc aagctcctca 180
[5322] ccgaggagga catctctcag ctcacaagag aggactgccg caagttcctc aaggacaagg 240
[5323] gcatgagaag gccgtcctgg aacaagtccc aggccatcca acaagtgctc agcctcaagg 300
[5324] ccctctacga gccaggcgac gactccggcg ctggcatttt cagaaagatc ctcgtgtccc 360
[5325] agccggtgaa cccaccaagg gtgaccacca cactcatcga gccgtccaat gagcttgagg 420
[5326] cctgcggcag agtttcctac ccagaggata atggcgcctg ccacaggatg gattctccaa 480
[5327] ggtctgctga gttctctggc ggctccggcc atttcgtgtc tgagaaggat ggccacaaga 540
[5328] ccaccatctc cccaagatcc ccagccgaga catctgagct tgtgggccag atgaccatct 600
[5329] tctactccgg caaggtgaac gtgtacgacg gcatcccacc agagaaggcc cgctccatta 660
[5330] tgcacttcgc cgccaaccca atcgacctcc cagagaatgg catcttcgcc tccagccgca 720
[5331] tgatctccaa gctcatctcc aaggagaaga tgatggagct gccgcagaag ggcctcgaga 780
[5332] aggctaattc ctctcgcgac tccggcatgg agggccaggc taatagaaag gtgtccctcc 840
[5333] aacgctaccg cgagaagagg aaggaccgca agttctccaa ggccaagaag tgcccaggcg 900
[5334] ttgcctcttc cagcctcgag atgttcctca actgccagcc gagaatgaag gccgcctact 960
[5335] cccaaaatct cggctgcaca ggctccccac tccattctca gtccccagag tctcagacca 1020
[5336] agtccccgaa cctctccgtg gaccttaact ccgagggcat cggatccggc ggcggctctg 1080
[5337] ctaagggcga gctgaggggc cacccgttcg agggcaagcc aattccaaat ccactcctcg 1140
[5338] gcctcgactc taccaggacc ggccaccatc accatcacca cggatcctaa tgaagaccca 1200
[5339] gctttcttgt acaaagtggt caggct 1226
[5340] <210> 121
[5341] <211> 1295
[5342] <212> DNA

[5343] <213> Trifolium repens

[5344] <400> 121

[5345] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga acggcggctc caccgtgtcc 60

[5346] ttcagatcca tcctcgataa gccggtaatg ttcagctctg ctatagtgtg tgccaccctg 120

[5347] cttgtttaat aatgcgttct cttcgttttt atgatatctt attcttccag ctcaaccagc 180

[5348] tcaccgagga cgacatctct cagctcacac gcgaggattg ccgccgcttc cttaaggaca 240

[5349] agggcatgag aaggccgtcc tggaacaagt cccaggccat ccagcaagtg atctccctca 300

[5350] aggctctcct cgagccgacc gacgatgatc tcccagcccc ggtgggcgtg tcatctgcca 360

[5351] tccaccatca ccaccaccac catcctcaac cgccacagag gaacctcaat gaggccccag 420

[5352] ttaagggctc cgacctcgac gataccggct tccatacagc cgaggacctc aacaagtcta 480

[5353] cctccaccgc cgtcgagatc ccgaccgaga caaacgatgc caacgtggtg aagtctagcg 540

[5354] gcggctgcgt ggcctccggc tccttcggcc agatgaccat tttctactgc ggcaaggtga 600

[5355] acgtgtacga cggcgtgtca ccagataagg cccgctccat tatgcaactc gccgcttgcc 660

[5356] catctagctt cccgcaggat aacctcctca acaagaacgc cgccgtttgg gcctccccat 720

[5357] gcaacatccc gatcgacaag gatgtcctct tcccgaacga caccgccatt ctccaggtgg 780

[5358] cccagaccga taagatggtc gagtacccac tccagtaccg cgagaagggc tctattgcca 840

[5359] gggatgccga tgttgagggc caggcctcca gaaatgcttc cctgcaacgc tatcgcgaga 900

[5360] agcgcaagga cagaggcaga tccaagggca acaagctgac cggcatcacc tcctccaact 960

[5361] tcgagatgta cctcaacctc ccggtgaagc tccatgcctc caacggcaac tcctctaggt 1020

[5362] cctccacaga ttccccaccg cagccaagac tcccactcgt gtccggcggc tctgccgaga 1080

[5363] accagccaaa ggtgaccctc ccgatcgacc tcaacgacaa ggacgtgcaa gagtgcggat 1140

[5364] ccggcggcgg ctctgctaag ggcgagctga ggggccaccc gttcgagggc aagccaattc 1200

[5365] caaatccact cctcggcctc gactctacca ggaccggcca ccatcaccat caccacggat 1260

[5366] cctaatgaag acccagcttt cttgtacaaa gtggt 1295

[5367] <210> 122

[5368] <211> 1214

[5369] <212> DNA

[5370] <213> Amborella trichopoda

[5371] <400> 122

[5372] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga cagccggcga cggctccatc 60

[5373] cgctctatcc ttgacaagcc ggtaatgttc agctctgcta tagtgtgtgc caccctgctt 120

[5374] gtttaataat gcgttctctt cgtttttatg atatcttatt cttccagctc gaggagctga 180

[5375] ccgaggagga catctctcaa ctcacccgcg aggattgccg ccgctacctc aaggagaagg 240

[5376] ggatgcgcag gccatcctgg aacaagtacc aggccatcca gcaggtcctc agcctcaagg 300

[5377] gcctcctcga gggcaagcca tgcgacgata actccgacgt gttctcccac aggtccccga 360

[5378] tcaccgtgat cccaaatgtt ggctccatgc gcgagaagga gaaggccgtc aatatcgccg 420

[5379] acccagagat ctccggctcc caccagccga actttaggcg cgagatccat gagacaacac 480

[5380] gcgagagagc cctcccagct tctgattggc cgccgtcaca agagccagtg tcccagatga 540

[5381] ccatcttcta cgctggcgcc gtgaacgtgt acaacgacat cccagaggac aaggtgcagg 600

[5382] ccatcatcta cctcgccggc aagtctgatt ccctccagca gaccaacgtg atcaggaccg 660
[5383] gcccagatca gtgcattgct tctgctgctt ccccgtccct caacgacctc cattctaggc 720
[5384] gcatccaccc gacctccaac atcaccacat ctcagtctct ccgcgtggcc acatctctcc 780
[5385] cagtgggccc gcactccgag gtgccaaaga ccagaaagac aagcgtgcag cgcttcctcg 840
[5386] agaagaggaa ggataggggc aggctcaagg gcacactcgc ctccggcggc tcctccaaga 900
[5387] ggggctcctc ctgcctcgag ctttacgcta catcccgcct taagtctgag ggcgtggcca 960
[5388] ccacaaccac ccagtccaac atgaacaacg tggtggtgtc cccgtccaac ccgaggatgc 1020
[5389] cgctcaaccc gggctcctgc tcctgggtcg agaacggatc cggcggcggc tctgctaagg 1080
[5390] gcgagctgag gggccacccg ttcgagggca agccaattcc aaatccactc ctcggcctcg 1140
[5391] actctaccag gaccggccac catcaccatc accacggatc ctaatgaaga cccagctttc 1200
[5392] ttgtacaaag tggt 1214
[5393] <210> 123
[5394] <211> 1160
[5395] <212> DNA
[5396] <213> Musa acuminata
[5397] <400> 123
[5398] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga acccgggcga gacaaccccg 60
[5399] ccatctccac ttgacaagcc ggtaatgttc agctctgcta tagtgtgtgc caccctgctt 120
[5400] gtttaataat gcgttctctt cgtttttatg atatcttatt cttccagctc gccgagctga 180
[5401] ccgaggagga tattgctcaa ctcacccgcg aggactgccg cagattcctt aaggctaagg 240
[5402] gcatgcgcag gccgtcctgg aacaagtctc aggccatcca gcaagtgatc tccctcaagg 300
[5403] ctctcctcga gggcaggcca ggttgcgatg actgcccggc cggcggcggc atcctccaga 360
[5404] agctcctcac ctccagcccg tctgagccgc tctccccgcc acaggactcc ccgccaccgg 420
[5405] ctccaaaaga gggcggctcc ggctcccagc ctctcgccaa ggagccgtcc ccgtacaggc 480
[5406] gcagggaccc gatcccgcca ccgtactccg ccggcaaccc gacctgccag accccgatcg 540
[5407] ctggcgccga cctcccgcac ccgccagaga agaggtgccc gtccccgagg ctcacagccg 600
[5408] aggtgccggt gggccagatg accattttct acgacggcat ggtgaacgtg tacgacggcg 660
[5409] tgtcagctga tcaggcccgc tccattatgg agcttgccgc ttctccggtg tgcttcgatg 720
[5410] atccaacagg cgcctttagc ccagccagac caccagcttt cagattccca ccaggcctcc 780
[5411] caaggccagc tccggtgccg accgccccgt ccttcgtggg caccttcccg atctccccag 840
[5412] ccggcaagag atgctactcc tactgctcct tccgctcctc cgtgtcactc ctcacaacaa 900
[5413] ccgagggccc aacatctagg aaggcctcac tccaacgcta cctcgagaag cgcaaggaca 960
[5414] ggtacggcca tctcccaacc gagtccattc tcctcgtgtc cggatccggc ggcggctctg 1020
[5415] ctaagggcga gctgaggggc cacccgttcg agggcaagcc aattccaaat ccactcctcg 1080
[5416] gcctcgactc taccaggacc ggccaccatc accatcacca cggatcctaa tgaagaccca 1140
[5417] gctttcttgt acaaagtggt 1160
[5418] <210> 124
[5419] <211> 947
[5420] <212> DNA

