(19) DANMARK

(10) **DK/EP 3879986 T3**

(12) Oversættelse af europæisk patentskrift

Patent- og Varemærkestyrelsen

(51) Int.Cl.: ***A 01 N 63/30 (2020.01)*** ***A 01 P 3/00 (2006.01)*** ***A 01 P 21/00 (2006.01)*** ***C 12 N 1/14 (2006.01)*** ***C 12 R 1/00 (2006.01)***

(45) Oversættelsen bekendtgjort den: **2024-07-08**

(80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2024-05-01**

(86) Europæisk ansøgning nr.: **19813424.9**

(86) Europæisk indleveringsdag: **2019-11-15**

(87) Den europæiske ansøgnings publiceringsdag: **2021-09-22**

(86) International ansøgning nr.: **EP2019081536**

(87) Internationalt publikationsnr.: **WO2020099660**

(30) Prioritet: **2018-11-15 NZ 18748421**

(84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**

(73) Patenthaver: **RAGT 2N, Rue Emile Singla , Site de Bourran, 12000 Rodez, Frankrig**

(72) Opfinder: **SAINT-PIERRE, Laure, Rue Emile Singla Site de Bourran, 12000 Rodez, Frankrig**
GRAS, Marie-Christine, Rue Emile Singla Site de Bourran, 12000 Rodez, Frankrig

(74) Fuldmægtig i Danmark: **Zacco Denmark A/S, Arne Jacobsens Allé 15, 2300 København S, Danmark**

(54) Benævnelse: **Græsendofytter**

(56) Fremdragne publikationer:
US-B2- 7 976 857
INOKA K HETTIARACHCHIGE ET AL: "Phylogenomics of asexual Epichloe fungal endophytes forming associations with perennial ryegrass", BMC EVOLUTIONARY BIOLOGY, BIOMED CENTRAL LTD., LONDON, GB, vol. 15, no. 1, 24 April 2015 (2015-04-24) , page 72, XP021223714, ISSN: 1471-2148, DOI: 10.1186/S12862-015-0349-6
C. A. YOUNG ET AL: "Indole-Diterpene Biosynthetic Capability of Epichloe Endophytes as Predicted by ltm Gene Analysis", APPLIED AND ENVIRONMENTAL MICROBIOLOGY, vol. 75, no. 7, 30 January 2009 (2009-01-30), pages 2200-2211, XP055462320, US ISSN: 0099-2240, DOI: 10.1128/AEM.00953-08
CHRISTENSEN ET AL: "Infection of tall fescue and perennial ryegrass plants by combinations of different Neotyphodium endophytes", MYCOLOGICAL RESEARCH, ELSEVIER, GB, vol. 104, no. 8, 1 August 2000 (2000-08-01), pages 974-978, XP022454543, ISSN: 0953-7562, DOI: 10.1017/S0953756299002300
LR FLETCHER ET AL: "The occurrence of ryegrass staggers and heat stress in sheep grazing ryegrass-endophyte associations with diverse alkaloid profiles", NEW ZEALAND VETERINARY JOURNAL, vol. 65, no. 5, 25 May 2017 (2017-05-25), pages 232-241, XP055669974, NZ ISSN: 0048-0169, DOI: 10.1080/00480169.2017.1329673
Cooper Bruce ET AL: "The role of perennial ryegrass endophyte in Italian ryegrass", Advances in Plant Breeding, vol. 12, 1 January 2006 (2006-01-01), pages 526-530, XP93050342, DOI:

Fortsættes ...

https://doi.org/10.33584/rps.12.2006.3022
Hume D.E. ET AL: "The role of endophyte in determining the persistence and productivity of ryegrass, tall fescue and meadow fescue in Northland", Proceedings of the New Zealand Grassland Association, 1 January 2009 (2009-01-01), pages 145-150, XP093050346, ISSN: 0369-3902, DOI: 10.33584/jnzg.2009.71.2754
CARADUS JOHN ET AL: "EpichloÃ« endophytes - new perspectives on a key ingredient for resilient perennial grass pastures", NZGA: RESEARCH AND PRACTICE SERIES, vol. 17, 7 May 2021 (2021-05-07), XP093050347, ISSN: 0110-8581, DOI: 10.33584/rps.17.2021.3435 Retrieved from the Internet: URL:https://www.nzgajournal.org.nz/index.p hp/rps/article/download/3435/3089>

DESCRIPTION

Description

TECHNICAL FIELD

[0001] The present invention relates to grass endophytes. In particular the present invention relates to fungal endophytes and combinations thereof and uses therefor. More particularly the present invention relates to endophytes which form symbiotic combinations with *Lolium multiflorum, Lolium ×hybridum* and *Lolium perenne,* ryegrasses. The strains from the present invention are distinct strains of *Epichloë festucae* var. *lolii.*

BACKGROUND ART

[0002] Over the last couple of decades, a number of fungal endophytes have been identified in the art as being useful for conferring agronomically useful benefits to artificially infected host grasses [1]. Non-limiting examples include:
AR1, NEA2, NEA6, Edge orAR37.

[0003] Prior to the identification of specific fungal endophytes all pasture seed was sold and used with a "standard endophyte" or otherwise called "wild endophyte". This wild endophyte had an alkaloid profile which contained lolitrem, peramine and ergovaline. This alkaloid profile was known to confer insect resistance to *Lolium perenne* ryegrass but did unfortunately cause significant toxic effects in animals namely ryegrass staggers and/or heat stress [2, 3]. Hence, the focus on identifying specific endophytes which could confer ongoing specific insect resistance [4, 5, 6] and yet not cause or at least limit the toxic effects for animals.

[0004] The initial specific endophyte developed and released commercially by Agresearch was AR1 (an LpTG-1 strain in the taxonomic group *Epichloë festucae* var. *lolii* species [7]) which does not contain lolitrem (the toxin which causes ryegrass staggers) yet via the alkaloid peramine does confer resistance to one key insect Argentine Stem weevil.

[0005] Following on from this was the release of NEA type endophytes (other types of LpTG-1 strains [8]) which also don't contain the alkaloid lolitrem but do contain levels of ergovaline which are at levels that generally don't cause heat stress. The Edge endophyte is similar.

[0006] In 2004 a new endophyte called AR37 (another type of LpTG-1 strain [9]) was released which contained a different alkaloid called epoxy janthitrem which conferred resistance to a wider range of insects. Specifically, US7976857B2 provides an isolated endophyte of *Neotyphodium lolii* as exemplified by AR37. However, under certain circumstances and in some animal classes, can cause ryegrass staggers.

[0007] In 2009, Young et al. reported the use of PCR and Southern analysis to screen endophyte isolates

for toxin biosynthesis genes, thereby providing a diagnostic method to screen endophytes for both beneficial and detrimental alkaloids [14]. The inventors have discovered RGT15 which is an endophyte classified within the taxonomic group *Epichloë festucae* var. *lolii* species LpTG-1 which produces peramine and ergovaline. However, RGT15 has seasonal alkaloid levels which differ from any previous similar endophytes and the inventors believe these differences will confer different insect resistance levels to the ryegrass plant.

[0008] The Inventors have also discovered RGT18 which is another unique endophyte classified within the taxonomic group *Epichloë festucae* var. *lolii* species LpTG-3 which produces indole diterpenes called epoxy janthitrems I -IV which confer a wide insect resistance to ryegrass and have not demonstrated any animal side effects [10, 11].

[0009] In addition, to the above both these endophytes RGT15 and RGT18 have been shown to have an ideal symbiotic relationship and existence with the R2n™ proprietary and other ryegrass germplasm enabling them each to develop a long-term association which confers agronomically useful benefits for pastoral agriculture.

[0010] However, there still remains a need for new endophyte artificially infected grasses to have an alkaloid profile which does not include lolitrem compounds. Lolitrem B has been shown to cause toxicity in the form of *Lolium perenne* ryegrass staggers in cattle, sheep, deer and horses [2, 3]. Neither RGT15 or RGT18 contain any lolitrem alkaloid.

[0011] It is an object of at least one aspect of the present invention to provide a host-grass:endophyte symbiont with a favorable alkaloid profile at least compared to wild type grasses.

[0012] There also remains a need for persistent turf grasses to exhibit similar attributes. Persistent turf grasses can also contain higher levels of ergovaline and janthitrems as mechanisms to limit insect pressure and also to stop animal feeding e.g. birds.

[0013] It is an object of the present invention to address the foregoing problems or at least to provide the public with a useful choice.

[0014] Throughout this specification, the word "comprise", or variations thereof such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

[0015] Further aspects and advantages of the present invention will become apparent from the ensuing description which is given by way of example only.

DEFINITIONS

[0016] The term 'viability' as used herein refers to the ability to survive and/or withstand one or more biotic or abiotic stresses.

[0017] The term 'vigour' as used herein refers to active well-balanced growth.

[0018] The term 'favorable alkaloid profile' as used herein refers to the presence of an alkaloid, or mixture of alkaloids, produced by an introduced endophyte within at least one host grass at a level or levels which is/are sufficient to be beneficial to: the host grass(es) and/or animals grazing thereon.

[0019] The term 'exemplified' as used herein refers to the endophyte having a similar alkaloid profile to RGT15 and RGT18.

[0020] The term 'beneficial to the host grass' as used herein refers to at least one advantage or commercially useful difference conferred to the host grass by the endophyte(s) of the present invention that:

- is not present in the wild type host grass; and
- is equivalent, superior or different to that conferred by other commercially available 'host-grass:endophyte' symbiont cultivars.

[0021] For example, in some preferred embodiments a favorable alkaloid profile may result in:

- reduced toxicity to animals which graze on the 'host-grass:endophyte' symbiont cultivar; and/or
- an increased protection against, and/or ability to withstand, abiotic or biotic stresses at least better than wild type host grass.

[0022] Preferably, advantages and/or commercially useful differences which may be beneficial to the host grass may include - but should not be limited to - one or more of the following:

- providing increased grass persistence/vigour compared to the wild type host plant and/or other commercially available 'host-plant endophyte' symbiont cultivars; and/or
- providing protection to biotic and abiotic stresses compared to the wild type host plant and/or other commercially available 'host-plant endophyte' symbiont cultivars; and/or
- reducing toxicity to animals, and/or improved animal production, which graze on endophyte grasses of the present invention;
- providing a grass which can thrive in a present or future, ecological environment and/or commercial environment, in a manner which at least provides the public with a useful choice.

[0023] The term 'production zone' refers to any physically defined space, such as a parcel of land; a floor, or part thereof, of a building (which could be multi-storied); or a vehicle (including a trailer or carriage); in which plants can be grown.

[0024] The term 'isolated endophyte' as used refers to an endophyte removed from its original source and purified from some, most, or all, of the original additional components associated therewith. For example, if the endophyte removed from seeds or plant as found in nature, an isolated endophyte can be considered as an endophyte isolated away from the seeds or plant from which the endophyte was sourced and therefore existing in a purified form. An 'isolated endophyte' can therefore be used to inoculate other plants of interest different to that from that in which the endophyte was originally sourced.

SUMMARY OF THE INVENTION

[0025] According to a first aspect of the present invention there is provided a method of improving the viability, persistence and/or vigour of a host plant in the form of *Lolium multiflorum, Lolium ×hybridum*, *Lolium perenne,* (host grass) which includes the step of:

- artificially inoculating the host grass with an LpTG-3 endophyte RGT18 strain;
  so the LpTG-3 endophyte RGT18 strain can:
- produce at least one alkaloid or combination of alkaloids that provide the host grass with a favorable alkaloid profile; and/or
- protect the plant from biotic stresses.

[0026] According to a second aspect there is provided a method substantially as described above wherein the alkaloid is at least one janthitrem epoxide compound.

[0027] According to a third aspect there is provided a method substantially as described above wherein the alkaloid is selected from any one of epoxy janthitrem I -IV; or a combination thereof.

[0028] According to a fourth aspect there is provided a method of improving the viability, persistence and/or vigour of host grasses in the form of *Lolium perenne, Lolium multiflorum, Lolium ×hybridum* comprising the steps of:

1. a) inoculating a first host grass with LptG-1 endophyte RGT15 strain and
2. b) inoculating a second host grass with LptG-3 endophyte RGT18 strain;
3. c) co-growing host grasses inoculated as per steps a) and b).

[0029] Preferably, the first and second host grasses may be selected from the same variety of ryegrass.

[0030] According to a fifth aspect there is provided a production zone which includes growing therein at least one host grass in the form of *Lolium perenne, annual, Lolium multiflorum, Lolium ×hybridum* wherein said host grass(es) have been inoculated as per any one of the methods substantially as described above.

[0031] According to a sixth aspect there is provided a production zone substantially as described above wherein the two grasses are randomly interspersed within the production zone According to an seventh aspect there is provided a production zone substantially as described above wherein the two grasses are grown in discrete regions within the production zone. According to a eighth aspect there is provided a production zone substantially as described above wherein the two grasses are each grown in a respective half of the production zone.

[0032] According to an ninth aspect there is provided an isolated endophyte of *Epichloë festucae* var. *lolii* species LpTG-3

- RGT18

wherein variations in the morphology and/or alkaloid profile over known LpTG-3 strains are as exemplified by RGT18 deposited at National Measurement Institute and accorded accession numbers

V18/011211 respectively.

[0033] According to a tenth aspect of the present invention there is provided a use of an isolated endophyte of *Epichloë festucae* var. *lolii* species LpTG-3 RGT18
to provide seasonal variation in the alkaloids produced by said endophyte(s) when present in a host grass.

[0034] According to a eleventh aspect of the present invention there is provided a use of an isolated endophyte of *Epichloë festucae* var. *lolii.* species LpTG-3 RGT18
to accentuate the benefits of increased insect tolerance relative to known endophyte grasses and/or reducing or limiting the side effects of staggers on grazing animals, when present in a host grass.

[0035] According to a twelfth aspect of the present invention there is provided an isolated endophyte of *Epichloë festucae* var. *lolii* species LpTG-3 RGT18 having a genome including the sequence of nucleic acids as shown in SEQ ID NOs. 1 - 817.

BRIEF DESCRIPTION OF THE DRAWINGS

[0036] Further aspects of the present invention will become apparent from the ensuing description which is given by way of example only and with reference to the accompanying drawings in which:

Figure 1
shows a LC-ESI-FTMS extracted ion chromatogram of epoxy-janthitrem I-IV observed in *Lolium perenne* ryegrass Bronsyn with AR37 endophyte, collected from 0-20 min in positive ionisation mode (ESI+); (not part of the invention);

Figure 2
shows a Peramine (a) and ergovaline (b) production (parts per million, ppm) measured in spring, summer and winter for STELLAR-RGT15, RGAS1137-RGT15 and commercially available *Lolium perenne* ryegrass-endophyte associations. Average production is illustrated by 'X';

Figure 3
shows an Epoxy-janthitrem I production measured in spring, summer and winter for STELLAR-RGT18, RGAS1137-RGT18 and commercially available *Lolium perenne* ryegrass-AR37 associations. Production is measured as a response (area measured under the peak). Average production is illustrated by 'X';

Figure 4
shows an Epoxy-janthitrem I-IV production measured in summer for STELLAR-RGT18, RGAS1137-RGT18 and commercially available *Lolium perenne* ryegrass-AR37 associations. Production is measured as a response (area measured under the peak);

Figure 5
Average epoxy-janthitrem I-IV production measured in summer for STELLAR-RGT18, RGAS1137-RGT18 and *Lolium perenne* ryegrass-AR37 associations. Production is measured as a response (area measured under the peak);

Figure 6
shows the differences in the nucleotide sequences of the genotype of RGT18 compared to AR37;

Figure 7
shows baseline tiller count (mean with SE) at day 0 (DPE0);

Figure 8
shows the damaged tiller count (mean with SE) at DPE10;

Figure 9
shows the vigour score at DPE10;
Figure 10
shows the mean damaged tillers (bars indicate SE) at DPE15;
Figure 11
shows the mean damaged tillers (bars indicate SE) at DPE21;
Figure 12
shows the percentage of adult aphids survival rate over 8 days;
Figure 13
shows the numbers of aphid nymphs born over an eight day period;
Figure 14
shows the number of aphid nymphs surviving over an eight day period;
Figure 15
shows the percentage of lambs having positive staggers scores after being fed various different grass endophyte symbionts (treatments);
Figure 16
shows the mean stagger score (Keogh 1973) of lambs by treatment and date;
Figure 17
shows the average peramine levels on three different dates;
Figure 18
shows the average lolitrem B levels on three different dates;
Figure 19
shows the average epoxy janthitrem I levels on three different dates;
Figure 20
shows the results of the Lennox Trial assessing: Average Total Dry Matter Yield (kgDM/ha) by Years; and
Figure 21
shows the results of the Waikeria Trial assessing: Average Total Dry Matter Yield (kgDM/ha) by Years.

BEST MODES FOR CARRYING OUT THE INVENTION

Example 1

SSR Genotyping (B loci methods)

[0037] DNA was extracted from each sample using the MagAttract Plant DNA kit (Qiagen, Hilden, Germany). The endophyte-specific SSR markers, B10 and B11 were used for PCR-based *in planta* detection of endophytes. PCR amplifications were performed in 12.5 µl reaction volumes containing 1 µL genomic DNA (5ng/µl), 1 X PCR buffer (Bioline, London, UK), 0.2 µM of forward and reverse primer (Sigma Aldrich, St. Louis, Missouri, USA; Applied Biosystems, Foster City, California, USA), 0.125 µl of 5mM dNTP (GE Healthcare, Chalfont St Giles, UK), 1 U immolase (Bioline), and was processed in a thermocycler (DNA Engine, Bio-Rad, Hercules, California, USA) programmed for 10 min at 95°C followed

by 30 cycles of 1 min at 94°C, 2 min at 65°C, 1 min at 72°C, then 10 min at 72°C.

[0038] The PCR products were diluted with sterile Milli-Q water (1:10), and 2 µl of the diluted product was mixed with 8 µl of ABI 3730 loading solution [7.95 µl of Hi-Di™ formamide (Applied Biosystems, Foster City, California, USA), 0.05 µl of 500Liz™ (Applied Biosystems, Foster City, California, USA) size standard] before analysis on the ABI 3730xl automated capillary electrophoresis platform (Applied Biosystems Biosystems, Foster City, California, USA). Products were detected using the GeneMapper version 3.7 software (Applied Biosystems Biosystems, Foster City, California, USA), and endophyte samples were identified by the presence of amplification peaks specific for each SSR marker.

Table 1

SSR marker profile of selected endophyte strains at the B10 and B11 loci [7].

Endophyte strain	**Taxonomic group**	**Alkaloid profile**	**B10 (bp)**	**B11 (bp)**	
				Allele 1	**Allele 2**
RAGT/R2n Endophytes					
1.4.4	*Lp*TG-1	EP	176	238	
RGT18	*Lp*TG-3	J	162	131	
RGT15	*Lp*TG-1	EP	176	152	156
1.9.7	*Lp*TG-1	EP	176	160	164
2.5.3	*Lp*TG-1	EP	176	152	156
1.11.13	*Lp*TG-1	EP	176	172	
Commercial Endophytes					
NEA6	*Lp*TG-1	EP	176	199	
AR37	*Lp*TG-3	J	162	131	
SE	*Lp*TG-1	LEP	176	176	
AR1	*Lp*TG-1	P	176	148	

LpTG - Lolium perenne Taxonomic Group; E-ergovaline; P-peramine; J-janthitrems; L-lolitrem B; bp-base pair

Example 2: Genome sequencing to identify SNP variation between RGT18 and AR37

2.1 Illumina platform sequencing

DNA extraction

[0039] DNA for genome survey sequencing was extracted from lyophilized mycelia using a cetyltrimethylammonium bromide (CTAB) based extraction method (Möller et al. 1992), and the quality and quantity of the DNA was assessed by both agarose gel electrophoresis and specific absorbance measurements using the NanoDrop 2000 Spectrophotometer (Thermo Scientific).

[0040] Prior to sequencing, genetic identities of isolated endophyte strains were confirmed using endophyte specific SSR markers.

Paired-end library preparation and sequencing

[0041] Genomic DNA was fragmented in a Covaris instrument (Woburn, MA, USA) to an average size of 100-900bp.

[0042] For the RGT18 endophyte DNA sample, paired-end libraries with inserts c. 400 bp in size were prepared using the standard protocol (TruSeq DNA Sample Prep V2 Low Throughput: Illumina Inc., San Diego, USA) with paired-end adaptors. Library quantification was performed using the KAPA library quantification kit (KAPA Biosystems, Boston, USA). Paired-end libraries were pooled according to the attached adaptors and sequence analysed using the HiSeq2000 platform (Illumina) following the standard manufacturer's protocol, RGT18, was sequenced in September 2012.

[0043] For AR37 endophyte DNA, paired-end libraries with inserts c. 400 bp in size were prepared using the standard protocol (Nextera DNA Library Preparation Kit: Illumina Inc., San Diego, USA) with paired-end adaptors. Library quantification was performed using the KAPA library quantification kit (KAPA Biosystems, Boston, USA). Paired-end libraries were pooled according to the attached adaptors and sequence analysed using the MiSeq platform (Illumina) following the standard manufacturer's protocol. The AR37 isolate was sequenced in September 2012.

[0044] All generated sequence reads were quality controlled by filtering and trimming of reads based on quality using a custom Python script, which calculates quality statistics, and stores trimmed reads in several fastq files.

2.2. SNP variation between AR37 and RGT18

2.2.1. AR37 reference genome

[0045] A reference genome for AR37 was assembled using SOAPdenovo. A total of 9,604,168 paired-end reads generated using Illumina sequencing technology were assembled to generate a reference genome with 19982 scaffold sequences (Table 2). To minimise 'N's present in the assembly `command-line resolve' was used, thus generating the AR37 resolved reference genome.

Table 2. Sequencing statistics for the AR37 reference genome

Sequence statistic	Length (bp)
Size_includeN	31354167
Size_withoutN	29768040
Scaffold_Num	19982
Mean_Size	1569
Median_Size	115
Longest_Seq	151941
Shortest_Seq	100

Sequence statistic	Length (bp)
Singleton_Num	13980
Average_length_of_break(N)_in_scaffold	79

2.2.2 Mapping reads to the AR37 reference genome

[0046] For read mapping to reference sequences, raw fastq sequences generated by the Illumina sequencers were trimmed and quality filtered using the Gydle 'nuclear' program in filter mode. The settings used trims reads to a minimum length of 50 bp having greater than Phred score equivalent of 20 and removed Illumina adapters. Reads were mapped to the AR37 reference genome using the Gydle 'nuclear' program in search mode. The settings used were Minimum length (L) of High Scoring Pairs 50, Sensitivity (s -minimum consecutive identities within a HSP) 25, K-mer size (k) used for search, 13 Mismatches allowed (m) 6, and --random-best (Reports a single hit randomly selected among the best hits).

[0047] AR37 and RGT18 reads were mapped to the AR37 reference genome using Gydle to generate a gym file. These were generated from the 'nuclear' aligned reads using the Gydle 'gym-build' program. SNPs were identified using the Gydle program findsnp which uses the gym file as an input. Settings for findsnp were min-coverage 2 (i.e. at least 2 DNA reads had to cover the base of interest) and a min-allele-frequency of 80% (i.e. a base different to the reference had to be seen in a least 80% of the reads covering that base) and min-allele-count 2 (to count SNPs in contigs with unresolved repeats per strain). SNPs were then further filtered such that: 1) SNPs with a minimum allele frequency >80% were excluded when comparing AR37 (reference) v AR37 (reads); 2) contigs had to be greater than 999 bp; and 3) less than 20 minimum-allele-count 2 AR37 (reference) v AR37 (reads) SNPs allowed per contig.

[0048] Using this approach, the inventors identified 817 SNPs, with an average coverage (sequence read depth) of 18x, which differentiate clearly between AR37 and RGT18 (Figures-7).

Example 3: Generation of novel host-endophyte associations

[0049] *Lolium perenne* ryegrass-endophyte associations were generated by inoculation using the 'cut and stuff' method [12]. Infected plants were identified 6-8 weeks post inoculation using strain specific DNA-based diagnostics to confirm endophyte presence and identity. A total of 154 novel *Lolium perenne* ryegrass-endophyte associations were generated (Table 3).

Table 3

Variety-endophyte associations generated via endophyte inoculation into seedling meristem.		
Host variety	**Endophyte strain**	**Number of genotypes**
STELLAR	RGT15	44
STELLAR	RGT18	44
RGAS1137	RGT15	30
RGAS1137	RGT18	36
Total		**154**

Example 4: Vegetative Stability of Endophytes

[0050] Vegetative stability of the associations was assessed six monthly, over a 24-month period (Table 4). Three or more tiller samples (c. 0.5 cm from the base) were harvested from each plant after 6, 12, 18 and 24 months growth in the field. DNA was extracted from freeze dried samples using the MagAttract Plant DNA kit (Qiagen, Hilden, Germany). Each sample was analysed for endophyte strain presence and identity using strain specific DNA-based diagnostics.

[0051] Table 3 summarises the number of endophyte positive plants identified 6, 12, 18 and 24 months following successful infection determined at 6 weeks post inoculation. Once novel *Lolium perenne* ryegrass-endophyte associations are established they remain stable. Further, endophyte strain RGT18 exhibited higher vegetative stability compared to strain RGT15. However, this could also have been due to the varietal-endophyte symbiosis occurring between this endophyte and the host variety, but also the inventors also believe could be due to the compatibility /marriage ability of the RGT18 endophyte with a host grass.

Table 4

Vegetative stability of variety-endophyte associations. Endophyte infected plants were identified at 6 weeks post inoculation, followed by 6-monthly assessments of association stability.

		Host variety + Endophyte strain Inoculated				**Total**
		Slellar + RGT15	Stellar + RGT18	RGAS1137 + RGT15	RGAS1137 + RGT18	
6 weeks	**Endophyte detected**	44147	44/44	30/30	36/36	1541157
	Vegetative stability	94%	100%	100%	100%	
6 months	**Endophyte detected**	35/44*	37/42*	25/30*	33/34	130/150
	Vegetative stability	79.5%	88.1%	83.3%	97.1%	
12 months	**Endophyte detected**	36/45	40/43	23/31*	28/34	127/153
	Vegetative stability	80.0%	93.0%	74.2%	82.4%	
18 months	**Endophyte detected**	36/45	39143	24/32	30/34	1411154
	Vegetative stability	80.0%	90.7%	75.0%	88.2%	
24 months	**Endophyte detected**	37/45	40/43	23/32	28/33*	134/153
	Vegetative stability	82.2%	93.0%	71.9%	84.8%	

*Where total plants tested is lower than the number of plants in the field, some plants were either not tested or deceased.

Example 5: Intergenerational stability (not part of the invention)

[0052] The intergenerational stability of the endophytes was assessed in seed generated via pollen cloud experimentation. Analysis was performed using a bulked seed approach whereby 10 seeds were pooled to form 1 sample. DNA extraction was performed using the DNeasy 96 plant DNA extraction kit (Qiagen, Hilden, Germany) for each seed line. Each sample was analysed for endophyte strain presence and identity using strain specific DNA-based diagnostics. Intergenerational stability, measured as transmission of endophyte to seed, showed endophyte strain RGT18 exhibits higher stability compared to strain RGT15 (Table 5). Variation for intergenerational stability was also observed between varieties; host variety RGAS1137 transmits endophyte at a higher frequency compared to STELLAR (Table 5).

Table 5

Intergenerational stability of variety-endophyte associations, measured as transmission of endophyte to seed.

Host variety	**Endophyte strain**	**Endophyte detected**	**Endophyte negative**	**Total genotypes tested**	**Intergenerational stability**
STELLAR	RGT15	40	11	51	78%
STELLAR	RGT18	39	5	44	89%
RGAS1137	RGT15	30	6	36	83%
RGAS1137	RGT18	35	1	36	97%
Total		144	23	167	

Example 6: Alkaloid profiling

[0053] The alkaloid profiles (ergovaline, peramine and janthitrems) of the associations were assessed over a growing season under field conditions to gain insight into seasonal fluctuations and presence of alkaloids.

6.1 Methods

Sample harvest

[0054] Plant material for alkaloid analysis was harvested approximately 5 cm above ground. Fresh material was packed into paper bags and stored at -80°C. Samples were then freeze dried, ground to a fine powder and stored at 21°C in the dark.

Sample preparation for alkaloid analysis

[0055] Freeze-dried and ground *Lolium perenne* ryegrass-endophyte samples harvested from three

different seasonal periods were measured for alkaloid content.

[0056] Plant material (20mg ±0.2mg) was extracted twice with 1 mL of methanol:water (80:20, v:v) (Merck LiChrosolv ≥99.9%; MilliQ water). The supernatants were combined and dried using a SpeedVac Concentrator (Thermo Fisher Scientific, Savant SPD 2010) at room temperature for approximately 16 h, and reconstituted in 200 µL of methanol:water (80:20, v:v) containing Ergotamine D-tartrate (Sigma-Aldrich, St Louis, USA) as an internal standard at a concentration of 216 ng/mL.

[0057] For alkaloid quantitation, peramine nitrate (BDG Synthesis, Wellington, NZ) and ergovaline were used to construct concentration curves from 1 to 2000 ng/mL (peramine and ergovaline) in matrix (endophyte free *Lolium perenne* ryegrass plant).

LCMS parameters

HPLC analysis

[0058] Extracts were analysed using a 100 mm × 2.1 mm Themo Hypersil Gold 1.9 µm HPLC column fitted to a Thermo Fischer Scientific Vanquish liquid chromatograph (Thermo Fischer Scientific, Bremen). The compounds were detected with a Thermo Fisher QExactive Plus mass spectrometer (Waltham, MA, USA; Thermo, Bremen, Germany), operating in the ESI mode with a HESI probe for positive data acquisition.

Mass spectrometry analysis

[0059] The sample extract (3 µL) was assessed in FT positive mode over a mass range of 80-1200 amu with resolution set at 35,000. Typical mass accuracy for the alkaloids was 3-5 ppm. Relative quantitation (expressed as peak area) were determined for epoxy-janthitrems I to IV (Figure 1). These were identified based on mass accuracy and fragmentation patterns via LCMS/MS (Table 6).

Table 6

Targeted LCMS/MS analysis of epoxy-janthitrem I-IV indicating accurate masses (m/z), retention times (RT) and MSn fragmentation data (LC-MS/MS) which were acquired in positive ionisation mode [M+H] using a Thermo Fisher Q-Exactive Plus orbitrap mass spectrometer. Accurate mass and MSn fragmentation results were compared with theoretical masses and fell within the range of 5 ppm difference (Delta ppm).

	Metabolite	Epoxy-janthitrem I	Epoxy-janthitrem II	Epoxy-janthitrem III	Epoxy-janthitrem IV
	***m/z* [M+H]**	646.3735	670.4076	672.4230	714.4341
	RT (min)	11.08	12.24	12.31	12.36
Product ion: LC-MS/MS	**1**	222.1277	222.1275	222.1274	222.1278
	2	280.1696	280.1692	280.1692	280.1694
	3	588.3320	612.3676	614.3833	656.3934
	4	631.3459	655.3814	657.3969	699.4081
	Chemical Formula	C39 H52 07 N	C42 H56 06 N	C42 H58 06 N	C44 H60 07 N

Targeted LCMS/MS analysis of epoxy-janthitrem I-IV indicating accurate masses (m/z), retention times (RT) and MSn fragmentation data (LC-MS/MS) which were acquired in positive ionisation mode [M+H] using a Thermo Fisher Q-Exactive Plus orbitrap mass spectrometer. Accurate mass and MSn fragmentation results were compared with theoretical masses and fell within the range of 5 ppm difference (Delta ppm).

	Metabolite	Epoxy-janthitrem I	Epoxy-janthitrem II	Epoxy-janthitrem III	Epoxy-janthitrem IV
	[M+H]				
	Theoretical Mass [M+H]	646.3738	670.4102	672.4259	714.4364
	Delta (ppm)	-0.5	-3.8	-4.3	-3.3

6.2 RGT15

[0060] STELLAR-RGT15 and RGAS1137-RGT15 were measured for peramine and ergovaline production in spring, summer and winter. Lolitrem B was not observed in any variety-RGT15 associations.

[0061] Generally, higher average concentrations of peramine and ergovaline were observed in summer compared to spring and winter (Table 7). STELLAR-RGT15 associations exhibit less seasonal variation in peramine and ergovaline concentrations compared to RGAS1137-RGT15 associations. This higher concentration exhibited in summer is very positive in providing high levels of insect ressitance at a time of the year when insect presence and lifecycles are at their peak in pastoral systems.

[0062] A wide range in alkaloid production was observed within each population (Figure 2a-b). Individual genotypes within STELLAR and RGAS1137 were identified with peramine concentrations higher than commercial cultivars tested.

Table 7

Seasonal averages for ergovaline and peramine production for *Lolium perenne* ryegrass-endophyte associations.

Association	**Season**	**Number of genotypes measured**	**Average ergovaline (mg/kg)**	**Average peramine (mg/kg)**
STELLAR-RGT15	Spring	42	0.28	4.85
RGAS1137-RGT15	Spring	26	0.12	2.34
Banquet-Endo5	Spring	4	0.03	3.10
Bealey -LE	Spring	4	0.01	1.30
TROJAN-NEA2	Spring	7	0.01	1.66
Alto-SE	Spring	7	0.03	8.79
STELLAR-RGT15	Summer	42	0.77	5.98
RGAS1137-RGT15	Summer	26	0.70	5.07
Banquet-Endo5	Summer	4	0.43	5.07

Seasonal averages for ergovaline and peramine production for *Lolium perenne* ryegrass-endophyte associations.				
Association	**Season**	**Number of genotypes measured**	**Average ergovaline (mg/kg)**	**Average peramine (mg/kg)**
Bealey -LE	Summer	4	0.00	1.30
TROJAN-NEA2	Summer	7	0.16	2.23
Alto-SE	Summer	7	0.58	17.04
STELLAR-RGT15	Winter	36	0.27	2.51
RGAS1137-RGT15	Winter	25	0.13	1.26
Banquet-Endo5	Winter	4	0.07	1.72
Bealey -LE	Winter	4	0.00	1.54
TROJAN-NEA2	Winter	14	0.04	1.41
Alto-SE	Winter	4	0.09	4.27
To note: the ergovaline levels exhibited in RGT15 were at optimum levels for suppressing insects but not at a level to cause animal effects.				

6.3 RGT18

[0063] STELLAR-RGT18 and RGAS1137-RGT18 were measured for epoxy-janthitrems I-IV production in spring, summer and winter (Table 8).

[0064] A wide range in alkaloid production was observed within each population (Figure 3). Individual genotypes within STELLAR and RGAS1137 were identified with epoxy-janthitrem I production concentrations higher than commercial cultivars tested, as were genotypes with epoxy-janthitrem concentrations lower than commercial cultivars tested.

[0065] Lower average concentrations of epoxy-janthitrem I were observed in spring and winter compared to summer. Again this is positive, in that in pastoral systems have higher insect pressures exhibited in summer, than in cooler times of the year.

[0066] The production of epoxy-janthitrem I and its variants (epoxy-janthitrems II-IV) in the summer were also measured (Figure 4). Average levels were greater in STELLAR-RGT18 compared to RGAS1137-RGT18 (Figure 5). Epoxy-janthitrem I was dominant in all samples tested, followed by epoxy-janthitrem III (Table 9).

Table 8

Seasonal averages for janthitrem I production for *Lolium perenne* ryegrass-endophyte associations			
Association	**Season**	**Number of genotypes measured**	**Average janthitrem I (arbitrary units)**
STELLAR-RGT18	Spring	43	100116
RGAS1137-	Spring	38	22054

Seasonal averages for janthitrem I production for *Lolium perenne* ryegrass-endophyte associations			
Association	**Season**	**Number of genotypes measured**	**Average janthitrem I (arbitrary units)**
RGT18			
SAMSON-AR37	Spring	5	0
STELLAR RGT18	Summer	43	6268565
RGAS1137-RGT18	Summer	38	2677393
SAMSON-AR37	Summer	5	434659
Alto-AR37	Summer	6	538814
STELLAR RGT18	Winter	36	42794
RGAS1137-RGT18	Winter	32	4473
SAMSON-AR37	Winter	8	0

Table 9 The proportion of epoxy-janthitrems I-IV (%) measured in *Lolium perenne* ryegrass-endophyte associations during the summer season.

Proportion of epoxy-janthitrems I-IV (%)					
Association	Season	epoxy-janthitrem I	epoxy-janthitrem II	epoxy-janthitrem III	epoxy-janthitrem IV
RGAS1137-RGT18	Summer	66.61	6.91	23.38	3.10
STELLAR-RGT18	Summer	79.96	4.78	13.65	1.61
SAMSON-AR37	Summer	57.08	0.00	42.92	0.00
Alto-AR37	Summer	76.30	10.36	9.89	3.45

[0067] The specific genetic differences of RGT18 genotype over AR37 are detailed in the 817 sequences of the Sequence Listing accompanying this specification and as also depicted in Figure 6.

Example 7 - Evaluation of perennial ryegrass (Lolium perenne) lines for resistance/ tolerance to adult black beetle (Heteronychus arator) feeding

[0068] This example details the results of a laboratory screening (choice test) of diploid ryegrass lines to test for resistance/tolerance to adult black beetle (Heteronychus arator) feeding. Black beetle is considered one of the two key pastoral pests in New Zealand along with Argentine stem weevil.

[0069] The grass/endophyte combinations (lines) tested were:

- RGAS1137 RGT18
- SAMSON Nil (control)
- SAMSON SE (control)
- TROJAN NEA2 (comparator)

- SAMSON AR37 (comparator)
- RGAS1137 RGT15

[0070] Grass tillers were counted on each entry (plant) at Day 0 immediately before the introduction of the adult black beetle. At days 10, 15, 21 post establishment (DPE10, DPE15, DPE21) assessments were made identifying and counting damaged tillers and assessing plant vigour. Plant vigour was scored on a Likert Scale (1 least vigour to 5 most vigour).

[0071] Analysis of the results was based on the tiller counts (total, healthy and damaged) and the vigour of plants, being the difference between the Day 0 score and later assessments. Plant vigour is an interpretation of a plant's ability to withstand feeding damage and the effects of adult black beetle test biting.

Key results

[0072]

- Plant vigour at DPE0 for all lines was assessed as being a 5 - (range 1-5).
- At DPE10, the damaged tiller count mean for SAMSON Nil (mean 16.4 or 47%) was significantly different (higher) than the balance of the entries ($p<0.01$). The vigour score mean for SAMSON Nil was 2.6, which was lower than the mean for the balance of the entries (overall mean 4.7). The results for SAMSON Nil were consistent with severe black beetle feeding damage.
- At DPE10 the damaged tiller count means for the balance of the entries were not significantly different from each other.
- While there were significant differences in mean tiller counts between lines when the assay was started, the results of the assay are conclusive with respect to the poor performance of SAMSON Nil.

[0073] The methodologies and results from a study of feeding choices of black beetle (Heteronychus arator) under laboratory conditions is outlined below. The feeding choices were diploid perennial ryegrass (Lolium perennes) varieties containing a range of endophytes (Acremonium loliae). The primary objective of the study was to measure adult black beetle feeding choices.

METHODS

Adult black beetle collection and maintenance

[0074] In April, 200 × 75mm diameter pitfall traps were placed in sheep and beef pasture (with a history of black beetle damage) in Tahuna, Waikato, to trap adult black beetle. The traps were emptied daily until a total of 200 black beetle were collected (90 were required for experimental purposes).

[0075] In preparation for the experiment the black beetles were contained individually in cube trays

enabling monitoring of individual insects, isolation in case of disease, and preventing combat injury. The beetles were transferred to clean containers every second day and provided with fresh carrot for feeding. The black beetles were maintained at ambient temperatures and not fed for two days prior to entry into the assay.

Choice test set-up

[0076] Six (6) perennial rye grass seedling types of diploid seed-lines and endophyte selections (Table 10) were received from Seed Force, Christchurch, where they had been grown from seed in planter trays. All plants had been tested for endophyte using the tissue print immunoblot method. The plants were well-grown; all lines had large numbers of healthy tillers.

[0077] To prepare the experiment representative seedlings of each type (entries) were planted equidistant apart (8cm) in a sandy loam soil (depth 10 cm), within the margins of galvanised sheet iron ring (height 15 cm diameter 32 cm). Plant position in each ring was randomised, and positions were labelled. There were 15 replications of each entry (i.e. 15 rings). The rings were covered with insect netting suspended 15 cm above the soil surface.

Table 10: Entries into adult black beetle feeding assay

Entry
RGAS1137 RGT18
SAMSON Nil
SAMSON SE
TROJAN NEA2
SAMSON AR37
RGAS1137 RGT15

[0078] The experiment was maintained in a screen house at ambient temperatures and checked daily to ensure the soil moisture was adequate and that insect containment integrity was maintained.

Assessments

[0079] The tiller counts and baseline vigour scores for each plant were recorded prior to the introduction of the adult black beetles (Day 0, Assessment 1). The vigour score is a relative score for all plants in the trial on a Likert Scale of 1 (least vigour) to 5 (most vigour). Vigour characteristics were growth form, growth level, leaf colour, and appearance. The plants were then trimmed to 3cm and adult black beetle were released into each ring (replicate) at a ratio of one per test plant (6 black beetles per ring).

[0080] Plants were inspected daily for black beetle adult feeding damage and four assessment made (Table 11) with a final assessment (Day 21, Assessment 4).

Table 11: Assessment type and timing post establishment (introduction of black beetle)

Assessment	Days post Establishment (DPE)	Assessment type
1	0	Vigour score, tiller count

Assessment	Days post Establishment (DPE)	Assessment type
2	10	Vigour score, damaged tiller count
3	15	Vigour score, damaged tiller count
4	21	Vigour score, damaged tiller count, confirm tiller count

RESULTS

Initial tiller count (DPE0)

[0081] A tiller count prior to the introduction of the black beetle adults provided a baseline. The tiller counts ranged from 10 to 52, with variation across the grass/endophyte combinations (lines) (Table 12). The mean range of was from 13.6 to 35.1.

Table 12: Baseline tiller count

Line	RGAS1137 RGT18	SAMSON Nil	SAMSON SE	TROJAN NEA2	SAMSON AR37	RGAS1137 RGT15
Min	14	21	14	10	12	4
Max	45	52	38	27	34	21
Median	31	33	26	15	21	15
Mean	28.0	35.1	25.9	16.3	21.9	13.6

[0082] Ideally the mean number of tillers in each of the lines is sufficiently similar that they could statistically be from the same population. Table 12 and Figure 7 show the mean baseline tiller count at day zero for each grass/endophyte combination. An ANOVA of tiller counts at planting (Day 0) confirmed that there was a significant difference between the means ($p<0.01$). T tests showed lines were split into four significantly different groups. SAMSON Nil had significantly higher mean than the rest of the lines. The statistical groupings based on the means were RGAS1137 RGT18 and SAMSON SE; SAMSON SE and SAMSON AR37; and TROJAN NEA2 and RGAS1137 RGT15. These differences are discussed below.