[5421] <213> Picea abies

[5422] <400> 124

[5423] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga gaggcggcga gagagcccca 60

[5424] ggctccaggc cggtaatgtt cagctctgct atagtgtgtg ccaccctgct tgtttaataa 120

[5425] tgcgttctct tcgtttttat gatatcttat tcttccagtc cctcgacaag ccgctcgagg 180

[5426] agcttaccga ggaggacatc ttccagctca cccgcgagga ttgcaggcgc tacctcaagg 240

[5427] agaaggggat gagaaggccg tcctggaaca agtcccaggc catccaacaa gtgctcagcc 300

[5428] tcaagagcct cttcgagtcc aagccgaacc agcagtccaa gaagccgtcc aagcacaagc 360

[5429] cagccaccct ccaattcgag acagccaggg attctacctt cgcccagtcc tccgtgtccc 420

[5430] aagagcaatc tctcggcttc tcctggtcca aggaggtgct cgataagggc acagccgaga 480

[5431] gacaaaggct ctgctccgat tcccaagagg cccacgagat tccaaggctc ggctctaagc 540

[5432] caccgcagtc caacaccgag ggcaagagat gcgctcatga tggccatggg agaaagtccg 600

[5433] cccaaccact cgttaggctc ccggccaact tcaagaacga ctgctccaac aggcagtcct 660

[5434] cccacacatc tgagtcccag ccagataccc tcctccgctc cgattctttc cagcagccaa 720

[5435] cagcccagct caccatcttc tacgccggca tggtgaacgt gtacgacgac gtgccactcg 780

[5436] acaaggccgg atccggcggc ggctctgcta agggcgagct gaggggccac ccgttcgagg 840

[5437] gcaagccaat tccaaatcca ctcctcggcc tcgactctac caggaccggc caccatcacc 900

[5438] atcaccacgg atcctaatga agacccagct ttcttgtaca aagtggt 947

[5439] <210> 125

[5440] <211> 897

[5441] <212> DNA

[5442] <213> Selaginella moellendorffii

[5443] <400> 125

[5444] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatgt cctcgatggt ggacttcctc 60

[5445] ggcatcgagg agaaggtgtc cacctccgtg tccgccgaga ggctcaagaa gctcgaggag 120

[5446] ctgaccgacg aggacgtgat gcaactcaca cgcgaggatt gccgccgcta ccttaaggag 180

[5447] aaggggatga gaaggccgtc ctggaacaag gcccaagccg tgcaacaact cctcagcctc 240

[5448] aagtccctct gcgatccatc tccggcctcc agcggagctg ccaagaggtc cccgtccccg 300

[5449] ccactcgacg aggccccagc caagaagccg atggccatga cctccatcga tctcaaggcc 360

[5450] gctgccgccg ttgatgccgc caatctcacc atgttctacg acggcgccgt gtccgtgttc 420

[5451] gatgatgtgt ctccagacaa ggcctccctc ttcccactcg cctacgccat tatgctcctc 480

[5452] gccggcaatg tgaagtcctg gccgtctatc aacgtggccg ccaacaccaa caaggtggtg 540

[5453] atctccagct acgagctgcc gcaagctaga aaggcttccc tccagcgctt ccttcagaga 600

[5454] aggcgcgaga agacagccaa ggaggccgct tctaagggca actccaacaa gtccccatgc 660

[5455] cacggcgagt ctagcggcaa gcacgcctct gatgctaccg atccagctac ctctccactc 720

[5456] ctcacagagg tgtcatccgg atccggcggc ggctctgcta agggcgagct gaggggccac 780

[5457] ccgttcgagg gcaagccaat tccaaatcca ctcctcggcc tcgactctac caggaccggc 840

[5458] caccatcacc atcaccacgg atcctaatga agacccagct ttcttgtaca aagtggt 897

[5459] <210> 126

[5460] <211> 1134

[5461] <212> DNA

[5462] <213> Arabidopsis thaliana

[5463] <400> 126

[5464] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatgg atgtgggagt gtctccagct 60

[5465] aagtctatcc ttgctaagcc tctcaagctc ctcaccgaag aggatatctc tcagctcact 120

[5466] agagaggatt gcagaaagtt cctcaaggat aagggaatga gaaggccatc ttggaacaag 180

[5467] tctcaggcta tccagcaggt tctcagtctc aaggctcttt acgagcctgg tgatgattct 240

[5468] ggtgctggaa tcttcagaaa gatcctcgtg tctcagcctg tgaaccctcc tagagttact 300

[5469] actactctca tcgagccttc taacgagctt gaggcttgcg gaagagtttc ttaccctgag 360

[5470] gataacggtg cttgccacag gatggattct ccaagatctg ctgagttctc tggtggatct 420

[5471] ggacacttcg tgtctgagaa ggatggacac aagactacta tctctccaag aagtcctgct 480

[5472] gagacttctg agcttgtggg acagatgacc atcttctact ctggaaaggt gaacgtgtac 540

[5473] gatggaatcc ctcctgagaa ggctagatct atcatgcact tcgctgctaa ccctatcgat 600

[5474] ctccctgaga acggaatctt cgcttcttct aggatgatct ctaagctcat ctctaaagaa 660

[5475] aagatgatgg aactccctca gaagggactc gagaaggcta actcttctag ggattctgga 720

[5476] atggaaggac aggctaacag aaaggtgtca ctccagaggt acagagagaa gaggaaggat 780

[5477] aggaagttct ctaaggctaa gaaatgccct ggtgtggctt cttcatctct cgagatgttc 840

[5478] cttaactgcc agcctaggat gaaggctgct tactctcaga acctcggatg tactggatct 900

[5479] ccactccatt ctcagtctcc agagtctcag accaagtctc ctaacctctc tgtggatctc 960

[5480] aactctgagg gaatcggatc cggtggtgga tctgctaagg gtgagcttag aggtcatcct 1020

[5481] ttcgagggta agcctatccc taaccctctt ctcggtctcg attctactag aactggtcat 1080

[5482] catcatcacc atcacggatc ctaatgaaga cccagctttc ttgtacaaag tggt 1134

[5483] <210> 127

[5484] <211> 1209

[5485] <212> DNA

[5486] <213> Trifolium repens

[5487] <400> 127

[5488] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga acggtggatc taccgtgtct 60