Day Zero initial vigour score (DPE0)

[0083] All entries achieved a vigour score of 5 prior to the introduction of the black beetle adults.

Day 10 post establishment (DPE10)

[0084] Plants were tended regularly and visually checked for black beetle damage following planting. On Day 10 there was sufficient damage to undertake a tiller count and vigour scoring.

Tiller damage

[0085] At DPE10 damaged tillers were counted and the mean for each calculated - refer Table 13 and Figure 8. An ANOVA of damaged tillers at Day 10 confirmed a difference in the means at a 1% level of significance ($p<0.01$). T-tests showed that the mean damaged tillers for SAMSON Nil was significantly different, and higher than all other lines.

[0086] The mean number of damaged tillers for SAMSON Nil was 16.4 (range 5-30) (Table 13). The next highest level of damage was SAMSON SE, with a mean of 1.6 (range 0-5). The line RGAS1137-RGT15 had the least damage with a mean of 0.2 (range 0-3). The line RGAS1137-RGT18 was similar.

Table 13: DPE10 damaged tiller count

Line	RGAS1137 RGT18	SAMSON Nil	SAMSON SE	TROJAN NEA2	SAMSON AR37	RGAS1137 RGT15
Min	0	5	0	0	0	0
Max	3	30	5	2	5	3
Median	0	15	1	0	0	0
Mean	0.3	16.4	1.6	0.6	1.2	0.2

[0087] T-tests of the means of damaged tillers showed that the mean for SAMSON Nil was statistically different from the means for all other lines. The means for all other lines were statistically the same.

[0088] Because SAMSON Nil had a significantly greater number of tillers at DPE0 and had the greatest mean number of damaged tillers a question arose as to whether there was any significance in this relationship. Testing the number of damaged tillers as a proportion of the tiller count at planting confirmed that as a proportion of total tillers at DPE0, SAMSON Nil had a significantly greater mean than other lines (Table 14). The mean proportion across the plots for SAMSON Nil was 0.50, followed by SAMSON SE (0.074), SAMSON AR37 (0.054), TROJAN NEA2 (0.035), RGAS1137 RGT15 (0.011), and RGAS1137 RGT18 (<0.00). Therefore, considering the higher starting number of tillers, we conclude that the mean damaged tillers for SAMSON Nil is statistically different from all other lines.

Table 14: Proportion of damaged tillers at DPE10

Line	RGAS1137 RGT18	SAMSON Nil	SAMSON SE	TROJAN NEA2	SAMSON AR37	RGAS113 7 RGT15
Proportion damaged	<0.00	0.50	0.074	0.035	0.054	0.011

Vigour scores

[0089] The vigour score is a Likert Scale with 1 is least vigorous and 5 is most vigorous. A zero score represents a dead plant. At the initial planting (DPE0) all plants included in the assay were assessed as having a vigour score of 5.

[0090] At DPE10, SAMSON Nil recorded the lowest mean vigour score of 2.6. No dead plants were recorded - refer Table 15.

Table 15: Vigour scores at DPE10

Line	RGAS1137 RGT18	SAMSON Nil	SAMSON SE	TROJAN NEA2	SAMSON AR37	RGAS1137 RGT15
Min	4	1	3	4	3	4
Max	5	4	5	5	5	5
Median	5	3	5	5	5	5
Mean	4.9	2.6	4.4	4.7	4.5	4.9

[0091] Except for SAMSON Nil (mean vigour score 2.6) the vigour scores (with SE) indicate a high level of vigour across all lines at DPE10 (refer Table 15 / Figure 9).

Table 16: Mean damaged tiller counts at DPE10, DPE15, DPE21

DPE	RGAS113 7 RGT18	SAMSON Nil	SAMSON SE	TROJAN NEA2	SAMSON AR37	RGAS1137 RGT15
10	0.3	16.4	1.6	0.6	1.2	0.2
15	1.3	22.3	3.5	1.3	3.9	0.3
21	2.0	18.3	5.8	1.9	7.1	0.4

[0092] At DPE15 (refer Table 16 / Figure 10) there was a statistical difference (ANOVA) in the mean number of damaged tillers across the lines ($p<0.001$). T-tests showed a greater spread than at Day 10, with RGAS1137-RGT15 having a significantly fewer damaged tillers (mean) than all other lines.

[0093] At DPE21 (refer Table 16 / Figure 11) there was a statistical difference (ANOVA) in the mean number of damaged tillers across the endophyte lines ($p<0.001$). T-tests showed a greater spread than at Day 21, with the lines now split into four significantly different groups Testing the mean damaged tillers as a proportion of the tiller count at planting showed that, while the order remains the same, the proportion of damaged tillers for SAMSON Nil had decreased as a proportion of tillers at planting (0.587). This was attributed to due to the recovery of some damaged tillers as black beetle feeding pressure lessened.

Table 17: Summary of mean vigour scores at DPE10, DPE15, DPE21

DPE	RGAS1137 RGT18	SAMSON Nil	SAMSON SE	TROJAN NEA2	SAMSON AR37	RGAS1137 RGT15
10	4.9	2.6	4.4	4.7	4.5	4.9
15	4.6	2.1	3.7	4.4	3.9	4.8
21	4.7	2.0	3.5	4.3	3.6	4.9

[0094] With the exception of RGAS1137 RGT18 and RGAS1137 RGT15 which recorded increases in vigour scores of between DPE 15 and 21, the balance of the entries recorded declines. The vigour score for SAMSON Nil reflects continued feeding attention by the black beetle, despite the fact that 64% (range 10% - 90%) of tillers were damaged.

Conclusion

[0095] Presence of either endophyte RGT15 or RGT18 in host grasses was found to confer better resistance/tolerance to black beetle (*Heteronychus arator*) feeding compared to nil endophyte varieties.

[0096] The DPE21 results indicate that both RGT15 and RGT18 endophytes confer a better vigour score and thus are more resistant to insect feeding compared to SAMSON Nil, SAMSON SE, TROJAN NEA2 and importantly provide a significant improvement over SAMSON AR37.

Example 8 - Evaluation of presence of RGT15 and RGT18 infected varieties of ryegrass on the presence of Root Aphid.

Methods

[0097] The effect of perennial ryegrass endophyte on the mortality and fecundity of the mealy grass root aphid, *Aploneura lentisci* Passerini (Homoptera, Aphididae), was examined using an *in vitro* bioassay.

Aphid diet preparation

[0098] Roots from a pooled sample of c.100 12-day old seedlings were ground to a fine powder in liquid nitrogen and suspended in a 20% sucrose/ultrapure water solution. A pooled sample reduces symbiotum-symbiotum variation and provides an indication of the population average.

Root aphid bioassays

[0099] Colonies of root aphids were reared on mature endophyte-free perennial ryegrass plants, in a controlled environment room (CER) maintained at 20 ± 2 °C and 62 ± 5% RH, with a photoperiod of 14 h light and 10 h dark.

[0100] Single adult aphids were placed in 35 mm petri dishes. A 200 µl aliquot of the diet was sandwiched between two layers of parafilm, creating a feeding membrane. Feeding chambers were then inverted so that the aphids sat directly on top of their food source. Feeding chambers were enclosed inside an additional large petri dish with a layer of moistened filter paper to maintain a humid environment. A total of 14 aphids were used for each treatment. Adult mortality, nymph production and nymph survival were monitored for eight days. Single factor analysis of variance (ANOVA) was used to determine significance among the treatments. A 2-tailed t-test assuming unequal variance was used to determine significance between two groups.

Results

[0101] The number of adults and nymphs surviving on perennial ryegrass-endophyte root-sucrose diet were determined over eight days. The symbiota tested were perennial ryegrass (prg)-SE (with standard endophyte), prg-AR37, prg-NEA2, 1137-RGT15 and 1137-RGT18. Prg-WE (without endophyte) was used as an endophyte-free control (Table 18).

[0102] Table 18. The mortality and fecundity of pasture root aphids exposed to a root-sucrose diet derived from perennial ryegrass-endophyte symbiota. The total number and percentage of adults surviving (A), nymphs born (NB) and nymphs surviving (NA) was assessed over eight days.

	Day	1		2		3		4		5		6		7		8	
Prg-WE[1]	A	12	100%	12	100%	12	100%	12	100%	8	64%	5	43%	1	7%	1	7%
	NB	17		30		40		48		55		55		55		55	
	NA	17	100%	30	100%	39	98%	40	83%	30	55%	20	36%	4	7%	0	0%
Prg-SE	A	14	100%	14	100%	11	79%	8	57%	6	43%	4	29%	3	21%	0	0%
	NB	17		22		28		38		39		39		39		39	
	NA	12	100%	22	100%	18	64%	20	53%	21	54%	11	28%	1	3%	0	0%
Prg-AR37	A	14	100%	12	86%	8	57%	6	43%	5	36%	5	36%	0	0%	0	0%
	NB	16		28		38		44		46		46		46		46	
	NA	16	100%	28	100%	37	97%	36	82%	29	63%	11	24%	3	7%	0	0%
Prg-NAE2	A	13	93%	12	86%	11	79%	10	71%	7	50%	4	29%	1	7%	0	0%
	NB	7		14		20		25		27		27		27		27	
	NA	7	100%	13	93%	17	85%	20	80%	19	70%	9	33%	4	15%	0	0%
1137-RGT15	A	13	93%	11	79%	11	79%	5	36%	4	29%	3	21%	2	14%	0	0%
	NB	5		13		31		32		31		31		31		31	
	NA	5	100%	13	100%	28	90%	23	72%	17	55%	10	32%	4	13%	4	13%
1137-RGT18	A	13	93%	13	93%	13	93%	5	36%	5	36%	5	36%	3	21%	1	7%
	NB	6		20		24		28		28		28		28		28	
	NA	0	100%	20	100%	20	83 %	16	57%	17	61%	15	54%	10	36	2	7%

[1]at the beginning at the experiment adult aphids **were n=12** for prg-WE, all other symbiota n=14

[0103] Adult aphids exposed to prg-WE diets survived longer than those exposed to perennial ryegrass-endophyte symbiota (Figure 12). For example, 37% of adult aphids exposed to 1137-RGT15 and 1137-RGT18 survived to four days, compared to 100% for prg-WE. Differences in adult survival at 4 days, for the symbiota tested, were statistically significant (ANOVA, $P = 0.0039$). Significant differences ($P<0.05$) were observed between symbiota and prg-WE (adult aphid survival average and variance 1,0) at 4 days: prg-SE (0.571,0.264; P=0.008), prg-AR37 (0.438,0.264; P=0.0011), prg-NEA2 (0.714,0.220; P=0.040), 1137-RGT15 (0.357,0.247; P=0.0003) and 1137-RGT17 (0.357,0.247; P=0.0003). No significant differences ($P<0.1$) were determined between other pairwise combinations of prg-endophyte symbiota. All endophytes reduced adult survival. When considering ranking of symbiota for effectiveness in reducing adult survival 1137-RGT18 = (1137-RGT15 > prg-AR37) > prg-SE > prg-NEA2 > prg-WE.

[0104] Aphid fecundity, measured as nymph production, ceased at five days (Figure 13). Compared to prg-WE (average and variance for nymph production at 5 days 4.583,13.356), significantly ($P<0.1$) less nymphs were born when exposed to root-sucrose diet of perennial ryegrass-endophyte symbiota prg-NEA2 (1.929,5.918; P=0.045), 1137-RGT15 (2.214,5.72; P=0.071) and 1137-RGT18 (2,5.692; P=0.051) but not prg-AR37 (3.286,10.066; P=0.348) or prg-SE 2.786,7.412; P=0.176). No significant differences ($P<0.1$) were determined between other pairwise combinations of prg-endophyte symbiota. The symbiota

1137-RGT15, 1137-RGT18 and prg-NEA2 effectively reduced aphid fecundity. When considering ranking of symbiota for effectiveness in reducing fecundity (1137-RGT18 = 1137-RGT15 = prg-NEA2) > (prg-SE = prg-AR37 = prg-WE).

[0105] Maximum nymph survival was observed at four days (Figure 14). Significant differences ($P<0.1$) were observed between symbiota (ANOVA, $P=0.088$). Compared to prg-WE (average and variance for nymph survival 3.33,8.42), significantly ($P<0.1$) less nymphs survived when exposed to prg-SE (1.429,2.72; $P=0.06$), prg-NEA2 (1.429,3.495; $P=0.067$), 1137-RGT15 (1.643,3.324; $P=0.098$) and 1137-RGT18 (1.143,2.132; $P=0.031$) but not prg-AR37 (2.571,8.11; $P=0.507$). No significant differences ($P<0.1$) were determined between other pairwise combinations of prg-endophyte symbiota. The symbiota 1137-RGT15, 1137-RGT18, prg-SE and prg-NEA2 effectively reduced nymph survival. When considering ranking of symbiota for effectiveness in reducing nymph survival 1137-RGT18 > (prg-SE = 1137RGT15 = prg-NEA2) > (prg-AR37 = prg-WE).

Conclusions

[0106] An in vitro bioassay was used to evaluate perennial ryegrass-endophyte symbiota for effectiveness in mealy grass root aphid (Aploneura lentisci) control. Aphids were fed a diet comprising a pooled sample of c.100 symbiota root samples suspended in sucrose. Use of a pooled sample provides an indication of the symbiota average.

[0107] Significant differences in aphid mortality and fecundity were observed when aphids were fed the root-sucrose diet. The presence of an endophyte generally reduced aphid fitness compared to prg-WE. When considering ranking of symbiota for effectiveness in root aphid control RGAS1137-RGT18, RGAS1137-RGT15 and prg-NEA2 overall provided better whole-of-life cycle control than prg-SE and prg-AR37 see Table 18 and Figures 12 -14.

Example 9 - Replicated live animal feeding trials conducted summer to autumn using lambs.

Materials and Methods

Establishment and Pasture Management

[0108] The trial area was sprayed-out, double-disced and power harrowed prior to sowing. Drilling took place on April using a Horsch Drill, the 3 replicates of each treatment were drilled and then the drilled cleaned thoroughly before starting the next treatment. The paddocks, 0.17 hectares (36 m × 48 m) in size, were sown as pure swards of perennial ryegrass.

[0109] The target sowing rate was 15 kg/ha of seed, assuming 90% germination and 90% field emergence and rates were adjusted according to seed size, in theory this would achieve a plant population of 520 plants/m^2.

[0110] Weeds were controlled through the winter and spring with applications of 650 mL/ha of Starane for

winter application and a combination of Jaguar at 1.5Uha and Nortron at 4Uha for spring application.

[0111] The trial area received 250 kg/ha of Cropzeal 20N as starter fertiliser before drilling in April 2018 and four applications of SustaiN; 100 kg/ha in September, 100kg/ha at the end of October, 150 kg/ha at the end of December and 150 kg/ha at the end of January, totaling 500 kg/ha leading up to the trial period.

[0112] The trial was not irrigated. Grazing occurred in common by ewes for three weeks in November/December, with ewes removed on mid-December and again by lambs in January, with the lambs coming off on end of January and the trial area topped to 75 mm height after which point the blocks were fenced into individual paddocks.

Climate

[0113] The summer of 2019 was hotter and dryer than the 10 year average. Mean air temperature and monthly rainfall from the Lincoln Broadfield EWS Weather Station showed that March of 2019 was on average 1.7 °C warmer than the mean of 2009 to 2019.

	JAN		FEB		MAR	
	2019	10 Year Mean	2019	10 Year Mean	2019	10 Year Mean
Total Rainfall (mm)	36.2	43.7	29.2	41.7	26.8	47.5
Mean Air Temperature	18.6	17.3	17.8	17.0	17	15.3

Endophyte Presence

[0114] 50 tiller samples were taken from each paddock and endophyte levels were measured and before further testing were confirmed to be above the 70% threshold for selling commercial seed to the market refer the KASP section and Table 19 below.

KASP

[0115] Endophyte purity and content testing was performed (44-50 tillers from each sample) from the perennial ryegrass-endophyte lines (3 replicates) were tested.

[0116] DNA was extracted from each line using the MagAttract Plant DNA kit (Qiagen) in an automated workflow with liquid handling platforms (Beckman Coulter). Each DNA sample was genotyped using a strain specific `Kompetitive Allele Specific PCR' (KASP™) genotyping method using diagnostic SNPs. Each plate contained eight positive controls as well as four no template controls (without DNA) for quality control. Each sample was tested for presence of the expected endophyte.

Table 19: Mean Endophyte Presence (%) of treatments

Cultivar Endophyte Combination	**KASP**

SAMSON AR1	98
STELLAR-RGT18	95
SAMSON SE	99
TROJAN NEA2	83
SAMSON AR37	75
STELLAR-RGT15	73

Note: KASP test provides the most definitive test for level of presence of live endophyte. Commercial levels for live endophyte are a minimum of 70%

[0117] The key controls used for the trials were SAMSON AR1 (Negative control, AR1, nil animal health effects) and SAMSON SE (Positive standard endophyte control).

[0118] Yield for the cultivars detailed in Table 19 was assessed as a function of calculating the number of lambs to be placed into each paddock at the start of the trial. The yield was measured at the mid-point of the trial to ensure enough feed would be available to lambs for the remainder of the trial period The close range of the final yield measurements (890 to 1134 kg DM/ha) shows that lamb numbers per paddock were well managed and that the assumptions made in the calculations for these were sound.

Lamb Liveweight Gain

[0119] SAMSON SE had the lowest liveweight gain in weeks 0-2 and varieties 2, 3, 5, 6 and 8 had significantly higher gains than this. There was only one significant difference in weeks 2-4 for liveweight gain.

Table 20. Mean lamb liveweight change (kg/head) for Week 0 - 2, Week 2-4 and Week 0-4.

	Treatment	**Mean lamb liveweight change (kg/head)**					
		Week 0 - Week 2		**Week 2 - Week 4**		**Week 0 - Week 4**	
STELLAR-RGT18		6.1	a	0.6	ab	6.7	a
STELLAR-RGT15		5.2	ab	1.1	a	6.3	a
SAMSON AR37		6.3	a	-0.3	ab	6	ab
SAMSON SE	4.4	b	0.1	ab	5.9	ab	
SAMSON AR1	5.4	ab	-0.3	ab	5.1	ab	
TROJAN NEA2	5.3	ab	-0.9	b	4.4	b	
LSD 5%	1		1		1		

[0120] Liveweight gain as a measure of the potential treatment effect is not a useful gauge as it is dependent on the number of lambs per paddock which, in this case, was according to the ETC Protocol minimum lambs/paddock requirement rather than a calculated number of lambs based on dry matter production available.

Stock and Animal Ethics

[0121] Animal Ethics Approval was sought and granted by the Lincoln University Animal Ethics Approval

Committee.

[0122] Trial lambs were sourced from the neighbouring farmer who made available 320 Coopworth x Hampshire cross and straight Coopworth ewe lambs at an average liveweight (unfasted) of 31.3 kg/head. All lambs had been grazed on Lucerne for the three weeks prior to the start of the trial, were freshly shorn the previous week and received a drench prior to going onto the trial. Lambs were allocated to paddocks at random and were weighed prior to going onto the trial.

Feed Grown

[0123] Yield was assessed by taking 3 strips using a rotary mower to 4 cm from each paddock and drying a sub sample to calculate dry matter percent.

[0124] Several assumptions were made when using yield figures to calculate the number of lambs to be allocated to each paddock: that the predicted dry matter production growth per day during the trial period would be 35 kg DM/ha, that the residual remaining at the end of the trial period would be 800 kg DM/ha and that lamb intake during the trial period would be 1.5 kg DM/ha/head.

[0125] Using these calculations, it was expected that feed would be tight towards the end of the 28 day trial period but 10 lambs per paddock (the ETC Protocol minimum number of lambs/paddock) were applied to all paddocks except three paddocks which had higher yields, these received 12 lambs.

[0126] Yield measurements were also taken using the same method, however the final measurement, at the end of the trial period was taken using a rising plate meter as a rotary mower would not have collected much yield above the 4 cm cutting height.

[0127] Yield was closely monitored and at the mid-point of the trial, those paddocks that had 12 lambs allocated to them had 2 lambs removed as the pasture cover was getting low. The mid-point yield measurement highlighted four other paddocks with low pasture covers (<1000 kg DM/ha). The Biometrician David Baird was consulted and his recommendation was to remove some lambs from each of these paddocks (as opposed to running with all 10 lambs and shortening the trial period for those paddocks), so three lambs were removed to leave seven in each paddock.

Lamb Liveweights

[0128] Unfasted lamb liveweights were recorded at the start, mid-point and end of the trial period respectively.

Herbage Alkaloids -See also Example 10 below

[0129] Samples for herbage alkaloid analysis were taken using an electric handpiece at the start, mid-point and end of the trial period respectively). Ten areas approximately 20 cm long were cut to ground level and combined from which a sub-sample of 150 grams was collected and stored immediately within layers of ice. Samples were then transferred to a freezer.

[0130] Samples were freeze dried and then referenced under trial codes and forwarded for laboratory analysis.

Staggers Scoring

[0131] Lambs were assessed using the Keogh Scale (see below) after grazing on paddocks for one week, again after two weeks after which point the scoring occurred twice weekly.

[0132] While operating in the best interests of the trial animals, the Trial Operator removed any lambs from the trial that staggered to the point of falling over (those that registered as a Score 4 or 5 on the Keogh Scale).

[0133] The Trial Operator interpreted a Score 3 to include 'stiff leg walking' or 'knee-walking' and a Score 4 `knee-walking to the point of falling over'.

Keogh (1973 Description of Staggers Symptoms)

[0134]

0 - No symptoms

1 - Slight trembling of neck, shoulders, and flank muscles after hard exercise (400 m run).

2 - Marked trembling of neck, shoulders and flank muscles, and shaking of head after hard exercise, but no lack of co-ordination.

3 - Marked trembling of general musculature and head shaking; some lack of co-ordination of movement and impaired vision while running.

4 - Muscle tremors and head shaking after a short run (< 30 m) or sudden disturbance; continued exercise elicits a marked lack of co- ordination resulting in a characteristic staggering gait which normally ends with the animal falling down; a short period of moderate to severe muscular spasm follows, after which the animal is able to regain its feet and walk off.

5 - Severe muscle tremors elicited by slight disturbance or exercise « 10 m rapid movement) which invariably result in staggering and collapse in a severe tetanic spasm which may last up to 20 min in very bad cases.

Staggers Results

[0135] Referring to Table 20 above and Figures 15 and 16 what is significant is that the only treatment that showed a significant increase in stagger scores was SAMSON SE.

[0136] In particular SAMSON SE was significantly higher on the Keogh Scale than all other treatments at the 5% level at the first score (measured 7 days after the start of the trial) and was significantly higher

again at the 0.1% level when next measured 10 days later.

[0137] Indeed, the observed staggers in SAMSON SE paddocks was so extreme Score 3 and above that all lambs were removed from the paddocks prior to the conclusion of the trial.

[0138] There were no other significant differences between the remaining 5 treatments as can be seen from the overlapping baseline of their datapoints in Table 20 and Figures 15 and 16 - (with only a slight variance clearly observable for STELLAR-RGT18 in Figure 16). Importantly, where lambs have been removed from plots the previous stagger scores have been carried over, to allow unbiased estimates of effects.

Conclusion

[0139] It is clear from the above results that RGT15 and RGT 18 endophytes of the present invention present a real-world advantage to SAMSON SE wildtype endophyte symbiont in terms of not sacrificing animal health for any improved reduction in insect related predation over non-symbiont grass.

Example 10 - Alkaloid results

[0140] The results of the herbage alkaloids from the endophyte grass symbionts (treatments) tested as mentioned above are shown in Figures 17 -19.

[0141] As can be seen in Figure 17 STELLLAR -RGT15 produces a similar amount of peramine to TROJAN NEA2 with much higher levels being observed in SAMSON AR1 and SAMSON SE.

[0142] In Figure 18 it can be seen that only SAMSON SE produces significant levels of lolitrem B compared to the relatively small amounts produced by TROJAN NEA2 with no other treatments producing any detectable levels or lolitrem B.

[0143] In Figure 19 the SAMSON AR37 and STELLAR-RGT18 treatments are the only grass endophyte symbionts producing epoxy-janthitrem I. With STELLAR-RGT18 producing around two thirds the amount of epoxy-janthitrem I of that produced by SAMSON AR37.

[0144] It is noteworthy, as can be seen from Figures 4 and 5 that the RGT18 grass symbiont in addition to epoxy-janthitrem I, also produces epoxy-janthitrems II, III and IV at relative ratios, that are such that:

- the combination of epoxy-janthitrems I-IV produced by the RGT18 grass symbiont does not impact animal performance; yet
- clearly imparts black beetle resistance to the grass;

refer Examples 7 and 9 above.

Conclusion

[0145] The only grass endophyte symbiont tested which produced significant amounts of lolitrem B was SAMSON SE, importantly neither STELLAR-RGT15 nor STELLA- RGT18 produced lolitrem B.

[0146] It can be seen from the results that STELLAR-RGT15 is an endophyte capable of producing commercial acceptable levels of peramine.

[0147] The results also show that both STELLAR-RGT18 and SAMSON AR37 are the only grass endophyte symbionts which produce epoxy-janthitrem I.

Example 11 Agronomy: Grass Endophyte Symbiont Dry Matter Production Studies

Materials and Methods

[0148] The Lennox Trial compared dry matter production of RGA1137-RGT18, RGA1137-RGT15, RGA1137 WE, One50 AR1, and One50 AR37. The trial location was situated near Ladbrooks, Canterbury with Wakanui clay loam soil. It was a dryland and mow only trial. The randomized complete block having 4 replicates with nutrients being replaced following each harvest based on the mean yield removal. The Waikeria Trial compared dry matter production of STELLAR-RGT18, STELLAR-RGT15, STELLAR AR1, Request AR1, and Request AR37. The trial location was situated in the Waikato region near Te Awamutu with ash (allophanic) soil type. It was a dryland and mow only trial. The randomized complete block having 4 replicates with nutrients being replaced following each harvest based on the mean yield removal. Both trials were harvested when the average dry matter yield was between 2000-2700 kg/ha. Fresh weight was recorded, with a subsample of the fresh herbage dried to provide a dry matter %.

Results

[0149] Results of the Lennox Trial are shown in Table 21 and Figure 20, and these clearly indicate that average total dry matter yields of host plants containing RGT18 were superior over those plants with no endophytes, or with the commercial endophytes tested.

[0150] Results of the Waikeria Trial are shown in Table 22 and Figure 21, and these also clearly indicate that average total dry matter yields of host plants with RGT18 were superior over those plants with no endophytes, or containing the commercial endophytes tested.

Table 21: Lennox Trial: Average Total Dry Matter Yield (kgDM/ha) by Years

Variety	Year 1	Year 2	Year 3	Average Total Dry Matter Yrs 1-3
RGAS1137-RGT18	15,450	12,321	14,426	14,203
RGAS1137-RGT15	14,946	12,778	13,767	13,897
RGAS1137WE	14,279	11,566	14,219	13,456
One50 AR37	14,357	12,470	12,763	13,183
One50 AR1	14,423	11,705	12,971	13,043
Trial Mean	*13,850*	*11,830*	13, 399	*13,009*
LSD (5%)	*1,206*	*1,072.0*	*1,050.0*	*611.9*
CV%	*9.3*	*5.4*	*6.6*	*5.1*

Table 22: Waikeria Trial: Average Total Dry Matter Yield (kgDM/ha) by Years

Variety	Year 1	Year 2	Average Total Dry Matter Yrs 1-2
STELLAR-RGT18	12,212	17,103	14,717
STELLAR-RGT15	11,702	16,797	14,297
SF STELLAR AR1	11,370	16,221	13,910
REQUEST AR37	11,215	16,006	13,683
REQUEST AR1	10,656	15,432	13,111
Trial Mean	*11, 617*	*16,282*	*13,963*
LSD (5%)	*577.4*	*773.6*	*761.7*
CV%	*6.7*	*3.3*	*4.3*

Conclusion

[0151] The results of both the Lennox and Waikeria trials show RGT15 and RGT18 endophytes support better yields over a three year period within the same grass cultivar.

[0152] The invention detailed herein may provide one or more advantages over the prior art endophyte grass symbionts and/or wildtype grasses, or at least offer the public a useful choice.

REFERENCES

[0153]

1. [1] van Zijll de Jong E., Dobrowolski M.P., Bannan N.R., Stewart A.V., Smith K.F., Spangenberg G.C., and Forster J.W., 2008. Global Genetic Diversity of the Perennial Ryegrass Fungal Endophyte Neotyphodium lolii. Crop Science, 48:1487-1501.
2. [2] Gallagher R.T., White E.P., and Mortimer P.H., 1981. Ryegrass staggers: Isolation of potent neurotoxins lolitrem A and lolitrem B from stagger-producing pastures. N.Z. vet. J. 29:189-190.
3. [3] Yates S.G., Plattner R.D., and Garner G.B., 1985. Detection of ergopeptine alkaloids in endophyte infected, toxic Ky-31 tall fesue by mass spectrometry/mass spectrometry. J. Agric. Food Chem. 33: 719-722.
4. [4] Ball O.J.P., Miles C.O., and Prestidge R.A., 1997. Ergopeptine alkaloids and Neotyphodium lolii-mediated resistance in perennial ryegrass against adult Heteronychus arator (Coleoptera, Scarabaeidae). J. Econ. Entomol. 90: 1382-1391.
5. [5] Prestidge R.A. and Gallegher R.T., 1988. Endophyte fungus confers resistance to ryegrass: Argentine stem weevil larval studies. Ecol. Entomol. 13:429-435.
6. [6] Rowan D.D. and Gaynor D. L., 1986. Isolation of feeding deterrents against Argentine stem weevil from ryegrass infected with endophyte Acremonium loliae. J. Chem. Ecol. 12: 647-658.
7. [7] Morland Latch G.C., Christensen M.J., Tapper B.A., Easton H.S., Hume D.E., Fletcher L.R. 2000. Ryegrass endophytes. US Patent No.6072107.
8. [8] Cameron N.E., 2015. Grass endophyte. US patent No. 9133434.
9. [9] Tapper B.A., Cooper B.M., Easton H.S., Fletcher L.R., Hume D.E., Lane G.A., Morland Latch G.C., Lee Pennell C.G., Popay A.J., Christensen M.J., 2011. Grass endophytes. US Patent No. 7976857.

10. [10] Finch S. C., Wilkins A. L., Popay A. J., Babu J. V., Tapper B. A., Lane G. A. (2010). "The isolation and bioactivity of epoxy-janthitrems from AR37 endophyte-infected perennial ryegrass," in Proceedings of the 7th International Symposium on Fungal Endophytes of Grasses, eds Young C. A., Aiken G., McCulley R. L., Strickland J., Schardl C. L., editors. (Lexington, KY).
11. [11] Hennessy L. M. (2015). Epoxy-Janthitrems, Effects of Temperature on in Planta Expression and their Bioactivity against Porina Larvae. Masters thesis, University of Waikato, Hamilton.
12. [12] Latchs G., and Christensen M. 1985. Artificial infection of grasses with endophytes. Annals of Applied Biology: An International Journal of the AAB., 107(1), 17-24.
13. [13] Keogh, R.G. 1973. Induction and prevention of ryegrass staggers in grazing sheep. New Zealand Journal of Experimental Agriculture 1: 55-57.
14. [14] Young C.A. et al. 2009. Indole-Diterpene Biosynthetic Capability of Epichloe Endophytes as Predicted by ltm Gene Analysis. APPLIED AND ENVIRONMENTAL MICROBIOLOGY 75(7): 2200-2211.

REFERENCES CITED IN THE DESCRIPTION

Cited references

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US7976857B2 [0006]
- US6072107A [0153]
- US9133434B [0153]
- US7976857B [0153]

Non-patent literature cited in the description

- **VAN ZIJLL DE JONG E.DOBROWOLSKI M.P.BANNAN N.R.STEWART A.V.SMITH K.F.SPANGENBERG G.C.FORSTER J.W.**Global Genetic Diversity of the Perennial Ryegrass Fungal Endophyte Neotyphodium loliiCrop Science, 2008, vol. 48, 1487-1501 [0153]
- **GALLAGHER R.T.WHITE E.P.MORTIMER P.H.**Ryegrass staggers: Isolation of potent neurotoxins lolitrem A and lolitrem B from stagger-producing pasturesN.Z. vet. J., 1981, vol. 29, 189-190 [0153]
- **YATES S.G.PLATTNER R.D.GARNER G.B**Detection of ergopeptine alkaloids in endophyte infected, toxic Ky-31 tall fesue by mass spectrometry/mass spectrometry.J. Agric. Food Chem.,

1985, vol. 33, 719-722 [0153]

- **BALL O.J.P.MILES C.O.PRESTIDGE R.A.**Ergopeptine alkaloids and Neotyphodium lolii-mediated resistance in perennial ryegrass against adult Heteronychus arator (Coleoptera, Scarabaeidae).J. Econ. Entomol., 1997, vol. 90, 1382-1391 [0153]
- **PRESTIDGE R.A.GALLEGHER R.T.**Endophyte fungus confers resistance to ryegrass: Argentine stem weevil larval studiesEcol. Entomol., 1988, vol. 13, 429-435 [0153]
- **ROWAN D.D.GAYNOR D. L.**Isolation of feeding deterrents against Argentine stem weevil from ryegrass infected with endophyte Acremonium loliae.J. Chem. Ecol., 1986, vol. 12, 647-658 [0153]
- The isolation and bioactivity of epoxy-janthitrems from AR37 endophyte-infected perennial ryegrass**FINCH S. C.WILKINS A. L.POPAY A. J.BABU J. V.TAPPER B. A.LANE G. A.**Proceedings of the 7th International Symposium on Fungal Endophytes of Grasses20100000 [0153]
- Epoxy-Janthitrems, Effects of Temperature on in Planta Expression and their Bioactivity against Porina Larvae**HENNESSY L. M.**Masters thesisUniversity of Waikato20150000 [0153]
- **LATCHS G.CHRISTENSEN M.**Artificial infection of grasses with endophytesAnnals of Applied Biology: An International Journal of the AAB., 1985, vol. 107, 117-24 [0153]
- **KEOGH, R.G.**Induction and prevention of ryegrass staggers in grazing sheepNew Zealand Journal of Experimental Agriculture, 1973, vol. 1, 55-57 [0153]
- **YOUNG C.A. et al.**Indole-Diterpene Biosynthetic Capability of Epichloe Endophytes as Predicted by Itm Gene AnalysisAPPLIED AND ENVIRONMENTAL MICROBIOLOGY, 2009, vol. 75, 72200-2211 [0153]

Patentkrav

1. Fremgangsmåde til at forbedre levedygtigheden, bestandigheden og/eller kraften af en værtsplante i form af *Lolium multiflorum Lolium ×hybridum* og *Lolium perenne*, (værtsgræs), som omfatter trinnet:

- kunstig inokulering af værtsgræsset med en LpTG-3-endophyt-RGT18-stamme;

således at LpTG-3-endophyt-RGT18-stammen kan:

- producere mindst et alkaloid eller en kombination af alkaloider, der giver værtsgræsset en gunstig alkaloidprofil; og/eller
- beskytte planten mod biotiske belastninger.

2. Fremgangsmåde ifølge krav 1, hvor alkaloidet er mindst én janthitrem-epoxidforbindelse.

3. Fremgangsmåde ifølge krav 2, hvor alkaloidet er valgt blandt en hvilken som helst af epoxy-janthitrems I-IV; eller en kombination heraf.

4. Fremgangsmåde til at forbedre levedygtigheden, bestandigheden og/eller kraften af værtsgræsser i form af *Lolium perenne Lolium multiflorum*, *Lolium ×hybridum*, omfattende trinene:

a) inokulering af et første værtsgræs med LptG-1-endophyt-RGT15-stamme og

b) inokulering af et andet værtsgræs med LptG-3 endophyt-RGT18-stamme;

c) samdyrkning af værtsgræsser, der er inokuleret i overensstemmelse med trin a) og b).

5. Produktionszone, som omfatter dyrkning deri af mindst ét værtsgræs i form af *Lolium perenne*, *Lolium multiflorum*, *Lolium ×hybridum*, hvor værtsgræsset/værtsgræsserne er blevet podet ifølge en hvilken som helst af fremgangsmåderne ifølge kravene 1-4.

6. Produktionszone ifølge krav 5, hvor de to græsser er tilfældigt indsat i produktionszonen.

7. Produktionszone ifølge krav 5, hvor de to græsser dyrkes i adskilte områder inden for produktionszonen.

8. Produktionszone ifølge krav 7, hvor de to græsser hver især dyrkes i hver sin halvdel af produktionszonen.

9. Isoleret endofyt af *Epichloë festucae* var. *lolii*-arten LpTG-3 RGT18, hvor variationer i morfologien og/eller alkaloidprofilen over kendte LpTG-3-stammer er som eksemplificeret ved RGT18 deponeret hos National Measurement Institute og hver især tildelt accessionsnumre V18/011211 hhv.

10. Anvendelse af en isoleret endofyt af *Epichloë festucae* var. *lolii*-arten LpTG-3 RGT18 for at tilvejebringe sæsonbestemt variation i alkaloiderne, der er produceret af endofyt(erne), når de er til stede i et værtsgræs.

11. Anvendelse af en isoleret endofyt af *Epichloë festucae* var. *lolii*-arten LpTG-3 RGT18 for at fremhæve fordelene ved øget insekttolerance og/eller reducere eller begrænse bivirkningerne af forskydninger på græssende dyr, når de er til stede i et værtsgræs.

12. Isoleret endofyt af *Epichloë festucae* var. *lolii*-arten LpTG-3 RGT18 med et genom, der inkluderer sekvensen af nukleinsyrer som vist i SEQ ID NO. 1 - 817.

DRAWINGS

Drawing

FIGURE 1

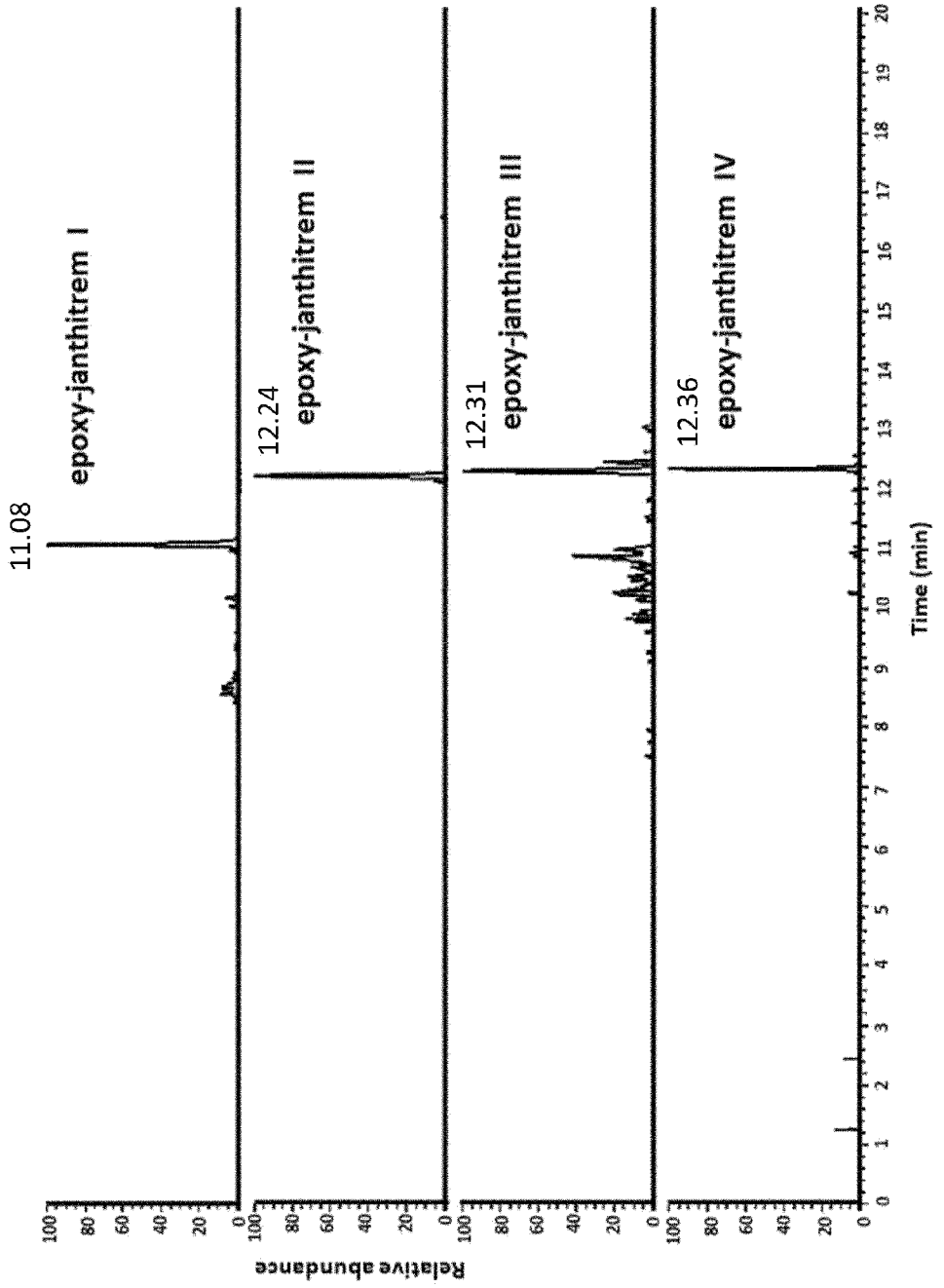


FIGURE 2A

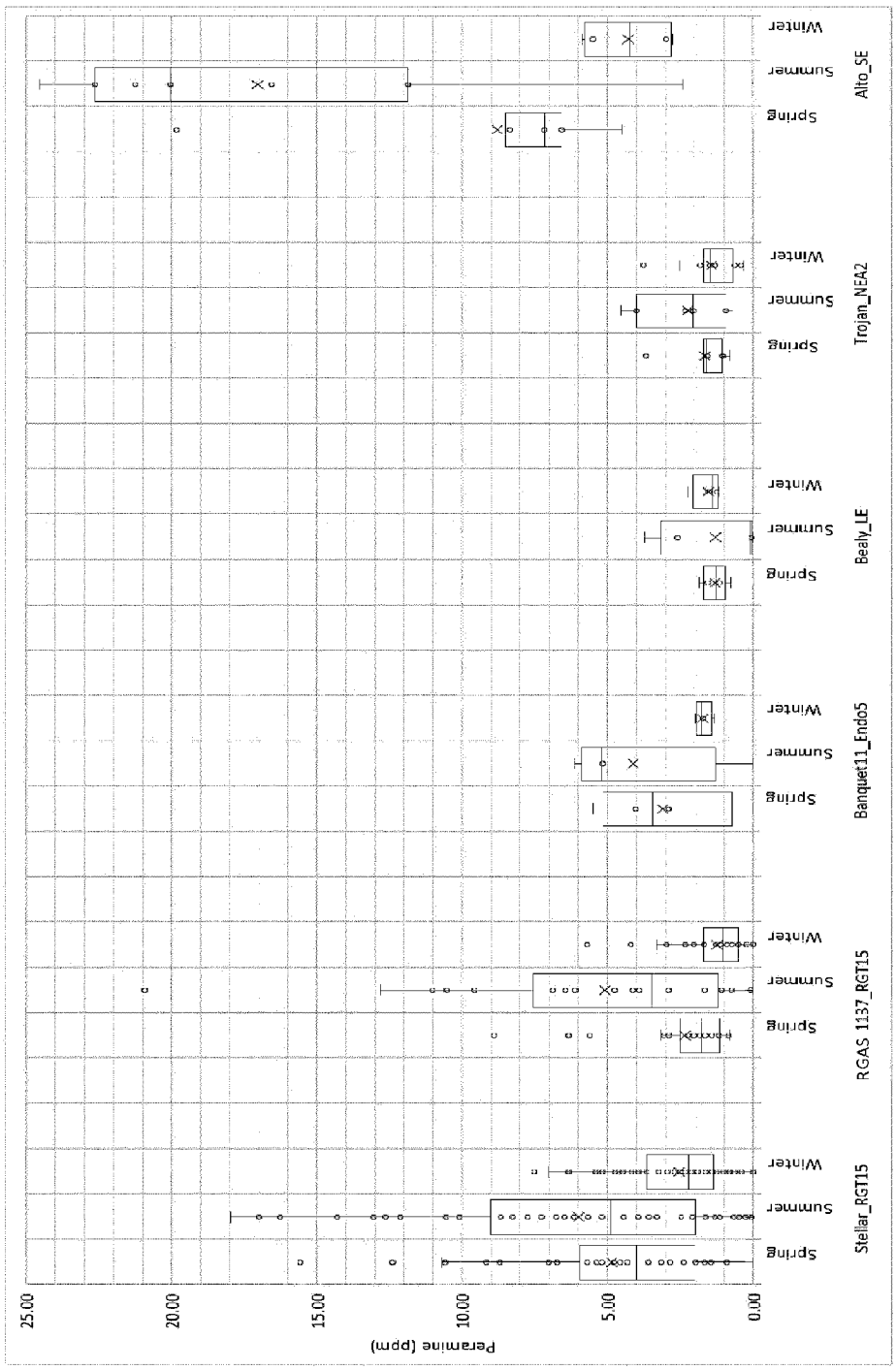

Peramine (ppm)
25.00
20.00
15.00
10.00
5.00
0.00
Stellar_RGT15
RGAS 1137_RGT15
Banquet11_Endo5
Bealy_LE
Trojan_NEA2
Alto_SE
Spring
Summer
Winter

FIGURE 2B

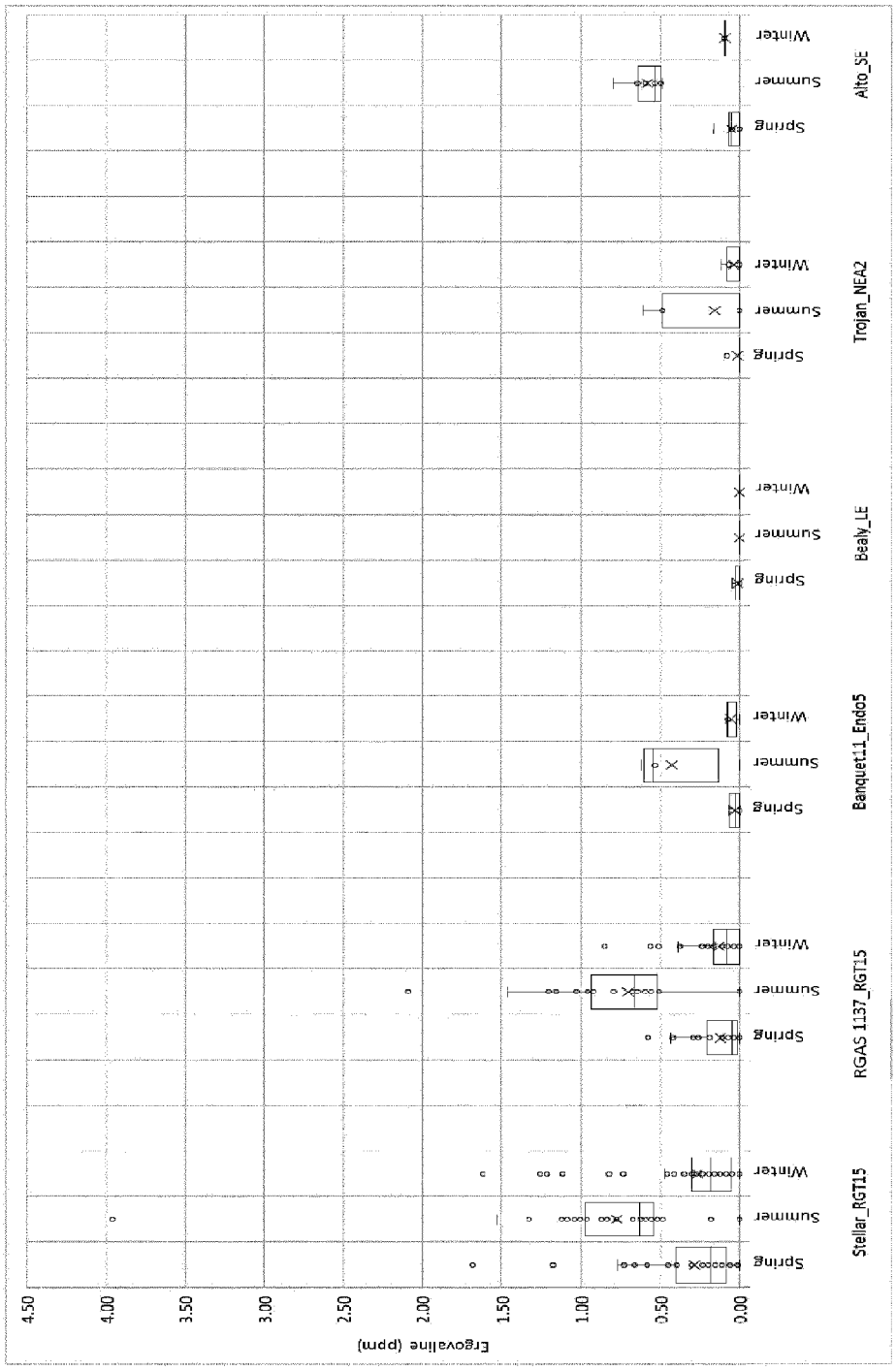

Ergovaline (ppm)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Stellar_RGT15
RGAS 1137_RGT15
Banquet:1_Endo5
Bealy_LE
Trojan_NEA2
Alto_SE
Spring
Summer
Winter

FIGURE 3

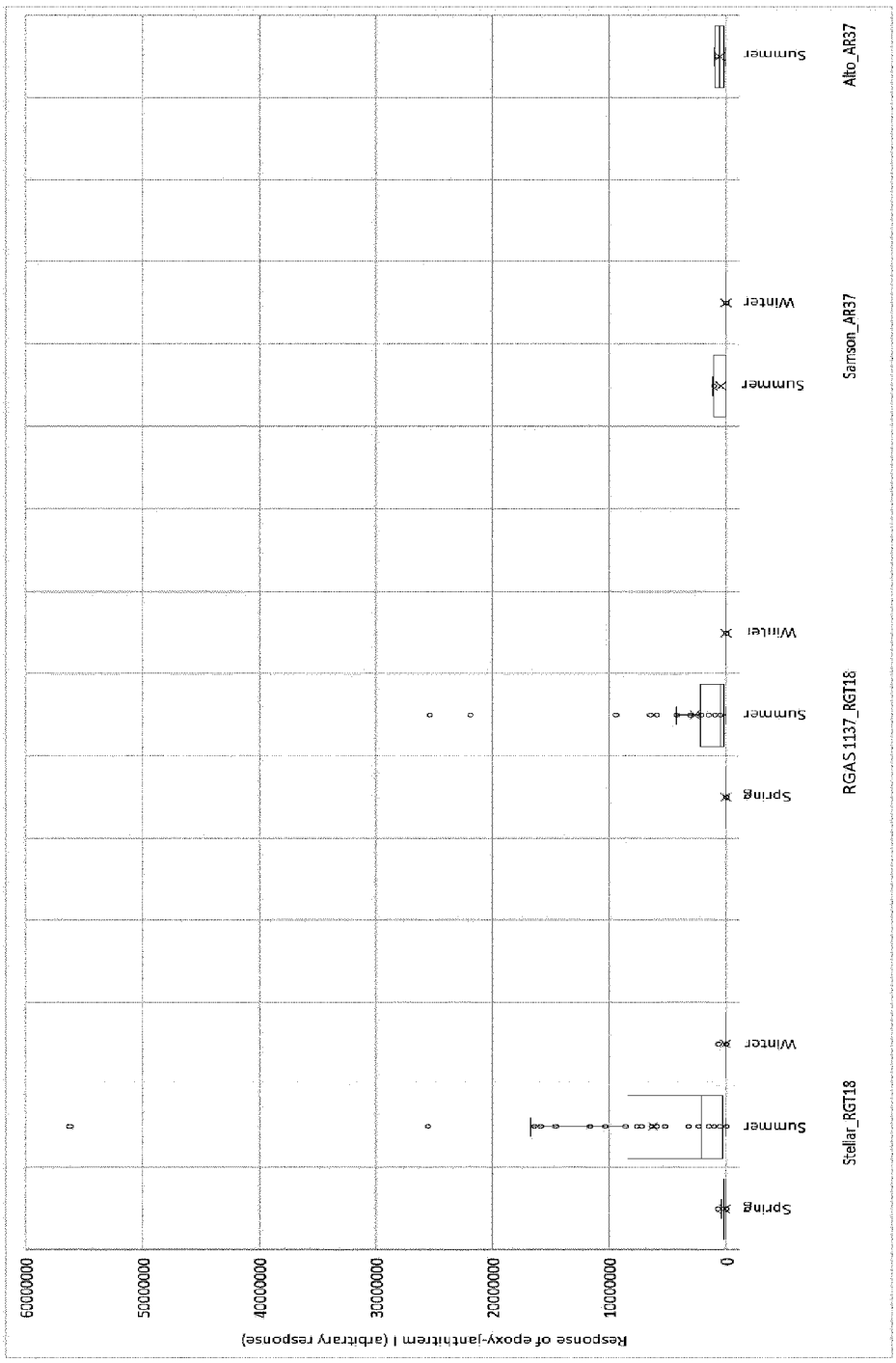

Response of epoxy-anthitem I (arbitrary response)
60000000
50000000
40000000
30000000
20000000
10000000
0
Spring
Summer
Winter
Stellar_RGT18
Spring
Summer
Winter
RGAS 1137_RGT18
Summer
Winter
Samson_AR37
Summer
Alto_AR37

FIGURE 4

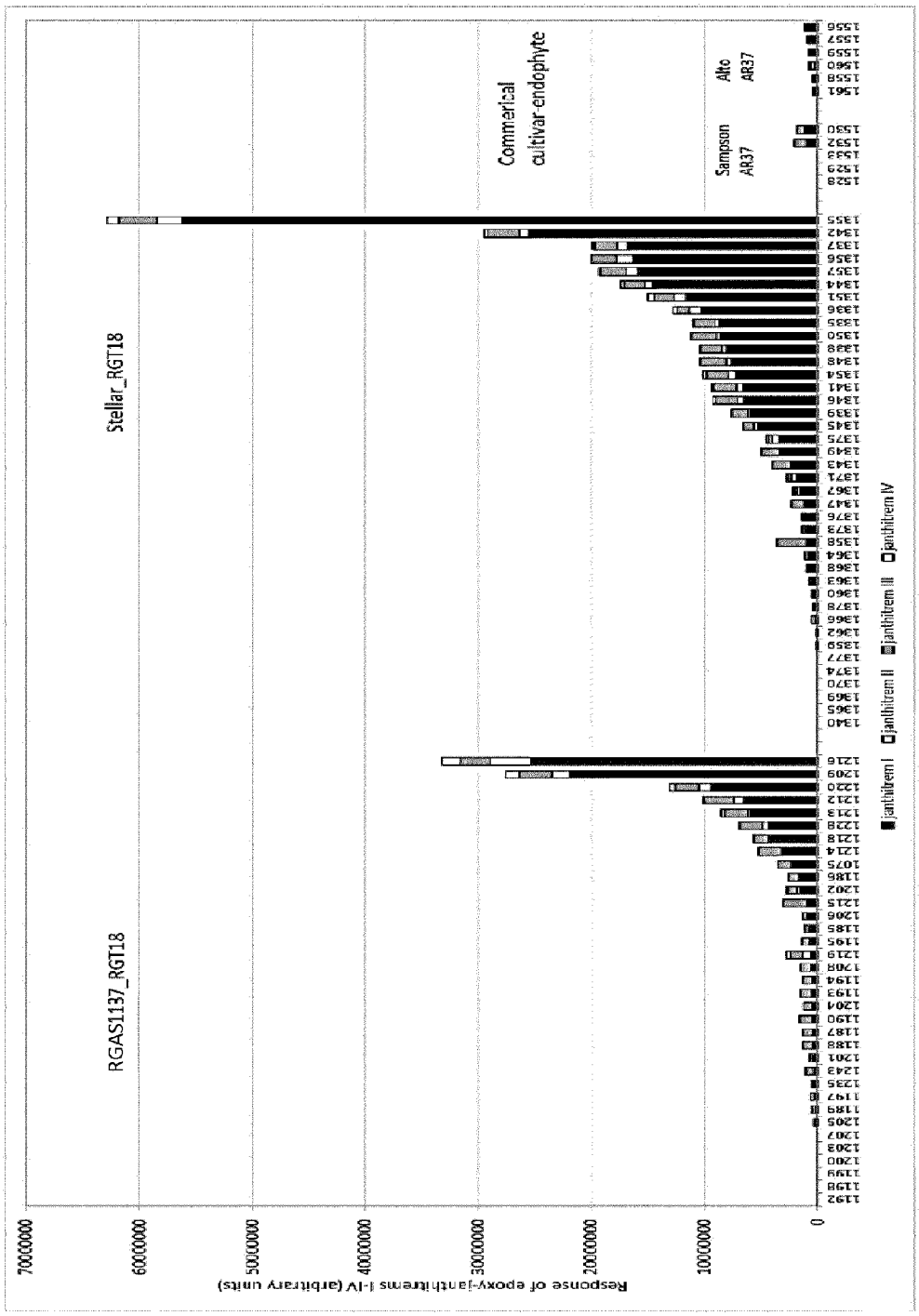

Response of epoxy-Janthitrems I-IV (arbitrary units)
70000000
60000000
50000000
40000000
30000000
20000000
10000000
0
RGAS1137_RGT18
Stellar_RGT18
Samposon AR37
Alto AR37
Commercial cultivar-endophyte
Janthitrem I
Janthitrem II
Janthitrem III
Janthitrem IV

FIGURE 5

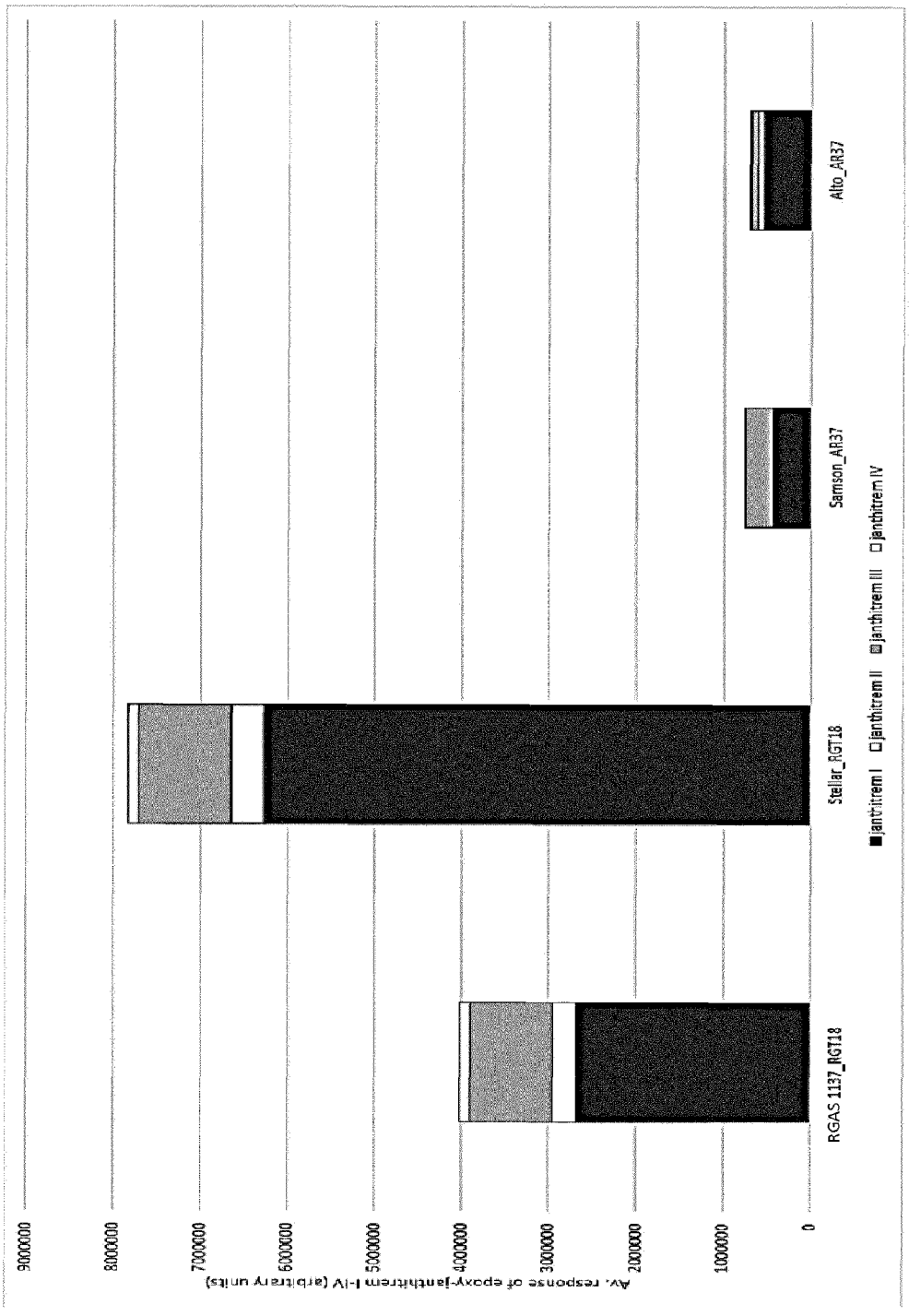

9000000
8000000
7000000
6000000
5000000
4000000
3000000
2000000
1000000
0
Δv. response of epoxy-jantitrem I-IV (arbitrary units)
RGAS 1137_RGT18
Stellar_RGT18
Samson_AR37
Alto_AR37
jantitrem I
jantitrem II
jantitrem III
jantitrem IV

Figure 6

Information used to produce the sequence listings for strains of *Epichloë festucae*

First letter into the brackets is the nucleotide observed on AR37 and the second letter after the "/" is the nucleotide observed on RGT18

locus_12991
CTTTACCTAAAGCATTAACTTAGGGTTTAAAGGAATACCTCCTCTAAGAA[T/A]AATTTCTAAAT
CCTTCGCTCCTATAAGGTATTACTAAAGGTACTTCTAAAG
C364892_m_1351
GACCGACTGCGCAGATCCCGTCAAGTTGTCATGCCGATCTGAAACTCTAG[A/G]CCCCTCCC
ACTCTTCACTGCACAACTCGACAGCCCGGTTTGTGTCAGTGAA
C369440_m_2614
ATTCCTTAAACTAGTTATCTTAAGATATTATAGAATTACTTACTATTAAG[G/A]AGAATAAAGTT
ATAAAGATAAGAAAGAGAGAAAAAAGAGTTAAGGGAGTAA
C369562_m_3539
CTCCTGGGTCTCCTGGTCTAGTCGCGAGATAAGTCGCGAGATAAGATAAG[A/G]CTGGACAG
CAACAAGCTGCTGTGTTGTTGCATGTTCCAACAGCCATTGAGC
C369930_m_1465
TAGCTCATCACAATAATTCATGAGAACAATTTTTTATTATTATTATTATT[C/A]TTCTTCTTCTTC
TTCTTCTTCTTGTCCTTCTCCTATTTAGCCGCCATTTCC
C370040_m_4739
CGGCCGGCCAGGAACATGGGAATGGCAGTGGACGCGGTTTGCAGGATGAC[C/A]CCCAGGT
TGAAGACCCAGCATGAGATGATGAGAGCCAGACGCCGGCCAATG
C370074_m_1987
ATACAGAATGGTGTAATTGTAAGTCCTATACAAAGAGAGAGAGAGAGAAA[A/G]GGGGGGCA
AAGGAGAGAAAACATCATACGCACCAGTCCCAAGATCAGAAAC
C370138_m_5622
ACGCCATCATCGGGGCCTCGGCCGCCCTCGCCGGCGTAACACGCATGACG[G/A]TATCCAT
CGTCGTCATCATGTTCGAGCTCACGGGCGCGCTGACGTATGTGC
C370190_m_3124
ATTTTTTTTTCGATGGATGCGGGCGGTTTTCGATGGTATTGGCGGTCGGA[A/T]CGGGTCAGA
GGAGGACGACTCACCACTGCGACTCTACCGGCAACAGAGACG
C370288_m_385
TTTCCCTGAATCCATTCGTTCCCTGGTCCCTGGTCTAGGTGTGGGAGTGA[A/G]TTGGTGGA
GCAATTTACGGATCCGTACCCGAGCTCTGATCGACGAGCGGAC
C370290_m_421
TGGTGTTCCAGGTGACGAGGTTCGGGCTGACGCCATGCTCTCGCATGATT[T/C]GAAGGATC
TGCTCGGCCAGCAGGCGGTCGCGGCCGTTCATCAAACCCCGCA
C370362_m_885
ATGGGTGCGTCTAGCAGGACAAGCCAGACGTATATCCTCAAGGGTGACTA[A/G]CCGGGAAA
ACCCCTCCAATGTCAGTAAAAGACGACTGCTTTTCTCGAACTG
C370774_m_7352
TGTTGTTGTGTGTTGTGTGCGGGCGAGGAGGGGCAGTTTTCCATACCTAT[T/C]GTGTGACC
CCGCTGCTCCATGTAGTCAAAGAAGGCCTTGCGCACCCGCGCA
C370830_m_6184
CCGTCTACGGAGACTCCCGTGAGAAGAAAAGTTACCAGGCTGTTGCACAC[G/C]CCCCGACA
CTAGAGGCGTCATCTTCTTCTTGTCCCCACCGCCTGGCACCAC
C371228_m_6920
ACGAGCTCTAGAAGTACTTCTTGCGCATTGCTGTTGCCGCTGAGTCGACT[T/G]CTATTGATG
AAGGGGAATTCGGATACCTGATCTATCGAGGGTAGGCGCACA
C371274_m_9715
AGAGCTCAATGACTGCCACGCCAGAGTACATGGCCCCCAGGCCCAATATC[G/A]CCAGGCC
CGGGCAAGCGCAACAAGACTCTGAGGAATACATACTGCAATAAG
C371494_m_5533
TCCCCCACTACATCACGTGTAAGGAAAGGGGCTGGGCGCTGGCATGTATT[C/A]GGGCACAC
TCCAGGCCACCCTGCTCAGGTCCATCTGCTTACTGTTGGTTGG

C371548_m_10171
CACTGCACTGCACTGCACGTAGCACCCATCTCGTTCAAATCTAGGTCCAA[C/G]GGAAGCGT
CCCTTTTTTTCAAAGAGAAGAAGGAATGCTGAGACATCGGGAC
C371558_m_7272
GCAAGACTGCAAGACTGCAAGATTGCACTGCGACAACACCCAGGTTGGTA[C/T]CACCAAAC
ACCCCCAAACACCCCCAAACACCCCAGGCAGCCACCCGGACGT
C371668_m_4548
CGCCGCAGGAGCCGCAGGAGCCACAGGAGCCACAGGGACTACGGGAGCCA[T/C]TGATGG
AATCCACGGCCAACTCCAGCGTCACGGCGGCCAATCACATCTGCA
C371926_m_13193
GATACTTGTTACTTATCACAAAGAAGAGATTAAAAATCTAGTTAATTCTA[G/A]CGCATTTCTTA
ACTATAGCCCTAGAGGACAATAACTTAACCGCGGTCTCTA
C372064_m_4214
GCATATTAACTCATGGCTGCTCATAGGTCGATTTGATTGAATGTATGGTT[T/C]TCTCTCACCG
TGAGAACAATCCACCCCTCTCGTGGAAGAGTCAATGTTTTT
C372142_m_2442
CCTTCCTTATGCCTCCTAATAAACTCATCTTTGATAGGAAAAGTGTGGAG[T/C]GGAACCACC
AGCTATATGTATAGACATGTATCAGCTGCCTGCAAAAGACCT
C372160_m_5782
GGAAGATGCCATGAAGAACGAACTCGGAACTATTTTAACTGGCCTCCAGG[A/G]CAGGCTCC
TTGCTCAGGTACCGGCGTACATGATCCCGTCCGCTTACATTCC
C372206_m_23391
AGCAGCCTCCTCTGCTTGGTCTACGGCCACGGCCACGGCCACCCCGACGC[T/C]CACAGAT
TTTGCAGGCTCCGCCTCGTCCATGGCGTCAGTTGCTGGGAAGTC
scaffold10_m_1124
AACTTTATTTTCTAATATCTTTAGTATATTAACTTATAAATTATAACTAC[T/C]TTATATTAACTTT
ATTACTTAGCTATTACTTATAGTTATTAATAATTTCTC
scaffold1004_m_2494
TATAAGGGGTTAATGGGAAGAAAATCACCTAGGGAAAGGGCCTATGTGAT[G/A]ATCTAGGC
TTTGCCTAGACCTAGCAATATAGGTGTTAATTGCATAAGTTAC
scaffold1015_m_9809
ATTCTAGAAATAACGATAAATCTTCGCCTTTCCTCTATTTATCTTTATTA[C/T]ACCTAACCTTA
GTCGTGGCAATTTGCCACTAGCTATAATAACAATAGCGCT
scaffold1042_m_1357
CGTGCCTAAATAATAATAAGCAATTATTAAAGCTATCTATAAGGAACTTA[G/A]CTATAAAGGA
GTTAAAGTGGTTTTTTAAGTAATAAAGTAATAATACTAGTG
scaffold1044_m_525
CCTAGCCGATCTAAATCCTATTATACTAGGACTAGGTATATAATAAAGGT[G/A]TCCTTTAGCT
TATTAAAGGCATTATTCTCTTTAAGTCCTTATTAGAAAGGG
scaffold1048_m_914
CTTTTATAGTTACTCTTACTATACTAATATCCTATTTTATTAGTAAGTAC[C/T]TTATAAAAGGAA
ACTCTAATAATAAATAGTATACTATACTTAAATTAGTCT
scaffold1092_m_3125
CCTGAGCACTGGCGCTCTACTATGGACTACGCCGGACACGAGTCCAGGGA[G/A]ACCGAGA
CCCAGAGCGGCTCAAACGGGACTTTGAGGATCCCAATGGATGGC
scaffold1093_m_539
ATTAAACTTCTCTTATTATTTTAGAAGAAAACATAGCTAATTTTATTAAG[G/A]ACTTTAAGGTA
AAGATAAAAGCAATAGGTATTCCTAAGGCAAATTAGCGTA
scaffold110_m_1461
ATTATAATACTTATTTAAATAGTAAGTAAGGTAAATTCAGTACTTAACTA[C/A]TAAGTCAGATA
TAGTACTTATACTAATTTAGCCTAAATAAAAGTCTCTTTT
scaffold1104_m_1604
TTATAGTTTCTAGAGTTTTTCTAGCTAAGTAATTTACTTTATTATTACTA[C/T]AGCTTTAATAGT
AAGGGTTAAGGGTTTGAATCTAAGTATAGTCTTTATAAA
scaffold1106_m_994
GAAGATATAATAGATAATATTACCTAGTAAGGAAAGAAGTAATAAGTGCC[T/C]TATAAAAGGC
TTATAATAAGTCTAGGTATTTTAAAGCAAACCTAACCTAGT
scaffold1111_m_204
CTAGAATAGTATTATATACCTAGTTACTTACTACTTTACTAGCCTTATAT[T/C]CTTATAAAAAAA
CTATATAATTTATAATAAAAAACTATTAGCTATTATCTT

scaffold1113_m_662
TCTTATTAATAAGTTCTTTAAGATCCTTTAATAGTATTATTAATATACTC[C/T]TAAAAAGTTACT
AATATATTAAATAGTTTAAATAGTATTATAAGATATTTA
scaffold1120_m_946
TTAGCTTAATTACTATATTATTAGTAATTAGGTTAAGATAGCTTCCTTTC[T/C]CTTATTATTATG
CCCTTATATAATAAGGTATAATTTCTTATATAGTGATTT
scaffold1121_m_1159
AGGCACTTAAGCTTACTCTTTTTAGGGTTTTAAGTAATAATATTCTTAAG[A/G]GTAATATTACT
TTACTTATAGTAATAATTATAAGAGAGGTTCTTACTAGTA
scaffold1122_m_691
GTAGTTCCTAGGCATTAAAATCATTAGGAATCGTAATACTAAAGAGATAT[A/G]GTTATTATAG
GAATTATATATTTAAAAGATAGCTTAGAAGTTTATGCCTAA
scaffold1124_m_789
AAGAATATATAGCTAAATTAGCTATAATATAAGTAATTTACTAAAGAGTA[A/G]TTAAGCCCTCC
TAGGAGTAAAAATTCTCTTTAACCTAAGTATATATATTAG
scaffold1130_m_2651
TAGTTATAGAATTTATATTTTATTAGTTATTAGTATTATAAGGATTAAAA[A/G]AATGCTAGTTAT
ATAAAAGCTTTTATTATTACCTATTTTATTTAATTAGTT
scaffold114_m_222
AGATTTATATTATAAGTAGTATCCCTCCTAATAGCATTTAGCTAACTTTA[C/T]TTCTAATACCT
ATTTAGCTTATTATATATTTATAGTAAGCTTTAGACTCTT
scaffold1141_m_9497
TCGCTCGGCGGCTGGCTGGCTGATCATGGCCCTCTTCTTTTTTTTTTTTT[C/T]TTTTTTTTTTT
TTTTTGGTTGTAACAGTTCCATTTTGCCGCGTCGCGGACC
scaffold1143_m_625
TTATTATAATTTAGTTATTTAGTTATAAATTCTTAAAGTTTAAGATTATT[T/A]AGATTATTAAGCT
AAGTATAGGTATATAGAAGCTAAATATAGTATATTTTA
scaffold1147_m_207
TTTATTTAGTTTATTATAGCTAACTTATATCTATTATAGCTAACTTATAG[C/A]TAGTTTACTATA
TCTAAGTCTTATATTAGAACTTTACCTTTATTACTACCT
scaffold1149_m_1266
AGGTATAAAATCCTATATAATAGCACTGTTAGTAGTATATAGAATCTCTT[C/T]TAGATATAAAA
TCCTATATAATAGCACTCCTATATTAACTTTCTTTAAGTT
scaffold1156_m_5691
CCTTCTAGGTCTCTTACAAAGTGCAAAATGCATATAACCGGACGCGCTAG[T/C]TATTTTCATT
AGCTAAGATCCATACAAATTCATGGAATTTTATCTAAATTA
scaffold1161_m_1033
ACGGTTAGGGACTAGTAGAACTACCACATTGAATATTTATTTAACGTGAC[G/A]TAACGGAAG
GTTTTAGCAGTTATTAACTAATAGAATTTAATCTAGATGACT
scaffold1170_m_3687
ACATTCGCCGTGACGGCAACGTTTTCTACTCTTTACCATTACTAGATGAT[G/A]GGTCCAGCA
AAAAAAACTAAGCATGCTCATGCTATACTAGATTTGGCTAAT
scaffold1172_m_1853
TTATTTTTCTTAGTTTATGTGGCTATTCCCCTATAGGTTAACTAGTGCTA[T/C]AAAGGTAGTAA
ACTATCTATAGGCTTAGATAAATAGGTTATTGCTTACTCT
scaffold1173_m_8668
CTAAATGATGAGAAAGCAGACACAGATGGCGTCAACTTCGACACGATGGA[C/T]GATGACGA
TGATGAAGATGATGACAATGACGACGAAGCATTGACAAATCTT
scaffold1180_m_4421
ATAAGGGTTCTATTAACTAATTTTCTATTAATCCTAATAATAACCTTAGT[G/T]AATAAAAAGTTA
TACTTTTTTTTACCTAACAATACATTTGTATTGTTTATA
scaffold1189_m_1202
CTTAAGGTATAGGATAATACCTACTAAATTACTAAGGGTTAGTAAGACTA[T/C]ATATTCCTAAT
AGACCTAAGTATAACATTATAGGCTAAAGCTAGGTAATTA
scaffold1190_m_2601
ATACTTATTTTCCTATAGTATTAAGTACTTAAAATAGTCTAATAAATCTA[A/G]GGGTTAGCTTT
TATTTTATATTCTTAAGCCTAATATTCTTTACTAATAGTA
scaffold1191_m_952
AATCTAAGGTATATAGCTAGAAAACCACACTAAGGGCTTAACCTAGAAAT[A/G]AATAAAAGG
GAGCTTATAAAGTTACTTACTCCTATATTCACTCTAGGCTAT

scaffold1198_m_941
AGGCATTAAAGCTTAGAGAAGTATAGTAAACTACTTATATATTAGAGAAG[C/T]GTAGTAAATT
ACTTATATATCTCTTTATATATTATAGTTAGTTTACTAATA
scaffold1199_m_1163
TAACTAAAACGTATAGCTTTTTCTATAGTAATTTACTTATACTTACTTAT[G/A]TTTATATTTAAG
CTATTTATTTATTATTTAATTTTAATTAAACTTTAACAC
scaffold1204_m_5834
GTATAATAAGGTAATAATACAAAATATACTAATTTGTTAAGGTATAGAAG[T/C]ATTTAGTAAGA
GCTTTATAATATATAAGATTTTATTAATAGTTAACTTATT
scaffold123_m_401
AGTATAATTAGGGATTTAAGCTATAGCTACTATAGTAAGATAGTAATTTA[T/C]ATAGTCTTAGG
CTAGTTTATCTCTAGGATGTCTAGAGAAAGTTATTTTACT
scaffold1232_m_548
TTCTATAAAAAGGATTTTCAGTACGAATAGAAGACTTCCCTTCTATAAAA[T/C]TGGAAGCGCA
CGAGTAATATAGAAGCATTCCCTTTTATAAAAAGGAAGTTT
scaffold1235_m_1011
AGCTACCCCTATAGGAAGCTATAAAGCTAATTACCTTAAGGTAGTAAAAG[T/C]AAAGGTAATT
AAGGCCTAGGCTTATAATCCTAATATCCTTATACTTATTAA
scaffold1236_m_246
CCTTTAAGCTTAGCAGTCTTAGGGAAGCTAGTCTTAGGGAAGCTATAAAC[T/C]CTCTTATTAA
ATTCCTTAATAATCGAATTATTAAAGGCAGCTTATATAGAG
scaffold1242_m_365
AGCCGGCCCCCTATCTTCTATTAGATAGACTTTATAAAGTTCCTTTTTAA[T/G]TCTTTAGATAT
AACGTAAATCCGGTCTAATTAGAAGACAATCATCCACATA
scaffold1246_m_909
AATTACTAGGAGAAGATAAATAGGGGCGCGCTACCTCTATTTAGAGTTAT[A/G]CTACTACTA
CTATAGCTATAGTATTATTATTACTAGGTAATAGTTATAGTA
scaffold1248_m_2117
TTTTAGTTAGATTAATACCCTTAGATAATTCTAGCCTTAAGGTTATTATT[A/G]ATTATTGTAGTT
ATAATGTATTCCTTAGTAGTAAAATATACGCTTATATCT
scaffold1249_m_1860
TGGCTAGAGTTAGTGTTTAATTAACTACGCACTAAATTACTAAGGGTTAG[T/C]AAGACTATAT
ATTCCTAATAGACCTAGGTATAATATTATAGGCTAAAGCTA
scaffold125_m_2468
AATAGTATAAGGGGTTTTCTAATATACTAAGACTAGGTAGTTATTCCCTA[A/G]AAGCTTATCT
TATAATAAGAGCTTTTATAGCTATACTATAATAATTTACTA
scaffold1260_m_36299
TGGATGGATGCATGGGTGCGCGGCCTTTTTTTTTTTTTTTTTTTTTTC[A/C]CCGGGCTAGG
CACGATATTGGCGTTGGCTGTTTGTATTCATGCTTTTTGGA
scaffold128_m_67766
GGATCCTGGTCATTTCCATGTCTGGGGTTCTTCAACTACCTACCTCTATG[A/G]ACCTGGCTA
TTAGCCCATGGACCTGGACATTAACCCATGACCGTTTTGGTG
scaffold1282_m_507
TGGTAGTTATTAACTAATAGAATTTAATTTAGATAACTTTTACAATATCT[T/C]ATATACTAATAG
AATTGATTTTAGTGACGTTATACGGGCAATGCAGCTGTT
scaffold1285_m_1278
TAGGTAAGGGTAAAGTAAAGGTAACTAAAGGTATAATAATAATTTATAAA[A/T]AACTTATTTAG
TGTTATAAAAGAGAAAAGTATATAATATAATAGGGAGTTA
scaffold1294_m_12186
ATTTCTTAACTAGTCGCTGAAGAGTATTTCGCGTCTGACTAATCAGAAGA[G/A]ACATCTCTAT
AGGATGGCCTTATTTTAATAAAGGGAAAGCGGGAAGCTTCG
scaffold1327_m_1224
ATATTATAATTTAGTATTAGTTATTTTCCTTAATATAAATATAACTAGGT[G/A]CTAGTAACCTAG
GACTAATATTATAAGTATAGCCTTAATTATATATCTAGA
scaffold1344_m_3680
GTAAAATAAAAACCTATCCCTATAAGTAACCTATATAATAGTAATAAGGC[C/T]TTATTTACTAT
ATAAAAGTTTTTAATAGAATATAAACTATAGGTAAATAAG
scaffold1346_m_4930
TCTATAATAACTATAAGGTATTATAGCCTCTTTAGAGATATTACTAGTAA[G/C]TTTATTATAAA
GTCTATAGAAATCTAAGACTAGAACTAGTTAGGGATAAGT

scaffold1349_m_1292
ATATTAAATAGGCTCTTACTACTAGTGTCTTAAACTATTATTTACCTTAA[C/A]GTAAGGAGTTA
TATTCTCCTTATTAGTAGTATTATATTACCTATATATAGT
scaffold1350_m_1080
TACTTTTAGAAGAAACTATATAACTAGGAAAGGAAACTAAAGATAGTAAA[C/T]ATTATTAAACT
TACTTTTAAAGCTTATTTTTAAATACCTTTAATATTAATA
scaffold1356_m_1213
TAATATAACTAAAGAAAAAAGGGTATTATAATACTAGACCTTAAATTAAA[T/C]CTATAATTACC
CCTTAATCTAGACTTATAATTACCTCTTAAATATTAGCTA
scaffold1357_m_107
AATCTTACTTTACTTATATTATTTACTCCTTTCCTTATCCTTCTATAATT[T/C]TAATAATTTCTAT
ATTAACTCTTTCTCTATACTAATATAAAGTAAGTTTGC
scaffold1362_m_1213
GTTTATTACTATTATTAGATAAATAGAAAAGCCCTTAGCTAGTTTAAGTT[C/T]TTCTTTAAAGA
TAACTATAACTTTAACTATAAGATTATTATTAATATTATA
scaffold1371_m_2716
ATTAACCTAAAGTTTAGCTAGTTAAAGTAATGATTTTTATAAGAATTTAG[C/T]GTAGCTACTAG
AGAAGTCCCTAGAAGAAGATATAGTAATGTATTTTATAGG
scaffold1384_m_722
CTAGTATTCTCTAATTATATCCTAAATATTATAAGCTTTCTATTTCTTAG[A/G]GTTAAGGAATTA
AGCTACTTAAAATAAGGTTACTATTGAAATGTAGGGAGC
scaffold1387_m_193
ACCTATTAGGGACTAAATTCCTTGCTATAATCTATAGGGGAGACCCTAAA[A/G]GTATAGCTA
GCAAAAGCTTAATAGGTTATTGTGACAGTGATTTTATAGGGG
scaffold139_m_1233
AGTAATATTATTACTTTATAAGCACTTTAATTATTATCTTTTTTTTCCTT[T/C]AATAATATTACTA
ATAGTATTCTTAAAGCTTAGACTACTATTATATAGGCT
scaffold1392_m_1294
TTATATATGCTATTATAGGAGTTATAGAAAATAAGTTTATTACCCTTAAA[A/G]ATAATAAGGTA
AAAGTATATAAAACTATTAAAGATATCCCTAAGAAACTAT
scaffold1393_m_147
TATAAGTAGGTGTTTTTATTACTTAATAAGGAAGGCCTAACTGTTTATAG[G/A]GCTATTAAGG
GCTTCTTTAAAGGGCTTAAAAATTAACTAGGTTAATATCCT
scaffold1395_m_4127
TTTTCCGCAAAATTTATTTATATATAAAATCTAAAAAATTAACTTACTAC[T/C]ATACAAACTAGC
AACCTATATGCACTAAATTTTAGTCTAAAAAATATTCCT
scaffold1406_m_50956
ATAATAAGGTATAATAAATACTACTTAATCCTAATTTAAGTAAAGGTATA[T/A]ATAATATAACTA
AAGAAAAAAGGGTATTATAATAATACTATAAGGTTATAT
scaffold1416_m_526
TTTTACTAGTAAAAGACTTAAATTAGACTTATAATATAATTCTAGTTATT[A/C]TTAACTATTTTA
TAATATATAGTATTTATATTCCTATTTTAATATAACTAA
scaffold1428_m_500
AAGTTATCTATAGTATCTAAAGCCCTAAATTATGAGGCTAAAGTCATCTA[C/T]AGTATCCAAA
GCCCTGAATTATAGGGCTAAAGACCTAGAAAAGGGTACTAA
scaffold143_m_185
ATATAAAAAGCCTAAGTATATATTCTTTACGCTAGGTAGCTAATTATGTA[T/G]CTATTCCTAGT
ACTCCGACTGCTTAGTTAAGAGGGAAAACCCTTAACTAGG
scaffold1433_m_421
TATTATTATATAAGTTACCTATAAGAATAGGTTTATATTTTACCTTAGGT[A/C]TAGTTAAGACT
AGGTTAAAGGTAAGAGATAAAGTAAGGTTAATTACTAATA
scaffold1438_m_1202
TCTATTAGTTAATAACTACTATATCCTTCCGTTACGTTACGTTAGTTATT[C/T]TAACGTGGTGG
TTCTACTAGTCCCTAACTGTAGAGCTGCACCTGTACAGCT
scaffold1448_m_1162
GCACTAAAGAGTATTATATCTAATAAGGGATTAGTCTTTATAAGCTAATT[T/C]TAGTTAAACTT
ATATTACTTATTATATATAAAGTAAAGGCTTTTTATAGTG
scaffold1454_m_1432
CCTTAAAGAATAAAAATCACTATATAAATATTATAATTAGAGGTTTAGTG[A/G]AAGAAACTAG
GGATAGGAATTGGTATTTACGTAGTTAGTAATATAAGTAAA