[5489] ttcagatcta tcctcgataa gcctctcaac cagctcaccg aggatgatat ctctcagctc 120

[5490] actagagagg attgcagaag attcctcaag gataagggaa tgagaaggcc atcttggaac 180

[5491] aagtctcagg ctatccagca ggttatctct ctcaaggctc tcctcgagcc taccgatgat 240

[5492] gatcttcctg ctcctgtggg agtgtcatct gctatccatc atcatcacca tcaccaccct 300

[5493] caacctccac agagaaatct taacgaggct cctgtgaagg gatctgatct cgatgatact 360

[5494] ggattccaca ccgctgagga tctcaacaag tctacttcta ccgctgttga gatccctacc 420

[5495] gagactaacg atgctaacgt ggtgaagtca tctggtggat gtgtggcttc tggatctttc 480

[5496] ggacagatga ccatcttcta ctgcggaaag gtgaacgtgt acgatggtgt gtctcctgat 540

[5497] aaggctagat ctatcatgca gctcgctgct tgcccttcta gtttccctca ggataacctc 600

[5498] ctcaacaaga acgctgctgt ttgggcttct ccttgcaaca tccctattga taaggatgtt 660

[5499] ctcttcccta acgataccgc tatcctccaa gtggctcaga ccgataagat ggttgagtac 720
[5500] cctctccagt acagagagaa gggatctatc gctagggatg ctgatgttga gggacaggct 780
[5501] tctagaaacg cttcactcca gaggtacagg gaaaagagga aggatagggg aaggtctaag 840
[5502] ggaaacaagc tcaccggaat cacctcttct aacttcgaga tgtacctcaa cctccctgtg 900
[5503] aagctccatg cttctaacgg aaactcttct aggtctagta ccgattcacc tcctcagcct 960
[5504] agactccctc ttgtttctgg tggatctgct gagaaccagc ctaaggttac actccctatc 1020
[5505] gatctcaacg ataaggatgt gcaagagtgc ggatccggtg gtggatctgc taagggtgag 1080
[5506] cttagaggtc atcctttcga gggtaagcct atccctaacc ctcttctcgg tctcgattct 1140
[5507] actagaactg gtcatcatca tcaccatcac ggatcctaat gaagacccag ctttcttgta 1200
[5508] caaagtggt 1209
[5509] <210> 128
[5510] <211> 1128
[5511] <212> DNA
[5512] <213> Amborella trichopoda
[5513] <400> 128
[5514] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga ccgctggtga tggatctatc 60
[5515] agatctatcc tcgataagcc tctcgaggaa ctcaccgaag aggatatctc tcagctcacc 120
[5516] agagaggatt gcagaagata cctcaaagaa aagggtatga gaaggccatc ttggaacaag 180
[5517] taccaggcta tccagcaggt tctcagtctt aagggacttc tcgagggaaa gccttgtgat 240
[5518] gataactctg atgtgttctc tcacaggtca cctatcaccg tgatccctaa cgtgggatct 300
[5519] atgagagaga aagagaaggc tgttaacatt gctgatcctg agatctctgg ttctcaccag 360
[5520] cctaacttta gaagagagat ccacgagact accagagaga gagctttgcc tgcttctgat 420
[5521] tggcctccat ctcaagagcc tgtgtctcag atgaccatct tctacgctgg tgctgtgaac 480
[5522] gtgtacaacg atatccctga ggataaggtg caggctatca tctacctcgc tggaaagtct 540
[5523] gattctctcc agcagaccaa cgtgatcaga actggacctg atcagtgtat cgcttctgct 600
[5524] gcttctcctt ctctcaacga tctccactct agaagaatcc accctacctc taacatcacc 660
[5525] acctctcagt ctctcagagt ggctacttct cttcctgtgg gacctcattc tgaggtgcca 720
[5526] aagactagaa agacctctgt gcagagattc ctcgagaaga ggaaggatag aggtaggctc 780
[5527] aagggaactc ttgcttctgg tggatcttct aagaggggat cttcttgcct cgagctttac 840
[5528] gctacctcta ggcttaagtc tgagggtgtg gctactacta ccacccagtc taacatgaac 900
[5529] aacgtggtgg tgtctccatc taaccctagg atgcctctta accctggatc ttgctcttgg 960
[5530] gttgagaacg gatccggtgg tggatctgct aagggtgagc ttagaggtca tcctttcgag 1020
[5531] ggtaagccta tccctaaccc tcttctcggt ctcgattcta ctagaactgg tcatcatcat 1080
[5532] caccatcacg gatcctaatg aagacccagc tttcttgtac aaagtggt 1128
[5533] <210> 129
[5534] <211> 1074
[5535] <212> DNA
[5536] <213> Musa acuminata
[5537] <400> 129

[5538] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga accctggtga gactacccct 60
[5539] ccatctccac ttgataagcc tctcgctgag cttaccgaag aggatatcgc tcagctcact 120
[5540] agagaggatt gcagaagatt cctcaaggct aagggaatga gaaggccatc ttggaacaag 180
[5541] tctcaggcta tccagcaggt tatctctctc aaggctctcc ttgaaggtag gcctggatgt 240
[5542] gatgattgtc ctgctggtgg tggaatcctc cagaagctcc ttacttctag tccttctgag 300
[5543] cctctcagtc ctcctcaaga ttctccacct cctgctccta aagagggagg atctggatct 360
[5544] cagcctcttg ctaaagagcc ttctccatac agaagaagag atcctatccc tcctccttac 420
[5545] tctgctggaa accctacttg tcagactcct atcgctggtg ctgatcttcc tcatcctcct 480
[5546] gagaagagat gcccatctcc tagacttact gctgaggttc cagtgggaca gatgaccatc 540
[5547] ttctacgatg gaatggtgaa cgtgtacgat ggtgtgtctg ctgatcaggc tagatctatt 600
[5548] atggaactcg ctgcttctcc tgtgtgcttc gatgatccta ctggtgcttt cagtcctgct 660
[5549] agacctcctg cttttagatt ccctccagga cttcctagac ctgctcctgt tcctactgct 720
[5550] ccttctttcg ttggaacctt ccctatctct cctgctggaa agaggtgcta ctcttactgc 780
[5551] tctttcaggt ctagtgtgtc tctcttgact accactgagg gacctacctc tagaaaggct 840
[5552] tcactccaga gatacctcga gaagaggaag gatagatacg gacacctccc taccgagtct 900
[5553] atccttctcg tttctggatc cggtggtgga tctgctaagg gtgagcttag aggtcatcct 960
[5554] ttcgagggta agcctatccc taaccctctt ctcggtctcg attctactag aactggtcat 1020
[5555] catcatcacc atcacggatc ctaatgaaga cccagctttc ttgtacaaag tggt 1074
[5556] <210> 130
[5557] <211> 1233
[5558] <212> DNA
[5559] <213> Picea abies
[5560] <400> 130
[5561] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatga ggggtggtgg tggtgctgat 60
[5562] agacttcctg ctagagctaa ccttgagaag cctctcgagg atctctctca cgaggatatc 120
[5563] atgcagctca ccagagagga ttgcagaaga tacctcatcg agaagggaat gagaaggcca 180
[5564] tcttggaaca agtctcaggc tatccagcag gttctcagtc tcaagaagct tttcgagtct 240
[5565] ggacctaacg atgagaagag gtctgctgct accaacaggc ctaatcctga tgagaacctc 300
[5566] aaagaggctg cttctgtttc tctcttgtac ggatctcagc ctgagtctcc ttctgtggtg 360
[5567] ttcgcttcta aggattctga taccttcaac ctcgagtggc tcgctaagac tgagcttcct 420
[5568] gttcttgctt ctcagcctag gcatatcgct cagcagaacg tgttcctctc ttcactttct 480
[5569] gctcagcagt ctggtgctca gctcaccatt ttctactctg gaaacgtgaa cgtgtacgat 540
[5570] gatgtgcctg ctgagaaggc tcaagagatc atgcttcttg ctggatctgg aaactaccct 600
[5571] ccttcatcta cttgccagtc taccagaaac acccagcaga acgctgttag agctgcttac 660
[5572] ccttctaacc ctaccaacac ccctttcatc catggtgttg gaccacctct tgctaccgtg 720
[5573] gcttcttctt ctgtgatgtc atctcctatc cacaaagagt ctccaatcac cagaaaggct 780
[5574] tcactccaga gattcctcga gaagaggaag gataggtcta ggggtaagct tggtgctcct 840
[5575] actatctcta agaaacctct cctcatggga atgttcatgc acccttctat cgtgcacaga 900
[5576] cagtactgga ctgataccgc taagaggaag tctggaaagc ctgatatccc tgcttctatc 960

[5577] tctcctacca gacctcctca cactcctaga aggacatctt ctgatgagca gctctctgct 1020
[5578] agacacgcta ggggagatat ttctgctcaa ggtggaagtc tccacaactc taacggatcc 1080
[5579] ggtggtggat ctgctaaggg tgagcttaga ggtcatcctt tcgagggtaa gcctatccct 1140
[5580] aaccctcttc tcggtctcga ttctactaga actggtcatc atcatcacca tcacggatcc 1200
[5581] taatgaagac ccagctttct tgtacaaagt ggt 1233
[5582] <210> 131
[5583] <211> 835
[5584] <212> DNA
[5585] <213> Selaginella moellendorffii
[5586] <400> 131
[5587] acaagtttgt acaaaaaagc aggctcaaaa aaaaccatgt caagtatggt ggatttcctc 60
[5588] ggaatcgaag agaaggtttc aacctctgtg tctgctgaga ggcttaagaa gctcgaggaa 120
[5589] ctcactgatg aggatgtgat gcagctcacc agagaggatt gcagaagata cctcaaagaa 180
[5590] aagggtatga gaaggccatc ttggaacaag gctcaagctg ttcagcagct cctcagtctt 240
[5591] aagtctctct gcgatccttc accagcttca tctggtgctg ctaagagatc tccttcacct 300
[5592] cctttggatg aggctcctgc taagaaacct atggctatga cctctatcga tctcaaggct 360
[5593] gctgctgctg ttgatgctgc taacctcacc atgttctacg atggtgctgt gtctgtgttc 420
[5594] gatgatgtgt ctcctgataa ggcttctctc ttcccactcg cttacgctat catgcttctc 480
[5595] gctggaaacg tgaagtcttg gccttctatc aacgtggcag ctaacaccaa caaggtggtg 540
[5596] atctcttctt acgaactccc tcaggctagg aaggcttcac ttcagagatt cctccagaga 600
[5597] agaagggaaa agaccgctaa agaggctgct tctaagggaa actctaacaa gtctccttgc 660
[5598] cacggtgagt ctagtggaaa gcacgcttct gatgctactg atcctgctac ttctccactc 720
[5599] ctcactgagg tgtcatctgg atccggtggt ggatctgcta agggtgagct tagaggtcat 780
[5600] cctttcgagg gtaagcctat ccctaaccct cttctcggtc tcgattctac tagaa 835
[5601] <210> 132
[5602] <211> 20
[5603] <212> DNA
[5604] <213> Artificial Sequence
[5605] <220>
[5606] <223> Consensus sequence
[5607] <400> 132
[5608] gatatgcgag acgcctatga 20
[5609] <210> 133
[5610] <211> 20
[5611] <212> DNA
[5612] <213> Artificial Sequence
[5613] <220>
[5614] <223> Consensus sequence
[5615] <400> 133

[5616] gagttccctt cagtgaacgt 20
[5617] <210> 134
[5618] <211> 26
[5619] <212> DNA
[5620] <213> Artificial Sequence
[5621] <220>
[5622] <223> Consensus sequence
[5623] <400> 134
[5624] gctggggcgt cggtttccac tatccg 26
[5625] <210> 135
[5626] <211> 27
[5627] <212> DNA
[5628] <213> Artificial Sequence
[5629] <220>
[5630] <223> Consensus sequence
[5631] <400> 135
[5632] cgcataacag cggtcattga ctggagc 27
[5633] <210> 136
[5634] <211> 20
[5635] <212> DNA
[5636] <213> Artificial Sequence
[5637] <220>
[5638] <223> Consensus sequence
[5639] <400> 136
[5640] ctgttgccgg tcttgcgatg 20
[5641] <210> 137
[5642] <211> 20
[5643] <212> DNA
[5644] <213> Artificial Sequence
[5645] <220>
[5646] <223> Consensus sequence
[5647] <400> 137
[5648] gtcacataga tgacaccgcg 20
[5649] <210> 138
[5650] <211> 24
[5651] <212> DNA
[5652] <213> Artificial Sequence
[5653] <220>
[5654] <223> Consensus sequence

[5655] <400> 138
[5656] ctcgtgcttt cagcttcgat gtag 24
[5657] <210> 139
[5658] <211> 26
[5659] <212> DNA
[5660] <213> Artificial Sequence
[5661] <220>
[5662] <223> Consensus sequence
[5663] <400> 139
[5664] gctggggcgt cggtttccac tatcgg 26
[5665] <210> 140
[5666] <211> 21
[5667] <212> DNA
[5668] <213> Artificial Sequence
[5669] <220>
[5670] <223> Consensus sequence
[5671] <400> 140
[5672] cacaggatgg attctccaag g 21
[5673] <210> 141
[5674] <211> 20
[5675] <212> DNA
[5676] <213> Artificial Sequence
[5677] <220>
[5678] <223> Consensus sequence
[5679] <400> 141
[5680] taaggtccac ggagaggttc 20

无油樟	LEELTEEDISQLTREDCRRYLKEKGMRRPSWNKYQAIQQVLSLKGL
挪威云杉	LEDLSHEDIMQLTREDCRRYLIEKGMRRPSWNKSQAIQQVLSLKKL
北美云杉	LEELTEEDIFQLTREDCRRYLKEKGMRRPSWNKSQAIQQVLSLKSL
紫萍	LSELTEEDIAQVTREDCRRFLKEKGMRRPSWNKSQAVQQVISLKAL
江南卷柏 PPD1	LEELTELDIRQLTREDCRRYLKERGMRRPSWNKAQAIQQVLSLRSL
江南卷柏 PPD2	LEELTDEDVMQLTREDCRRYLKEKGMRRPSWNKAQAVQQLLSLKSL
芭蕉属物种	LAELTEEDIAQLTREDCRRFLKAKGMRRPSWNKSQAIQQVISLKAL
海枣	LSLLTEEDIAQLTREDCRRFLKEKGMRRPSWNKSQAIQQVISLKAL
白蝴蝶兰	LNLLTEDDIAQITREECRRFLKDRGMRRPSWNKSQAIQQVISLKAL
烟草	LHLLTDDDISQLTREDCRRYLKEKGMRRPSWNKSQAIQQVISLKAL
番茄	LYLLTDDDISQLTREDCRRFLKAKGMRKPSWNKSQAIQQVISLKAL
马铃薯	LNQLTDDDISQLTREDCRRYLKQKGMRKPSWNKSQAIQQVISLKAL
洛矶山糜斗菜	LFQLTDEDISQLTREDCRKFLRDKGMRRPSWNKSQAIEQVISLKTL
毛果杨	LHQLTEDDISQVTREDCRRYLKEKGMRRPSWNKSQAIQQVISLKTL
大豆	LNQLTEDDISQLTREDCRRFLKEKGMRRPSWNKSQAIQQVISLKAL
蒺藜状苜蓿	LWQLTEDDISQLTREDCRRFLKDKGMRRPSWNKSQAIQQVISLKAL
白三叶草	LNQLTEDDISQLTREDCRRFLKDKGMRRPSWNKSQAIQQVISLKAL
拟南芥 PPD1	LKLLTEEDISQLTREDCRKFLKDKGMRRPSWNKSQAIQQVLSLKAL
拟南芥 PPD2	LKLLTEEDISQLTREDCRKFLKEKGMRRPSWNKSQAIQQVLSLKAL
雷蒙德氏棉	LSQLTEEDISQLTREDCRKFLKEKGMRRPSWNKSQAIQQVISFKAL
可可	LSQLTEEDISQLTREDCRKFLKEKGMRRPSWNKSQAIQQVISLKAL
克莱门氏柑桔	LSQLTEEDITQLTREDCRKFLKEKGMRRPSWNKSQAIQQVISLKAL
川桑	LNQLTEDDISQLTREDCRKYLKEKGMRRPSWNKSQAIQQVISLKAL
蓖麻	LTQLTEEDISQLTREDCRKYLKEKGMRRPSWNKSQAIQQVISLKAL
葡萄	LHELTEEDISQLTREDCRKYLKEKGMRRPSWNKSQAIQQVISLKSL
相同的氨基酸	* * * * *** ** * *** ***** ** * * *