scaffold1455_m_269
AATAAGAAACTAATATAATCCTAGTAATTAATATAGCTAAACTAGTAAAG[C/G]TATTTTATAAA
GAGATTAAGCTATAATTTAAAGCCCTAAAAGGCATTATAT
scaffold1456_m_14569
GAACATGATGAGGGTTAAGAAGCTTATGTAAATGGGGGATTGGGATTGGG[C/A]TTGGGATC
ATCATGTCTTAAAGCGAAGACATACCATGTAAAAATATACTGA
scaffold1460_m_1028
AGTAATAGAAAATAAGAAGGTAATAAATAGAAAATTAATTTTAGAAAGGT[T/A]AAATATATTAT
TTAATATAATAATTCTAGAGGACTTATTAAGGGATATATA
scaffold147_m_691
TTATTTAGCTTTATAAATAGCAAGACTAACTATAGCTTTAGCTAATAAAT[A/C]AAGACTATATA
TAAATACCTTATTAGATTAATAAGCTTATAAAAAATTCAA
scaffold1490_m_431
CTTATATTACTCTTTTTAAGAATTATTAATAGATTTTATTACTAGACTTT[C/T]ACTAGTAAAAGA
CTTAAATTAAACCTATAATATAATTCTAGTTATTATTAA
scaffold1500_m_2057
GCCTAGGGCGTTCTAAGCCACTAGGATTTGCTTAACCTAATATTCCTTAA[T/C]AAGTTTATTA
TTACCTTCTATAGGGACCTATTCTAGTCCTAGATAGGAGTC
scaffold1501_m_1207
AGTGTGTACTATATAGGTAATTAAGGAGGTATTCTCCTATACTCTCTTTC[T/C]CTTTCTTTTTA
TTTTTACTATAGTGTACTATATAGGTAATTAAGGAGGTGT
scaffold1503_m_18812
TAGTGTAAGATATATATCTTTAGATTATTAATATTAATCTTTTAACCTTA[T/G]CCTTTATCTAGA
GGTTTAATCTTATATAATACTAATAATAACTTTCTCTTA
scaffold1507_m_43317
GGTTCCGACCGAACATCTCTCGGGTGTGTACTACGTGCATGGCCTGGGGG[A/T]CCAAAGAC
CACACGAGATTGCCATGTGGCCTGGCATATATGAAGTGGTGCT
scaffold1508_m_1723
CCCGCGTACAGGGTAGCCTGCTTACCTAATTACTAGTGCCGCGGTTATGG[T/C]TACGCTTG
CAGCTACAATGCAATTGACTAATCCACAATTAATTGGAATTAG
scaffold1510_m_1479
AACCCTTTGCACTAGTGTAATATTCCTTAGTGTAACTAATACTAATTAGT[A/G]GTTAAATATAA
CTATAAATAAGCTAGGTATTATAAGAAAAGACATTTCTAT
scaffold152_m_1051
ATTCTCTAGCGTTTTCTATTTAATCCTAGCTAGTTATATTAAACTATAAG[A/G]GTATCTCTTCC
TTAGACTTCTTTTAAGATTATAATATAGTTAGTATCTTAA
scaffold1520_m_9944
TTTAGCTGCTTTTAGGTGCTCTATATAGGGCCTAGCTAGTGCTATAGGGC[T/C]TAGCTAGTG
CTATAAATAGCCACTAAAGTGTAAAGGCTATGTCTAGCCTTA
scaffold153_m_802
TTAGAGCAAAAGATCTAGTATATACTTATTATAGTTAATTATTTTTCTTA[G/A]TTTATATAGCTA
TTTCCCTATAGGTTAACTAGTACTATAAAGGTAGTAAAC
scaffold1547_m_5107
GTTTATAAATACTAAATATAATTATAGTATAGTAAATTAAAAGCTACTTA[T/C]TATAGTAAAGTT
ATTTAAATACTAGTAATACTATATTAAAGATATAGTAAC
scaffold1550_m_29509
ATAATGGCCGCCAATCGGCACACTGGAGAGCTCAGGCCAGCGGGCTAAAT[A/G]GAATATGT
GGGCTAGGCAGGGGGGGTGGTGGCAGGGGGGGTGGTGGCAGCA
scaffold1553_m_371
CTAAGTATCTCCTCTAAAGGTAATATAACTTAGCTTATATAACCTTATAG[T/C]GTTATTATAAT
GCCCTTTTTTCTTTAGTTATATTATCTATATCTTTACCTA
scaffold1557_m_822
CTAGAGCTAGCTAGCCTTTAGCTAGAAATAATATTCCTTATCTTACTAGG[A/G]TTACTATTTTT
ACTTACTATTCTCTTACTAGTACTTTTATTATACCCTTAC
scaffold1577_m_445
TTTATAAAATACACTTATAATAACCTAAGGTATTAGTTAAAGAGAAAGAG[C/T]ACTAAAACTAA
GGCTAGTAACTAAATTAAGGAATTAGTATATTAATAGAAC
scaffold159_m_6030
ATACTAGTTTAATTAGTATAGACTTAGGAATATAATCTTACTATAAAGTA[A/C]CTTATAGATAA
TAAAATAAGAATATAAGTATCTTTATAATAAGATAACTAG

scaffold1592_m_1136
TAAAGATATTATAAAGAAAATAAGATATTATAGAGAAAATAGAAAATAAG[G/A]ATAAGAATAGT
AATAAATCTAATAAGGAAAAGAATAAGCTTAACCTAAAGA
scaffold1598_m_1686
TAAGGTTTAATATTAGGATGAACTTTAAACTTATAATTAAAGTTAAGGAG[C/T]GTAAAGATAAA
GTTATATTTATTAAGGGACTTTTAGTAGCTTTATCTAATT
scaffold1606_m_321
AATAGTAAAGTTAGGGATAAAAGATAATATTATAACTATAATAGCCTAGA[C/T]TACCTTATAAA
TAAGTGTAGTAAGCGTATAAAGATATTAAAATAGTAGTAA
scaffold1613_m_487
TATATTACATCCTTCTAATGTTCCCTCTTTCTAATATATATATTATATCT[A/G]AGTTTTGCTTAT
CTTATATTTAGAGCTTATTTCTTCTTTATCTAGTAATAT
scaffold1622_m_13087
TATAGCTTAAAGAAAAACCTTCTTATTATATTATTTACTATTTTTATTAA[T/C]TATTTTGTATTTC
TATAAATTATTATTATTACTTATTTAAAAAAAACACTA
scaffold1623_m_206
TATAGTGTAAAAAAGGCAGTGAATTACTATTGCCTAGGCTATATAGCCTA[A/G]GTTAGCTAG
CTAAAGCTAAAGAACTATATATACCTCCTAGATAGCTATAGC
scaffold1625_m_3085
TAACATAGCCTTATAATTATTATCTATTATTTTGCAGTCCTTATATAGTC[T/C]TTAAGTGTAATA
TTAGACTAATTAAACTAAGAAACTATAGTTTTAGACGCT
scaffold1628_m_761
TAAAGCTTCTCTTACTAGCTACCTAAGAGTAATATAGGGGGGAGAATTAC[C/T]TAATTTACTA
GAGTAATATTAGTAAGGGTAACACTATAGGTATAAATATGC
scaffold1638_m_2464
TTACTTTAGAGAAGACTTTATAAAAGACTTTATAGGTATAAGCTAAATAA[A/G]GGTAAAAAACT
AAGATAAATAAGGATAAATAATAATAATAATTAGGGACTA
scaffold164_m_34046
AAAGTGTTGGTTGTAGCAGCCTCACATCTTAGGCATCACTATCGCGATGT[C/A]TTCCCTCTT
CGAGGCCTTGTTGCGAGACCTCGGCACTTAGGGCAAAGACTC
scaffold1640_m_3271
TTAAGCATTTAAACCTATGCCTTAAATAAGTCTTATCTAGAAGTAATTAC[A/G]TCCTAATTAAT
TAGTCTCTAGGTTAGGAATTTTACTTCTAGTAGTAAAATT
scaffold1642_m_2592
ATCCTTCTATCCTAATAGTTACTAAATTACTTATAATAAACCTCTTAAAT[G/C]CCTTATTTAGTA
ATACCTTTGTAAATATATTTGCAAGGTTATTATCCCTAT
scaffold1650_m_52505
CACGATCCCGCCGCCGCCCACAAGTATGCCACCCTGCTAAGCCAATTGTC[A/G]GAGAAGCT
GTCCAAAGATTTGTGCATCATCATGCGCGCCTACCTCGAAAAG
scaffold1669_m_5977
GATAAGGAGGGCTAATATATAGAGGCCTATCTCCTTACTAAATATTATTA[A/G]GAAAATTATA
AAAGCAGTGATTATAAAATAACTTATAGCCTTTACTAAGGT
scaffold167_m_1972
AAGCTTAAGCTAAGGTAAAAGCTAAGTTACTTAAAGAAATCCTTATATAT[T/C]TAAGAATTACT
ATCTTTTTAATAGCTTAAATAATACTATAAGAAAGTAAAT
scaffold1674_m_483
GGAAAGGGGATTAGCATACTAAACCCCTTAACTAGCTAATAGGGTTATAT[C/T]TAGAGGACT
TATAATTAGGACTCTTAGGGAACTTACTAAATCTAGAGGAAT
scaffold168_m_14508
TCGTCCTGGCGCTGCTGCTTACTGTCTTCTTATTCGCACTTGATATGGTA[C/A]CGGATTCCA
TCCACGAAAGCGTCAGGAAGATAAACCATGCTGATGCTTATT
scaffold1684_m_1117
ATTAATAACTTAATCTTTATAAGTATTAAATTTAATATCTTTAAATAAGC[G/A]CTATAGACTTAT
AGTCTCCTTTACTACCTATTATAAAGTAAGTAATTTAGC
scaffold1686_m_1489
TACCAATAGAATTGATTTTAGTGACGTTGTACAGGCAATGCGGTACCGAC[T/C]GTATTGGTG
GATCCAGACCGCTAAAGAGGTCTTATAGGCTACTTTTTATTT
scaffold1689_m_306
CCTAGGGCTAGGTTTACGTGACACTAGTAAGCCGCTAGCTATAAGATAGT[G/A]ACTTATATG
TATAATATATTTAGACTTAGTAAGCTTTAGTTAATATACTAA

scaffold1690_m_639
TCTAGGGATAGTCCTAGCTGCTAACTTCTAGGCTTTAGGTTATTTTTCTA[A/G]GGGGATTAGA
ATCTTATAGTGAGATCCTATGGCTCTAATACTGCTAATATT
scaffold1695_m_1048
GACCCCTAATAAGGGGGTAGGCTATTAGCTCTAGCCTTATTAAAAAGGTC[T/C]GTGAAGTTA
GCTAACTCCTTAGGTAATATTAACGTGTCTAGGCTATTAGGC
scaffold1696_m_214
TTTAACTATTATACTATTATAGAAAGCTACTACTACTATTTTTACCTAGC[T/C]CTTTACTCTTCT
TATTGCTCTATATTCTATTAGATTAATAGTAATCTAATA
scaffold1705_m_262
ATTATTACTTTATATGTAACTACCTATATATACTACCTTAGTTATATTAT[C/T]CTTAAAGGTATA
GTAGTTTAATTTAAATAATATATTTAAGTTTACTAAGAA
scaffold1709_m_13556
TCTCGTCGTGTGAAATTCAAGATGCTCCCGACTTCCGTGTTCTGGGGACT[T/A]GCCATCTTT
TATAAGTCCATCGATGAATAATTTATTAATCAATCAATCGGC
scaffold1711_m_3305
TAACTTTATATCTAGATATTCGATCTTAGCTAAACCCTCTAAAACCTATT[G/A]CCTAGCTATAT
AAGGCAGGGTTATAAGTAGTGGTTATAGCGCCTTAATTAT
scaffold1718_m_1223
TAAGTAATCTAAGGTATATAGCTAGAAAACCACACTATAAGCTTAACCTA[G/A]AAATAAATAA
AAGGGAGCTTATAAAGTTACTTACTCTTATATTTACTTTAG
scaffold1719_m_1178
ATCTCTAATACTTTATAGCTAATAACTAATAAATATAGCTTAAGTTACTT[C/T]TAATAGCTTAAT
TTACTTATAATAATATAGTAAATAAGACTATAAGCTACT
scaffold1721_m_2286
GAGTTAGCTAACTTCGCGGACCTTTTTAATAAGGCTAGAGCTAATAGCCT[A/T]CCCCCTTATT
AGGGATCCCTTAATTACCACATACACTTGCGTAAGAATTAG
scaffold173_m_1905
AACGGGCGCAGTGACTTTGGTGAGGGGCGGGCTCCCAACGTTGGCCGCAG[T/C]GATCCAA
TCAAAACCAGCTGCGGTTGGGCAACGCCTTCCCTTTGGCGCAAG
scaffold1752_m_978
AATACTCTTATAGAAAAAGCCTAGCCTTATTAGCTACTATTATACTTTAA[T/C]TAATAGTCTAG
GAATTACTACTAAAAAATAAAAGAAAAAAGCCCTAAAGGT
scaffold1757_m_2409
TATAAAGGGATTATTAATTTAATAATAAACCTCTCTAAGGTTTATAAGAA[G/A]GTTACTTAATA
GGTAAATATTTTATAAGAGTTAAATATAGAATATATATAC
scaffold1763_m_179
AATAAAGGCATTCTTTAGCTTATTAAAGATATTATTCTCTTTAGGTTCTT[A/G]TTAAAAAGAGG
TATTTCTCTTAGTTAATTATATTAGTAATGCTACTAGCTC
scaffold1767_m_2368
TCGCTAACTTCTAGTAAAACTTTAACTTAGCTACTAAGGCTATGTAACTA[A/G]AGAGCTTAAT
ATTAACTAAAACTTTATTAATATTAATTAAATAACTAGAGA
scaffold1768_m_9765
TTAAATTATTATGCTAACTTAAATATAATTATAAGCTACCCTAACTATAC[T/C]TAATATTATTTA
GTACTAGGGAAGTAATACTAATAAGGTCTATACTTTATT
scaffold1776_m_728
TAATTACTTTAAAAGCTAAGAATAAAGATATATATATATTAATTACTATA[A/G]ACTATATAATAA
GGTTTATATTAAGATAATCCTATATAAAGGTAACTAGAG
scaffold1781_m_579
CCTAATCCTTAGGAGTAGCCTTTAGCTTATAAAGCTTTAAATAAATTATA[A/G]GATTCCTATTA
CTTTAAGGTATCTTTAATATTATAACTAGAGTATCTAGGG
scaffold179_m_1283
TATTAAGTTCTATAGTTATTAGATTAATCATTTAATTATTTAGTTATTTA[A/G]TTATTTAGTTATT
TAGTTATTTAGTTATTTAGTTATTTAGTTATTTAGTTA
scaffold180_m_1258
TAATATTATATATATATATTCTTTACACTAGATAGCTAATTATGTAGCTA[A/G]TCCTAGTACTC
CATCCGCTTAGTCAAGAGGGAAAACCCTATATAATAATAT
scaffold1805_m_602
GCTAGAATATTATAATATAATGGATACTATAGCTAGAATATTATAATATA[G/A]TTATTTATATAG
TAAAACAGTAATTAGTTATTAAAGTAGTAAAGGGCTTAT

scaffold1807_m_2089
TACTTTAAGATAAAAAACCTTATTTTAACTTTACTACTTTATTATGTAAT[T/C]TAATTACTAAGT
AAGTTAAATTTAGCTTACTATATAAATAACTTAGCTATA
scaffold1818_m_11723
ACTAATTCTTATAGTTCTAATACTATAATAGTCTTTAGGTTTATTTATAG[A/G]ACTTATATTCTA
GTTTATTAATATACTAGATATAAGTAATAATAAGATTTT
scaffold182_m_1170
ATATATATAAAAGGGTCTAGTAGCTTTAATCTATCCTATTAAATCTAGCT[A/G]TTTACTATTAA
CTTTTTTCCTTTATTATTACTATTCTATAGGCAGATTAAG
scaffold1827_m_22598
CTATAATATAAATTATCTACTTATTATTATACTAGATAATTAATAGAGAA[G/A]GGACCTATATG
CTAATATTATAAAGTAATTTACCTAGAGATATACGCTCTT
scaffold1830_m_942
AAGTAGCCTAATTCCTTAACCTTAAGAAGTAAAAAGCTTATAATATTTAG[C/A]ATATAATTAAA
GAGTGCTAGATTAATATATATCTAGGCCCTCTAGACTAGA
scaffold1832_m_1076
GCTATAGCTATATAGGGGTAAAGCTACCCTAGGAATATATCTTTAGAAAA[G/T]GAACTTATTA
AGGCTAATCTTTCCTATATATAGTTATATTATTATAAAAGA
scaffold1833_m_1450
TAGGAAGGGGCCTAGAGGTTTCCTATTAAGACACTTATAAGAGAATAGGT[A/G]GTAAATTAC
TCTATAAGGCACTTATAAGAGAGTAAGTAGTAAATTGTTCTA
scaffold1834_m_8109
GGAAACTTAAGGGTAAATATAAGAGGGAAAGCATAGAAGTAAACTCTAGG[T/A]GTAGCTTTA
GTATAAGGGGTAGGCTAGTTTATCTTACTAACCCCTTCCACT
scaffold1835_m_555
GAGTTTTAGGTCTTTACCCCCTATATAAAATAATAAATATATTAAGGGAA[T/C]TATTAGCTAGC
TAGGCTTATAGGCTAATACCCTAGGGAGTAATTAGTCTAT
scaffold1839_m_3941
TCGTTATTAATAATATTAGGGATAAACTTCTAAGCTATCTTTTAAATATA[T/C]GATTCCTATAAT
AACTATATCTCTTTAGTATTATGATTCCTAATGATTTTA
scaffold184_m_769
ATACAAAACACCATAGATATAAGGGTAATTTTGCCTACTAGATAGTAGCC[C/T]TTAATTAATC
TAGAATAGTATAAATAGAACGTTTTGCTAATCTATTTTGCT
scaffold1856_m_979
AGTATCATTAGCTATAAAGAATAGTTAGTACTTAATACCTAATAGTATAT[A/T]GTTAGTAACTT
ACCTAGTGGAATTTTAGTTATATTGTAATTTATTACTAGT
scaffold1869_m_396
GGGTACTTACTTTAAGTGTAAAGTTACTAGATATTATACTATAAACTATA[G/C]TATAACTAGAA
ATAATTTATTATAATAATAGGAATCCTTATAGTTAAAATT
scaffold1881_m_438
TAACTATAGTATTTACCTCTTTACCTTTAACTTCTATAAGTAATAAATTA[T/C]ATATAGTTAGCT
TCTTAATTATTACTATCTCCTTAAGTTTATATAGTCTTA
scaffold1884_m_7608
ACGTGTATGCAAACACTTCCAAAAACGATGCGCAGAATGGAGCTCCTGAT[G/A]TTTGAGGAA
CATCTCGTGGTCTACTAGGGCACTGGGACAATTATTGGCTGT
scaffold1889_m_213
TTGTAAAGGAAACTAGCTATTTTAATAAAAGTTTTAAGACTTAATAAATT[G/A]CTTAGAAAAAT
CATTTTTTAAAAGGCTTTAAGTCTATTATTAGTGTTAATA
scaffold1898_m_586
ATAGCTATAGGGTAACCTGCGTACAGGGTAGCCTGCTTACCTAATTACTA[G/T]TGGCGTGGT
TATGGCTGCGCTTGCAGCCATAACGCAATTGACTAATCCACA
scaffold1899_m_681
CCTAAGGTAATATTTTCCCTTTTTTTAATTTAATAGTATAAGTATAACCT[C/T]TTAGTTTAAAAA
GCTTACTTACTAACTCTTTAGAAAAAATATTTATAAACT
scaffold1903_m_5961
GGGGGATCGAAGTCATGCCGTCGGTTCCCGGTCAGTAACTTGGGGGCCAC[A/T]CGCGCAA
ATGCAATGTAGTGTCCACTTTGAAGCGAGTCGCCTCTATGACAA
scaffold1909_m_1922
TTAAATTCAATACCTATAAAGATTAGGTTATTAATTATAATAATTAATAA[A/G]TAATTTAGCTTA
TACTTAATAAGAGTAAATAATTAAATACTTAACTATATT

scaffold1913_m_906
AACTAGATTAAACTAGGAAAAAACCCCTATTATACACTTATTCTAAGTTA[A/G]AATAAATATCT
TCTGAAGATTCATTAGAAGAATCTTTAGAGATATTCTAGT
scaffold1916_m_1068
ACCTTAATACTAAGGCTCCTATACTAATTTTATATAGGAGTTTTTTATTA[A/G]GTATTCCTAAG
GCCTTAATACTAGATTACATATAAAATATTAAGTTAATAG
scaffold192_m_1317
CTGCTATTAGTGCGGCTGCCCCGTATTTTAAATCCACTCCCTCTGCTGTG[A/G]CTTACCACT
ACATATAACTTTATGGAGTTAAATGTGAATATTAGAAGCATT
scaffold1925_m_787
AGTTTTTTTCTTTTAAATAATTATTTCCTTTACTAAAATGCCTTAATACT[G/A]AACTAATGCCCT
TACTTCTATAGCTTTAGTAGCTACTCCTATAGTTACTCT
scaffold1932_m_2159
ATATTTACTTATAAAGTGTTTAATTATATATATTAACCTTATTATTAAAA[T/C]AAATAAAATCTA
GTATAGCTTTTAGGTTATAGTATAGATTTATATAAGGTT
scaffold1948_m_4673
AATTAGGTTATAATACTTAAGAATTAGGCTTTTTAATATGCCTTACTTAA[G/A]TAAAAGCTATA
CCTTAAAGAGCCTTTTAATAAGGATATTTTAATTTATTAT
scaffold1968_m_10551
CTACTCTGGTGCCAATCTGCTGAACCAGGTCCTTGAGAGCCTGTTGAGCA[A/G]TCTCCTGA
GGACCAGTGGCATCAAACCGAAGGCGGCCATTGGATGCCGTAG
scaffold1971_m_15539
CTATATTCTCTAAATATTATATAAATACTAGTATACACTTATAGATTATT[A/G]TTATAGACTTTG
CATTTGCTATAATTCCTTAACCTTTCTTATCCTTAATAC
scaffold1985_m_298
AATATCTTAGTTTACTTAGGGGAATTAAGGAAAAACTATATAGCTAAGGT[C/T]TAGCTAATATT
AGGCTATCTAAGAGCTATAGGTTTATACTTAGATCTTAAT
scaffold1988_m_411
ATAAAAAGTAACTAATTAATCCTAACTAAGGAGTATAATATTATCTAAAA[G/C]TTTCCTAATTA
ATCTAAACTATAATCTATAATAATTAATTAAGGAAACCCC
scaffold1991_m_662
TATGGCCAAAGTGTAAGTCTACTAAAGGGATACACGTAATGTAATTAGCT[A/G]CATTATAGGT
AACCCTATACTATTTATAGTGGCTTTACACTACTACCTTAC
scaffold1994_m_430
AGCTATATTTAATAATAGCTAGGATTAAAAAGGAGGTCTTTTATCTTTTC[C/T]TGTTTTTCCCT
TTTATCTATTTTTATCTAAAAGTTATTGTTTACCCTATAG
scaffold2005_m_1059
TATAATTAGTTTAAATAAATAAGGTACCTAATACTATAGTTTTAAATAGT[A/C]TAACTAAAGGG
CTTATATTATAGTTACTATAAGTTTATAGCTATTAGGCAT
scaffold2009_m_1941
TATAGATTTATATAATATCTATAAAGCTTATATTTAACTTCTAGTGTAAT[G/A]TTTTTATGTTTT
ACTTAATATGTCTAAGAGTCCGGAGGAAGCCACAGTTTG
scaffold2016_m_647
CTTATTTATTTAAAATCTTTAAAATTACTAATCTAAGACTAGTAATCTTT[G/A]CTAGATTTACTA
CTAATAGTAGTAGGGTTAGCTTTTTCCTTTCCTTTTCCC
scaffold2020_m_1183
ATCTTATAAAAGAGTAATTACTTAACTAAATATTATAATACTAGTAAGAT[A/T]TTCTTAGAGAAA
GACTTTTAATAAGGTAATATTTATAGTAATAAGTAACCT
scaffold2027_m_5360
ACATTGCACATGCCTAGCATATGCTTAGCATATGGCTAGCATTAGCCTAG[T/C]ATATGCTAA
CTATATGTAAAATTTTCTTAAAGATCTTAAATATACATAAAG
scaffold2056_m_2217
ATTTAACTAGTAGCCTCTCCCTAATATTGCGTTTATTTCGAAATAGCGCT[T/C]CTTATCTAGAT
TAAATAAACCTATATAATTTGTCTAATAAGTTTATTATTA
scaffold2059_m_1734
TATAGCTAGCTTCTTACTAGGTTATCTTAGGTTAATATTCTTTATTAATA[C/A]TAAAATATAGTT
ACTAACTTTAAACCTTATTAGAGTTCTCTTCTAGTTATA
scaffold206_m_3874
TAAAGCTTTGGTTAAAGCATTAGTTATAATCTCTCTAATTATAACATTAG[C/T]TATAATCCCTT
TAATTAACGCCTTAGTTGTAATCTCTTTAATTAATGCTTT

scaffold2067_m_464
TATATAAAGAAATATATAAATAGTTTACTACCCTTATTTAAGTGCTTACC[T/C]CTTATTACTATA
GTAAGAACTAGTATTATTATTAAATTACTAAGTTAAGTA
scaffold2089_m_483
AAGTACTTATACTTATTTACTTAACTCTATTTATACGTAAATTTATTCTA[G/A]GAAGGTTAGAC
TTAGTAATTACTATTAAAAGGGCTTTCTTTTATAAGATCC
scaffold2090_m_503
GCGTATATATTAGAATAAAGAGTAATTAAGCTCTCTTAGAAGTAAAGATT[C/T]TCTTTAGCCTA
AGCGTATATATTAGAATTTATATTAATTAAAATATAAGCT
scaffold2095_m_2168
AGACGGTCAGATTAATTGGTCTAACAACGGAAGCTTTCGTTAACGGCAGA[G/A]GCCTTATTA
GAAGACCTTCTGTACGTCAGATTCCCCTTTAAAAGTCGGAAG
scaffold2107_m_237
AAGGTATTAGTAATATTAAACTCCCTATTAGCAAAGGCTATTTAGAACTA[T/C]CTAATACTTAA
TAGGCACTAAAGGCTAAAGTTAATATAATTTTACTAGGCC
scaffold211_m_3532
GATATTAAACGCAATGCAGGAAGCTGCATTATTAATTAAAGAGAGGATAA[C/T]AAGAGTGAT
GCCTAATATCTAAGGCTATAATATAAGGCTGTGAATATCCTT
scaffold2113_m_358
TCCGTAACTATAAGCTAACCTAATAGTTAATTCTATTATATTAAAGCTAG[A/G]ATCTAAATATA
AAGGTATCCTACTTATATTTACTTATAAAGTGTTTAATTA
scaffold2133_m_1012
ACTAGATTTAGACTTTAGATAAAAAGAATTAACTTTCTTTAGATATCTTA[C/T]CTTATACCTAAT
AGTAGCTCTTATAGTAAACTTAGTATAACCTTATAATAG
scaffold2145_m_643
ATAATTTAATATGCTTTAGAGCCTTTATTATTATTAGAAACGCCTTATAT[T/C]TATAAGCTTATA
GATATATAATTAAGGGCTTTTAAACTTCTAATATCTATA
scaffold2158_m_384
TTTATTATTCTAGTTTTTAGCTATTTTAGAAAATTTACCTAGGTAATTAA[A/T]AAATAATTTATAT
ACTTATTTATAGCTATATAATATATTTATTATTACTTT
scaffold216_m_1198
AGTTAGTAATATCTAAATAGCAGCCTATACATAGCTTTAATATAGTAAAA[T/C]AAATGTTATTA
CCTATTATATAGCTAGAAGAAAAAAAAAATAGATAACCTAT
scaffold2168_m_1053
AGATACTTATCCTATCCTAGAGATACTACTATCTCCTATCCTATCTTAGA[G/A]ATATTACTATC
TTATTAGTTACTAAAATACTCTCCTTAACTAAGTGTAGTT
scaffold2169_m_1445
AGAAAATAGGGCTTTTATTTAATGCAGGAATATTTTTTAGACTAAAAGTT[A/G]GTGTATATAG
GTTACTAGTTTGTATAGTGGTAAGTTAATTTTTTAGATTTT
scaffold2172_m_1520
AGAGATATATAAGCCCTTTACTACTCTAATAACTAATTACTATTTTACTA[T/C]ATAAATAACCA
TATTATAATATTCTAGCTATAGTATCCCTAGTATTATATC
scaffold2182_m_5088
GATTTAATATATTATAAATAGCTTTAGTTATTACTATAGTAATAAAGTAA[A/G]AGAGCCTTAAG
GAAGTATATAAACTAATTTTAAAATTCTTAGTATATAGAG
scaffold2198_m_1959
ATTATAAGATATATTCTCTAGTTTATACTTACTAAGTTATTTTAAGAAAA[T/C]TACTAGAATATA
TATTACTAAGGCTATTTTAGAGAATCTATTAGGATCTTT
scaffold2216_m_4847
TAAAAAGAAAAAAATAGATAACTTATATTAATTTTTATAATTAGTTTAAA[T/A]AAATAAAGTACC
TAATACTATAGTTTTAAATAGTCTAACTAAAGGGCTTAT
scaffold2217_m_2102
TAATTTTATAGTAATTATATACAGTTATAGTTATAGTAGTTAACTATAAT[T/A]TAATACTAGTTT
TCTTTTACCTAGCTATAGCTATAGAAAGGTAATGCTACC
scaffold2221_m_3777
TAAACTAAGGTTTTATATTTACTAGTGGTTTTTAAATAACTTTTTATTAT[C/T]TTCTTATAACTA
AGTAGCTACTTAGCTTTATTATTTTCTTATAACTAAGTA
scaffold2225_m_3214
TATCTATATTATAGGTAATAGCCTAGATTATACCTATTATATTAGCGTGC[G/A]TATGTTTAATA
TAATGCTACCTTATAACACTCTTACTAATTATACTAAGCT

scaffold2229_m_2659
ATTTTTAGCCCTTTTCTAGTTAAAGGACCTTTTTATTACTAGCTTGCATC[G/T]CAAGCCTAACA
GCTGCACTGCAGCTGTTAACGGTCACGCAGGTAACTGTCA
scaffold2232_m_1832
TAGAAAGAGAGAATTACTAAACTTAATATAGGTAAAATACTAATTAAATT[C/T]AATAAATAAAT
TAATACTTTAAAATAAAGCATAGTTTAAAAGGATAAGTAT
scaffold2252_m_1659
TCCCTTTATAATTCTTATTAGTCTTTTCTAAAGGTATATTAATAACTAGC[A/G]CTAGTCCCTTT
ATAATTTCTATTAGTCTTTTCTAAAGATAACTATTCTCTA
scaffold2259_m_7435
CAAGCCTCTTTAACCTCTTATTTTTCTATGAAAAGGCCTTAAAATAATAC[T/A]ATTATAGAGGA
ATTTTCATCTAAAAAGGCTATTACTCTAGTTATTAAGTTT
scaffold2260_m_2176
CTTTAAACGCTATAGATAGCTCTAAAGGGAATTAGAATATAGTTATCTAT[A/G]ATTCTAGAGC
TAATGTTTATATTTTTAATAATATTTATTAGTTTAAATAGT
scaffold2287_m_1451
ATTTATCTAATAAAAGGTTCTTTACCTTTATAACTATTTTATTATAATTA[T/A]AAGTAATTACTTT
AATTTTTTAGTCTTTTTTACTTAAAAGAAAAGTAAAAA
scaffold2298_m_3021
ATAAGACCAGATTCAGTATCTTACCTTATACCTAATAGTAGCTCTTATAG[T/C]AAACTTAGTAT
AACCTTATAATAGTAAATCCATTAGCCTCTCTAATAGATT
scaffold23_m_3484
TTAGATAAATCCTATATCTATATGCCTTTCCTAGATAATATTATAGTAAA[G/A]GGACTAATAAT
AATATATAATAAGAAGGAAATTATGCTAGGAGTATATAAA
scaffold231_m_151
ATATAAAGGAAACTATAATATATAGTATTACCTATACCTCTTAGTTTACT[C/T]TCTTTATATTAC
TATTAGTCTATAGGTAATATAATATAGAAAGTAACTAAT
scaffold2321_m_2404
TATAAGTACTTAAAATAGTCTAGTAAATCTAGGGGTTAGCTTTTATTTTA[T/C]ATCCTTAAGCC
TAATGTTCTTTGCTAATAATAGTACTAGGTTACCTCTTTT
scaffold2324_m_258
GTGTATATAGGAGGATTTATTATTTATAGAAGAGAGTTTACTTAGGTATA[A/T]AAGGCTTAGT
TCTTAAACCATAAAAATAACACTTAAATTTAGTTTCTAATA
scaffold2327_m_1414
CTTAGATAAAGCCTAGATTTAGTAGGAATTTTATTAGGTATAAAAACTAT[T/G]ATTAAGGAGC
TTCCTATAGCCTATATAATACTCTTATTATTTTCTAGAGAT
scaffold2332_m_3584
TATATTTAATTTTTATATTCTAGGGATAGCTTATAAAACTAAAATTACTA[T/G]ATATTTTATAGT
AATAGTAAATATAATACTAAATCTAAGACTAAAATTATT
scaffold2334_m_714
AATAAACAGGCTAGCTAGCTATAAGATAGCTATATGCTTATAAAGCAGGG[T/C]ATTTATTAAA
GACTATGTATATTATTAGTGTAAGGTTAGAGATTAAAACCT
scaffold2342_m_1207
GGAGATAAAGAACTATATAAGAATCCCTAATATTATAGAAATAACTTACC[T/C]TAGAGTTATAA
GCCTTATAGGAACTAAAGGAATAAGAACTAGAAAAAGAGC
scaffold2344_m_914
ATAGCTATTCCTAAATAATTAGCTTCTATTACTATAGGGAGATCTAGGTC[T/C]TATTATACTAG
TACTAGGTATGTAATAAAGGTATCTTTTAGCCTATTAAAG
scaffold2351_m_3742
GAATAGCTTTAATTATTAAAGCTATAATTACTAAGGACTATAGGACTTAA[A/G]TAATAGGTTTA
AGAACTATAAGGCTTAGATATACTAGCTAAAAGACTAATA
scaffold2367_m_1637
TATTAAAGTTTTTTTCTTTCTTAAAGAAGTTATTATTACTAAGGCCTAGT[G/A]TATTATTTATTT
ATATTCCTATAATTCTAAAGAGATTCTTATTATTTAAGG
scaffold2376_m_962
GTTAATCCTTATGCTATATTATTACCTAAAGGTAGTGTCTCTAAATCTAG[T/C]ATATATTCCTA
GTAACCTAGTTAATCCTTATGCTATATTATTATAGTAATA
scaffold2401_m_1796
GCTAGAAAACCACACTAAGGGCTTAACCTAGAAATAAACAAAAGGGAGCT[T/C]ATAAAGTTA
CTTACTCTTATATTTACTCTAGGCTATTAGATTTAGTTTTTT

scaffold2404_m_469
AGGAAACCTATTACTAGTTATAAAAGCATTATACTCTAATATCTAATGTA[A/G]ACCTAATAGGA
TAGAAAACTATAATAATCTAGTCTAACTATATCTATAAGG
scaffold2405_m_491
TATATATATATATATAACTATCTTATTAATAAGAGAATATTAAAATTTAA[A/C]TAATAAAGAAGT
TCCTAGTAATATAGCTATTTTATTAGAATTATAAATAAT
scaffold2423_m_856
AGTAACTTTAAAGATATTAGAATTAGCCTATAATAATAGCCTAATTTAAA[A/G]GGGTTTATTAC
TTTAAGTATAAAGTTATTAATAAAATTAGTTACTTAGACT
scaffold2424_m_259
ATTTTTAGAGACTATAGAGCCCTAGAAGGTATTATAATAGACTAAGGTTT[T/C]ATATTTACTAG
TGGTTTCTAGATAACTTTTTGTTATTTTCTTGCAATAAAG
scaffold2450_m_931
ATTTTATAAGGAATATTAAGTCTTATTATATAGTAGTTAAGGCTAATAGG[A/G]AGTTAAAGGCT
ATTACTTATAAAAAACGCTATAAATAATAAAGAGTTAAAC
scaffold2457_m_19692
AGATCCTCGGCGCATCTCTAGAGTCTAGCCTTTTTTTTTTTTTTTTTTG[G/T]TCTTGTCTCTC
TGTCTTTGGTTCTCAAATCCTTAGATTCTGTCATCTCCTG
scaffold2459_m_597
CTAGCTTCCTTACTAAACTATTGAATAATTACACATAGAATTAATTCTAT[A/G]TATAATTCCTC
TAAGCATTAGATTATTTAGTAAATCTAATATTAGTTATAA
scaffold2483_m_620
AATAAAAAGGAGGGAGTTCTTATTTTCTAAGAGAGTTTTAGGTCTTTACC[C/T]CTTATATAAAA
TAATAAATATATTAAAGGAACTATTAGCTAGCTAGGCTTA
scaffold249_m_680
ACCTTTTATATTATTTACTAAAACCTATTAGTTATATTTACTTAGCTAAC[T/C]CTTTTATTTTACT
AGGTATTTATTACCTCCTTAACCTCCTTAACTTTATAT
scaffold2492_m_1197
AAGCCCTATCTTCTAGCTTTAATTTACTATATATAAGACTTTTATATAAC[T/C]TCTAGTTAAAG
AGAAAATCGCTATTAAAGATAGCTATAGGGTAACCTGCTT
scaffold2501_m_421
AAAAATTAGTTTTAATTAATTATATTATAGCTTATTTACTTAGTTATAGG[T/G]TTTTTTTATTAAA
AATAAGCTTAAGAGATAAGTTCTATTAGTTCTATTAGT
scaffold2502_m_1086
ATAAAGAGATTAATAAGCTAAAGGAATAAGGAATATAGTGGTAAATAAAG[T/C]ATTCTATAGT
ATAATTAAAGCTATTACTATTAAAATAAGTGTTTTCTTATA
scaffold2511_m_491
AAAATAAAGTACTTAGTAAATTAGTCTATAATTACTAGAATTATATTAGT[C/T]TTTTATTTACTT
ACTTAAGTAATTACTATAATATTAGTAAGAATTTAAGGC
scaffold2516_m_2186
TATATATTTATTAAGATATTCTTAAAGCTTATAAGCTCCTTCTAGTCCTA[A/G]ATTATATTAACT
CTATATATATTTATTAAGATACTATTAACTAATAAAATA
scaffold2525_m_3028
ACCACTTTAACTCCTTTATAGCTAAGTTCCTTATAGATAGCTTTAATAAT[C/T]GCTTATTATTAT
CTAGGCACGTTAATAACTAGCGCTAGTCCCTTTATGATT
scaffold2527_m_370
TTTACCTAAAAGTAAGAAATTATATTTTTCTTATTAGTAATACTATATTA[C/T]TTATATATAGTAT
ACTAAGCTTCTATTTACTAACTTATAACTTTACTATAC
scaffold253_m_658
AGAAAACTATATAATAAGGCAAAGAAGTTTTACCTAGAGATAGAAAACTA[C/T]ATAATAAGGC
AAAGAAGTTTTACCTAGAGAATAGTTATCTTTAGAAAAGAC
scaffold2533_m_191
TAATATAGGTAGAACTAGACTATTTTAATTCTAGGTTTGCCCTAGCTTTA[C/T]AATATAGGTAT
AAAGTTTAATATTAGGAACTCTAAACTTATAATTAGAGTT
scaffold2545_m_1932
CTAGGTTATATATAGCAAACTTTAATATCCTATTATATTTTAAAGTATTA[C/T]ACTTTATTATAA
TATGTAATTCTTTATTATAGTAATAATAATAATTTAACT
scaffold2550_m_3185
GAGTAAGAATATATCTAATATATACTTATAATATATAATATACTTAACTA[G/A]AACTACCCTTA
GGTATAGTATAACTATATAAGTAGCTATTTATTTTCTTAA