图1

无油樟	TREDCRRYLKEKGMRRPSWNKYQAIQQ
挪威云杉	TREDCRRYLKEKGMRRPSWNKSQAIQQ
北美云杉	TREDCRRYLKEKGMRRPSWNKSQAIQQ
紫萍	TREDCRRFLKEKGMRRPSWNKSQAVQQ
江南卷柏 PPD1	TREDCRRYLKERGMRRPSWNKAQAIQQ
江南卷柏 PPD2	TREDCRRYLKEKGMRRPSWNKAQAVQQ
芭蕉属物种	TREDCRRFLKAKGMRRPSWNKSQAIQQ
海枣	TREDCRRFLKEKGMRRPSWNKSQAIQQ
白蝴蝶兰	TREECRRFLKDRGMRRPSWNKSQAIQQ
烟草	TREDCRRYLKEKGMRRPSWNKSQAIQQ
番茄	TREDCRRFLKAKGMRKPSWNKSQAIQQ
马铃薯	TREDCRRYLKQKGMRKPSWNKSQAIQQ
洛矶山耧斗菜	TREDCRKFLRDKGMRRPSWNKSQAIEQ
毛果杨	TREDCRRYLKEKGMRRPSWNKSQAIQQ
大豆	TREDCRRFLKEKGMRRPSWNKSQAIQQ
蒺藜状苜蓿	TREDCRRFLKDKGMRRPSWNKSQAIQQ
白三叶草	TREDCRRFLKDKGMRRPSWNKSQAIQQ
拟南芥 PPD1	TREDCRKFLKDKGMRRPSWNKSQAIQQ
拟南芥 PPD2	TREDCRKFLKEKGMRRPSWNKSQAIQQ
雷蒙德氏棉	TREDCRKFLKEKGMRRPSWNKSQAIQQ
可可	TREDCRKFLKEKGMRRPSWNKSQAIQQ
克莱门氏柑桔	TREDCRKFLKEKGMRRPSWNKSQAIQQ
川桑	TREDCRKYLKEKGMRRPSWNKSQAIQQ
蓖麻	TREDCRKYLKEKGMRRPSWNKSQAIQQ
葡萄	TREDCRKYLKEKGMRRPSWNKSQAIQQ
相同的氨基酸	*** ** * *** ***** ** *

图2

无油樟	TIFYAG
挪威云杉	TIFYAG
北美云杉	TIFYSG
紫萍	TIFYDG
江南卷柏 PPD1	TIFYSG
江南卷柏 PPD2	TMFYDG
芭蕉属物种	TIFYDG
海枣	TIFYDG
白蝴蝶兰	TIFYGG
烟草	TIFYCG
番茄	TIFYCG
马铃薯	TIFYRG
洛矶山耧斗菜	TIFYCG
毛果杨	TIFYCG
大豆	TIFYCG
蔓藤状苜蓿	TIFYCG
白三叶草	TIFYCG
拟南芥 PPD1	TIFYSG
拟南芥 PPD2	TIFYSG
雷蒙德氏棉	TIFYCG
可可	TIFYCG
克莱门氏柑桔	TIFYCG
川桑	TIFYCG
蓖麻	TIFYCG
葡萄	TIFYCG
相同的氨基酸	* ** *

图3

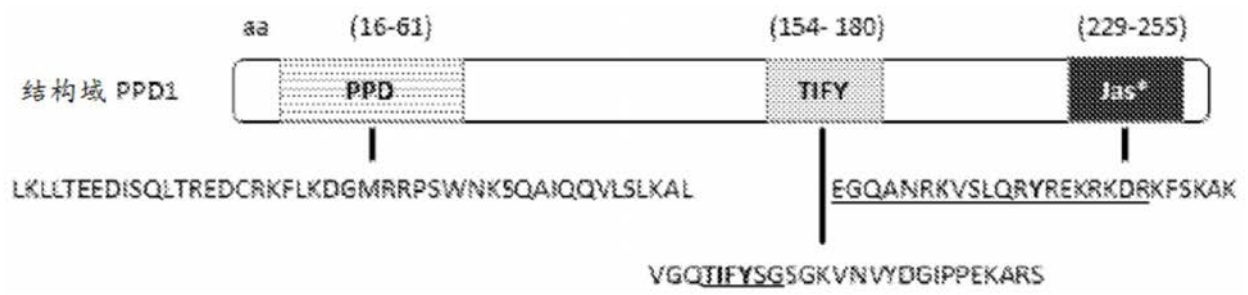
aa
(16-61)
(154- 180)
(229-255)
结构域 PPD1
PPD
TIFY
Jas*
LKLLTEEDISQLTREDCRKFLKDGMRRPSWNKSQAIQQVLSLKAL
EGQANRKVSLQRYREKRKDRKFSKAK
VGQTIFYSGSGKVNVYDGIPPEKARS

图4

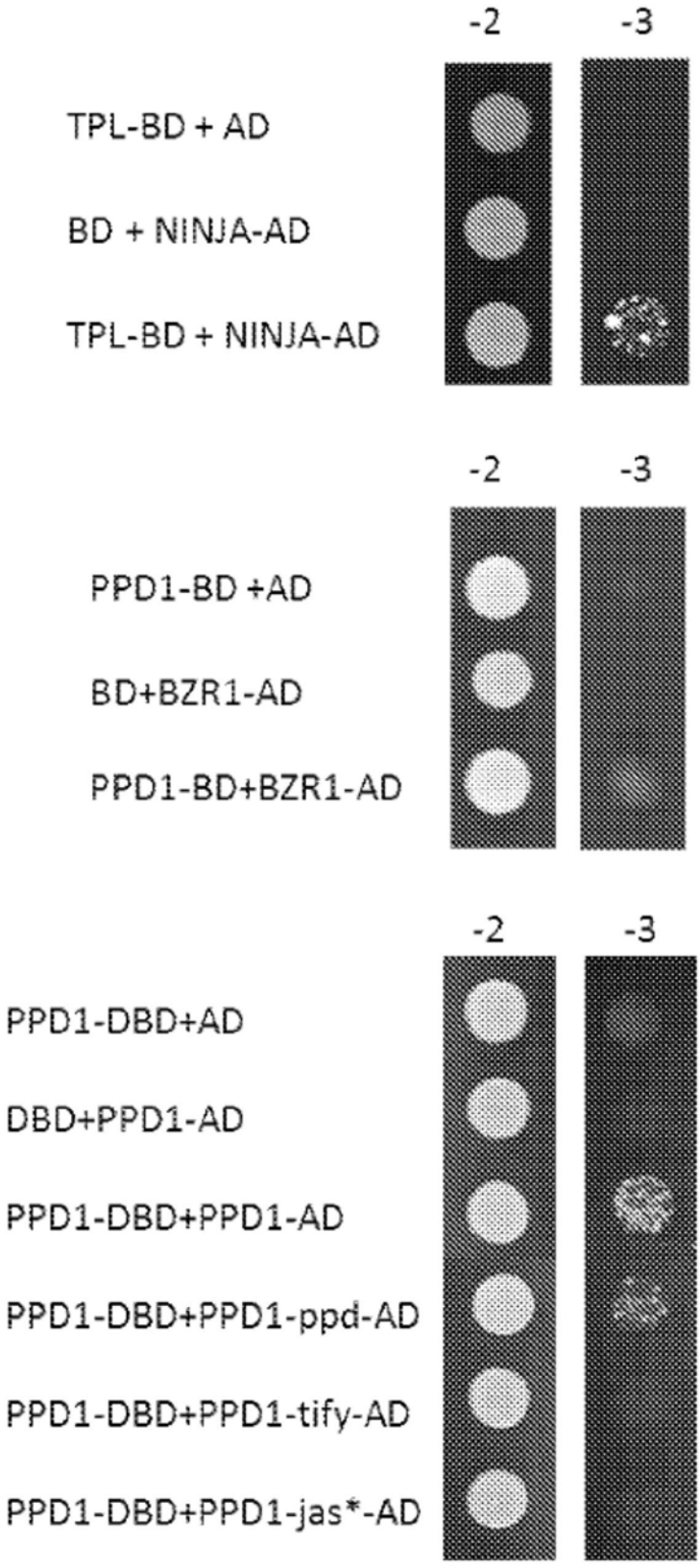
-2
-3
TPL-BD + AD
BD + NINJA-AD
TPL-BD + NINJA-AD
-2
-3
PPD1-BD +AD
BD+BZR1-AD
PPD1-BD+BZR1-AD
-2
-3
PPD1-DBD+AD
DBD+PPD1-AD
PPD1-DBD+PPD1-AD
PPD1-DBD+PPD1-ppd-AD
PPD1-DBD+PPD1-tify-AD
PPD1-DBD+PPD1-jas*-AD