scaffold2558_m_248
TATTTTAATAAGATTACCTTATAGACTATAGGTAAAATTATAGCTAATAT[C/T]TAAGGGGTAAT
TATAAGTCTAAATTAAGGGGTAATTATAGGTCTAATTTAA
scaffold257_m_630
TTAAAAAGGGATTTTATTACTAAAGAAATTATTAATAATTATAAGTAATA[C/G]CTAAGTAATAA
AGTTAATATAAGGTAATTATAATTTATAAGTTAATATACT
scaffold2574_m_199
CATAAATCCCTTAGTAATAAGTTAGGCCTTGTATTTTAAAGGATTATTTT[T/C]TTTATCCTTAG
GCCTTGTATTTTAAAGGATTATTTTCTTTATCCTTTTTAA
scaffold258_m_4900
GGTGGCCGTCAATGGCTACGTCGCAGCTGTCAACAGCTACGACCGTTATT[T/C]AACTGCGT
TGTGGCTGCAAGCGTAGCCACAACTATAACGCCACTAGTAATT
scaffold2582_m_1429
ATAAGGATAATAAAGGCATTACTAATTATATTTCTAAGGGCCTAAAGGAG[A/G]TATATAAATT
AGATAAAAAAGGTAAAATAAGATTTTTCCTAGGGATCTAGA
scaffold2583_m_609
AGTTTATATCTTTAAAAAGGTTAAGAGAGATTAATTTATTATAGCTTATA[C/T]TAAAAGGTTAA
GAATAAAGTAATAGCTAAGACTATTATAGTTACTACTAGA
scaffold2587_m_672
CTATAACCCTTAACTAGGTTTAAGGTTTATTAAGATAGTAATAACTTTAA[C/T]TAGGTAATACT
AATTAAACTAGGGTAGGATTAGTTAAGCTAGTAAAACTAT
scaffold2592_m_782
CACTTTTATTTATCTTACTAGGTCTACTATTTAGTTAGTAGCTTATTTCT[C/T]TCTTTACTATTA
TTCTTTTATTTATTTTTATAGTAATTCTATTCTAGCTAT
scaffold2596_m_235
TATCTAACTATATTATAAGCTTAAGTAAGTAAATAAAAGACTAATATAAT[T/C]CTAGTAATTATA
GACTAATTTACTAAGTACTTTATTTTCTTACTTATAACT
scaffold2599_m_353
CCATCTATCTTATCTCTTGACCCCGCCATCGTCAAGGATCGTCAAGCCCC[G/T]CTTGTCTCC
ATCAGCTTTCTCAAAGTGCGGCTACCTTCTACCTTGATCGTC
scaffold26_m_1691
GCTAAGATTAATGCCTTATAAGCTTATAATATGTTTAGATTTATAATATT[T/C]AATCTAGCAAA
GCATAGAGGCCACTGGATCTTTAATTCTTATATGGTCTAA
scaffold2607_m_4707
AATTATAAGGCTATAATAGCACTTATAGTAGCTTACTATAAGCTTATAAG[A/G]GTATTAATAAG
GGCATTAAATTACATAGCTAGGCTAGCTAGGGTATTATAT
scaffold2610_m_730
TAGCTATAAGGTATATTATATTTAAGCTATATTTTATAAAGATTTATTTA[G/A]GGCTCTTAATTA
TAGTATTTACCTCTTTACCTTTAACTTCTATAAGTAATA
scaffold2620_m_6828
TCTTCGGGCATCTGTGCGAGGAAAGTTTCCACATGATCCGAATTGGGAGA[A/G]ACACAACTT
GCAACTGCCAGCAAAATGATGGTGCATGTACGGAGTTACTTT
scaffold2622_m_456
AAGAGGATTTAGAAGCGTTTAAAAATAGCGAATTTTTGCATTATTTTACG[A/G]AAGATATCTC
TTCTATTAAAGAGAGACAAGATTATAAGGAATTTAAGTCCT
scaffold2637_m_2156
TTATTAGTTATTAGTATTTATAAGGTTAAAAGAAAGCCTTATATAAAAGC[C/T]TTTATTATTACC
TATTTTATTAAATTAGTTATAGAATTTATAATATTATAT
scaffold2649_m_177
TCTAGCTATTAAGATTTTATTATTAGATAGTTATATTATCTTTTTAGAGG[C/T]AAATAAGTAATA
GTTATATAAGATAAGTTTTAGGTTAGATATTATTAAGTC
scaffold266_m_1203
GAGGCCTAGCTATCTAGCTAGATTAAAAAGATCTTCTTTCTCTCATATAC[T/C]CACTAACCAT
ATTAGTGAATCCAGGCCGCTAGAGAGGTCTTAAGAGCCACT
scaffold2678_m_735
AGTTACCTAGAAAGCTAGTAATTAAATAAATATAGGGAGATAGATAATAA[A/G]ATCCTAATTT
CTTTTAGTATTTCTTATATAAAGAATAGGGATATATAGGAT
scaffold268_m_1749
GCTAATATCTTTAGATTATCCCTCTAATACTATCCCTTTAATGCCTTACT[G/A]CCTTCTAATCT
AGTGGATTTATTAAGAAAACCTTTAGATTTAGCTTTATAA

scaffold2691_m_1629
CTTTAACTTAGTCTATACCTAGGATTATTCCTTTACTTATATTAGTAATA[A/T]AGTAGCTAACTT
AGTAAACCTTTATAAATCCTATACTATCTTTTATTTTTA
scaffold2696_m_772
TTAAGTTTAATAATTACCTATTACCCTTATAGTTCCCCTTAATTTCTAGG[C/T]TACCTCCTAAT
ATTTAATTTAACTCTAGATAATCTTCTATATATTAGCTAT
scaffold2698_m_2599
AGAAAGCCACTACTACTGTTTTTACCTAGCCCTTTGCTTTTCTTATTGCT[T/A]TATATTCTATT
AGATTAATAGTAATCTAATATGTAGGCTTTCCTACCTATC
scaffold27_m_1964
AATTACTACACTATAAACTACACTACACTATAAACTACACTAACTATAAG[C/T]GAAAAAAAACT
ATAATATAATATAATATAAATTTTTTTCCTTAAACTACAC
scaffold2704_m_1609
AGAGATTAATATAGCCTTATAGGAACAAATTTAGGAGAGACTAGGAGCTT[G/A]CTTAGAATA
GGATAAACCCTAGTAGAATTTAATTAATCCTATTTAAATCTT
scaffold2709_m_40857
CGCAGGGGTTCTAGCAAACTCCGGACAGGTCGGATCTGTACACCTTGGGA[A/G]TGGTGGA
AATGGGAATTGGGTCATCGAGGCCTTGTCGTAAAAGGCACTGTC
scaffold2717_m_1531
TACCACTACATTTAGCACTCCTAGTATATATGTCACTTTTAAGTTAAATT[A/G]TAATAGATAAT
TTGTAACCTTAGCTAATTTTAGATTAGCCTTATCTAAATC
scaffold273_m_688
ATAACTACCCTACCCTTACCTATTTATAACTTACCTAGTATAAGTGTAAT[A/G]TCTAGTATAAA
TATCTTACTTATACTTACACTATCTTACTTTCCCCTTTAT
scaffold2730_m_1373
ACCTTAGGGTTAGTGCGGAAAAGTATGCAAAGGTTAGATTAAATTATAAT[C/A]GGGTCACAA
ACTATAGTATATATAGCTACATAAGTAAACTATTTTAACCCT
scaffold2731_m_126
TTATATTAACTTTATTACTTAGCTATTACTTATAGTTATTAATAATTTCT[A/C]TAGTAATAAAATC
CCTTTTTAATACCTAAGAATTCTTTAAAGTATTATAGC
scaffold274_m_1201
TATAATAAAATATTACTAAATACTATAAGTATTTTATTATTAGTGCTATT[A/C]TAGTTTTAATTTA
CCTAGGAAATTATAACCTTAGAGAGGTATTACTATAAG
scaffold2746_m_304
ATTTAATAACTTTAATAACTTTAATAACCTTAATAACCTTAATTACTATT[A/G]TTACTATTATTAC
TATTATTACTATTATTACTATAATTACTATTTACTTTT
scaffold276_m_4281
GCCTTTAAAGCATCCTTATAGAAGTCTAAGCTATACCCTTAAGCTATGCC[T/C]TCCCCTTACT
CTTAATCTATCTAAGTTAATAAGTTAATAGGAAGCATGCCT
scaffold2767_m_943
TTTTAAAGATTAAACTAAAGATATATTTAGAAAAGCTACTAATAAGCTTA[T/A]AAGAGAGCTAT
AAAACTCTCTATAAGATAATAATATTTATATTAGCTAAGG
scaffold2796_m_252
GCTAAATTAGCTAGAAGTTTTAGCTATAAACCTTCTAAAGATTAAGTAAT[C/T]TTATTATAAAA
GTCTTTATATAGCCTAAAATAAAGATTAAGGTATCTAACC
scaffold281_m_1185
TTAGCGCTAGTTATTAACATGCCTAAATAATAATAAGTAATTATTAAAGC[T/A]ATCTATAAGGA
ACTTAGCTATAAAGGAGTTAAAGTGGTTTTTTAAGTAATA
scaffold2812_m_1297
GAATTTAACCTTTAATAAATTAGGTCTTTTATGATTAGACCTTTGACCTA[T/A]CCTTCGTTAGC
TAGGTCCGTCGTTATAGATTAATTAATCTAACTATCTAAT
scaffold2822_m_5391
CCATACTAGGTTGCTAGTTATCTAGTACTAGATAACTAGTTAGTTGCCTA[A/G]TTAGGTGAAA
AACCTACTACGATTTGTTTGTTTTAGCTACATACATGGTTT
scaffold2832_m_1667
ATTAAGGTATATTTCTATAAGAATTAGTATTTTCTAAGTATTTAGCTTAT[A/G]TTAATCTTAAAG
AAGCTTAAGTATTTTATAAGTATAATATTAAACTAACTC
scaffold2834_m_339
TCCCTGTGCCAGGAACGCCGGTGCCTGGATTGAACTTATGGCACTCGTGA[G/T]ATGCAATT
CATTGTGCTAATCGTGAATCCTTCATAGACCACACAATCTCCA

scaffold2838_m_629
CTTTATCCTTTTATAATTATATTTTATTATAATATAAAATATATATCCTT[A/T]AAGTTAACTTCTA
ATCTATTAAATACTATTATAGTACCTTTAAGGGTAAAT
scaffold2840_m_765
TAAGCTAAAAGTAAAGTTTTAGCACTAAAAGAGAAGTATACTATAATTAA[T/A]TAGCTTTTAAG
TAACTTATAGACTTAGTATAAAAAATATTATAACTAGAAG
scaffold2867_m_1121
GAGGCATTATTCCTATGCCTAAGGATAAGAAAATAAGGATTAATCTTGTT[A/C]ATAGGTAGTA
ATATTAAATAAGGCTAATTAGACCTTATAGATTAGGTAGCT
scaffold2872_m_120
TACTTTAGAATAGTAATTATAATATAAAAACTTCATAAAAAGTGCTTTTA[G/C]CTAGATAAAAG
TAAAGATATAAAATCTTATTATTACTTATATCTAGTATAT
scaffold288_m_631
AACACTAAGAACCCTTTACTAATAATATCTTATAACTTAATAAACGCCTT[T/A]AGTAGTAAATT
AAGCATTAATAATAGGGATTATAGTATATCCCCTTAACTC
scaffold2882_m_1713
AAGAACATAGTTACTAGCCTATTACTAGTTAGTTACGTTAAAATAGGGAT[G/A]TAAATACTAT
ATTTTGTAAAATAGTTAATAATAACTAAAATCACGTTATAG
scaffold2898_m_1208
ACTAGCTAAGTAGTAGCTCTCTTACTGGCTAGTATAACTTCCCTATCTAG[A/T]CTATTATAGC
TAACTTATAGCTAGTTTACTATATCTAAGTCTTATGCCTAA
scaffold2902_m_804
ATCTAGTTCTAATAATAATAGATATAAGATTAGCCTATGTTACTATAGTA[G/A]ATAATAAAAGG
TAAGATCTATATAATTACTTATAAAGTAAAGATTAGTCTA
scaffold2906_m_981
AAGACTTCTATTCTTAAGGATCTTAATATCTTTCTCTTACTAGTATTACT[A/T]ATAACTATAAAA
GCCTCTTTTTATAATAATAGTTTACTATACTACTAGACT
scaffold2907_m_709
GTATTTATAAATTTAAATAAAAAGGTAAGAAGTTATATAGTTATTACTTT[C/T]TCTTTCCTTACT
TTACTTACTAAATCTAGTTTTCTTAAAAGTAAGTTAGTA
scaffold2909_m_198
ATCTTAATGCTATTAAGATATAGGTTAATAAAATCCTTAATATCCCCTTT[G/A]ATATCTTAATCT
AATTAATTTAAAGCCTTAAGGCCTTTCCTAGATAAGGCA
scaffold2916_m_578
TTACATATTTCTTTACATATAGCGTTTAGGCTACTAATACTATAGTAATA[A/G]GGGGTAAGTA
CCTAGATAAGGGTAGTAAACTATTTATATATTTCTTTACAT
scaffold2927_m_678
ATTTAACGTATGTAAGATAAACTAATATAATACTAGTCACTAAAATAATA[T/C]AATTAATTAAAA
GTAATTACGGGTTTAAGGCTAATTTAGCTATTATTAAAC
scaffold2945_m_718
CCTTAATTAATTATTATAGATTATAGTTTAGATTAGTTAGGAAAATTTTA[A/G]ATAATATTATAC
TCTTTAGTTAGGATTAATTAGTTACTTTTTATATTATAT
scaffold2949_m_10115
GACTAGATTAAAGAATATTTACCTATAATTATATATTAGGAGTATAAATA[G/T]TAGAGATATAT
AGTAATAATAAAATATCTCTCCTTTACTTATAATAAGTAG
scaffold2955_m_15876
AAGAAGAAGAAGAAGAAGAAGAAGAAGAAGAACAACAACAACAACAA[C/G]AACAACAA
CAACAACGAGACGGACTGACAACGGGCAACCGAGCCAGGGGGG
scaffold2959_m_778
TTACTTAATTTTATCACAGATATACTAGAAGTATTAGCTATAAATATAAT[A/G]TGGTAAATAGA
AGGATACATAACATATAATTTATTATGCCTAGTAAATTAC
scaffold297_m_3649
GCGCCACTTTTGTATGCCAATCCCAAAGGTCTGCCCGTCAAAGCGGCGAC[A/T]GCTTCTTC
GGATTTGCCAGGGCGACTGCACTTCGATAAAAACCGGAATTAC
scaffold3007_m_501
ACAGGTCGCGCGAGCGCGGGATACACATTGCCGCGGGATACCTTGTCGGC[A/G]CGGCCG
GGCTGTTGTGGCTCGCCCTCGCGCCCAGCGGCGTGGGCAAATGGA
scaffold3011_m_529
TATTTATATATTTATTACTACTAGATTCTTTAATTAGCCTTTACCTTTTC[C/T]TTTTTAATTTTTA
TTTTCTAGAATACTTAGCTTAATCTTTATTACTTTTAA

scaffold3016_m_251
TTAACTAGTAAATATTAAGATAAATAAAAGATACCTTTTAATAAGTACCT[C/T]TCCTTTATTATT
ATAACCTAAGTTAGCTAGTATATATTAAGATAAATACTT
scaffold3018_m_373
TATACTAGGAAATTATAACCTTTCTAATGGAGCCCTTAATCTATATAAGA[A/G]ACCTAGCTCT
CATAGGACTAGTTATAAGAGCTCTAGCAATAGTAAGTTTAA
scaffold3024_m_118
ATAGTATTACTAAGTAATACTATAAATCTAAAGATATAGATTAATATTTT[T/A]AACTATCTTTAC
TTTATAGCTTAAAATATCCTAATAGTAAGCTTTCTTAAT
scaffold3034_m_1430
AAAAGGAAAGAAAAAGATAAATAAGCTAGTATTTACTAAAGGACTAGCTA[T/A]GAGAATTATT
AAATTAAAAACTAGACTTAAGAATATATTAAGTAAACTATT
scaffold3035_m_1005
ATATAAACTTAGCTTAATTACTACTAAAATCTATAAAATTAAATTAATAA[T/A]ATCTAGGAAATC
CTAGATATTATATAAGTATTATAAATAATTAAGGTAATA
scaffold3038_m_299
CTTCTAACCTTTAGGGGCCTTTTCCTTGTCTTTAGCACCCTTTTCTAGGT[A/C]TTAAGCCCTA
TAATTCAGGGCTTTAGATACTATAGATAACTTATCCCTCTG
scaffold3046_m_1305
TTAGGTTATAGCTATATAGTAACTTATTTAGGGTAGTAACTAAACTAGCT[C/T]TAGGTTATAG
CTATATAGTAGCTTATTTAGGGTAACTCCTATTATAAAAAA
scaffold305_m_5252
TAAGGGTATATATAATATAAGTATTATATATATTACTAGGGGATATTATA[G/A]AGAGGAGTTTA
TTAGTAATAAGTAAGTAAGGGTATATATAAGGGCTTAGGC
scaffold3052_m_265
TCTTAGGCTTTAATAACTATATTACTAGCTTTATAGTCTCCTAAGAAGAC[T/C]TTTACTTACTT
CTCTCTTATAATAGATTTATTTATAATAAGAGTTAATAAA
scaffold3058_m_1521
TACTTAGTAACTAATAAGGTTAAGCCTTTTTTATAGTATATTTATATTTC[T/C]TTATTAGTACTT
TAATCTAATATTACTACCTTTCTTACTAGACTTACTTTA
scaffold306_m_784
TTATTAGCTAGAAATCAAAGAAAGCTAGTATAATAGCTCTATTAATATTA[G/A]AAGCTAAAGCT
AACGCTATTTACAAGACCTTCTAGGAGCTATAGTGGCTTT
scaffold3066_m_13958
CTTGTCATGAAGCAAATGTCTAAATGTTTGAACCATTCGATCTCGGTCAG[A/G]GTATATATCT
TTTGAATGTCAAGTGTTGATGGTCGTAGTCGGAATAGAATG
scaffold309_m_963
TAAACTTAGTTTAATAACTATTTAGGTAAAGACCCTAATAATAAAGGCAA[G/A]ATACCTAGAT
CTCTTAGAGAGCTTAATATAAAAACCTTTATAAAGCTTCTT
scaffold3096_m_1499
ATATAAGAATTCCCTTACTTTTACCTAATAATTTATAGATAAATTATTCT[G/A]AAAATACAAACA
TTTTATATAAGTATATATTAATAATATTATTGTATTTTT
scaffold31_m_264
AAATAATAGGCTAATAACTAGGATAACCTTAAGGATAACTAGAATAAATT[C/T]TAAACTTAAAT
ACTTATATTACTTAAGGACTTTATAAACTATAATACTTAA
scaffold310_m_2447
GGGATGCCTAGTGGTCTCTCTTAACTAGTAGCTAGTGAAAAAATCCTATT[C/T]TATTAAATAA
AGAATAAACCTCCTTACTATAGGTGTTATTTATAATGTTAC
scaffold3105_m_1636
ATAGATTTTATTATAGAATTACCTATTACCTAAGTAAGTAAATAAGAGAC[T/A]AATATAATCCT
AGTAATTATAAACTAATTTACTAAGTACTTTATATTCTTA
scaffold3119_m_1595
AACTATATTAGTGAATCTAGACTACTAGAGAGGTCTTAAGAGCCACTTTT[G/A]ATTTTCCGTA
AAATTTATTTATATGTAAAATCCAAAAAATTAACTTACCAC
scaffold312_m_295
AGATTAATAATTCCCTAGTAAGAGGCAAGGGAAAAGCTAGTCTATAGTTA[T/C]ATAGTATAAG
AGGCCTCCTAATATACTAAGACTAGGTAGTTATTCTAGTTA
scaffold3124_m_467
TAAGATATAAAGGAATATATAATTTATATAGTAAGAGTTAGAGATTTAAT[T/A]AAAAAAAAAGG
GGGAGAGAGAGAAAAAAGGAATAAAAGGAAAGAGAGAGAA

scaffold3125_m_336
TTATTAAGATAGTAATAACTTTAACTAAGTAATACTAATTAGACTAAGGT[A/G]AGATTAGTTAA
GCTAGCGAAATTATTTAATAGATATCTATAAATTCCTAAG
scaffold3132_m_1062
AAATTATAATACCTAGGATAAAGCTAACTATTTCTAACATATTAATATTA[G/C]TAAAGGAGTTA
GTAAACTTTATAGACCTCTTTAATAAGGCTAAAGCTAATA
scaffold3133_m_797
TTAAGGATATAAAATAAAAGCTAATCTCTAGATTTATTAAACTATTTTAA[G/C]CACTTAATACT
ATAAGGAAATAAGTATATTAACTTATATTACTTAAAAAGT
scaffold3139_m_9202
TCTTAGTTTATATATAGTTATTATATTTATTTAATATCTTAATTTACTAA[C/T]TACTTTTTATAGC
TTTAATAAAGAAAAAATCCTTTAATTTTAGTATAAAGT
scaffold3143_m_30303
CTCGCTCCGATTCGTATGGGTGACCGAGTTCCCCATGTTCAAGCCCGTTG[A/G]AGAAGGCG
AGCCTGGCCAAGGCGGCGCAGCTGGCATCTCAGCAGCACACCA
scaffold315_m_324
ATTAATCTTAGCAAGGCTTTAGCTTATACTAGACTAGTAGTTAATTAGCC[A/T]AAGGCTCCTA
TATCTAGTATAATTCCTCTAAAGATCTCTTTAGAATAGCAT
scaffold3155_m_195
TATTACCTAGGACTTAATTATAAAATATATTTAATATTACTAGTCTTAAA[T/C]CTTTTAAAGGG
GATCTAATAAATATAGAAAATATATCCTTACTATAAGATA
scaffold317_m_584
CCCCCCCTCCTTCTTAATTACTCTTTATTATTATAAAAACTTATTACTAA[A/G]GTGTGTATATA
CTAGATAGAACCTAGGCATATTAATTTTTTATAGCTAAAT
scaffold3171_m_930
TACTACTAACAGAGCGGGGTAGCTTGCGATGCATCTAATCGCATCGCGTG[T/C]ATCCCTTTG
GTGGCTCCACTCTTTGGCCACGGTCGGACTATCTATTGTCCG
scaffold3175_m_1168
CCTCCGTTTAGAGTTAGTGCTTTACTAATATAGCTATAGCACGTTCGCTA[A/G]GCAATAGTCA
TAGCACAAAGAGTTATCTGCCTAGGACGTAACCTAGGTTCT
scaffold3179_m_1184
CTAGCATAGGCTATGTAAATAATAAAGAGGCTAGCTAGCTATAAGATAGC[T/C]ATATGCTTAT
AGAGCAAGGTATTTATTAAAGACTATGCATATTATTAGTGC
scaffold3190_m_22763
GTGGACCTTTTCTCCTTCTATATTTACATGCGAGATCAGCAAAGATCGGT[G/A]GATTATCTG
GACTTTTGGTAAGCAGGATGATTTGAAGGTCTTTATTTTGAC
scaffold3194_m_23960
TCACCGTCACATGTTTCGTTGAACATGTAGACGTAGCATGTTGCAGGGGG[C/A]ATGGCGGG
AAGCTTGTCAGAGTGTGAGGCGGCAGACGAGCCTGTCGTGTTG
scaffold320_m_289
ATAATAAATCCTAATCTCTAGGAAGACCTTTAGGGAATAATATTAGTATA[G/T]ACCCTTAAGA
TAAACTATAAAGAGACTTAGACTTTTTCTAGTATTTCTTAT
scaffold3211_m_9407
CGTGGGTATCGCCTGATGAACAACTTTCTTCACTTTTTCTTTTTTTTTTT[G/T]GGGTTCTTGTC
ATGACATAACCATTTGAAGTTTACCAGCTTGTTGTGGTGG
scaffold322_m_309
ATAGGGCTCTAGCCGTATTTATCTTATCTTGCCTTATAGTTAGTGTGTAT[A/G]TAGTTAAGTG
TAAAGAGAATCTTTTAGTAATTATATTAGTATTTTTTCTTT
scaffold3228_m_342
CTCCTAATATATAATTATAGGTAAATATTCTTTAATTTAGTCTATACCTA[A/G]AATTATCCCTTT
ACTTATATTAGTAATAAAGTAACTAACTTAGTAAACCTT
scaffold3237_m_377
TTATTATCTCTTCCTTTAGGTGCTTTAAAGTTATAAGGTATTATAGTTTT[C/T]TATAATATAATT
AGTATATACTATATATTATAAAAAAGCTAGATATTACTT
scaffold3238_m_1387
ATAGCTATATTTTAATTCCTAGGGTTAGTAAAGGTACTTATAGTAATTAC[A/C]TTTAGAATAGG
TCTTATATAGTAAGCTATAAGTAGGGTTTTACTTCTAGGT
scaffold3243_m_641
TATAAGGGCTTAGGCTTTACCTAAGCATATTATAGATAGAAGGAAGGGTA[A/G]GAGTAAGTA
AGAATAGGTAAGGAGGAGCTTATATAAGAAGCTAAGGGGGTA

scaffold3258_m_1093
TTACGCACTAAGATTAGGGGCTAGCTACCTCTAACCTTATTAATTAGTAT[T/C]TATCTTCCTTT
TTATAAAAGGGAAGCCTTTTATTTATACTAATTTCCTTTT
scaffold326_m_1440
ACTATTATAAAGACTAAAGTATTTATCGTTAAATACTAGCTATTCCCTTT[T/C]CTTAAATATAAA
CTTCCTAGTCTAAATACTATTTTAACTACCTTTTATTAG
scaffold3266_m_3790
TAGCCTTATATATATTAAGTATATTAATATTACTTACGCTTAGGACTTAT[A/G]TCTATTAGTATT
AGATTAGGTCCTTAGAATTATATTAGTAATATATATTAG
scaffold3270_m_623
AAATAAACTATTAGTATAATTACTATAGAAAGTATAGGATTAAGATCTAG[A/T]TTTATAAGTAA
GATTAATAATTCCCTAGTAAGAGATAAGGGAAAAGCTAGT
scaffold3279_m_1097
AAAGTTAGTATAGCCTAGTATAAAAAAAGTCAGTAATTTATAGCTATAAGA[A/T]AATAAAATACT
TAGTAACTCACTATCTTATATATATTGCTATATTTATTAT
scaffold329_m_343
AAAAAAATAGATAACCTATATTAATTTTTATAATTAGTTTAAATAAATAA[A/G]GTACTTAATACT
ATAGTTCTAAATAGTATAACTAAAGGGCTTATATTATAG
scaffold3294_m_2248
TCCAATGCAGTCATTCAATCGACGTCACCAGCAGCAAATTGCTGGGCAGG[G/T]GGGAAAGA
ATGACGATGATGATTTCCTTGTCGCATAATCCGTTCACTAAAA
scaffold3305_m_3237
TAAAGTTATATATATATATCTAAGCTATTTTAAGTATAGTAACTATAGGA[T/C]TTACTAATAATA
TAAATATAGTAATATTTAAAAAGAATATAGCCTAGACTT
scaffold3319_m_6117
TCTTTTTTTTTTTTTTTTTGCTGGACTTGCGACAGGTCATGCGGTAGCATG[A/G]GACGGTCTG
GGGAGTCGCAAGTCGTGGTGGTTCAAAACTAAAAACTCATTC
scaffold3320_m_203
ACAGTGATGGAGATGTTAAGAAAGATATAGGATTAGGCAGTAACTATTAA[T/A]AAGCTAATAG
AGGAGTAAAAAAGACGTAAAGAACATGCTAGGAAGGTAAGA
scaffold3322_m_337
ATAGATTTAACCCTTATCTATTAAGTCTATAATCTAGTGCCTAACCTCTA[A/G]AAGCTAGTCC
CTTAGTATATTATATAGTAGTATATTATATAGTAATCCCTA
scaffold3327_m_6368
TGCACTATTAGGACGCGAATCCATTGAACAACCTCTTTTTTTTTTTTTTT[C/T]TTTTTTTTTTTT
TCCCCTTGCTCGCAGGTTCCCTTGCAGGGTGTCACTGGC
scaffold3341_m_2102
TTCGAGAACGGGCACTTCTGCGATGGCCCGATGGGTAACTCGTATACAAA[G/T]TAGCGAGC
GTGGTCCCCAACGTGGGATCCCCCCTTCGTCGCCAGGACGTGC
scaffold3344_m_739
AAGGGAATAGCTAGCGTTTAACTAGCTAAAGAATACCTTTTAATAAGTAC[T/C]TTTTCTTTATT
ATTATAACCTAAGTTAGCTAGTGTGTATTAAGATAAATAC
scaffold3354_m_2549
TAAATAAGTAGGTATAGTTTTCCATGCCTAATTTTACTAAAGTTTATAGG[G/A]TATAACCTAAT
TCTTATAATACTTCAAAGGCATTTTATTTAGTAAATAAAC
scaffold3368_m_2002
AATATAATCTTACTATAGAATACCTTATAAATAATAGAATAAGAATATAG[G/A]TATCTCTATAAT
AAGATAACTAGTAGTTAGCTATATAAGCGCTATTTAATA
scaffold3379_m_7219
CCTCAAGGCGTCGAATTGGATCCAGCCTGTGGTTCATGTCCCGCGGTAGT[C/T]GAGAATCG
AGAAGCCATGGCGCAAGCCAAGTCTGCCGCAAAGTCCCCGTTC
scaffold3387_m_1426
ACCGGCACAATGACGTGGTTCCAGAAACAATTTACTCTGCCCGCCAAGTC[C/T]CGCGGCTC
CTACCTCATCACTGATCAGATCGTTGGGGCTCTTCCTGAGATT
scaffold339_m_2899
GGAGTTATATTATAATAGTTTATTAACTAGAAGTATTCTATAACCTTTTA[G/A]TTACTATATAAT
ACTAAGAACCCTTTACTAATAATATCTTATAACTTAATA
scaffold34_m_1098
AATAATAGTTAATTTATATAGAGATTTTAGAATTATAAGGGGTAGCCCTT[A/G]ATTTCCTGTTT
TCCTATATAAATTAGCTCTTTAGCTTGTCTCTCTATATCT

scaffold3400_m_154
CTTAGTAAGAGGTATATAGTTTTATATAAGAACTAGGTAAAACACTAAAT[G/A]CTTATATCTAA
TAAGCTAAGTATTTAGCTTCTAAGATAAAATCTAATATAT
scaffold341_m_429
AACCTTTAGTAAAGTTAATAAATCTCTCCTTCTAATAGGTAAAAAGCAGT[A/G]GTTTCTCTTAC
CTCTAGAAGCTACTAAGGGTAGCCCTATTTACGTACCACT
scaffold3421_m_8066
ATCTTGTGTCGCTGGTTGGGGAGATTGGCAATGCCAATCGGCGAGGCACT[A/T]TCCGCAGC
TGGGGCCATCTTGGACAAAAGGGATTTGTGAGTTGGAAAGGTG
scaffold3432_m_356
GTTTCTTAAAATACTATTAAGAAAGTAAAAGAAAACTATACTTACCTAGC[T/C]TTCCTTATTTC
CTTTCTTTAATATTTCCTAGTAATAATATTATTTAGATTA
scaffold3441_m_995
ATAGTATACTTTTTCTCTTACTTATAAGCTTTAATAATCTCTAGCTATAT[T/C]TTATAGGAAACT
AAGCTAGGTAGTATTACTAAAGTATATATAAATAATATT
scaffold3444_m_2356
AGCACTCTCTATATCTTTTACTAGAACCTATTAGTTATATTTACTTAGCT[G/A]ACCCTTTTATTT
TACTAGGTATTTATTACTTTCTTAGTTTTTTCTATAGTC
scaffold345_m_316
ACTATATCTAGGATATAGCTATATTACTACTTTTAAGTAACTTTAATTAA[C/G]CTATAGTAAAG
TTATTACCTTACTATACTTTATATAATAAGACTTAAATTA
scaffold3469_m_1122
ATAATAGCATTTTAGAGTCTTTATTTTATTAATCCTATTTACCTTAGTAG[C/T]GCTTTACTTACT
AAGGAGGGGGCCTTTATGTATTTCTAGGGTAATTAATTT
scaffold347_m_145
TTTACCCCTAGATAAATAGCTAGATAAAACGTTTAAACTAGGTCTTAAAA[C/T]ATTATTTAAGG
GCTTTTACTTATACTAAATAAACTAATTAGGTAATTTAAG
scaffold3474_m_2213
GAGAAACTGAGCTAGCCTTCGAGCTAGTTGTTGGCTTTAAGCTGGTTGCT[A/G]GCTTCGAG
CTAGTTGCTAGCTTCGAGCTAGTTGCTAGCTTTGAACTGGTCG
scaffold348_m_329
ACACTACACGTTTTAGTGCAATACTCTAGTTATATATAATATTATACTTT[C/T]TTAATAATACTA
TTTAACTTAATACTTTATTTCCCTAATATAACTTAAAGA
scaffold3496_m_3312
TTTTATTATAATTTAGTTATTTAGTTATAAATTTATAAAGTTTTACCTTA[C/T]TTAGAAAATTAGC
TATAAGTAAAGGTATAGGGTATATATAAAAGATATTTT
scaffold3504_m_1032
TTATTACACATTACATTACATTACATTCATTACAAATGTAATATCAGGGG[G/A]AAAAAAAGTG
GGGTATATTAAGGTCTTATAATATTGTATAGAATTTTCTCT
scaffold3515_m_257
AGTAAGCTTTAGACCTTTCTTTTTCTTAGCTAGCTTATTTTATTTCCTTA[A/G]TTAAGTCCTAG
CTATATATTACTACATATACCCTAGTTATTAGTATATTAC
scaffold3521_m_451
GATAGGCCTAATAGAATACTAAAAAATTATTAATCTTAGTATATCTTAGA[A/G]GCTTTAAAATA
ATTTAATATACTAGATAGTAAGTATATCTTAGAGGCTTTA
scaffold3533_m_675
GTTTTAAGTTATATTAGTAAAATAAAGTATTAAGTTAAATAGTATTATTA[T/A]AAAGGTATAATC
TTATATATAACCTTACTTAGTTATAGTAAAATTATTAAA
scaffold3540_m_874
TTTAACGGTCAGAGGCCTTGTCAGACAGTCGGATTAATTAGTCTAACGAC[C/G]GAAGCTTTT
GTTAGCGGTTAGAGACCTCGTTAGAAGACCTTCTATTAGTCA
scaffold3565_m_739
TATAATAGAATTTAAGAAATTTGCTAAAAGCTAGATAAATTCGCTAGTTT[A/G]CTAGACTAAGA
GAATGAATTTAGACTAAATTAAAACGGAAATAGTTAGTAT
scaffold3568_m_12116
AGGCATTTGATTCAGCCAGCATTGACGACACACATCACATGCTTGCTTTG[C/T]ACATGTGAA
CAACAGGAACAGAAAAGGACTTCGACAGTGGCGACCGAGTGT
scaffold3593_m_1869
AGGGAGCGTTAGTTTAGACCTATCCTAATTCTTATATAAGCGTATGTAGT[A/G]ATTAAGGGAC
CCCTAATAAGGGGGAAGGCTATTAGCTTTAGCCTTATTAAA

scaffold3598_m_7160
AATTTATAATATTTACCTTTTTTTAAGGATTTTACTATAACTAGGGTTAT[A/T]TATAATATTATA
CCTTTTTAATAATACTATTATACTTATTACTTTATTTTA
scaffold3600_m_5156
GACTAGTACTATATTATAGTTAACTACTATAACTATAACTATATATAACT[G/C]CTATAAAACTA
GCCTAGAGATATATAGGAAGTGAGGCTAGCCTTAGATAAC
scaffold3601_m_2320
ATTAGTAATATTATATTACCTATATATAATACACTAGGCTTCTATTTACT[T/A]ACCTATAACTCT
AATATACCCTTAAGGATCTTAAGGCTAAAATTACTATAA
scaffold3615_m_14094
TTTTCTGCTTTGCGAATTCGCCATAATCGAGTCGCGCCGCTCGCACGGGA[T/C]TTGTGAACA
GAAGGACGTGCGCACTTCTACTCCATCGGGCGGGTAGAAGCT
scaffold3626_m_429
AAGGTTAAGGTCTTTTAACTATAGCTACCTTATAATAAGTAATTTAAGAA[G/A]AGAGAAAATC
ACTATAGCCTAAGACTAAAGACCCTAAAGACTCTAAGGACT
scaffold363_m_10537
TCTAGGCATGTTTTCCTTTATTATTTAGTAGCATAACCTAGGCCTTTAGG[C/T]AATAGTTTTTA
TAGTAACTAATAAGGTTAGGCCTTTTTTATAGCATATTTA
scaffold3630_m_291
ATAGACCTTTTTAATAAGGCTAGAGCTAATAGCTTACCTCCTTATTAAGA[T/G]TCTCTTAATTA
CTATATATACTTATACTAAAACTAGGATAAGTCTAAACTA
scaffold3642_m_267
AAGTTCCTAGGTATTATAAGTTAGCTAGATATAAAGAGATACTATAGTCT[T/C]TAGCTATAAAA
CTTAAGGCACTCTAGTAAGGTAAGTAAGGATAAGTATATA
scaffold3644_m_236
AGGAGACACTCTATTCCTTATTTTAGGCATACTAGTTTATAAAGGTAAAT[A/G]TTTATATAGC
GTTTTATAAGCTATAGATTACTAAGGGCTAGGAGCACTTTA
scaffold3670_m_2561
TAGAGGTAACTTACTACTAACTTACTAAGTATTATATTAGCCTTATTATA[A/G]GCTTTAACTAT
ACTAATACTACCTATTATATTATATTTAGTTTAACTAGTA
scaffold3722_m_2534
GTCCGCATAACTTCTTCTACTATAGACTTTAGGATAAGGGGGCCTAAGGT[T/C]ACTCTATAA
CCCTTAAACTATAATAACACTGTTTTAATTAGGGTTTCCTAG
scaffold3733_m_313
CTTAGCCCTAATACTTAGATTAATAACCTTACTATATATAGAATCTAGCT[T/C]TATAATAAGTT
TTAATTAAAGTTATAGTGCCTTATAGTATTACTTTACTAT
scaffold3751_m_544
CCTAAGATACCTAAGATTAAGTGTCTTTTCCCTTAGGCTTTATTATCTAA[C/T]CTAGCTAAGG
CCTATGCCTCTAAGCGCTATATTTAGTATAAGAAGAGAGGT
scaffold3755_m_672
TTATATAATTCCTTAGGAATATCTTTAATAGTTTTATATACTTTTACCTC[T/C]TTATTATCTTTAA
GGGTAATAAACTTATTTTCTATAACTCCTATAATAGTA
scaffold376_m_737
TATAACTTCTTATATAGTGATTTAGTGCCTTTACCTTTAATCTCTTAGAT[T/A]ATATAAGAATTA
AAGATCTAGTAGCCTTTATACTTTACTAGATTAAATATT
scaffold3768_m_1429
GGATTTACTATTATAAGGTTATACTAAGTTTACTTTAAGAGCTACTATTA[G/A]GTGTAAGGTAA
GATTTCTAAAGAAGGTTAATTCTTTTTATCTAGAGTCCGA
scaffold377_m_495
TACAATTATTAGTAGCTTCTTACCTCTTTTCCCTTTAATCTAGGTTAGCT[G/A]GATTAAATCCC
TTCGTTCTGATTAATTAATCTAGGTTATCTAACTAATCTA
scaffold3785_m_18071
GCACGATTCATTGCAGGGGCCGGCCACCTGCCCCCACGTGCGCTGCGCCC[A/G]CCTGCGC
CCACCTGCGCCCACCTGCCTGCGCCCACCTGCCCCCACCTCGAA
scaffold3796_m_28285
TCCAGGTTCAAGTGCGCGCGCACCGGAAAAACAATATGCATCGCCCACGC[A/T]GGCCACCA
TGCGTGCTGCGATCAAACAGAAGAGCAACGATTCATCGGTGGG
scaffold3801_m_4312
TATTAATATTATAAAGCTTAGTAATAGGGCACTTTCCTTAGAATAAAAAG[C/T]ACTTCTTCTAA
TTCTAATAGATTCTTACTTTTATAAGAATTATTACTAATA

scaffold3802_m_1127
TGTAGTTAGTGTAGTTTAGGGGAAAAAATTTATATTATATTATATTGTAG[T/A]TTTTTCCTGCT
TGTAGTTAGTGTAGTTTGTAGTGCAATACTCTGCTCTTAG
scaffold3845_m_6529
AGGTTATGGCAGTTATTAACTATTATTAACTAATAGAATTTAATCTAGAT[A/G]ACTTTTACAAT
ATCTTATATACTAATAGAATTGATTTTAGTGACATTATAC
scaffold3848_m_757
AAAAAAGGAAAATATTACCTTAAAGGCCTATATATAATTTAGCTAAGAGA[A/G]AGCTAAAGGT
CCTTAGAGAGTACCTTATAAGTATATAGCTTAAAGGGTAAA
scaffold3850_m_1541
ATAATTAGACTATCTTAATAGTATATTTATAATTAGACTATCTTAATAGT[G/A]TATTTACTAGGT
TACTTTTCCCTAGTCTATACCTAATTATAAAGTAAAAGG
scaffold3858_m_3362
GAAAGCAACGGCTAAAAACGACAAGAATTTTCTCGTAGTGGGAGCCCACG[T/C]ACCAGTTTA
TGCTCGCCATTGTTATTGTGCCCCCTTCTTCGTAGAATCTAC
scaffold3864_m_576
AATTACTTTCTCTATAGTATAGTAAAAGTAATAAACTACTATAACCTAGG[C/G]TATATACCTAG
GGTTAGAGAGCTAGAGCTAAAGGACTTATCTTACCTCCTA
scaffold3882_m_650
ATTATAGATTTAAGTAAGAAAGCTATAGATAAGTTACTAATAGTTATAAG[A/G]ACCCACTTATG
GACCCACTTTTATTAAAACCGATTAAAAACCCTCTCTTTA
scaffold3886_m_833
AGTTTAGCAATTCCAGTGGTAGCAAGAATAGCATTAACAGGACCTTTAGG[T/A]CCTAAGGAC
CTAATATCTATAGCAGTAGTAGCAATTAGAGTAGCAATTATA
scaffold3887_m_17925
CCACCCACCATCATCAGAAGTGGGCAACAATGTATCTCCATCACAGATCC[G/C]AAACCACCA
CGTCTCATTCGTCTCGTCTCAACGAGTCAATCGCCCCCTTCA
scaffold389_m_535
AAGTATTAAGAAATAATATAGTTTAACTAAAGTAAAAGTAGCTATAATTA[T/C]ATAGAGTGTTA
GGAAGCTCTAAAAAATAGTTTAATCTAATAACACGGTGGT
scaffold3898_m_14459
TAAATCTTAAACTATAAATTAAAATATTATAAACTATTTATACTTTATAG[C/A]TAAAAATATTCTA
ATAGTAAGGCTTCTAAATATTTATAGCTGATACTTTAC
scaffold390_m_236
AAAACCTTCCGTTGCGTTGCGTTAAATATTTAACGTAGTGGTTCTATTAG[A/T]CCCTAACCGT
AGAGCTGCACCTGTACAGCTGTTGCCAGCCAGCAACTAGCT
scaffold3907_m_1604
AGCAAAATAGCCTAGGATAGGCATATTATTAGACTAGATTTACACTAGGA[G/A]GGGGTATAG
TTACCCTTATTTTAGTAAATCTTTCCTTTATCTTTCTTTTCT
scaffold3908_m_1411
GATTAGTTAAGATCTTATTAGAATAAAGCTTAAAAAGAATAATCCTACCT[C/T]TTTACTATTAG
CTATAGGCTAGGAAAATAAGCAGTTTAAAGTAAAAACACC
scaffold3925_m_730
TAGACTATTTTAAGTACTTAATACTATAGGAAAATAAGCTTACTAACTTA[C/T]ACTACCTAAGA
AGTATAGCTAACTATATAATATATTTTATATTAGCTTACT
scaffold3947_m_571
TTCCTATAATAATTATATTATCTATATATAGAAGAAGTATAATATTATTA[T/C]ATTAAAAAATAC
AGAGTTTGCTTAATAGCCTCTTAAAGCCTTACTATTTAA
scaffold395_m_2914
TTAATAGATTACCTTAGAGGGAATTAACTAGTAATATTTAAACTAAAACC[T/C]TATAAGTTAGT
AGTATTTAAAGAACTTTAATAAAGATTTTAAAAAGCGCTA
scaffold3951_m_137
TACACTATATAAATAGTGTTTACTAGCTTATATAGTGCTTTATAAATATA[C/G]CTTTAAAAAGT
AACTAAGGTATTAGTTAGCCTAAAGGGTATTATAAGATAT
scaffold3958_m_494
CTTTAAGTGTAAAGTTACTAGATATTATACTATAAACTATATTATAACTA[G/A]AAATAATTTATT
ATAATAATAGGAATTCTTATAGTTAAAATTAATAATACT
scaffold3961_m_942
TATATATAGTACACTAGGCTTTTATTTACTAACCCTTATCTCTATTATAT[G/A]TTAAAGGATATT
AAGGCAAAGATTACCTTAGGTATATATATTATTAAACCT

scaffold397_m_975
AACTATTTTACTAGCTAATATAAAGTAAATATAGTATTTTATTACCTTTA[C/T]TATATATAGGCT
ATTATAGCTTATACTAAATAAGTACTTTTTTAAAGGTAC
scaffold3994_m_287
ATTAAGATATAGATAAAAATACCTATATATAAAGAGAAAATATATAAAAG[G/C]TTATAAAATTT
CTTAGTAAACTTAAATAAATTATTTAAATTAAATTACTAT
scaffold3996_m_976
GCTTAGTATTAAACCACTTCTTATAATTTAAATATACTTTATATAAGTAT[T/C]TAATATACTCTT
TATATTTCTCTTAAGATAATATATTTAAAAGAGATATAA
scaffold3997_m_12754
ACGCTGCGGTTGTACTCGTTAGAACAGCAGCGCGACCGTCACGGCGGAGG[A/G]CATAACT
TGCACATACAGGCAACGATCATCTACGACCTTTATGACACTGCG
scaffold4003_m_1027
ATATTAACACTCTTTACCTAATTATATCTTACTAGCTTAGATATTTTACC[G/C]TTTTAGGTTTTA
TTATCTTTATTTATTTTAACTACTTAATATACTTAGAGT
scaffold4018_m_386
TTATTAACTTTATAATAAACTTACTAGCATTTAGATTAATTAGGAAAATT[C/T]TAGATAATATTA
TGCTCCTTAGTTAGGATTAATTAGTTACTTTTTATATTA
scaffold4028_m_902
TATATAGTTCTTTTATAAGGATATAAGGCTAGTAAAGTAGTAGGTAACTA[A/G]GTATATAACG
CTATCCTAGCCTTACTAGGAAAGGTTAGCTTTTACTACTAT
scaffold4040_m_148
TAAGTTTATAAAGGTAATATATAATAAGACTATTATATATACTATTATAA[A/G]AGTTATAGAAG
ATAAATTTATTACCCTTAAAGATAAGAAAAAAGTAAAAGT
scaffold4050_m_167
TTATATATTTTTAATAAAGCTTATTAAGCCTTTAGAGTTTATTTTAGTTT[C/A]TTTCTTAAGACT
TTTTCTTTTTAAATTAATAGCTTTTCTAATTATATTATC
scaffold4067_m_4476
CTTCTCCCGACCCTTGTATCCCCTACCAAAAAAAAAAAAAAAAAAAAAA[A/T]GTCCCATCGA
CATGCCCCTTCAGTCCGTAGCGATATTCCACAGCCCATCGC
scaffold4068_m_227
AGCTAGCTATAGTTTACATTAGGACTAATACTTAGTTAGTCTAAGGTATA[A/G]GTTTAGCTAG
CTATAGTTTATATTAGAACTAGTACTTATTCTCTATAGTAA
scaffold4075_m_279
CTAGATAAATACTAGCTAGGGGCAGGTATATAAAGGTTTTAATCTCTAAC[T/C]TAGCACTAAT
AATATATATAGTCTTTAATAAATACCTTACTCTACAAGCAC
scaffold4086_m_715
ACTAGATAGTAGCCCTTAATTAATCTAGAATAGTACAAATTAAACGCTTT[C/A]CTAATCTATTT
TGCTTATAGATATAGGGACTAGAAGTTATAAATTTAATCC
scaffold4095_m_2264
ATATATAAGTAGTTTACTACGCTTCTCTAAGCTTTAATACCTTATTACTA[A/G]GATAAAATCTA
GTAATATATTTAAATTACTAGGTTAAGTAATAAATCTCTT
scaffold4098_m_1478
TCCTTAATATTCTTATATTATCTAATAGTAATATTTTCTAACCTTAGCTA[G/A]ATAATCTCCTTA
AGTATAGTAATAACTATAGCTATATTTTATTATTTTTCT
scaffold41_m_327
ATTAAACCTAACTAAGCCACAAAGCTAAGGGATTAGCCTATACCTATAAG[C/A]TTACTTAACC
TCTTAATTAACTTACTAGGGATGTAAGCTAGTAATAGGGAG
scaffold4120_m_1511
TAAGGTCTTATAAAGCCATTCCCTATGTCTATTTATTAGTTATATATAAA[T/C]AATTTACCACT
CTCTCCTATAGTTATAAATCTAAATCTTTATTTACTATAT
scaffold4125_m_147
ATTAAATCTTACTAACTTACTTTTAAGAAGACTAGATTTTATAAGTAAGG[C/A]AAGAAAAGAGA
AAGTAATAACTATATAACTTCTTACCTTTTTATTTAAATT
scaffold4134_m_28756
GATTGTTGAGATGGCGTACCTGCGTACGTTCGACCCTTATCAAAACAAAA[C/G]AAAAGAAAA
AGCATCGGTCCGCTATGCGCGGACCGGGCAAACCCAAAGAAA
scaffold4136_m_1307
AAACTTTTATTTATTATCTTTAATAGTATCTTATAGTAAGAACGCATTTT[A/C]TATATTTATTAA
GTCCCCTTTAAAAGGTTTAAGACTAGTAATATTAAATAT

scaffold4158_m_645
AGTATTATTAATATACTCCTAAAAAGTTACTAATATATTAACTAGTTTAA[G/A]TAGTATTACTAG
ATATTTAAAGTAACTATATTAATAATAAAACACTATTTT
scaffold4159_m_1259
CTACTCTTTATATTATCTTTATTTAATTATCTCTTATTTATTTAGCACTA[C/G]TCTTAACTCCTTT
ATGTTCTTAGAGATAATTAATTATATAGGATAATTTTA
scaffold4160_m_808
CCTTTAGATATTATATACTAGGATAAGTTCCCTAGTTTTAATTAATCTTT[C/T]CTAAGAGAAAT
AGCTTAGTTCTTATTAGTTTAGTTTATAAGGCATTGCCTA
scaffold4172_m_3003
ATTTAAATAAGAAAATCTTGTTTTTATATATATTTTACTTATTTAATTAT[G/A]AATTTCTAAAACT
TTAGCTTATTTAGAATAATAAGCTAAGAATAGGCTAAG
scaffold4195_m_375
AAGTTATTTTATATAACTATTAATCTTTTACTTCTAAAAAGATCTCCTAG[T/C]TTAGCAAAGAG
TCTAGAATACTAGATTATTCTAATCTAGTTTATGTGTAAA
scaffold4218_m_107
TAAATTAAAACTAGAATAATACTAATAATAGAATACTTATAGTATTTAGT[A/G]ATATTTTATTAT
AAATTTCTATATAAAATATTAGTAATTAAACTAGTATTA
scaffold4220_m_2396
TTATATTACTTAAATATATTACTTTAAGTATTAAGAAACTATATAACTTA[T/G]AAGTCTCTTTAT
TCTTATTATAGATATTATCCTTATAATATTTAATTATTA
scaffold4241_m_15908
ATAATAAGACGCTTGAAAAGCTTGTGAAAGACTTGCTAGGACCTAAATGG[A/T]AACCATGCC
CGGCGTGGCTCAAATGTTTGTCGATCTGTCACACATGCCATT
scaffold4249_m_369
ATAATAGCGAAGTTAGGGATAAAAGATAATATTATAACTATAATAGCTTA[G/A]ATTACCTTATA
AATAAGTATAGTAAGCTAAGGAAAGAGCCCTAAGATAGCT
scaffold4256_m_21513
CTGTTACTCTTCCCAGACCGTTGACTAGCGCTGCGACCTTTTTTTTTTTT[G/T]TTTTTTTTTTT
TTTTGTTTCGAGAAAGGACATGAGTTGATGAGGGGCCAAC
scaffold427_m_1631
TGCTACTATAAATATTTATAATTAAACTAATAGAAGATTTTAACTTAAAT[A/G]CTCTATAGTAAT
TAATTAGTTTAAAAGCTAGAAAACTTTATTCTAATTACT
scaffold4270_m_741
ATCTCTTTATATATTATAGTTAGTTTACTAATAACTTATTAGTTTTATTA[A/G]AATAAAACACTT
ATAGCTTACTATATAGAGTAAGCTATACTATAGCTAGCT
scaffold428_m_285
GAAAATAAGCCTTATTACTAAAGGATAAGGACTTTAAATGTATAGCTTAT[G/A]ATTAATCTAAG
GTAGTACAAAGACCTAGGAAGTTAGCTATCCCTAACCCCC
scaffold4286_m_15963
TATCTCAAAGCGTTATGCAGGGGACTAATATAATGAGCCGAGTATTATAT[T/A]GAGAAAGAA
GGCAACCCGCAACTGGTCTAGTCAACAATGGTGGTTCCATCT
scaffold432_m_198
AGGAGAGAGCTCTTAGAATACCTATAATAAGATAGCTAATAGTAGCTTAG[G/A]ATAGAATAAA
TAATAAGGACTTATTATTAAGAAGTAGTATTATAATAGAGA
scaffold4322_m_1461
AAATCGGAAGGGCCAAGCTTTGAACTGACTCTGCTCCTGGGCCATGTCTC[C/T]ATGCTCACT
TCCCTCGTTGTCGCGGAGAGCCAAGGAAAGAAGTACATCTTG
scaffold4339_m_23249
GCATGGACCGGTAACGTTTTTCCTGAAAGAATGAGCCAAGTCAGTTAGAG[C/T]CAGATTGGA
GGCACGAGGCAAAGTGCCGTTTGAAGAACGTTTGGCGCAATC
scaffold4342_m_12826
ACCATGCCCATCCGTTGCATGAATAATTGCACCCCTCTCCAGAAGCAGAC[C/T]GACGATGCT
CGCATGTCCTTCACAAGCAGCCCATGAGAGAGGAGTACGGCC
scaffold435_m_1749
CTATAGGGTAACCTGCTTACGTCACCCTAGCTTACCTAATTACTAGTGGC[A/G]CTGCGGTTG
TGGCTACGCTTGCAGCCATAACGCAATTAAATAATCCATAAT
scaffold4377_m_2049
TCTCTCCGAATTCTTCTCACCGACCTCAACTTGCAGACAGAACCTCCCCC[C/G]CCCCCCCC
CCCCCCCGCCCCCACCCCCACCATGTCGTCAGCCCTCATCTCC

scaffold4382_m_4477
GTAGCTTTATATAAGTAAGTAAATTACTAATTATATCTCTTAAATATATA[A/G]AAGGTTTAGTA
AATTTATTATAATAAAGCCTCTTATTATAAATAAAGCTAT
scaffold4397_m_551
AATAAAATTAAGGCTTTAGCTAAGCTAACTAATCTTCTAATTTACCCTTT[T/A]AGCTATATACT
TAACTAATCTTTTAATTTACCCTTTAAGCTATATACTTAT
scaffold4408_m_1639
GAGACTATAGTATAAGTTAAAATATACCCTAGTCTAATTACCTAACTATA[C/A]TAGCTTACTAT
TAAAGTATTATACTAGATATTAAGTCTTACTAATTAGAGA
scaffold442_m_502
ATATTTACTATACTTAAATATTTACTAATATTACTTATAAGGTAAAATAT[T/A]ATAAATATACTAT
AATAGTATTACTAAGTAATACTATAAATTTAAAGACCT
scaffold4428_m_17646
AGGGGTGCATGCTCGAGAAACTGCCCAACTTGTTCTATTCCATGGGCTAC[G/A]TCGACGCG
AGCTGGACGCTCGGCGCCGACGCCACCGCCCAGCTCGTCTGCC
scaffold443_m_893
TAATAGCTCTATTAATATTAGAAGCTAAAGCTAACGCTATCTGCGAGACC[A/T]TCCGGGAGC
TACAGTGGCTTCAGGGCTTGATTAATATTAGAAGCTAAAGCT
scaffold4438_m_155
TTATAGTAAGCTTTAAGGAGTAATTTAAGTAAGAAAAGAGTTTAATTATT[T/A]GTCTAGTAAAT
TTAGGAGGATTTAGATGCCTATAACTAGGTGCTTTAGGAT
scaffold4464_m_6452
TATTTTAAAAGCAAGGACGCGGGGTTTGGAAAGAGAACGGAAGTCTGGGG[G/T]TTTTTTTTTT
TTTTTTTTTTTTTGCTAGCCATGCTTTAGTAAATTTTTTTTT
scaffold4468_m_261
TAATAAAAAAGGGAGTTATTACCTAACTTACTATAGTAATAAGGGATAAG[C/T]ACTTAGATAA
GGGTAATAAACTATTTATATATTTCTTTATATATAGTGTTT
scaffold447_m_2965
AATTATGTTATAAAAAATCAGATGCATTGGCTATAGCCAATGAGGTAAAA[A/T]TTTTTTTTTTT
AAAATCAATAAATCAATAATTGTTAGTATCTATTAGGATA
scaffold4470_m_648
TAAGGAGAGTATTTGTTGTGCTGAAGTCTGACGGTGGTGGTGGTGGTGAC[A/T]GCAGAATA
GGCAAGGAGAAGCCAGGAGAAGCATAAGCTCCGGAACCGGGTT
scaffold4482_m_478
AAAGGTCCTAATATCTTAAGATAAGGGTAACTTATATAGCTCTATTATAG[T/G]CTAATAAGTAA
GTATTTTAAATATAGGTTTTCTAAATGCTAGTAAAGGTAG
scaffold4495_m_220
AAAAATAGTTTACTAAGGTAACTATAGCTATATTTATTTATACTTATAAA[A/T]GACTAGGAAGA
GCTTATTTAACTAGACCTAGAGATTACTATATAGCCTAAG
scaffold450_m_524
TTAAAGGACTCTTATAGTTCTTATAAGTAGAGCTTAAAGTAATAACTAAT[G/A]CTTAAATCCTT
ACTAAACATATATAACTATTTAAATTTAATATTATATTAG
scaffold4500_m_2927
TCAACATGGCGCAGGCAAAGAAGAACCTCCTGCTCCTTACGATTAGGGAA[A/G]TTGACGCA
GAATGGAAAAGGAGAAAGTCAGGTAGGATATTTGCGTATCGGC
scaffold452_m_15327
AAGAACTATATTCGTATTTCTTAAGATCTATATATACTTACTTTAGTGTA[T/A]AATTTACACTAT
AAAGTTAATTAACTATAAATATAATATTAGGTTATATAA
scaffold4525_m_115
TTAATTTTATTCTATTAGTTTAGGGTATTTTTTATTTAAAATAATAATAA[A/T]AAAATATAAAAAT
ATAAAATAATTAATAATAATAGTAAATAAAATAATAAG
scaffold4528_m_7220
GATGGCGTTGACCCCACGCGGACATACACCAACGACCTGTGGCAGATTGT[C/T]GAGGTGTT
TGGCATTGAAGCTGCCCGTTCTGCTCTGGTGAAGGAGCTGACC
scaffold4534_m_2007
CCAGAGTATTGCACTACAATTGATTTGTAGTGTATTTTTTATTTAACAAA[T/C]AATATATATCT
AATCTTAGAAAATATGTAAAGATATAAAACTTCTTTTTTT
scaffold4544_m_1159
ATTAGTAATTTAGTATTACTAGAATTTTATATTAAGATTATAATAGAATC[C/A]TACTATTAATTT
AACTAGGTTTAACCTGATTTTTACTATAATAGTAACATT

scaffold4547_m_594
TAGTGTTTAGCTTTGCTAAAGCCTAATCTTATATAAAGTAATTAAGATAG[G/A]AAACAGGAGT
TTAATAGTTTCCTAGGATAGATTAGTGTTAATAAAGGATAA
scaffold4553_m_2124
AGATCTTTAAAATAAGTCTAGGTAAGGATATATTAGTAAAGTTTAAGTTT[T/C]CTCTTTTATCC
TAGTAATTATAATCTTTTCCTATCTATAATATTTAATAGC
scaffold4577_m_430
TTCCTTCTAAAATCCTATATAAGCTTAGATAGTAATCCTAAATAGCTTAG[T/C]ACCTAATTAAT
ACTCTTAAAGTAACTTAGTGTTATAATTATTAGCTATAGG
scaffold4588_m_6001
CCCAAGCGACCCAGGCGGCCATAATCTTAAACAGCATTTCCCTTTTGCAA[C/T]ACGCTCGAA
TGTTTTCCTAAAAAGTGAACAAGTAATCATTGTCTAGATAGG
scaffold4590_m_1568
TAATAAGATAATAGCATAGAATTATTACTCTCTCCTATTAATTAAGAAAA[A/C]ACTTTACTTCTT
ATTTTAGGTATATTAGTTTATAAAGGTAAATATTTATAT
scaffold460_m_1269
TACTATATAAATAACTAGATTAGAGAATTAACTAATAAAACTAAGGATAG[T/C]AAGGACTATA
GTATAGACTTAGTAATATACTTAAATAGTGTGGGTTATACG
scaffold4623_m_1047
CCTTAATAAAATTAGCTATATTTTCTCCTAAAAACTACTAAATATTATAC[T/C]TATTTTATATAG
TAATAAGAGAAGTTTAATATACTATTATTTCTCTAAGAA
scaffold463_m_805
ATAAAGAGATTAAATAGTAAAGCTATTTTATAAAGAGATTAAGCTATAAT[T/A]TAAAGCCTTAG
AGGGCATTATATTTAATAGAGAATTAGTCTTTATAAGTTA
scaffold4639_m_2585
ATTATTAGGTACTGCATTTTCAGTATTAATAAGATTAGAATTAAGTGGAC[T/C]AGGAGTTCAA
TTCATATCAAATAACCAATTATATAATAGTATCGTTACAGC
scaffold464_m_1495
AATAATCTAGTATTCTAAAATCTTTACTAAGCTAGGAGATCTTTTTAAAA[G/A]TAGAAAATTAA
TAGTTATATAAAATAACTTTAAGATCTAATATTATAAGGT
scaffold4650_m_17534
CTAACCATCTGCTATCTAGTCCAATTCGCTCTTCTTCGTGTCTACGCAGT[T/C]AAACTTGCTC
CTCTCCCTCTCCCAAGCGGCGTGACTTAACTTCTTAGTCAC
scaffold4661_m_923
AGTTATCTTCTATAATAATCTATTCTCCTAGCTAAATGGCAATTTTGCCT[G/A]GTTTTCTATGG
GTAATTAGGTATTACCTTCTAGCACTATTTTAACGTGCTT
scaffold4668_m_26419
TCAACAACAACCTCCAATATAGACAGTTGTGACACCCCAGTAAAATCTCT[T/C]CCAATTAATG
CAATAGGGTATCAAAACAAGAGGCTCAAAAGACAAAGGAGA
scaffold467_m_6110
AACTTTAAGAAAAACCTTCTAATTATTTTATTTACTATTATTATTAATTA[C/T]TTTATATTTTTAT
TATTAATTTAATTAAAAAATACCCTAAACTAATATAAT
scaffold471_m_7897
TCTATAGGAATCCTTATTTTCTTATTATAAAGAAAGATAAAGGGATTTAC[T/C]TAATTCTATTTA
CTATAAAGTATAATAAGGTAATAATATAAGATATGCTAA
scaffold4715_m_347
ATATTATAATATTGCAATTTTTAGCAATATAGCCTTTATTTTTTGCCTTA[C/T]GTAAAGATTTTA
ACCAAGTCTTGTATAATCCTTGGTTATTCTTGATAATAA
scaffold4724_m_6984
GTTTGACATGGAATGCAAGCAGCAGGACATTTTCGACTTCTCCATTCGTC[G/C]CACTGTTGA
CGACATCTTGAACGGCTACAATGGCACTGTCTTCGCCTACGG
scaffold4754_m_14148
GGATGATGTGGAGAAGTAGACTCACTTCTAAGACTGCGATACGGAATAGT[T/C]AGGGAAAG
CGGAGCTTTGCCGCAAATGGACAAATGGACAAATAGACGAATA
scaffold4778_m_753
TAGTTAGTTTTCTCATATAGATAATAAGATTAATAATTAACTAAATATCC[C/T]GGATAGATATA
ATAAGGTTATATCCTATAAGCCTAAGGGTTAATAGATTAA
scaffold4781_m_507
TAGCTAGTAGCTTGCTAGTGTTACATAAACCTAGCCCTAGAGCCTTACTA[A/G]CCTATAAGG
TGCATAGGTATACCTATTATTGTAAGTAAGGCCTTATAATTA

scaffold4782_m_1926
ATCCTTCTTATTTACATTTGTAAGGGCTTAGACTTTGCCTAAGCATTGTC[T/C]GTATAGTAGTT
AGAGAGGGGATTAGTAAAAGCAATTAGGGTAAGGAAAAGG
scaffold48_m_374
TTTATTACTAAGTTAAATACTTTAATTATAAGTAATTTATTACTAAGTTA[G/A]ATACTAAGCACT
TAATTTACTCTCTAAAGACTAGAATATACTAAACTAATA
scaffold4800_m_8121
AAACTCACTTGAACATGTCGGCCGAGATCTGAGTGATCCTCGCCCACGCA[A/C]TCACGCCA
GGCCGGGCAGGCGTCTTCTGCAGCCTCGTCTTGATGGTGTCGA
scaffold4803_m_3263
ATGTAATCAGGCCGGCTGTCCACGAACTCTCCCAAGGAAAGCGCCCTACA[A/G]AAGTGTTC
CAAATGAGACTTGGCGTTGTCAAAGTCAAGTCTTGCCCCAGTA
scaffold481_m_9752
GAGTAGAGAGCAGACAAACAAGGAAAAAAAAAAAAAAAAAAAAAAAAAA[G/A]AAAAAAAAA
AAAAAAAAAAAAAAAAAAACCCGTGTAGCAGTTCAAGTACAAT
scaffold4810_m_287
ATATATATCTTAACTATTAGTTTTAGTATTTCTAAGTTTAATAGTTAATA[G/A]AAGCCCTATATA
TAATTAGTATAGGATAATTAAATATAATATATATATCTA
scaffold4817_m_11318
CCCCAAAAAGAAAAGAAAAGAAAAAAAAGAACGCCTCGCTTACTCTGCCT[G/C]CCCCACGC
TCCACCACAATCACGCAGCAGATATTACTCTGCCTCCCCCACG
scaffold482_m_1913
TATAGGGATACCTATATTATTTATAGGGTAATCCTTTAAACCTTAATTTA[A/G]ATCTTATTATTA
TACTAAATTATTTTCCCCCTCTAAAGGGTTATCCCCTAT
scaffold4834_m_1388
TTATTACACATTACATTACATTACATTCATTACAAATGTAATATCAGGGG[G/A]AAAAAAAGTG
GGGTATATTAAGGTCTTATAATATTGTATAGAATTTTCTCT
scaffold4853_m_6855
GGTCCGGGCGGGCAACTCGAGCCGGGAAAAAGGGGGGGGGGGGGTTTTTT[C/T]TTTTTTT
TTTTGTAATAAAGATTGCCCGAGATGAGGTTTGCCTGGGGGGGG
scaffold4856_m_4697
TTCAAGCTGGTACGGGGGCTTGGATTAAAATTGCCACATCTACCCTACCT[T/C]CCCTAAATT
GAAGCGACATCGAAGCGACATTGAAGCGCGACATGAACAAAA
scaffold4865_m_25940
AGTAATCATGGCTGCAATGCACTGATCTTGGGTGTACGAATTGGCCGCCG[G/C]TCATGAGA
GGAGATTGAAATCTTGTCTATTTTTTGGGAATTATCAATGCTC
scaffold4886_m_296
TATATTAATAAGATTAGGGAAAAATTTAGGTAAGTAAGAAAAGGCACTTT[T/C]CTTACTATACT
AATCCTAGTAGTAAAGTATTATAAGTTTAAGGGTTACTAT
scaffold49_m_4162
TAAACTTATTAAGGGCCTATATTTATACTATATTCTCTAATAGTTCCTAT[A/G]TAGGCTATATA
TAGCCCGCTTACTTAATAAGTATATTATATCTCTTGCCCT
scaffold492_m_242
CCTTAGATATTAGCTATAATTTTACCTATAGTCTATAGTAATTATATAGT[A/G]AGGTAGTCTTA
TTAAAATATAAATAAAAATGCTTATATATAAAGGGGAAAC
scaffold4940_m_21612
TATTGAGATGCATCAAAAATGTGACAACCTAAAAAAAAAAAAAAAAAAAAA[A/G]AACGAAAAGA
ACTCGCAGGATATCGTGTCCAAAGACGTGCGGAATTAAAGT
scaffold4980_m_520
TCTTTTGCGACAACCTCAACTTACAACCGCCACGACGCCAATGATCCTCA[A/T]TGTCCCACG
AGCAATATCGTCACCCACGAAAACAACCAGCGAACAATCTTC
scaffold4989_m_4820
TGAACTGGATACAGCATAGGTGTAGTAGACGTTTCTTTTTTTTTTTTTTT[C/T]TTTTTTTTTTAA
AAAAGCCCATTCGACTGTTGAAGCTTGTTTCTGTTTCCA
scaffold5010_m_13835
TTCCGGCGGATCGGGACGACGCTCCCAGGGCGTGGAGCTTGAGCGACGGG[C/T]GTTGGG
CGAGGAGGAGGATGAAGCGCTGGCCGACGGAGCCTGTGGCTCCAA
scaffold5025_m_2345
TATTTGACATTGAGACTTGGCATGATGGAACTTGAGGACGACTGCTCTCT[C/A]TAGCAATTC
ATCATGGCAGGTGTTTGCGAGATTCCATGTCATGGTTTTCAA

scaffold5043_m_16469
TGTACACAGCGAAATCGGGGACCGAAAAAAAAAAAAAAAAAAAAAAAAA[A/C]CTACCCTCC
GCTCAGTGAATACGGAACTAGGATCCATCTCTTGTTTTTGGA
scaffold5057_m_32065
ATCTAGGTTAGTGAACTGGAACTGCTTCTTCTCGCCTGCTCCAGCACTAG[A/G]CCGTGGAG
GAGCTGTCCCTTCTGGCTGGCCACCCGCGAGGCTCGCCCTTCT
scaffold5065_m_641
TAGGGTTAGAGGGCTAGAGCTAAAGGACTATTCTTACTTTCTAAGGGTTA[A/G]AGGGCTAGA
GCTAAAGGACTATTCTTACCTCCTAGATAAATATAGTATTCT
scaffold5084_m_3518
TTCGACAAGGGTCAGATACAGCTGCCTCAGCCAACACGCTCTGTCCAGCT[A/G]ATTTATCAT
ACATGATGCTGTTTCATCATGTCCACGCAGAAACGCCTCTTG
scaffold5089_m_17633
GGAGCGGGTAGGCAGTCTTGGTAAGATAATGGTGGAGTTGCGCCGCACGA[A/G]CCGACAA
ACCGCCAAAAGAGGAGGCAATGGTGTTGAACTCTACCTGCTTGA
scaffold5094_m_3323
CAAGGATGGGGGACTGGTTGCGTAAGCAAAACAGAGCGAAACGGAGGGGG[G/A]AGACCAC
AACAAGATGCACCAGACTCATGGCATGGCTCATCGGGAAGTTCC
scaffold5098_m_13754
ACAGACAGTTCGATTTGCTTCTGACAAGGATGTGTGACGTTTACTCATTT[G/T]TCAGTCTGC
GCTACTTTATGAGCTTTTGTGTTTGTAGCAGAGATTGACGAT
scaffold51_m_404
ATAATATATAAAGAAAGAATATAATAAACTAATATTTATAATCTATTAAT[T/A]AATAATTAATAG
TATTATTTTAATTACCTTATATAGCTTAATTAAGCTATA
scaffold510_m_2194
TACTAATAATATTATAGTACTAGTGCCTTAGATTCTTAATTAATTATATC[T/C]TATAAGACACA
CACTATAGCGCTTAAGGCTTACCTAGCTACCCTAGATTAG
scaffold5103_m_4781
GCTACAGCTCTAGTTTGCACTCTCAACATGAGGTGAATAGACTGTCACCC[G/A]ACAGCTCCG
TCAACGAGCTACACATTCACCCACTCTTTCGGTCTGACTCTC
scaffold5104_m_21258
TACAAAGCTATGGCGCATCCCGGCGTTCAGGACGGTGAAAGCTTTACGGG[A/C]AACTATTC
AAACTGAAGAGATTTTGTCGTTCATCTACTTGCTTAGGGTAGA
scaffold5113_m_29387
GACAACAAGGCGGCAATTGGGAGCAGAAGCAGACGACAACGGTGAGGGGG[G/T]GGTGGA
GAGGGGGAGGGGGAAGAAGAAGCAATCATCAAAGGACCCTGACGA
scaffold5120_m_15718
AATGGTCGAGCCAGGCCAGATCGTAAGACCGGCCAGCGCATGCAGCACAT[G/C]CAGCACA
AGGAAGCACCTTCGCGGCCTGGCCGGAATCACTGTCCAGAGTGA
scaffold5122_m_903
ATACTAGCCCACAGTCATAGGTAGCAGTAACGTCTGCTTACATTAGAAAA[G/C]TTAATTAACT
TAACAGTAGTAATTATAATAATAGCTAAATCTATCTTTATA
scaffold513_m_591
TAGAGTTATTAAAGAGATTATAAGTAAATTATTAATTAGAGTTTAATATA[T/C]TTTAATTAAACT
AAGTACTATTAAAAACTTACTTAATCTTATAAAGAATCC
scaffold5130_m_34645
GGCCATGCGGCTGGGTTGGGCGTCGTCGAGGTCTTTGACACGGGGAGTGT[A/T]GGGAAGG
GCGTACGGGCAACGGGGGCATGACCAGCTTTCAAAAGACTTGTT
scaffold5132_m_12068
AACTATCAATATTATCTGTACTATTAATATTATCTGTACTGTTAATATTA[C/T]CTGTACTATCAA
TATTAGCAATACAATCAATATTATTAATACCATTAATAT
scaffold5137_m_8301
TCAACAACCCCAGACCAAACGAAAAATGAACAAAAAAAAAAAAAAAAAAA[G/A]AACAAAAAAA
AAAAAAAAAAAGGCCTCCTCTTCCTTCCAAGTGGATGCCCG
scaffold5140_m_1256
CCACTACATTCTCCAGGCGGCGTCCTCTTTCCTCCCCTGCATGGCCCTCG[A/G]CCCGCAAG
AGAACGAGCGCGTGCTCGACATGGCCGCCGCCCCCGGTGGCAA
scaffold5142_m_1318
GAGACCCGAGCTTGGTCGCTCGTACTCGTACTCGGATGCTGCCATTGTCA[T/C]GCCCAGGC
ACCACGGCACGTCGCCGTCGCTGAGTCAAAGCCAAGAATTACC

scaffold5146_m_572
AAGGCTAGAATAAAACTAGTATAGGATAGCTAAGACTTACCACTACCCCC[T/C]TAATTAATAT
AGTAATATTATAAGTCCTCTTCTAGAATATAAATAAGAAGG
scaffold5155_m_369
GAGCGCACTAACAAAGAAAGGGGAGGGGGGGGGCGGAAAGCAAGAAAAGA[T/A]ACGTGGA
GGATCGAGATCTGCCCCCCCAGCACTGGAATGTCAACACGTACC
scaffold5156_m_42710
GCGCTTGTTGCGTCAGCATGGTATGTCTCATCTTGTCTTTTTTTTTTTTT[C/T]TTTTTTTTTTTTT
TCCCCTTTCAAGTCAAAAGGGCATTCATTCATCATCGAG
scaffold5168_m_5682
ATTTGCTCTCATCTGCCACGCCTGCAGACTGGTCAACGGCCAAGCTCCCC[A/C]CGGGACGA
AGACTCTCGCAGAAATCGGCATGTGGAGGTGCAGCGGGTGCGG
scaffold5169_m_13798
GCCTTTTGCGGGAAGTCGTTGATTTCAAGCGTCGCGTGGAACGCCCCGGC[A/G]TCGGGAC
CCTTGTTGTCGATGGGCTGGCCGGACCGGAGCTGGCCAGCCTTT
scaffold5172_m_2425
CTAGGTCCGTCGCTTGAGGCAAGTCCCACCAAACCGTCCCCAGCCTGCTG[A/C]TCTCCTTG
CACTGTGCAGGCAGGACATGCACGATGGCGGGTTGAGCCTGCA
scaffold5174_m_30982
ACGTATAAGATGATTGCCGTTTTTTTTTTTCAGAACGCACTCGGGCGCCA[G/A]GAGCATGAG
AAAGAAAAGGAGAAGAGAAAGAAGAAGAGAAAGGAAGATGCG
scaffold5179_m_972
CAAGCTTTAGCAGGGGCATGCATCAGGGACCGGGGGGGGGGGGGGGGGG[G/A]GGACA
AACAATCATGTGGTTTCGTGAAAGCTGGAGAACGGAAGACGCGGGG
scaffold5184_m_1328
GGGAATCTAAACACAGAGATATCAGTCCTGCAAATGTTCATCTCCCCCCC[C/T]CCCCCCTTT
TTTTTTTCTTTTTTTAGAACGGCAAGCTCCCAGTTTCTTCGT
scaffold5187_m_21446
CAAAAGTGGCGTTGAAGGCCGACCAGATCGTGACCGGCCTCCGAGGGAAG[T/A]CAGTCAG
GGTCGTGAAGCCGCGGATCGAAGTCGTAGTCCACGCAAACGACG
scaffold5197_m_198
AGTAAATTAGGTGGTTCTCCCCCCTATATTACTCTTAGGTAGCTAGTAGG[A/T]GAAGCTTTAG
AATTATAAGAATAATAGTAGCTAGGTAAGAGGTATAAGGGC
scaffold5198_m_12563
GGGGAAGCACAAAGTCCATGGGAAAAAAAAAAAAAAAAAAAAAAAAAAA[A/C]CGTTCGAAG
AGCAACCGTCGCTCCGTGAGCAGCTGGTTTGGGTATTGCGAT
scaffold52_m_295
ATTAGTAGTGCTACTAGCTCTAAAAAGTTACTAATAAAGTTATAGTAAAA[G/A]TTAGTAAACC
CTAGGAAGCTATAAACCTATAGTAAAAATTAGTAAACCTTA
scaffold520_m_4408
CAGGGCGTTCCTGGCGCTCATCTTGAAAACCTTGCCAATCTGTGATTTCG[G/A]CCCGCAATT
GATCAATGTCTTCGAGCTCCTCCTGAATAGCGTTAGCACCTT
scaffold5203_m_26971
AAATGATCCGTACCCATATGTAATTGTAATGCAGCATCCCACGCCTTTGC[A/G]CTAAATTTAT
ATGGGGCGCCATGGCAAAAAAAAGATATCACCTAATATTAT
scaffold5205_m_32688
ACACGCACCAAATGAGAAGGAGATCCCCGATCGATACCCAGCACCAGCAC[T/G]GTGGACC
GGAAATGTATGTAGAGAGGACTCACTGCTCACTGTCAGAGGAGA
scaffold5210_m_1222
ACGCCTACAACATTTTCTTGGTGGGCGGCCTTGGAGGATATCGACGGACC[A/G]CCTATGCC
TCTCGATCGGTACTTGGTGAAGATCAATAGGCGGACAAGGACA
scaffold5212_m_2949
TGCTCTCGGGGATTTCGGGGGCCCGCTGCCTGCCTGGATGCAACATTGAG[A/G]CTGACCG
ATGCCTTCTTCGGCCTCGGTCCTTTTCCTTTTCCCCAACCACCG
scaffold5213_m_2882
GCGAAGGTCGCAAAAGGATGAATCGTGTTTGACACGGGCAGCATCTCAAC[G/A]TCAAGGAT
GGACACGAGCCCGGGGTCCTTGACTGTGCGTGTGCCCGAGGAG
scaffold5215_m_14457
CCTTCGGTTAGTGTGCGTCGGTCGAGGGAGTCCCGGTGGCGCAACGTCTC[C/T]ATTTGGC
CACAGATTGGCAGATTGGGGCGAGAACGGGGGCCTGGAAAAGCT

scaffold5217_m_922
CACGTGCGTCTGCGTTGACGATTTATACCTCTCAACAACATAAACGTTAC[T/C]CGCAGCAAT
CTGCCTAGGTATGTTTCACGACACCGATGCCCTTCATCCTAC
scaffold5218_m_3297
CAGAAGACATCATCTTATTTTCCGCCTTCAACGACTTGTGGAAAAAGAAC[A/G]ACATGTCAA
CGTTCGATGCTGACCAGTTTTGGGGCATTAACGGTGCGGTTT
scaffold5226_m_953
GCATCTGACATGTTATCAAATCGTGTCCACGGATGGCAGCCGGGTATCTC[C/T]TTTTTTTTTTT
TTTTTTTTTTTTCAAAAGTCCCAAAAGCTCTTTTGAGCAGC
scaffold5227_m_4398
AAAAGGCCGCCTGCCTGTTTCCTGCTGCACTCCTCTCTCAGGCTCTCTGG[A/T]AGAACATGT
GGACCCGCCATCACCGGCCAGTTTTGGCGGCCACGACCACAT
scaffold5228_m_4315
ATCTTCATCATCGAGGGGATCCCGAGCGTGGTGCTGGGCGTGGTGACGTA[C/T]TTTGCGCT
GCCCAACGATGCCGGGACGGCGTACTTTCTGGACGACGCGGAG
scaffold524_m_1781
TAAATAGGTAAAGGCTATGCTAGTTAGGAATGTAATAATACTAGTAATTA[G/A]GAAGTTCCTT
TTCTCCTTAATTAGTAGATTTAGGCTTTTCTGCTTTATAGT
scaffold5240_m_9279
TCACGGAAATGAGACATGAACCCGCGGCCCAATAGTTGGGGCGTTGCACA[A/T]GCCCTTGT
GCGAGCGAGGGCTTAATTCCCCGAAGCTGGACCACGTGCCTTG
scaffold5250_m_606
TTTAATAAAATTATTTAACCTTTATTAAATAATAAAATTATATTATACTC[T/C]ATCTTAATACTTT
TAATTAAATAGTTAATTAAATTAACTTTATATAAAACT
scaffold5254_m_979
GGCAATCTTTGCATTGCCTTGTGTTTTTTTTTTTTTTTTTTTTTTTTTT[T/C]GGTCAGCAAAGG
TTGAGAACATGGGCAGTCACTGGAAAGGGCGCGGGGCAG
scaffold5268_m_10712
TCTTCTCCCATCGCGCCTCGCCTTCAGCAACCTTGTTGAGATATGACGTC[A/G]CAATGCCCC
GGCTCTGCCGCACCTCACAGCAAGACAGTCGAGCCGCGCATC
scaffold5269_m_9018
TGCTGGCATGCCGTCGATACATCGTTAACGAGGGCAAAAAAAAAAAAAAAA[A/T]TTTTTCCAT
CTCACACTCGGTGAAATGTAAATATGTCCCCTCACTTGTAAT
scaffold5275_m_19184
ACCGAGCCCGCTCTTCCCGAAGAAGCCCTCAAGCTGATCGACTGCGGTGA[G/C]GCGGACA
AATTCGGCCTGGCCAAGCAGTTCCAGAATGTCGTTTCTACACAG
scaffold5280_m_4258
CATCAGTATTTTCATGACTGTCAGAGGGCCACCGGGGGGGGGGGGGGGGG[T/G]GTCTTTA
CTTACATCCAGTTGGAAATGCAAAAGGCAATAAAAATGCCAAGG
scaffold5286_m_43100
TTTACGAATATCGGGGTCGGCATCGGCAAATTGTCCCACAGAAAGACAAA[C/T]GGTCGTGA
GTGGGCCGGCCGTGGCAAAGGTCAACTGAAAGTTGAGCTTCAG
scaffold5289_m_363
TGTCTCATCAGCAAAAAAAGAAAAAGAAAAAAAAAAAAAAAAAAAAAA[G/A]AAAAAAAAAA
AAAAAAAAAAAAAGGAAAAGGGCCTCGTTTCGTAATTCTAG
scaffold5293_m_785
AGCGTCCCTGAAATATCAAGGGGACTGACAGTGAAATCAAGACGACAAGA[A/G]AAAAAAAA
AAAAAAAAAAAAGAAAAGACCAAGGGAAAATGAACCAAATCAA
scaffold5294_m_488
TGTACTCCGTACACACGGATTAAAGAGCACCAGATCTGTGGCTGGTGGTC[C/T]GCCACATC
CGGCATTGGGACTTGTAGGCTTATTAGCGCTCGCATCCCATCT
scaffold5303_m_5061
CGAAGAATTGGGGCATGTAGATTTATAAAATAATTCGGGGGGGGGGGGGG[G/T]GGGTTGTA
CAAAGTGTCTCTCCATCGTGATATCAATATCCCAACGCCCAAA
scaffold5314_m_2954
TTTGAGAAGAAGATGACGCTGAACACACCCTGGCTGGACGGATCGGCGTA[T/C]CTGAAGAG
GCCGGGACGGGGCGGTCGGCTGGCGGCCAAGGCGGTGCCGGTG
scaffold5315_m_6434
GAGGGTGCTGTTGTACAACGTCGGCCAAGTAGAGAGAGATGTGGGATGTA[A/T]AAATTACT
TTCGTCTGGCAGAGGCTGGACGACGGATGCGTCGGTACAACAT