图5

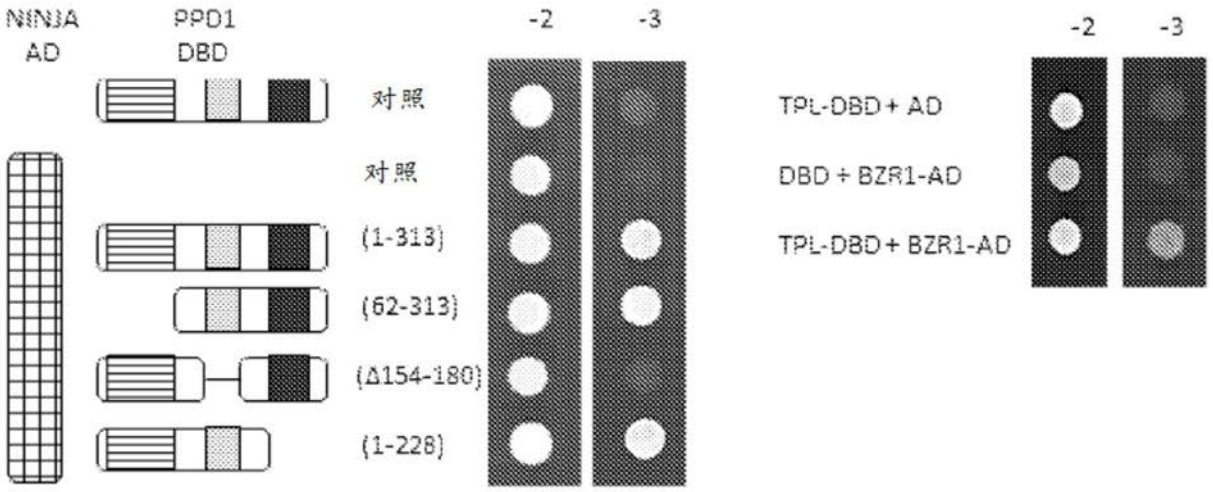
NINJA
AD
PPD1
DBD
对照
对照
(1-313)
(62-313)
(Δ154-180)
(1-228)
-2
-3
TPL-DBD + AD
DBD + BZR1-AD
TPL-DBD + BZR1-AD
-2
-3