scaffold5323_m_37272
CCTCGCTGTTCAAAGGGCACTTGTTCGCACAGTTGAACGTTCAATGCCCC[C/A]CCAGGAGC
TACGACCCAAACATCACAGCTCAGAAGGACGAAGTGTTGTTTG
scaffold5332_m_15423
CTGCGATGAGTTTTGCGCTAGGGGCATAATGAAAGACTGAGGGAGCGTAC[T/C]GTGTGGCC
GAGCGACAGGAGGAGCCATCCCACCGCGGTGACTCTGAGGGAT
scaffold5335_m_1748
GCCAGGTATAATATATTAGCCAGCATCTCTTGTGTAGAAAGAACCAACCC[G/C]AAAAAAAAA
AAAAAAAAAAAAAAAACACTCCGAAAATCAATCATGATGATT
scaffold5336_m_8414
GCCAGCACCGTTGGGTCCAATCACAGCAATACGAGATCCCAAAGAGCACT[G/C]GAAAGTGA
TGTCGGAAACCTGGGGCTTGGAGGTACCGGGATACTGGAAGGA
scaffold5342_m_2360
TCGCCGCAGTTGAAGAAGGCGAACAACAGGCCGTCATCGTCATCCTCCCC[C/A]TCGGCGTT
GCCACGCGCCCGCGCCCGCGTCCGCGCCCGCTCGTACGCCTCG
scaffold5345_m_2579
GGCAACCATGACACCATAAACGCGGTATTTTTTTTTTTTTTTTTTTTT[G/T]TTTTTTTTTTTTT
TTTTTTTTTTTTGCTTTTTTGAATCCCCCAACATGCCG
scaffold5349_m_4213
ATTCTTCTTGAGCAAGCGTTTGATGGGCTGGGTGCTCGGTCTCCTTTCAA[G/A]GCGCGAAT
GCCTCACAGTCGTGCATTTTAGATTCAGGATTTCTTGGGTCGA
scaffold5366_m_7865
TTTCGGCTGAGACATTGGGAAAAAAGGAAAAAAGGAAAAAAAAAAAAAAG[G/T]TATGGCTTT
GGTTCTGGTTCCTGACGAAAGCTGCCACCCCCGGCACGGTTC
scaffold5367_m_1849
AAAGAGACGTTGATGTGGATAACCCACGGATACGGATTCGCACTTCCCGT[A/C]ATGGTTCG
TGAAGTTTTCGTCGCGGATGAAGGGTGCTTTGCAGTTGAATGG
scaffold5383_m_26476
TCTCGCAGTGGAGATCGCCCGCGCAAGTATGTGCGCGTCTGAAATATGTA[C/T]AGGATGCT
GAGGCTTGTTTCCTGGGCGAAGAAGACGAAGAGCTGGACACGA
scaffold5385_m_10820
TTCAGGTGGACACGCAGCGCAATATTGTCTTTGCAAGGCTGGGGGCTAAG[A/G]ACTGTGAG
TCGTCGCGCCCGACGTACGCAATGCCCAACACATGGACGCACA
scaffold5386_m_1643
AGCAGCGGCAGGCTCAGCTGCGAGAGGGTGAAGGCGCGGTGCAGGTTCAG[C/T]GTGAGG
AGCTTCGTCCACGCCGCGTCGGGGTGCTCGTCGAAGGGGGCGCCC
scaffold5387_m_19083
CTGCCAAACGACACGGTTGTCTGTGTAGGTTCTGCTTTTTTTTTTTTGGGG[T/G]TTTTTTTTCC
CTACGAATGAGCAAGGATTCGGGAAGCATGCCTGGTGCTAA
scaffold5396_m_19311
TCGTGGGTGCCGAATGAAAAAAAAAAAATAGAAATTTGAAAGCGTTAAAT[A/G]GTGCCAGCT
CAATTGAGAGGTACCGCCGACCAGCTCCCATGTGCCATGAGG
scaffold5409_m_2313
CGACGGATTGGATGCATATTTGTGTGCTTGGGGAGGGGCGGGGGGGGGGG[T/G]TGAATGC
GCCCCCGGGAAGCATTAATATCAGGTTTCTAGACAATTTTTGTT
scaffold5413_m_358
CCTGCATCTGTCCCGGGCAGTCCGTGAGGGCTACGAAAAAAAAAAAAAAAA[G/A]AAAAAAAA
AAGTCGCCACCACCACCACCACCACTCAACATATCGTTTTATT
scaffold5421_m_4088
CTCTCGCCCGTTAGCCCGGCCGCCAGTGCCATTTTTGCCGTTTGCTGCAA[C/T]AGCTGCGA
GAAGAACATCCCCGATGCTCATTATCACTGCTCTACCTGCGAC
scaffold5423_m_2295
TCCTATATTCGTCGCTGGTTCGACGACCGTGACTTCGTCTCAGTGCAAAC[T/A]CCTATGCTT
AATCCAATTGCTGGTGGTGCCACTGCCAAGCCCTTCGTTACT
scaffold5425_m_8273
GCGTTGGCAGTCGGTCCCCTCATGCATCTGAACGGGGAACAGCACGATCC[A/G]GGACCAG
CGAGCCCAACTGCGCCAACGGCCGGACGCCAATGAAGTCATCCT
scaffold5426_m_3992
CCGAACTATGTTATGAAAAAGAAGAGGCCGAGAACTCGAGAACTTCTTCA[T/C]AGCTACCAA
GAGATTGTTTGGGCTACATGTGTTTTTTTCCCTTCCGACCTT

scaffold5435_m_19088
CGTTTCCAGTTTCCCTACTCTGTATTATTTATCTGCTGCGTCGACTCTTT[C/T]CCCCCCCCCT
ATCCATGTTCTTTCATGGAACCAAGGAGCTCTTTTCCTTTT
scaffold5439_m_1960
CGTCCAATTAGGATAGCCTTGGGCTCATCCAGGCTACTGGAAGGAGCACC[A/G]CCGTCTTT
GCTCTGATTTTCCATGATGGATGCAATCGTAGCACTCAAGTCG
scaffold544_m_3502
ATTCTAAATAATTAGCTAAAAGAGCAGGTTATTAAGTAACAAGATGCTAT[T/C]AATCTATTATT
ACTTATAAAAGCTAGAGGCTCTAACTACAGCTATTAATAA
scaffold5441_m_8333
CTGTTGGGAGACGGTCATGCTGCCTGGGGAAGAGGTGGCGCGACGCGGGA[G/C]TTGGGC
GGCGTTGAGGTCGACTTGGTTCTTTGGTGCGACTTGTTGGACCGG
scaffold5442_m_33999
AGGGAGAAATCGTGTCCCTCCGCTGTTTGTCGGAGAGGAATTGAAATGCA[G/A]CCTCCATT
AGTTCTGCGACGAAAGCCTCGTCATCTCGGAGAAGTTGTCGAA
scaffold5448_m_1433
GGACGACTCGACTTCCTCTAGTGTGTATTCGCACTACGTGTCCTCCGTCT[T/C]ACAATCGGC
GGGGCTCGACACGAATCGCGTGCACGTACTCCGCATGCAGCG
scaffold5451_m_123
TATAGTTATAATAATTCCCTTACTTCCTTATTATATATATATTATATATA[C/T]TATATTATAAGTG
TATTTATACTAATATATTATAGGGACTAGTATATATAG
scaffold5455_m_16094
GACTGACCGACTTGTCTTGAGAATGCGGCACCATCCCATCAATGCCCCCC[C/T]CCCCCCCC
CCCTCTTGAGAATGCGGCACCATCCCATCAATGCCCCCCTCCC
scaffold5459_m_10717
GCCCTCCCTCACGGGACCGGCCTGGCACAATTTGGGGGGGGGGGGGGGGG[G/C]GCTTGT
TCGTTGACTCTTCAGATGTTTTCGATGTCTTTTTAACTCTCGCGC
scaffold546_m_455
AAGACTATCGCAGTCGCTACTAGATAGATACTAGCTAGGGGCAGGTGCGT[A/G]AAGGTTTT
AATCTCTAACCTTACACTAATAATATGCGTAGTCTTTAATAAA
scaffold5467_m_6586
CTGGGGGGATGATGAGAGGGACATACTCGTCTTGGTGTCACCAGATTGCA[T/A]GATACAAC
TTGTGCACAGGCTCGCGACGCGAGCCACGTCGAAGCTCCGATT
scaffold5471_m_6442
GCTCCAGCAGCAGGCGCCTATGCAATTTGACAAAAAAAAAAAAAAAAAAAA[A/G]AGTCCAGCG
TTAGTATAATCATTGATCATTCAGTTTGTTCCGTATCCTTGG
scaffold5472_m_468
ACTTGCAACAGCACTTCCTTTCGCTGTTTGCATACCAGTCCTTTCCCTTC[T/C]CGCTTCTTTG
AAAGACCGCGTGAACAACTCTCCTTGACGGCCGTGCCGATT
scaffold5477_m_2371
ACTCGTTATCCAAGTCGATGGGTTTGCGTCCTTTTTTTTTTTTTTTTTT[C/T]TTTTTTTCCCCT
CTTCTAATATATTTCTTTTTTTTTTTTTTTTTTTTCTTT
scaffold548_m_542
CTATCAGAGACCCATAAAAGACCCACTTTTTTATATTTACTCTATAAAAT[T/G]AAAATAGTATA
CCTATAGCTTTAAAATTATATAAATCTAGCTAATTTATAG
scaffold5482_m_27596
CCGCATCGCTGGCCTGGACGCTGTAAGAGGTCGTGTGAAAAGGGGGTCTC[A/C]TGTATTGT
TGTTGTTCCATGCCGCAGAAGTTGGAGATGCACACAATTTGCC
scaffold5485_m_456
AAAGAAGAAGAAGAAGAAGAAGCAAAAAAAAAAAAACCAAAAAAAAAAAAAA[A/C]AAGTTCTGT
ACAGGTGCAGTAAGAAGAGAGGGTAAGCTGCATATGTGTCTA
scaffold5488_m_2780
GGACTGCCTGCGAGCCGAAGAGTTGTTGCGCGCTGCGAACAGGGCCCAGT[G/A]TAGGTCG
AATCGAGGCGGGATCGGTGGTCTTGGAGGGAGACGCTGATGCCG
scaffold5509_m_12438
GAAATGTGTCTGACGACGCAACATGTGCGTCATCGTCAAAAACCAGATTT[C/T]AGGATAGCT
AGTAGAGTCGAATTCTAAGCAACATTGCAAAGAAGTTCTAGT
scaffold5511_m_1659
ATTGCTGCTGAACTCCGTCCATTGATCGTGGTGGAATTAGAGTGCTCCCA[A/G]CGTTGCGA
GAAACGGCCAGTCGAGCCTCTCGAGGGCGATGATGCCGGTGTG

scaffold5515_m_23278
CTACTAATCCGTACGGAGCATAGTAATGACTCCTGCAGGAGCTGAGGCAG[A/G]TGCGGCTA
TAGGCATATTACTGGATGGATTGGACTTGCCATAATATGTCAA
scaffold5517_m_8834
CTTGCTTATCTGCTGCCTTCTTGGCTGCCTTTGCGGCTTTGCTCCCACCT[T/C]CATCGTCGT
CGTCTTCTTCGCCGTCTACCTCCACGACATCATCGTCAATGT
scaffold5522_m_12810
AATATATAAAAATACACATGTCCCCCGGCTCAACTCGTCGACTTCTCTCA[T/A]TCAATCGACC
AAACCAACCAACCAACCAACCAACCAACCGTAACACACAGC
scaffold5527_m_10172
GACGAGCTTTTTGACGCCGTGTCCACCACGAGCCCATCTACGTTCTGTAA[A/G]GCATTCTTC
CTGCTTGCGGCCCTGGGTGTTCTGTCGCTGAATGTCCTCCCT
scaffold5530_m_14884
GCTCTGCTTCGTCCTTCTCCCACTCGTCGTTGACTGGAAGCTGAGGTCTT[T/A]CGCGCTCTT
TCCCCTTGCCGCTGCGCTGCTGACCCCCGACTCCTCTCTCTT
scaffold5537_m_2730
AGATGATCTCAGAAGTGGTGTCCCTATAGGAACGGAAGGGTTTGTGATCG[T/A]CAGCGTAG
TAGAGGGTGTCGCTCCTTTTGGGTGTGTACCTTGGAGGAGGAG
scaffold5538_m_15678
TTGTTGAGGGTGGCTTTGTCGCCGCGGCAAAGGCCTCGAGCATCTCGCG[G/A]TACATGG
CTTTTGCGGTGGGCGCAATCTTGGCCCTGCGGGCCTTCCATTTC
scaffold5545_m_1070
TGTGTACTCGCCATTTGGAGAACCAACAAAAAAAAAAAAAAAAAAAAAA[A/C]TATGTATAGA
CACAACAGCGCCTCGACGGAGAATACATCTACTGAACCGTC
scaffold5546_m_5568
GATGCCAAGGCCACACGAGAGCGTCCACCGCCCAAAAAAAAAAAAAAAAA[A/C]GTCATGAG
GCGAAGCATCCCGCCGAGTAAGATAATCGGGCATGGAATGGGA
scaffold5550_m_6587
TTCGTGAACGTGGTGTTGGTACTCCAAAAAAAAAAAAAAAAAAAAAAAA[A/C]ACTATGATGC
TAATTGAAACATGAAGAAGTTGTAGCGACCAAATGTCGCCC
scaffold5551_m_2691
CGCTCCGTAAACGGAGAAGCGACGGCTACCCCTTCACACTCCGTCGGTAT[C/A]GTGAGCTC
CATAATATTAATCATCAAGTTTTTGACCGACTTCTAATAAGTC
scaffold5553_m_47236
GAGTAAACGCAAGCACGAGGATGACGATTTTGAGGGCACTCCCGTTTGGG[T/A]GCTCTATG
TAGCCTCAATGGCACTCGTTCTACTTGGTGGTGCTTTTGCTGG
scaffold5554_m_5124
GGGTTGCAGACCCCCGTTGTTGGATCATTTGTTCTTTTTTCTTTTTTTTT[C/T]TTTTTTTTTTTTT
TTTTGCCGTTTTTTTTTTTCTTTTTTTTTTTTTTTTGCCG
scaffold5556_m_14918
GTCGAGGTGGCGGTCGATGGCGTCGAGTGCACAGAGATTGTCCTGTCCAA[A/G]CCTCACA
AGTACTACTCTCTGATTTTGGTAAGTTTCTCAACGGTCCCCAAC
scaffold5557_m_1032
TGTCTGTCCCGACCGTCCTGTACGGAGTAAACTACGGTCCGTATCAAGTC[A/G]CCTCCTCTA
GTCCGTAGGCTCTGGGGCTCTCATCTACAGCGCTCTCGGAGA
scaffold5560_m_7821
TAGACCGTCCTTTGCATCCAGCAGCAGCAGGACGAAGGGTGGCGGCAAAG[T/C]TCATGGTA
AGATGACCATCAACAAGGGCAAGGGCAAGGGCAAGGGCAAGGG
scaffold5564_m_16339
TCTTGAGAAAAGGACGGTCTGGTCTCCTTTTTGGGGCGTATCAGGTCTCG[T/A]TCGATCCTG
TCGCGGTCGTCGCGAGGTTCGCGCCGAATGTCTGCTTCTGGT
scaffold5570_m_1285
CGTTGCGAAGCTCTTGGAGACGAGTTTAGACAGGACTGTGCGGCATGAGT[G/A]CTTGCAAG
AACTTGCATTCAGCTATCGACGCCACAGGCTGAAGCTGAACCA
scaffold5575_m_15350
GAACTGGTTGCCTGGTTTCATGATGTGCCAGCCAATGAGTGGGTATGGAG[A/G]AACATTGG
CTAATATACGCTTGCAGGTTAAATACAAAATTAGTATCAAGGG
scaffold5585_m_1339
TCAAGGTTGGGTCATGTCGATGCGACGAGCGAAACATGAAAAATTGATAC[C/A]CCCCCCCC
AAAACCGACTGGTGCCCGCCAAGTCGATGTGGAATACGCTTGT

scaffold5588_m_8819
GTTGCTACATCAGCTATACGTCCACGTAGAGCGGACACGGATCAAGATTT[A/G]TCGCGCTG
GAAGAGATGCATTCCTATCTTTATGAATCCATCGCCAGTATCC
scaffold5594_m_1722
GGAGGGGGGGGGCAAGCCCAGACCCCCTCAAGCGCGCCCGACTTCTAGAA[C/T]AAGTCTG
CAGCTGATTGTGTGTGGGCTTCATCATATTAGTTTCAGTTACTA
scaffold5598_m_3811
GTCTAGCGGCCTTTTGCGCCCCTCGTGGGCGAAATGGGGCGAATGGGCGA[A/G]TGGGGC
GAGTGGGGCGAGTGGGGCGAGTGGGGCGAGTGGATCCCCCTGATC
scaffold56_m_2491
GTGATTTTAATAGATAATTTTTCTTTAATTTACTTAGCTAGGTAAAGAAT[G/A]AATCTAGTTATA
GTCTAACTATTTCTATCTAGGATAGTTATCTTTTAAGGC
scaffold5601_m_15660
TCTGCATCTTTTTTGCGTCCTCGTGCAGGGAACCTTGTGGGTATTTTTTTT[T/A]TTTTTGGTTT
CTGCCAGATGCGGTTGGAAATTTGAAGGCTCAGGTTGGGGT
scaffold5606_m_9252
TCCAAGAGGGGCTGAGAGCAGACTTGGTCCTGGTGGAGGGTGACCCGTTG[A/T]ATGACATT
CGGGACACTCTAAACCTGAGAGGCGTGTGGAAGAAGGGCATTC
scaffold5611_m_30371
GACCATTGAGCATTAGTAACAGGAGTAGATGTGGTTGTCTTTTGTCACAA[G/A]CTGCTCTGA
GTGAGACGTGGCACCGACTGCTATCAGCCGATGGTGAAGTCG
scaffold5616_m_15863
GCCCGAAACGTCGAGAAGGCTGGCCTTATCGTAAGACCATTGAAAAAACA[C/G]CAGTCTAT
ACAAGTTTTTTGGTACTGGTCGACAAATGTTTGCTGACAAGAG
scaffold5617_m_3516
CGCAGGTCTCGAGCTGCCTCTCGACGAAGACTCGTTGTTGTGTCGGTGTG[C/T]CGCGCGT
GGCTGTGGGGAGATTTCTGTGGGCGTGTCGGAATCGGGGTCGAC
scaffold5618_m_13823
GAACAACTGTGGAAACAAAACATGCATCTTCTAGCTTTGAAAGCAAAGGC[G/C]AATCTGTAC
ACGTCGTGGGGGGAAATCGCTATTCGATTTCAAACATCTCGT
scaffold5623_m_10615
TTTGTCTTTATCACGATCCCCTCCTCCCCTTACGGAGTACACCCCCCCCC[C/T]GCGATTCCC
CAACCGCAATACTGCCCCCTCGCTCACTCGTGCGGAAAGGAA
scaffold5625_m_41344
TTTGTGGAATGGAAAAAAAGAATAAAAAAGAACGCTTTATATTCAATCGC[C/A]AAGGACTCAC
AATTTGGAGTGAAGACGCTATTAACAGAACTGACTTCCAAA
scaffold5632_m_1413
CGACCTGCGCAGGGACGAGCGGCCCGAGCTGGGCTATCAGGTCGGCGTGA[T/C]GCTCGA
GGGGACCGAGAGGCCCAGGTGCGCCGTCGACGAGCCCTGCCTGGA
scaffold564_m_868
GAGAGAAAGCATAGAAGTAAACTCTAGGAGTAGCTTTAGTATAAGGGATA[G/A]GCTAGTTTA
TCTTACTAATCCCTTTTACTAATCTAGGATAGCTTACTATCT
scaffold5644_m_9157
GGTCCTGGTGCGCATGGCCCCTTGTATCTTCAGCACAAACGGGTCCCGTA[C/A]TACTACGC
ACCACAACACCGACCGCTTCGTGAAGAATAGCAACGCAATGGG
scaffold5649_m_1400
CGAGGCCCCAGCCGGATGAGGAAGCAACAACTCTCTCTGGACTTTTTTTC[T/C]TTCGATGGT
GGTCGTGAGATGTACCGAGTACCGAGTAATGTATAGTGTGTT
scaffold5660_m_6013
AAAGGCGCCGAGAGTCATTGCGCCGAACGTGACAGTTTCATGTTCTCAAC[A/G]TCCGAGAC
GAGTCTGCCAGAAATCAGAATAGACGAGAGTAGCTGTCCTGGC
scaffold5661_m_3138
ATCAAATTGGCTCGCGAGTCTCAGGTTCCTGTTCCCCGGATAGAGACGCT[G/A]TATGCCATT
CTCCATAATCTCAACATTGTCAACCGTTCCAGGCCTAAGCCT
scaffold567_m_229
AGGTTGAATCTTTTGGTTTAATAGCTTACCCTTATACCTTTAGGTTCTAA[T/C]ATTAATGCTAG
CTCTTATAGGTCTTCTAGTGTACTAGTCCTAGGTTTAATT
scaffold5674_m_11897
TGCTCACATGGACAACCCAACCTTCTCTAGTCCAACGACGATGTCTTCAA[C/A]ACCAACCAC
CCCCTCTTCCACTGGATGTTCCGCGCTTCCCGCAACTGGGGC

scaffold5675_m_5789
CTCTGTTCTTTTCTGATGCCTCCTGGTCGTCCGACGTCTCACTGGAAGCT[T/G]ACTCGTTAG
TGACAGCCATCACATGCTCTTCGGGCCGCCACCCATCACCAC
scaffold5676_m_35415
CCGCCGCGGGGCAGAGCTCTACGGAGTATTACAGCCTGTCACTCAGTGGT[G/A]CTTGACG
CTCCGTATACTGACATTGAACGAGGCGCAGGGGCGGGCGCCTTC
scaffold5683_m_45343
TTAGGGTCATGAAAGCATGGAGATGTATGGAGCAAAGGCTTGTGCAGCAC[A/G]AACAAATG
TGTCGTGTAATTCTCTGCCAACCCAGGAGCTGATGTTTTGGCG
scaffold5690_m_9637
CTCGCAGTTTGCATGCGTACCGGCAAGATTCAACCCCATAGTTGTCCGCA[T/C]CATGGCCG
AGTGTGAAATTGCTGAAATCACCTTGCAAGTCATAGCAGCGGA
scaffold5697_m_5057
AACATCCAGCTGTCGACTGCCATGGCGAGCGACATATCTGATGAGTCTTC[A/G]CGAGGCTC
TACCATGGCCATAATCGGAGCATGCTTCTCCATTGCCTTTACC
scaffold570_m_1203
TAGTAAAATAGCAAAAAACTAAATAGTTTTATAATAGGGAGCGCTAGTAA[T/C]ACTAGTTTTA
CCTAGCCTAAATAAAACACTACCTATATTATTAGATAAATT
scaffold5705_m_12649
ACCCAGCTGAAGAGCGCGCGAGCCGAGGCGCGAGCCTCATTTGGCCAAGG[C/T]GGCGAG
GTTATGCTGGTGGAAAAGTATATTGTACGGCCACGTCACGTCGAA
scaffold5708_m_5008
TCTACACGACCACAATGTACTCTGAAATGCCATGTCCAACACACCTTTTT[T/C]TCGACATCAT
CCGAATCAATCGTCTCAGAACCCAAGCGACGGCTGGCGTGT
scaffold571_m_1364
TATTACTATAGTAAATAATAAAAGGTAGGATTTATATAATTACTTATATA[G/A]TAAAGGATAGT
CTATAGTTAAAAAAGGTAAAAGGAAGCTAAAAGTTTACTT
scaffold5711_m_918
TACAATAGCAAAGCTTGATTTTCAACTCGGGGGGCGGTTTTTTTCTTCTT[C/T]TTTTTTTTTTT
GGGGGGGGGGGGCATCGCATAGCTTGTGTAGAGGGCATGG
scaffold5714_m_6005
AGCAGGAGGAGCAGGAGGAGCAGGCTGGTTGTCAGGAGGAGGAGCAGGCT[G/T]GTTGTC
AGGAGGAGGAGCAGGCTGGTTGTCAGGAGTAGGAGCAGGCTTGTT
scaffold5716_m_11760
GAAGGCGCTAGACGGGGCGTTGAATCAAGCACGACAGCCGCGGGACATGG[A/G]ACTTGGG
ACTGGAGGCGCACGCCCCCCCCCCGGCCTTGGATATGTGGTCCA
scaffold5730_m_1001
TGTTTCAAGGTTTTGTCATGAGAGCCGTCAAAGAGAAGGGCCAATATGAC[G/A]AAAAAAAAA
AAAAAAAAAGGGATGAATCTGCATATATTGGTCAAGGAGTCG
scaffold5737_m_5950
CACTAGTCTGTTTTTGGCTGTGGCTTCCGAGAGAGCGGTTGGGGGGGGGG[G/T]TCCATTCT
CTTCGCTTGCACACCGGTGACACACGTGACAAGCAGCCCTAAA
scaffold5739_m_2327
AGGGCCGTCCTTGGGCTTCCTGGATGCAGGCTCGCTGGCTAGACCGAGGG[G/C]CTCTCTC
ATTTTCTTGCGAGCAAGCTCCTTTTTGGACAATTTTGGTGCACC
scaffold574_m_221
TCTAATTAAATAGTTAATAATTAGTAAATAAGTAAGTAAGAAAAATCTAA[C/T]TAAAAAGTAAT
AATCCTTAAGGAAGAAGAAATTAAACTCTTACCTTAGAGA
scaffold5740_m_1406
TCCGAGGCCTTTTGTGATTTGGCCGAATACGAGAAGTCCCGAAGAGCTGG[C/T]TCCATGCC
CAAAGCCATGCCCAACAAGCCATGCCAAACGCCAATTTTGGCA
scaffold5751_m_1303
GCGTCTCTTGACATGTCGACAAGACGAAGCTGGTTGCGATGAGAACATGT[G/A]TACAATGT
CCAATCATCTGAGCAAAATGATCAAAAACGCCATCCCAGTGTG
scaffold5752_m_23900
TGCTATGATACCGTCTTTTGCAGCCAATACTGTCACGACATTGCCCAGGA[G/C]CGCTACCAC
CCATCCGTGTGCGAGAAGGACGTGGATGCTATTGCCAAGGAC
scaffold5758_m_1128
TTTTTTTCCCCCTTTCCTCAACGACAGCCACTTTTTTTTTTTTTTTTTT[T/C]CCCCTTTCCTCA
ACGACAGCCACAAAGCGCCAACAGCCGAGGGCTCGCTAA

scaffold5760_m_10152
TACATGTTTGCATGCCAAGCTAGTTAGTCTCATTTGCATGTGTCTCAGCC[T/C]TTTTTTTTTTTT
TTTTTTTTTTAACTTGTGTTGATTCTGCGAAGCCGAATT
scaffold5763_m_18026
TAATTTACGAGCGCGAGTCACCGGAGATAATGGTGCCCAAAGTCCAAAGT[T/C]GGCAACTG
ATTGCGCCGGTTGATCAATCTCCACGTGAACATTCTGCCATTG
scaffold5764_m_3149
TTCTTCCGACATTGTCTGATGAATAACGGCCGTCTCCAACATGTCCCATG[C/T]CTCAGACTG
CGAATCCAAGATCGCCAGAGACTGTGAATATAAGGTTTCCTG
scaffold5766_m_5508
TTTGGACAGTGCCATGACGATGGACTCACCCTCTCTGAAGGCAATCAAGG[C/G]GAAGAAGC
GAAAACGCGAGAGTCTTAACATTCGGCCCGAGAGGGAGCAGAT
scaffold577_m_1747
CCCTAGATTTATTAAATTATTTTAAGTACTTAATACTATAGGTAAATAAG[A/T]ATATAAACTTAT
ATTACCTAAAAAATATAGTTAACTATATAATATATTTTA
scaffold5773_m_13570
AAGGCCTGGAGCTGGAGCCATGATTGGGCAGTGCACGCGTGGCCTGAATT[T/C]TTTACCCT
TGTGCCCCAACTGCCCCTCCTTCAGAGCAGGAATGAAGGGGCC
scaffold5775_m_1184
CTTGACCTTCAAAGACGTCATTAGCCGACTTGCCCGCGGGGGGGGGGGGG[G/C]GGCGCA
GGCACAAGACAAGAAAACAAGCGAGGACTTACAGGCTCCAAAGGC
scaffold5784_m_47676
AAGTCAATAGAGGAGTTTGACAGCGAGGGCGTCGGTTTGATCGGAAAGCG[C/G]CCCCTTTC
ACAGCAGCCAGTCATGGTCAAGGCAAAGATGTGGCAGAGATAA
scaffold5787_m_18906
TCTCCCCCCGGAGTACACGATGCGTCCCATCCGGATGGAGGTTCACGATA[G/T]AATGGACC
TCCGAGGCGAGATCCCTGAGAGAATATGTCTGTTGGCAAGTGA
scaffold5788_m_1672
AGAGAAAGCAGGACGAGGAAGAGGAAGAGCTCGTTTCTCTTCCCGAGGAA[G/C]ATGATGG
CGAGGAGGAAGAAGAGTGAGTGACCAGCGCCAACGAACCCAAGC
scaffold5791_m_29642
AATTGACTACTGGAAAGACCATGCACAAATAATTCACTCATATGGCCCGT[T/C]TGAATGCAC
TCCCATATCTATCAGTCATATCCTGGATCCCGATCGATCTCG
scaffold5797_m_9489
GATGGCCTAACCAGAAGGGGCATCAGCAAAAAAAAAAAAAAAAAAAAAA[A/T]AGTTCAATA
ATGTAGGAGACTTTTTTTGCGGCTCCCAATTCATACGACGTA
scaffold580_m_1503
ACACTTAGAAGTGGGCAGGGGTTATTATATTGGATAATAAGGCAGTGAGG[C/T]AGGTGCCT
ATTAAACGCTTTATAAATAGCTATTAGTAAGGATAGTTTTTAT
scaffold5800_m_1138
ACGAACTCACGAGAGATAGCCTTACAATCCTTTCAGAGATGGTGTACCAA[T/C]TATGACCAG
CACTATTTCAGAGTCAAGCGCAGTAATATGCCCTGCGCGATC
scaffold5802_m_11191
ATGACGCGTGGAGATGTGTCGAGATTTTCAACCCAAGACCAAAAGTCCTT[T/A]TGTGCACGT
TTTGCATTGGTAAAATCCGTGCTGTTTGCCAAAGGGCATACA
scaffold5808_m_16562
TCCAAGGCCTTGATAGTCTAGAAACAACAGACAGCTCGTGCGAAGCGGTA[T/C]GATTCCAT
CGTTGACCACGTTGGAGTATGTTGTGCGGTTTCTGAATTTCTT
scaffold5815_m_30513
CATCGCGGGCATCACCGGCCCACACTTGATTGTCGTTCCCAAGTCAACAT[C/T]GGACAATT
GGAAGCGAGAGTTCGCCAGGTGGACGCCAGAGGTCAACGTTTT
scaffold5817_m_3645
AAATCTCGGATGAGGACCCGAGAAATCTTGAGCAAGAGCTGGTCTCTTCT[A/G]CTGGGCAA
GCTGTAAATGAACAAAAGTTGGTCGTGTTGACTTCCAAGAAAT
scaffold5818_m_4786
GGCCCGTTTGCCTGAATCAGGGGCATGGACTTTCTGTAAACCTGCCAATA[A/G]GACGGCTG
TGGTTGGTTGTAATTGTATTACATAATAATAAACGAAAGCAAG
scaffold5823_m_12748
GCGGTTACAGCTGCGAGAGGATGGGGCGAACCAGGGACGGCAACGGCGTT[G/A]TGAAAG
CTGGTTGGCTGGCAGGGGACCAAGTTAAGCGCCCGGGCGAGCAGG

scaffold5827_m_10221
ATTTTTGAGTTGCAAATATTCGTCACTTGGTCCAGCCTCTTGTCTTTTTA[T/G]CACGTAGGAG
AGCAGTAGCGATAGCTAGGTGGGACGAGGACTGGAGAAGAG
scaffold5828_m_31167
GGCATGTGCCGATCAATAACACTCCACAAAGGCCATGAGCGTTGCGGAAG[A/G]ACGCAGA
GCTATTTATCTATGTGCCAAACTGGCTCTTCACCCGGCTCGCTT
scaffold5833_m_13138
CGCCAATTGTTTCCCTGTTGGTCTGCGGAGATTCAGTCCTCCGAGCGGTG[T/G]TTTTTCCTC
TTCATGGCATTCCGCAGCGAGGGGATGTTACGAGAGCAGCGA
scaffold584_m_1487
TTAATAGTTTTATTACTATAAGTAAAGTAATATAACCCTTAAAAATATTA[T/A]TACTTAAAACCC
TAAAAAAAGTAAGCTTAAATACCTTAAGATTTTATTAAC
scaffold5848_m_6229
TGTACGTCTTGTACGGACCAACGATAATCGTATGATAATTATTATATAAT[A/T]AACTTTCAAAG
AACACAAAACACTTCCTATGTAGCAAGCTTCCGGAGATTC
scaffold5849_m_4218
GCCCCCTATCAAAGCTGATGCCGCCCCGCACATGCTCCGTGCCGCCGGGG[A/G]AATAGGA
AAATAAGCCGGCTCTTCGTGCCTTTTTACTCCGTACCTTGTCCC
scaffold5867_m_48896
TTCGACTCGTCCGTGAGGGCGACGGGAGAGAAGACGGCGAGGTTGCCAGA[T/A]GTGAGTT
TGACTGAAAGAGGGGGGGGGGGGGGGGGTTGCAGTTGGTCAGT
scaffold5872_m_18962
CTAGGTTCCCCGTCGTCGGCGTCCGCGACGGCCTCGTCTCCAGCGTCGAC[G/A]CAACACT
CTCGGGCAGGGCGGCGTAAAACGCATTCAGGCAATTGATTGTCC
scaffold5873_m_2239
GTACCGTGGGCACAGTGGTTCCTGAGGTTTGAAGTGAAGAGGTCGAGGGG[C/T]TGACCAA
GGTTGAGCCTACAGTAGAGATGCTGCTTGTACTGTCACTGCTGC
scaffold5874_m_8708
TAACCTCACCATCCGAGTCGCCTCGTTTGAATTCCGAGACGTGGTCAACT[C/T]GTGATCTCT
TGACACGATCCAGGTCGGCATAGAACCTCTTCGCACCGGCAC
scaffold5876_m_25181
GTCGGCAACTGCCAGCTCCTCGATGGACAGAATGAAGCCACAGTGTTGAC[T/C]GATACAGG
AAGAGCTGCCAGAGACTTTGTGGACTTCTTTGCTGCTAGCTTA
scaffold588_m_5575
CCTATCTTTAATCTTTATACTCCTAATATAATACCTCCCTTATATATAAT[A/T]AACCTTAATTAT
AAAATAAGCTACTTACTTAGGGTATAGTTACTATATTAA
scaffold5882_m_26924
AGTCGTACCAAGATGGCGAGGTGTTAGAGGCTTTTTTGTATTATGTGTCT[A/T]CTAGAACGG
CGACGTCGGCATGAAGCGCGAATAGGAGCACACGGCACGACT
scaffold5887_m_6614
GGAAAGAAAAAGAAAAAAAAAAAAAAATAAGTTGTGTGGGGAAAGAAAAA[G/A]AAAAAAAAA
AAAAAAGCACAGCCTAAGCACAAAATGTCCACATGCTTCCTT
scaffold5889_m_17337
GCACCATTGGGCAGGATAACTCTGCTGGCGTACAACGTGTCGACACTGTA[T/C]GCTTACAG
TTTGAGTCAGAAGGTAGATGATGATGACGATGACGAAGGCGGA
scaffold5896_m_12596
CACCCCTCTCCTCTTCCAATCGCCATTCGCCAAATCGCCAAGAATTGAAA[T/G]TAAAAAAAA
AAAAAAAAAAAAAGGTTGAAGCTTTACTAACCGCTGTGTGCCT
scaffold590_m_11839
CTTTACGAGCTCCTCGGTCCCCCGACTCTCCGTGGCCACTTTTGCGCATC[A/T]ACACCACG
ACGAGATCATGGCGACTCCAGACGCCAAGGCGTCTCGCGCCCC
scaffold5901_m_3336
TGGCCCTCCTCGTCCGGGATCATTGGTGGCCCGAATGAGGTTTGAGGCGA[C/T]AAGACGG
TGTTATAATGACGCCTTGTGCATTCGACGGCATCTTGTTCAGAA
scaffold5910_m_2969
CTGTACAACGCGGCGAGGACAAGAATTTTTGTGGCATGTCTTGCGATAAA[A/C]AGACATTCA
AGAGATTTATATCCCGACATGGGTATATTTGCCATGTGATGT
scaffold5912_m_61954
AGCTTGGCCTCACTTATCCAATTGTTTCTTCGCATTTGGCAACATACTGT[T/A]CGCGAGTTTG
AGTGGGTAACTTCTGGTATTGTCCTTGCTACTTATGGATTT

scaffold5925_m_4905
CTCAAATGTACGGATCCGTAGAACGTCTGCTTGTTGGCCGTTGTACGCCT[G/A]CCGTTCCTC
TTTTTTCTTTTCTTCTTTTCCCTCAACTTTTCCGTGTGTGGG
scaffold5935_m_18351
AGACCTGGTACACTTGCATTAGTGCTGTACGCAGACTGCACGGTCCATAT[T/A]GAAAAAAAA
AAAAAAAAAAAAAAAAAAAAAGGCCGTACTCACGTTTCTGAAG
scaffold5937_m_3353
GCAAAAATGGACAAGAATCCGGATTCTCTTTTTTTTTTTTTTTTTTTTTT[T/A]AGAGGGTCCGG
GTCCCCCTTTGGAATCGCCTCGAAACACCAAAACACCAAC
scaffold5939_m_653
CTTTCCCCTTCTTTTTCTTCTTGCCTCGCGGCGCGTTCCGGGTCCACACA[T/C]TCCCGGGGA
AGCTGGGAAGCTGGGAAGCTGGGATCTAGGAAGCTAGGAAGG
scaffold5940_m_18895
AGACACCAACATGCGATTCTTCAGCAACTCAGTGGCTTCTGCTACTCTTT[G/T]GGCCGCTAC
TCTATCTCAAGCGCAAATCCTCATCAATGAGCAAAGCTTTGG
scaffold5945_m_3469
ATCAGCCAGCGTGTTGCCCGCGTGTTAACGGTCGCTCAATCGGCCCCCCC[C/T]CCCCCCC
AAATTGGTTGAAGACATGCACTGATGACGAGGCGCTGCGGGGAG
scaffold5952_m_1756
GTCACATGGCTCTGCTGCGAAGGACGTGTTCCATGCTGATGATCGATTAG[A/G]TGAAACTT
GTTGCGGTCTTGACAGCTGCAAGGGTCCCGTGGAGATGCCACG
scaffold5954_m_13088
TCATTGACTGCCTGTGAGACGAAGACCGATGTCGGAAAAGCCATCGAGTC[C/A]TGCACGGA
CGACATGCTGTCGATTCCCGAGAATCCCGCGTTTCGCAAAAGT
scaffold5957_m_4752
CGTGCAGCTGGCATGCCTAATCTGGTATTTGATCAGCTATTTTCCCATGG[G/C]GTCCACGG
GTCTTCGCCTGGCAGCTTCATTTGGCGCCAGGCAAGCAGCTTC
scaffold5962_m_10238
GGAACGCAACCGTATACTTGGCATGTTGGCGTTCTGGAAAAAAAAAAGAA[A/G]AAAAGAAGA
AAAGAAAAAAAAACCCCCATCCGTGGCAAACGGTTGGATGGT
scaffold5967_m_6548
CTTTGAAGGCAATGCCCTCATTCGCCGTCTCGTCCGCGTTGGTGTCCTCG[A/T]CGAGTCCC
GCATGAAGCTCGATTACGTGCTTGCCCTGAAGATCGAGGATTT
scaffold5968_m_2637
TGTGGACTATCCTTGGCTGATGGGTATTTCGAAGTTGGAGGCTACGCATA[T/C]TGTGAGCG
GGATGCATGGAGAAGGGTCCAGGCCCAGTCATATGCAGAGCAA
scaffold5969_m_4552
AGCATCAGGTTTCCGAGAGACGGGTCGGGCCCCCGGGGGGGGGGGGGGG[G/T]GGGTC
CCTAATGGATAGATAGACCAAGACTTACGGAGGGAGTGGTTCACGC
scaffold5973_m_8053
GGACCGCACCGTCCGCCTCTGGAATCGTGACAGGGGCCACTCCCGCGACA[T/A]ATACCAC
ACCAAGCGCATGCAGCGCGTCATGGCAGCCAAATGGACCCCCGA
scaffold5980_m_4826
CTTCGCTGCTTCGCAGAGGTTGGGAATCTCGTTTATGAAACTATTCAGCC[A/C]CTATCGCGG
ACCAAGTATGATCAATGAGTTCCTCGATCCTCACGGCGAAGG
scaffold5982_m_13101
AAGTCCACCGATGAGTACTCGGAGATCGTCTACGAGAGAAAAGCATTCTG[G/C]AACCACCC
CCACACCCGTACGCAACAAAGGTAGCCGAACTCCTACGCCAAT
scaffold5983_m_7587
ATATTGCCATTCCAGAGCGAGAATTCGTTCTTAGACCTTTATCGCAGTAA[G/A]CCCAATCTTG
CCCAAACTAAAGGACTTGTTGCTATTGACCACAGTCTCATT
scaffold5984_m_8045
ATAGCGACGTTGGCGCCTCTGCAGTTGCGCCTGGTCGTCATGGACGCGAC[T/A]CGACTTG
GACACGGGGCCGGTTTTTGGTGGGTACTGGGTTGTCCGGCGCTA
scaffold5987_m_5902
AAATTTGGCATCTGGAGAGTCTTGACACCCGTTTTTTTTTTTTTTTTTTT[C/T]TTTCTTTTTCTT
TTTTTTTTTTTTTTTTTTTTCTTTCTTTTTCTTTTGGCCA
scaffold5990_m_15266
ATCGCCGTAATATCGGTAAATCAAATCCATCGTTGCGTGTTTCCCCGATG[C/T]GGATATGAA
GGCAGAGCGCAAAGCTAAAGCACATCGTCCTTTTAACCAATG