图6

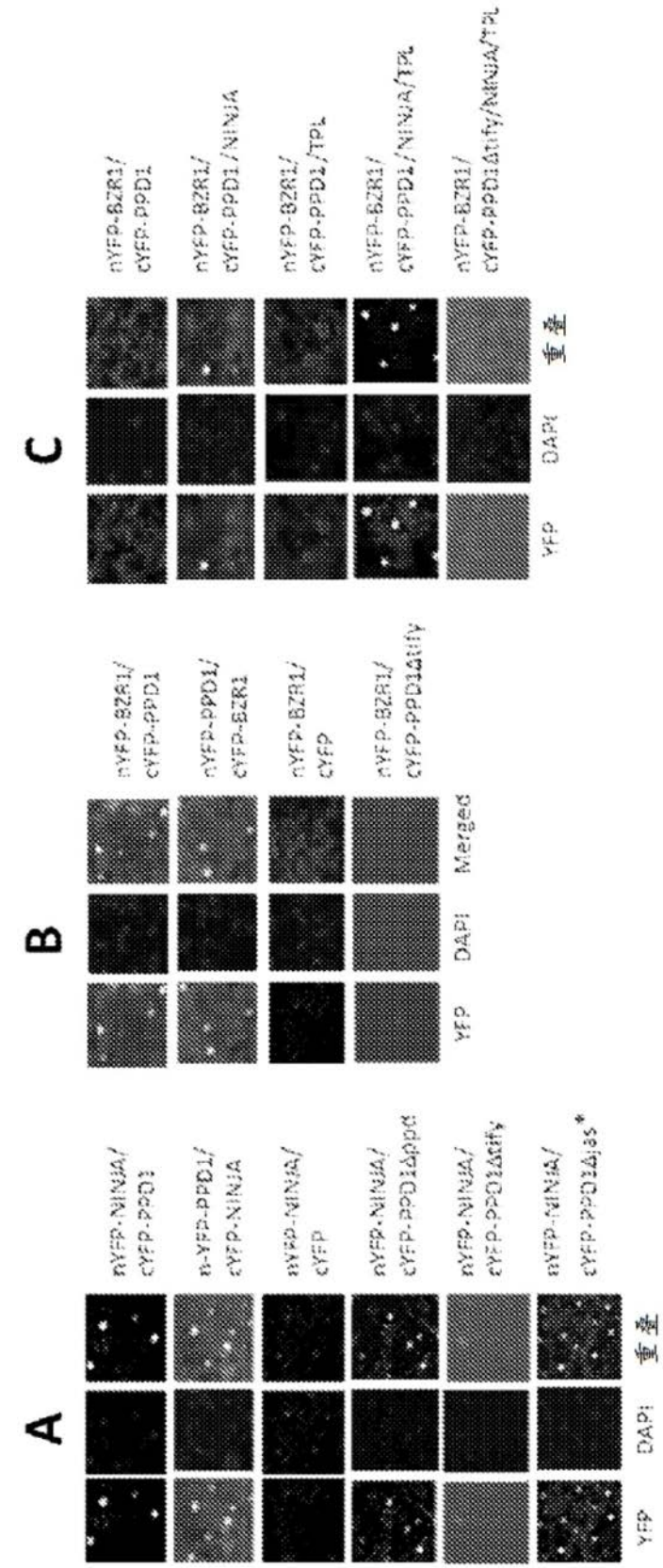

图7

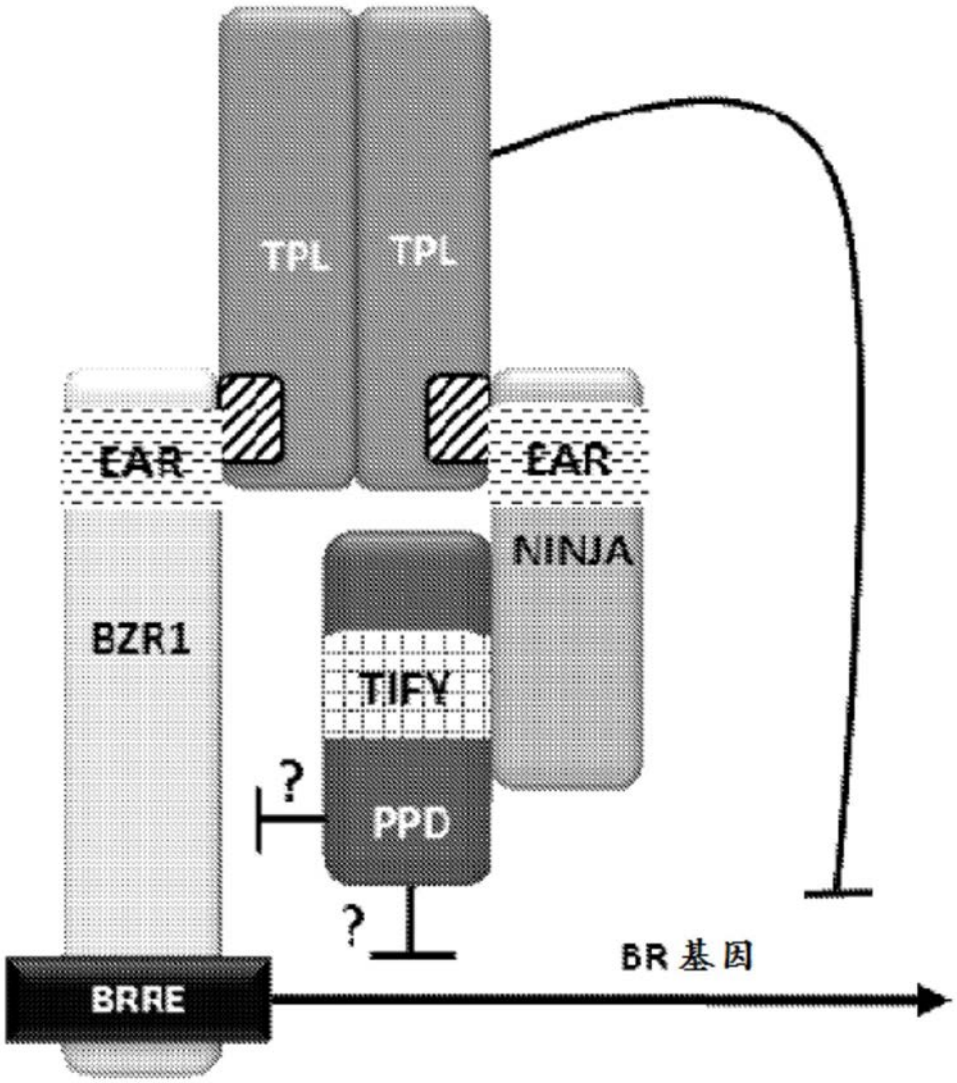

图8

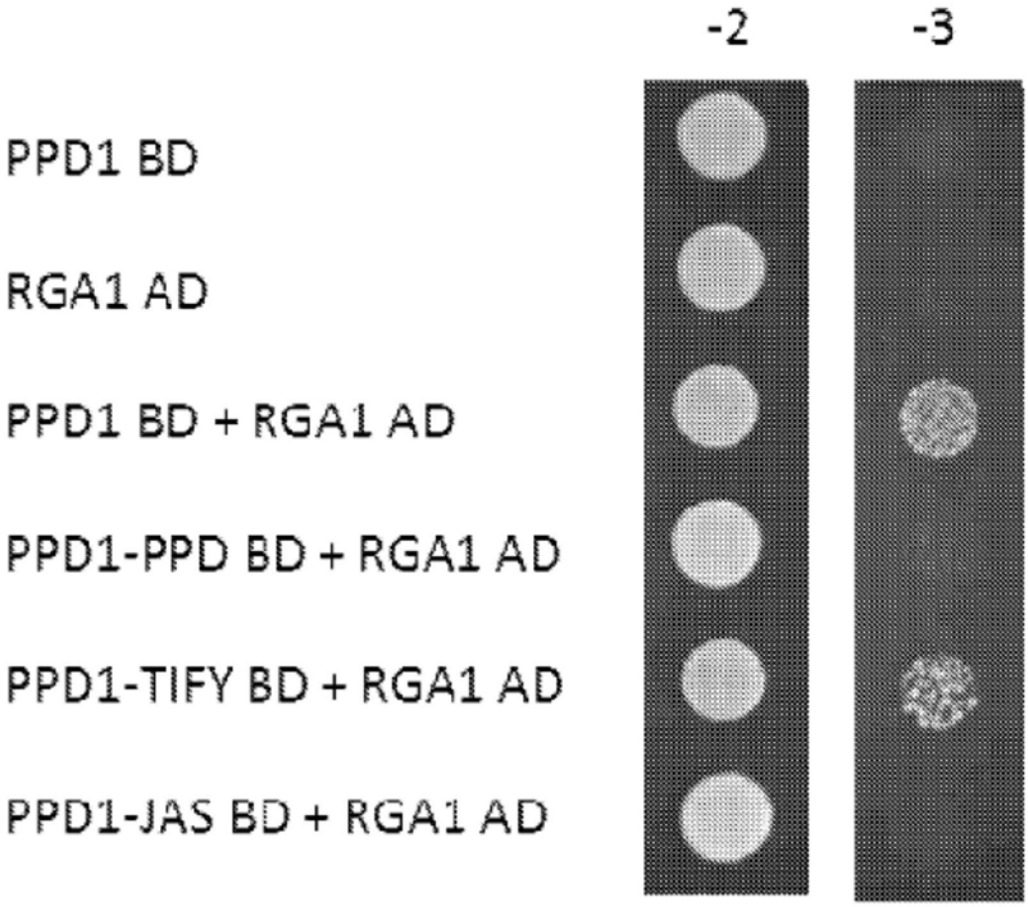
-2
-3
PPD1 BD
RGA1 AD
PPD1 BD + RGA1 AD
PPD1-PPD BD + RGA1 AD
PPD1-TIFY BD + RGA1 AD
PPD1-JAS BD + RGA1 AD

图9

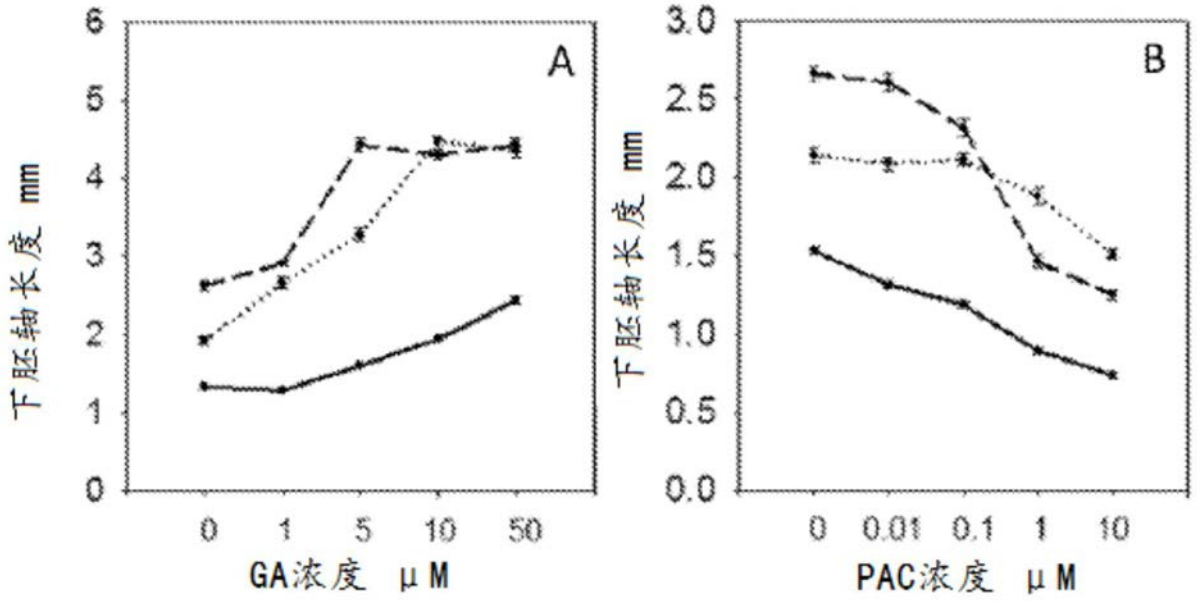
A
下胚轴长度 mm
0
1
2
3
4
5
6
0
1
5
10
50
GA浓度 μM
B
下胚轴长度 mm
0.0
0.5
1.0
1.5
2.0
2.5
3.0
0
0.01
0.1
1
10
PAC浓度 μM

图10

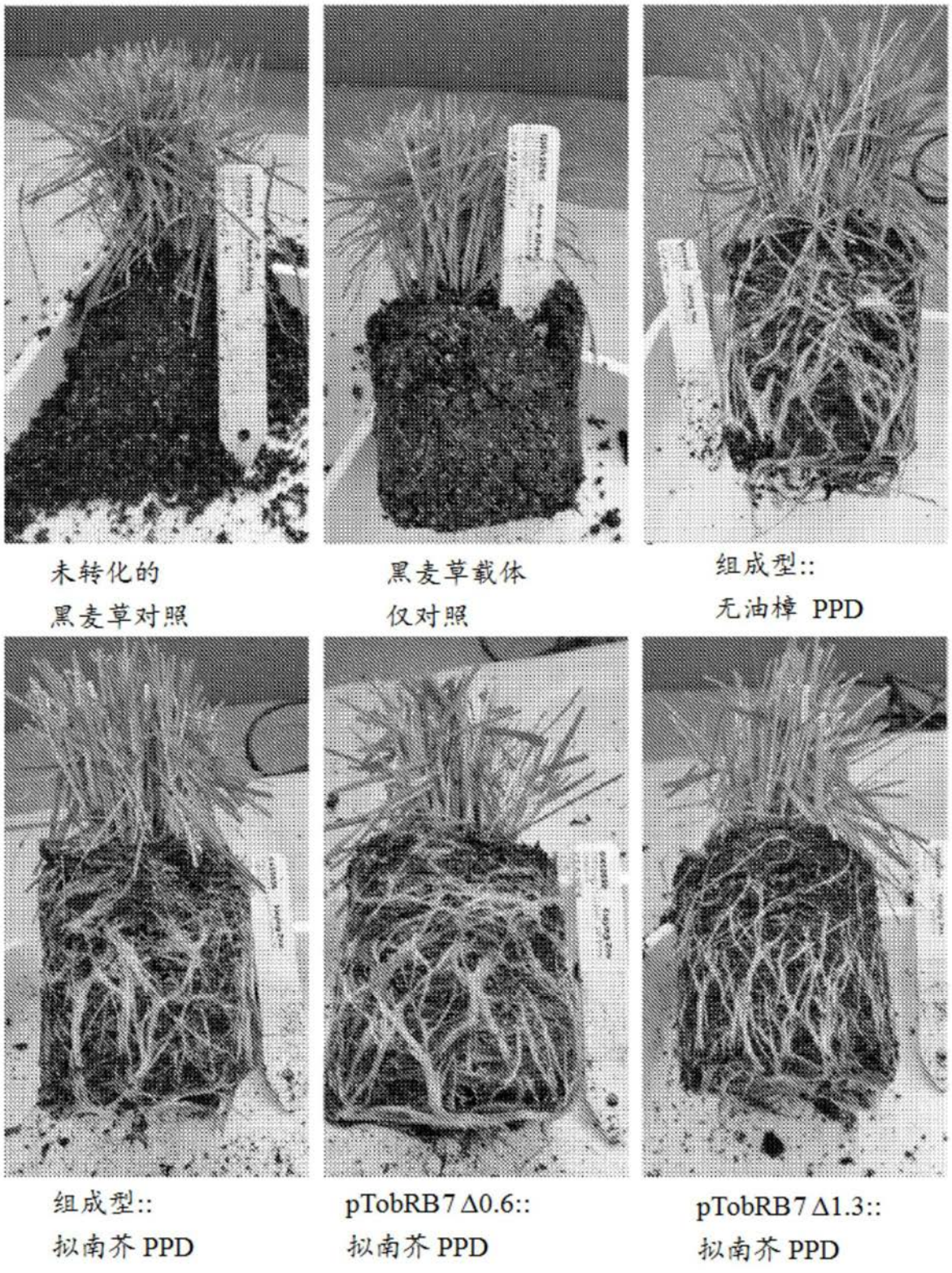
未转化的
黑麦草对照
黑麦草载体
仅对照
组成型::
无油樟 PPD
组成型::
拟南芥 PPD
pTobRB7Δ0.6::
拟南芥 PPD
pTobRB7Δ1.3::
拟南芥 PPD