scaffold5996_m_13473
GGATAATCTTGTTGCCTAGCTGAGAGTAAGAACGGCTTTGGGGACATCAT[G/A]CTTCATATT
GGTCATGGAGCATGCCCCTCTTTATACCTGGTTGTGCGGATG
scaffold6001_m_11001
CGGTGGAGCAACATTCATCGACGGCGGGGAAAGAGAAACAAAGTCTGTCT[C/G]ACTCTCTC
TAGCAAGCTCCGAGTCCGAGCTGACCAGATGCTGCCGACTTGA
scaffold601_m_1895
TTATTATCTTATAGAGAGTTTTATAGCTCTCTTATAAGATTATTAGTAGC[C/T]CTCCTAAATAT
ATCTTTAGTTTAACCTTTAAAATCTTCTCTAAAGTTCTTC
scaffold621_m_540
ATTAAAAAAGAGGTAAATAAAGACACTATAAGGATAGATTTAATAAAGCT[G/A]AACTAACTAG
TTCTAGGATAAGTAATTAAGGCTATTATAAGACTATAAGAA
scaffold623_m_1649
TTATTTAATAGATATCTATAAATTCCTAAGAAAAGCCTATAAGACACTAA[G/C]TAAAGACTAGC
TTAACTAGTTTAAACTAATTACTATAAGTAAGATTATTAT
scaffold631_m_2058
GTTATAAGGGTATTTATGCTAGATAAGTTACTAAGCTAAGGCTATTAAAT[A/G]TTAAGATTTAT
TTTATCTAAGGGAAATAGAATACTACTGCTAATAGGTTAT
scaffold634_m_7757
GTGTCATCATCTTGCAGTTGTTGTCCCTCGCACCTGGCACTGCACTGCAC[T/A]GCACAGCA
CAGCACAGCACAGCACAGCACAGCACTGCACTGCACTGACTTG
scaffold645_m_8175
CACTAGTCCCTTTATAATTTCTATTAGTCTTTTTTAAAGATAACTATTCT[C/T]TAAGTAAAACTT
CTTTACCTTATTATATAGTTTTCTATAGTCCTTTATACT
scaffold648_m_873
TAATACTATTATTATAAGGACTATAATTCTCTATAGCCTTACTACCTTTA[T/G]TAGTAATTTTAC
TAGTCTTTATAGTAGTCTTTATATATTTAGTTATTACTT
scaffold652_m_469
AAATATGCCGTAAAAAAGGCCTAACCTTATTAGTTACTATAAAAACTATT[A/G]CCTAAAGGCC
TAGGTTATATTACTAAATAATAAAGGAAAACATGCTTAGAG
scaffold657_m_4174
TTACTTTAAAGCTAAAATAAAAGGTTTTTAAAGTAATTTATAACTTTAGG[A/G]ATATAAATAGT
AAGACTATTAAATTAGGTTATTTATATTATAATATAGAAG
scaffold665_m_337
CTTATTTTCCTTATAAAGCTTTAATATAGTAACTACACCCTAAGTAAGTA[A/G]CTTATTTTATAA
TTAAGGTTAATTATATATAAGGGAGGTATTATATTAGGA
scaffold67_m_1628
TATTAAAGATAATAAATAAGAGTTTAAAGTTAACTATAATAGAAGGTATT[G/A]TAAATATCTAG
TTAAATAAAAAGGCTATAATACTTTAGAGAATTCTTAGGT
scaffold671_m_2437
TAGAAGAAAAAAAATAGATAACCTATATTAATTTTTATAATTAGTTAAAA[T/A]AAATAAGGTACT
TAATACTATAGTTCTAAATAGTCTAACTAAAGGGCTTGT
scaffold676_m_1099
TATTAGTAATAAGTAAGAAAAGTCTTTTTATTAATAAGGTATTCTAGAAT[C/A]TTATAAGTACT
ATTTTTTAGGAGAATATTTTATATTATTACTTACTAATAA
scaffold681_m_378
TCTATCTCTTATTCTCTTTTTCCTTTACTTAGTAACTATAAGGCTTACCT[T/C]TATCTCTTATTC
TCTTTTTCCTTTACTTAGTAAAGCTATATATTTACCTCT
scaffold682_m_897
TAAATAGGATTAATAAAATAAAGACTTTAAAACACTATTATATAAAAACA[G/C]GTGTATAAATA
CTATACTAGATAAAGAAAATAAACTTATATAAGGAAGTAA
scaffold693_m_3846
TTGTAGAATCTTGATGTGTTCTTTGCTGCTGCGCGCGGGGGGGGGGGGGG[T/G]GAGATTG
CCTCTCGCTGGTTGGAAAACCGTGATATTGCCAAGATGATTGAT
scaffold7_m_336
TTACTTAAAGGAAATAATTATTCTCTAAGTCTTTATTTAAATTAATAAAA[T/A]AGCTTATATAAG
TATATATTACCTTTATTTAAAGTTAGTGCTTTACTAATA
scaffold70_m_414
AGATTATACAAAAGTCTTATATTTAACAGCGATTTTCTCTTTAACTAGAG[G/A]TTATACAAAAG
TCTTATATATAGCAAATTAAAGCTAGAAGATAGGGCTTTC

scaffold702_m_809
AGGCTAGTAAACACTATTTATATAGTGTATCTAGATAATATCCTTATTTT[A/C]TTAAAAATATAA
AAGAAGCATACTATATATATTAAGGAAGTTTTAGAATAT
scaffold731_m_7682
GGGCTGTATGGATCATGGTAAGCAACATCTGCTACTCTTCCCTGTCTTCT[G/A]TGCTTCATC
TCCTTGAATTATTGCGTGTGCATTTGCGTTTCTTGAGTTTTT
scaffold739_m_14951
ACGTGTTGTTGCCTCTGTCCTAAGCGTCCGCAGTTGAAGCGCATTGCTGA[C/T]CGCAGCCT
CAGCTTCTTGGATTAGTGCTCGCCGTTACACTGTCTTCGTATT
scaffold74_m_535
TACTATTTTAACTACCTTTTATTAGTATATATAAGGGTACTATAATCCTA[T/A]AGTATTAGTAAA
TAAACCTTTAGTAAAAGTTATAAAATCCTAGGAAAGACT
scaffold740_m_1214
TCCTAGTATTATTTTTAAAAATAAGTTAAACTTATTTTTTATAGCTTAAT[T/C]AAGCTATATAAG
GTAATTAAAATAATACTATTAATTATTTATTAAAAGATT
scaffold743_m_5917
TATAAGCTATAGGCAGACAGGGACTTTATTAGAACTAATAAGGATAAGTA[A/G]ATATTTATTT
ACTAGAACCTATCCTCTAAAGTCTAGTCCTAGGTGGCTACT
scaffold748_m_415
ATAAGCTAATTCTAGTTAGACTTATACTACCTATTATGCGTTAGACTTAT[A/G]CTACCTATTAT
ATATAAAGCAAAGGCTTTTTATAGTATTTCACCCTTAAAC
scaffold749_m_3023
TTTATGCCTAGTGCTACTTTAGTAATGTTATTATTATCTTAAGAGTTATA[G/A]GAAGTATCTAA
TAGTAATATACTAATAAGTAGCTAGCCTAGTAACCTTCTA
scaffold766_m_226
GGGACTATTTAATCTATAAAGAGATTACCTATAGCTAGATTCTTTTAAGG[T/G]TCTTTATGCAT
GCCTAACTTTAGATTTTTAACTTAAATGCCTAGCGCTACT
scaffold772_m_1590
ACCCTTAGGATTATTATCCCCTAGGTCTTTCTTTTTACTAGCTTTACCTC[T/A]AGTCTTTTTAC
CCTTAGTAATTTTTTCTTTAAATATATTACCCTTAGTATT
scaffold778_m_343
CTATAGTTTGCGTTAGGACTAGTACCTATAGTAAGGGCCTTAATATTAAC[T/C]ATAATCTTAT
AATACTACATAATAGCTATATACCACACGCTTTAGCTAATA
scaffold785_m_186
TTACTACCTAGGACTTAATTATATAATATATTTAATATTACTAGTCTTAA[A/G]CCTTTTAAAGG
GGACCTAACTAATATAAAAGATATATCCTTACTATAAGAT
scaffold789_m_1201
AAGAGGAATCCATAGTGAAGTGAGTCTAGGTCTTTTTTTCCGATTTTTTC[T/C]GATTTTTTCT
GATTTTTTCCGATTTCTTTCTGATTTTTCTAATTTTCTGAT
scaffold79_m_669
AAGAAAAAAGATATTAAGATAAAAAGACTTTTAAAAAGTATAAAAAAAAT[T/C]ATTCTATAAAC
TAAACTAAGAATTACTTTATTAAGGTATATAATATAAACT
scaffold795_m_259
AGGATAGATTTAATAAAGCTAAACTAACTAGTCCTAGGATAAGTAATTAA[A/G]GCTATTATAA
GACTATAAGAAGTTAAATATAATAGGAAGTAAGTAAATATA
scaffold8_m_1327
CATAACTAAGTGCTAGTAACCTAGTACTAATATTATAAGTATAGCCCTAA[T/C]TATATATCTAG
ATATATCTATCTTCACTCTAAGATATATAAGTAAGTTAAA
scaffold814_m_2725
ATGCTATATAATAAATAGTTAATTTACTTATTTCTAGTTAACTAAAAGAC[T/C]AGATATAAGTAA
GTTATCTTATTACTAAATAAGGAAGGCCTAACTATTTAT
scaffold815_m_632
CTAATAACTCTATAGATTTATTATAACCTTAGCTAATTCTTAATATCTAT[T/C]TAGAATAACTTA
TTAGTTACTACTTACTATTATTAAAGAGTTTAGTTTATA
scaffold83_m_3324
CTAGTGTAAATTAAAGGGGATATAGTAAAGGAAGTAAGATATAACCTATA[C/T]ATTAGCTCCT
TATATAATATCCTTAGGGAGGGAAATGGATTTATAGTTAAA
scaffold835_m_2169
TATCTATAGTATTACCCTTATTTAATTAGGTATAACTCTTATTTATTAGG[A/G]TTAGGTTATTAT
CTAATATTACTCTTATTTATTAGGGTTAGGTTATTATCT

scaffold854_m_82704
GCCCAACAAGCTGATTCTCCCATCGCCCATTTTTTCCGACTCGCCCCCCCC[C/T]CCCCCCAC
CGAAATTTAGCCAACCGCTAAAAAGTGCGGGCTCTTGTCTCAA
scaffold855_m_2053
ACTTTTTTTCTTAGCCTTATAGTTAGCTTTAAGTTATTAAAATCTCTTAA[T/C]TAATTATTTACT
TTCTTATAGTATTATTTAAGCTATTTAAAAAGATTATAA
scaffold859_m_4037
GCGAATACAGGTAGAATACCTTTACATTTAGATCCTAGCTTTAATATAAT[A/G]GAATTAACTAT
TAGGTTAGCTTATAGTTACTAATTTAGCATAGTAATAATC
scaffold869_m_1466
ACTAGTCCCTTATTATTAGGGGTGGCTATAGGTTTATAATAGAGTTAGTC[C/T]CTAAGACTAC
TAGTCCCTTATTATTAGGGGTGGCTATAGGAACTATAGAGG
scaffold88_m_822
TTCTCTAATTTTTACTTTAAGCTTACTCTTAGCTTACTTTTTCTTACCTC[T/A]TAATTAATTACT
AACCTATACCTTTTATCTTTTCCTTTCTCTTTCTCTTAC
scaffold887_m_1346
GCCTTAAATACTTTCCTATCTTCTTAAAAACTTTATTATAATAAAGTTTA[T/C]AAGCTCTTTTAA
CAAAAACCCTAACTTCACTATCTAATCTTAGTTAAGAGA
scaffold895_m_473
CTATAATTCTTTAGTAACTCTATAAGTGTTAGGAGCGCAGAGGTCAGAGA[T/C]AGGATGTTTA
TTAAAGCAAGTCTTCAGAGAACCTTTAGGCTATACGAATAA
scaffold896_m_1808
AGAGATCCTAAACTAGTGCTAAGAAGCTTATTACTTCTTAAAGATTAATA[T/C]TAAGAATACTT
ACTATTAAATCTATATTAAAGAGAGTAATAAGTAAAAGAC
scaffold901_m_940
ATTAGTAATTATAAGTTAATTTCCTTAATATTCTAACTTTAGCCTTTTTA[G/A]GTTAGAGTTAGT
AAGTTATTAGTATTTTAGGTTAGGATATAGCTATTAAAG
scaffold915_m_275
ACTAAAAAAGCCATGTTTAATTTTTATATTCTAGGGATAGCTTATAGAAC[T/C]AAAATCACTAG
ATATTTCATAGTAATAGCAGACGTAATGCTAAATCTAGGA
scaffold930_m_1179
ATTTCTATGAATTATTTTATATTTCTATAAATTATTATTATTACTTATTT[A/T]AAAAAAACTATAA
AAAGAACTACTAGTAAACTTAATATAAGTAGCTTATTA
scaffold936_m_1153
AATTATAGGTCTAGTTTAAGGTCTAGCTAATCCTAGATTTACCTTAAGCT[T/C]TCTAATTTATA
CCTTTATTTATAAGACCTTTTATTTTCTTTAAAGGTAATA
scaffold937_m_1767
TATTCTAGATTAACTAAAAGACTATAACTAGGTCCTTAAGGAAGCCCTTT[A/T]GGTATAACCT
ATAATCTCTAGTGCTTAGCTTTACTTATAGTATAAATCTTA
scaffold949_m_4278
TCGAATTCATATTACATAAATCACTACGCTTGTTTATGGGAAGTAACAGC[T/G]TCCGAGATCG
TTGGTCACTGGGCTTGGGACTATCTTGAAAAGTCGCACAAC
scaffold952_m_2318
TTATAACTAATTATTAAGGTAATTCTCTATAAGAATAAGTATTTTCTTAG[T/C]ATTTAGCTTATA
TTAATTATAAAGAAGCTTAAGTATCCTTTAGGTATAATA
scaffold959_m_1009
TGTTATTACTAATCTAGTACTAAAGTAAATAACTTCTAGGTTATAGGGTT[T/A]AATTATTAATA
ATGGCATTAATCTTAGTAAGGCTCTAGCCTATGCTAGACT
scaffold984_m_1221
AGCTATATTCCATAGGAAACTAAGCTAGGTAGCACTCTATAGCTATATTC[T/C]ATAGGAAACT
AAGCTAGGTAGCACTACTAAAGTATATATAAATAATATTAG
scaffold988_m_144
GAACCTATCTTCTATAAGCTACTAGAGGGTATAAATATATAAGGTTATCT[C/T]TAGAAAATAA
CTAGAGTATTATATAGGCTATAGGAAGCTCCTTAATAATAG
scaffold992_m_1017
TTTATAAGATTAATTAAAAGCACTTTTTACTAAGCCTATATCTAACCTTA[T/C]ACTATCTTACTC
CTAATAGCTAAGTAAAGCAAGACCTAGCAAGCACCTAAG
scaffold996_m_831
GGGTTTATAGCTTCTTAGAGCTTTAGGCATGCCTAATTTTCTAGATAATC[T/C]GGATATTTCT
AGGGCGCTAGGGGACGCTAACTAAGCTATTATCCTAATGTT

Figure 7

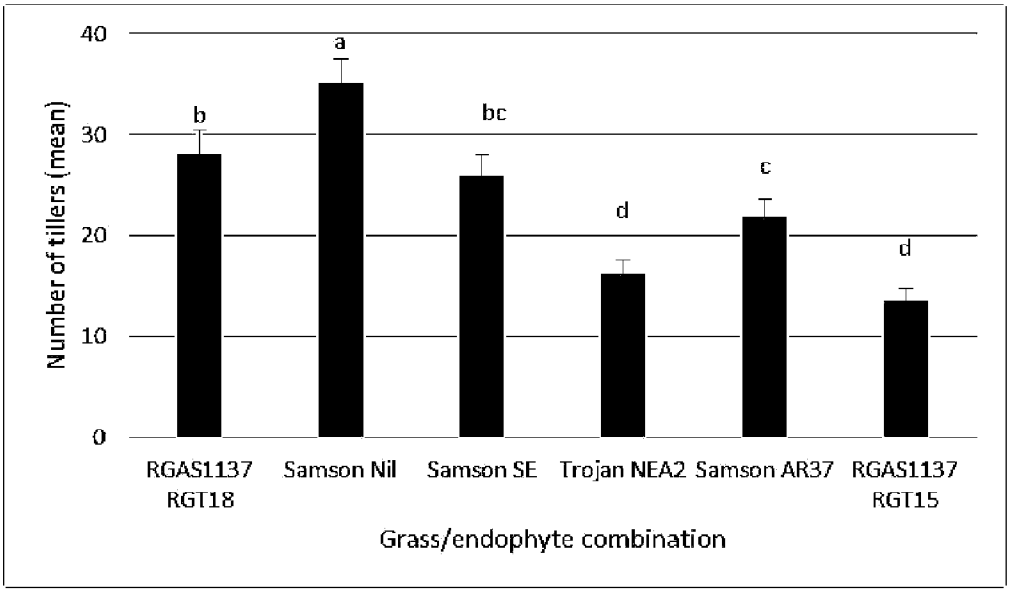


Figure 8

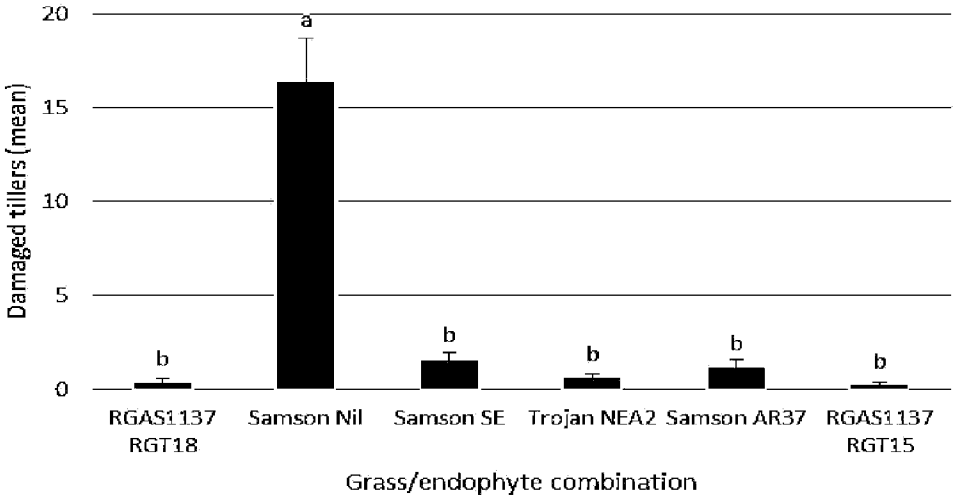


Figure 9

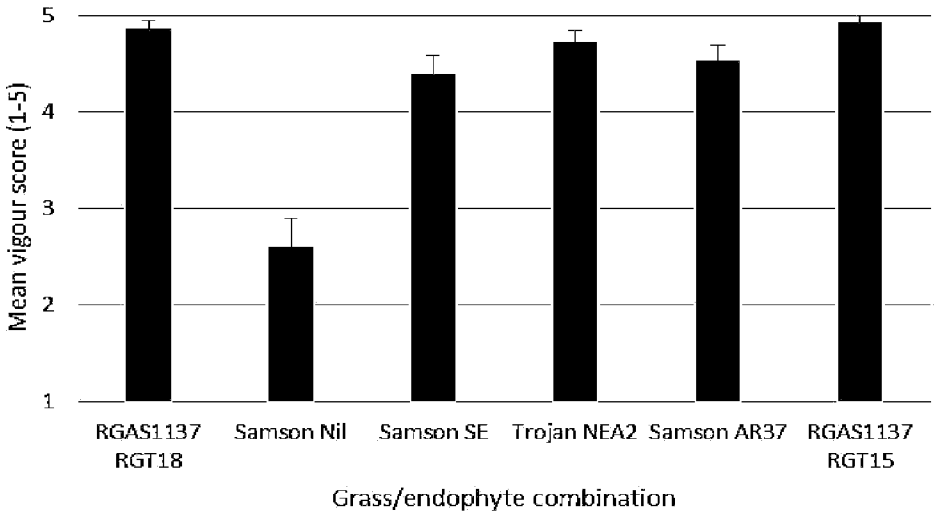


Figure 10

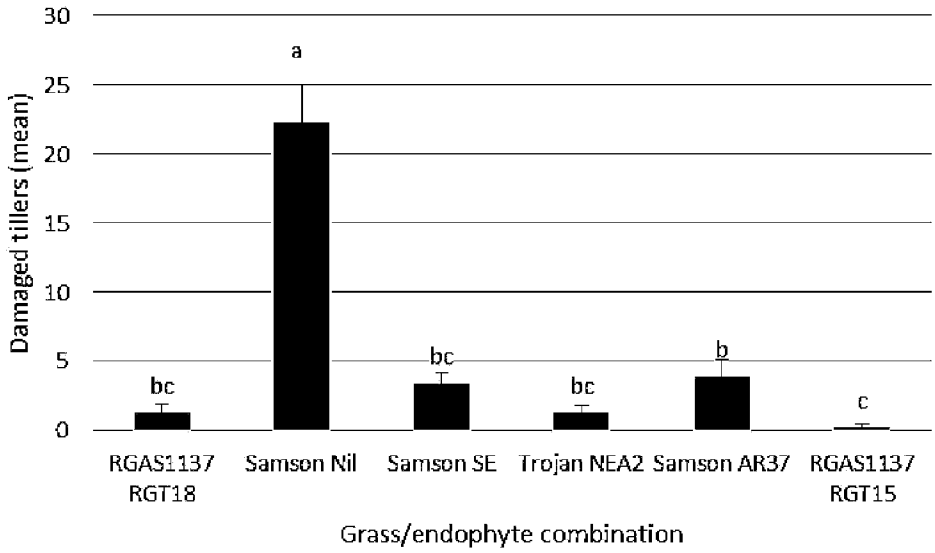


Figure 11

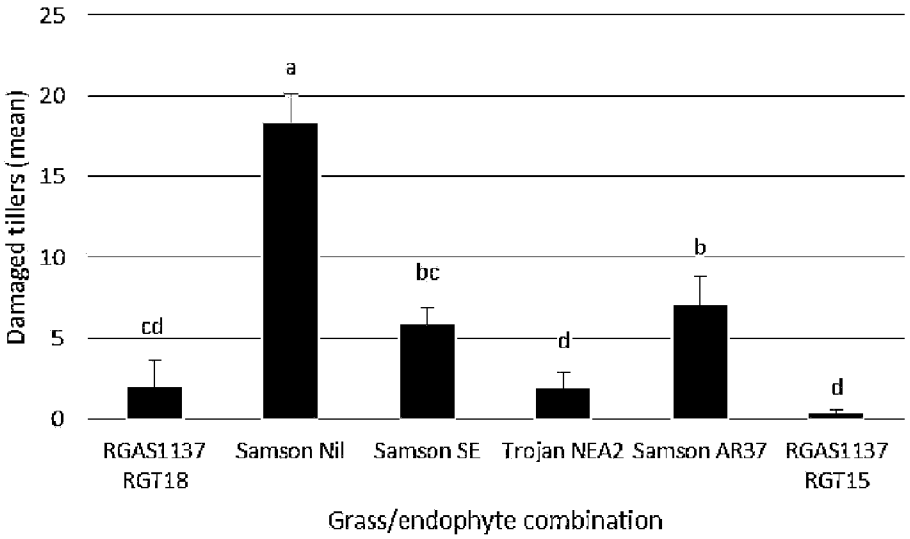


Figure 12

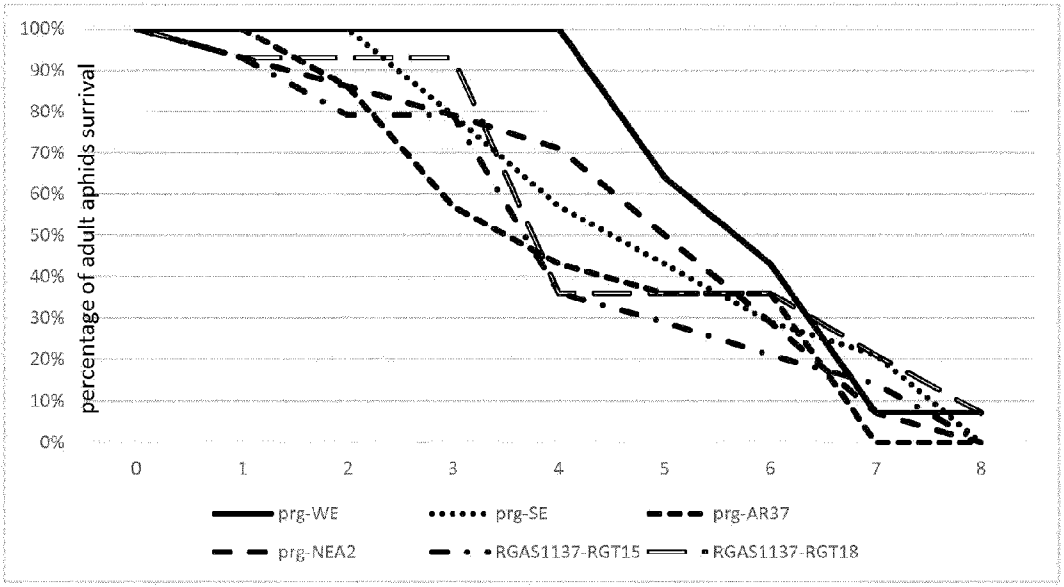


Figure 13

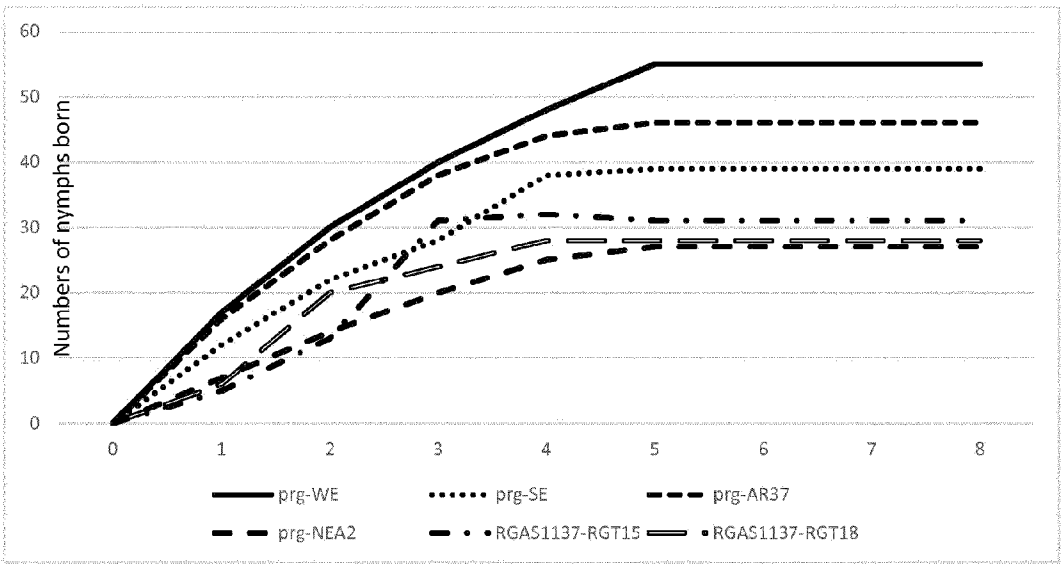


Figure 14

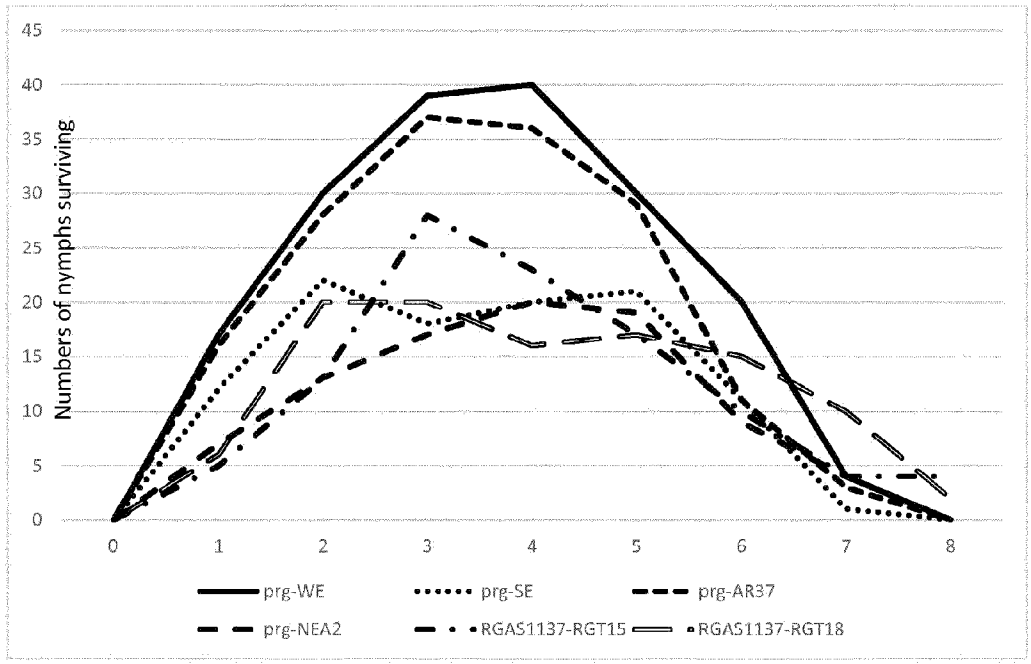


Figure 15

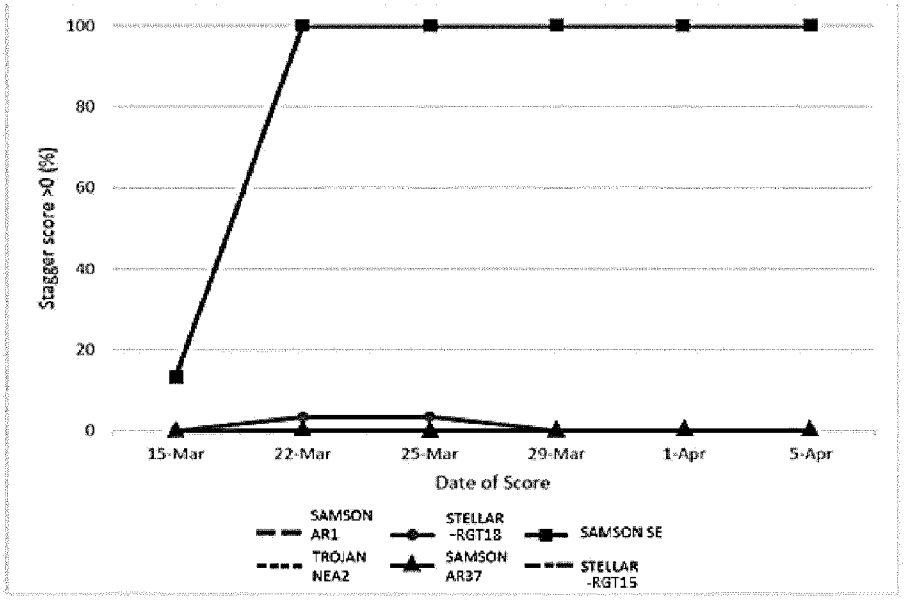


Figure 16

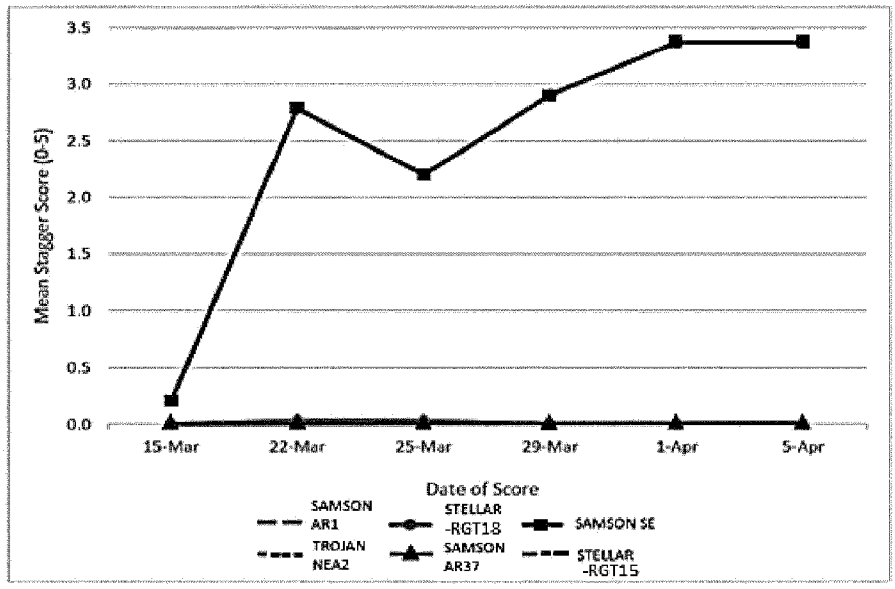


Figure 17

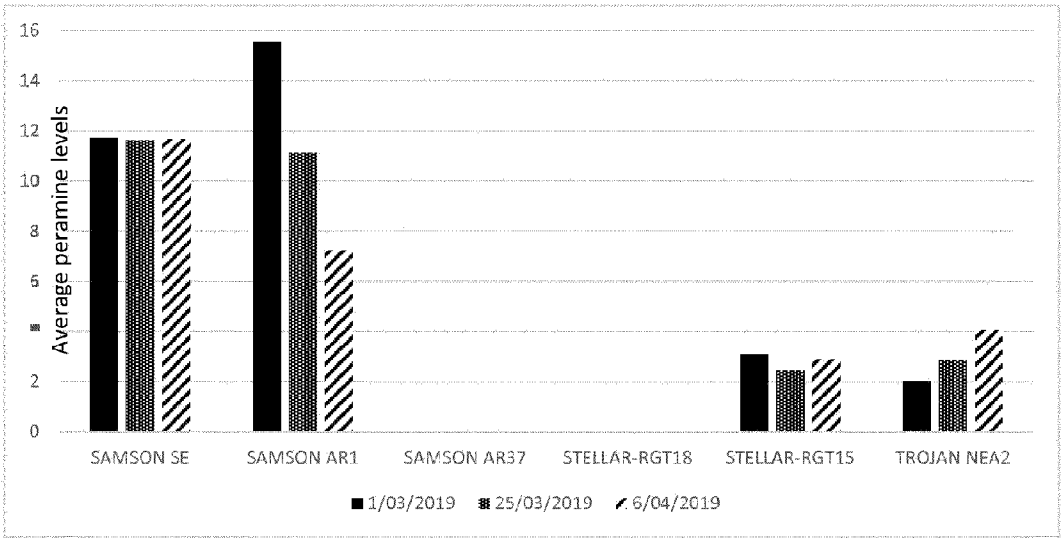


Figure 18

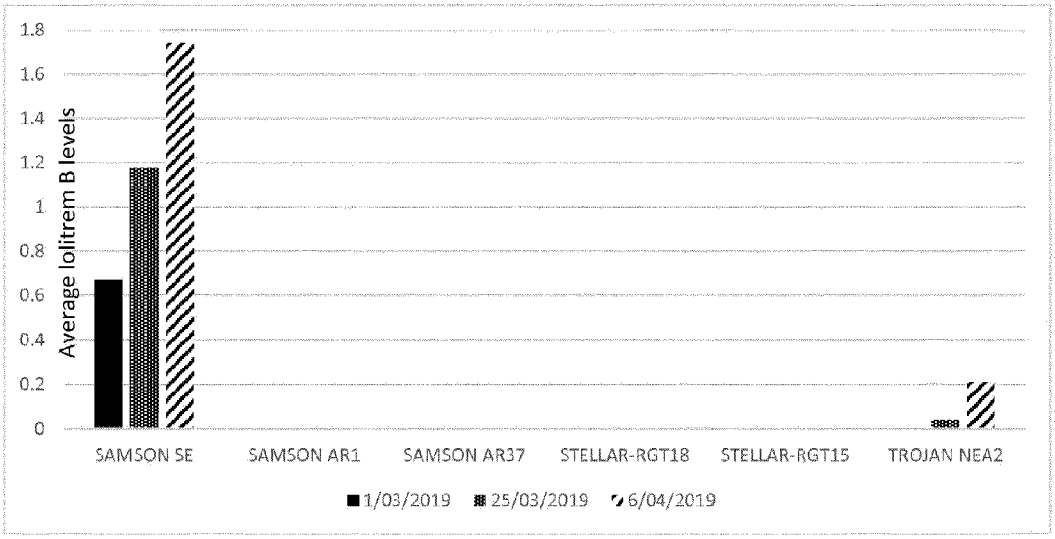


Figure 19

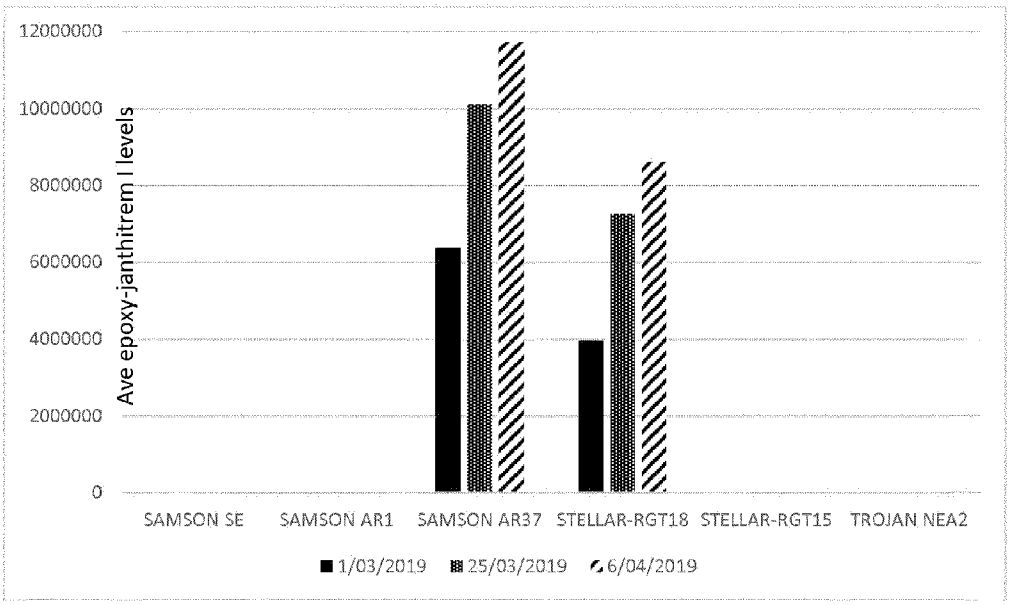


Figure 20

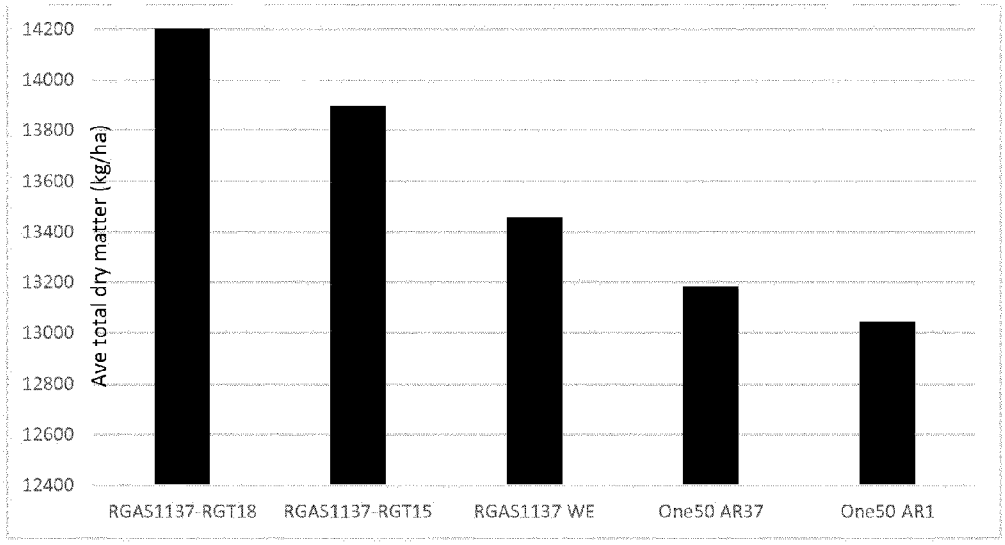
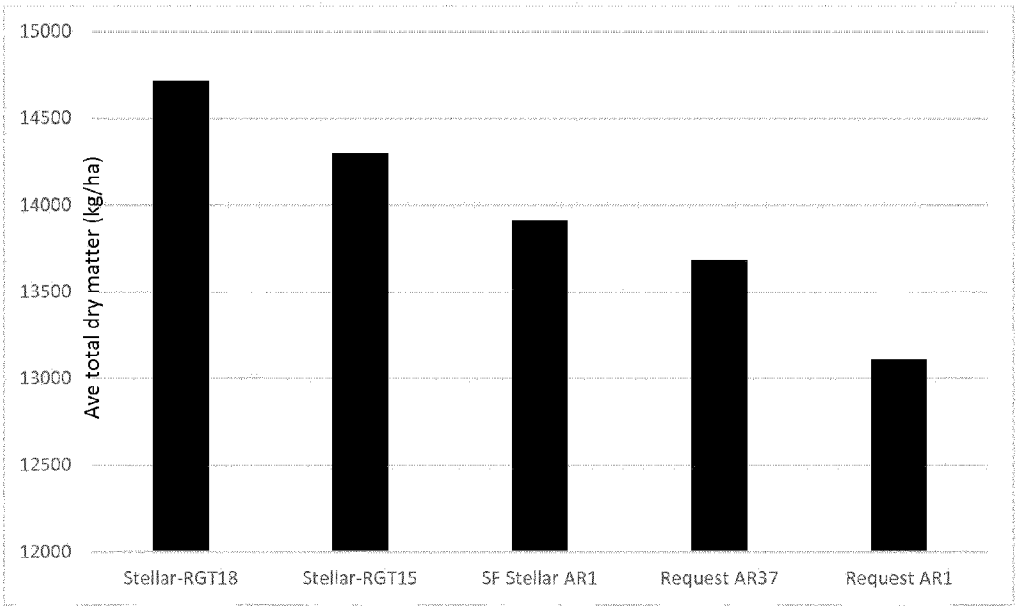


Figure 21


15000
14500
14000
13500
13000
12500
12000
Ave total dry matter (kg/ha)
Stellar-RGT18
Stellar-RGT15
SF Stellar AR1
Request AR37
Request AR1

SEKVENSLISTE

Sekvenslisten er udeladt af skriftet og kan hentes fra det Europæiske Patent Register.

The Sequence Listing was omitted from the document and can be downloaded from the European Patent Register.