图11

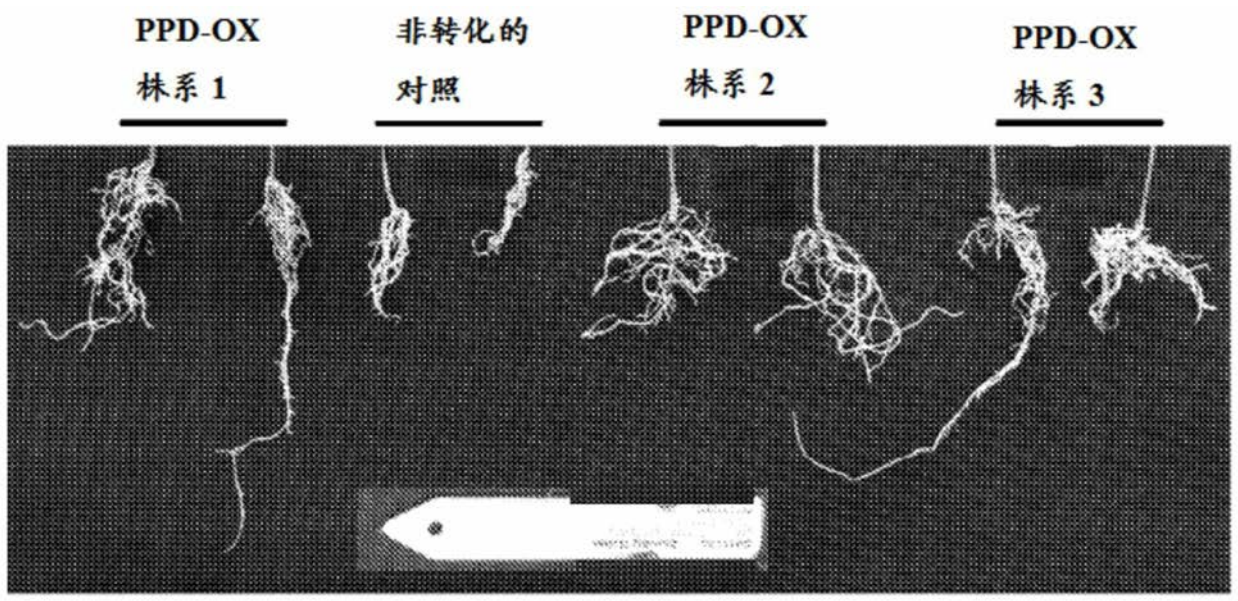

图12

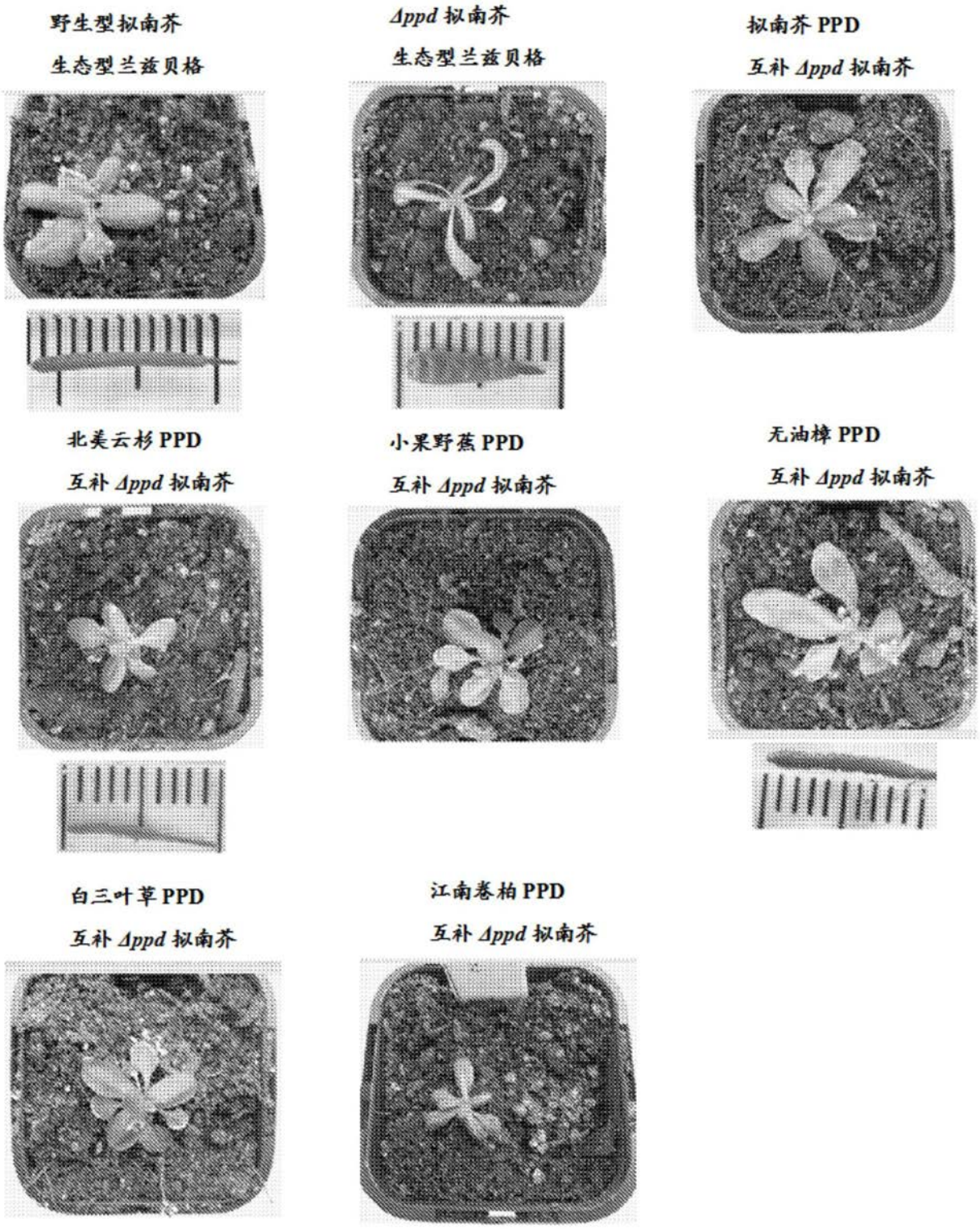
野生型拟南芥
生态型兰兹贝格
Δppd 拟南芥
生态型兰兹贝格
拟南芥 PPD
互补 Δppd 拟南芥
北美云杉 PPD
互补 Δppd 拟南芥
小果野蕉 PPD
互补 Δppd 拟南芥
无油樟 PPD
互补 Δppd 拟南芥
白三叶草 PPD
互补 Δppd 拟南芥
江南卷柏 PPD
互补 Δppd 拟南芥

图13