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VEROMANN E ET AL: "Relative attractiveness of Brassica napus, Brassica nigra, Eruca sativa and Raphanus sativus for pollen beetle and their potential for use in trap cropping", ARTHROPOD-PLANT INTERACTIONS ; AN INTERNATIONAL JOURNAL DEVOTED TO STUDIES ON INTERACTIONS OF INSECTS, MITES, AND OTHER ARTHROPODS WITH PLANTS, SPRINGER NETHERLANDS, DORDRECHT, Bd. 6, Nr. 3, 18. April 2012 (2012-04-18), Seiten 385-394, XP035105501, ISSN: 1872-8847, DOI: 10.1007/S11829-012-9191-6
LUULE METSPALU ET AL: "Flea beetle (Chrysomelidae: Alticinae) species composition and abundance in different cruciferous oilseed crops and the potential for a trap crop system", ACTA AGRICULTURAE SCANDINAVICA. SECTION B. SOIL AND PLANTSCIENCE, Bd. 64, Nr. 7, 3. Oktober 2014 (2014-10-03), Seiten 572-582, XP055671801, NO ISSN: 0906-4710, DOI: 10.1080/09064710.2014.933871
SHELTON A M ET AL: "Concepts and applications of trap cropping in pest management", ANNUAL REVIEW OF ENTOMOLOGY, ANNUAL REVIEWS, US, Bd. 51, 1. Januar 2006 (2006-01-01), Seiten 285-308, XP002756181, ISSN: 0066-4170, DOI: 10.1146/ANNUREV.ENTO.51.110104.150959 [gefunden am 2005-08-03]
TANJA BOHINC ET AL: "Sowing mixtures of Brassica trap crops is recommended to reduce Phyllotreta beetles injury to cabbage", ACTA AGRICULTURAE SCANDINAVICA. SECTION B. SOIL AND PLANTSCIENCE, Bd. 63, Nr. 4, 1. Mai 2013 (2013-05-01), Seiten 297-303, XP055671890, NO ISSN: 0906-4710, DOI: 10.1080/09064710.2012.752858
HASSAN BARARI ET AL: "Effect of a turnip rape (Brassica rapa) trap crop on stem-mining pests and their

Fortsættes ...

parasitoids in winter oilseed rape (*Brassica napus*)", **BIOCONTROL**, KLUWER ACADEMIC PUBLISHERS, DO,
Bd. 50, Nr. 1, 1. Februar 2005 (2005-02-01), Seiten 69-86, XP019230644, ISSN: 1573-8248, DOI: 10.1007/S10526-
004-0895-0

Specification

[0001] The present invention relates to a seed mixture having oilseed rape seeds, wherein seeds of at least one sacrificial and one denaturing plant from the cabbage family are added to the oilseed rape seeds as protection against insects and slugs, and to a cultivation method for protecting oilseed rape against insects and/or slugs, wherein seeds of sacrificial and/or denaturing plants from the cabbage family are sown in addition to oilseed rape seeds.

[0002] A seed mixture and a cultivation method are known from UA 89629 U, by means of which insects are to be attracted for pollinating alfalfa blossoms. At the start of spring, when the machines can first drive into a field, a seed mixture is sown by means of a sowing machine in the form of strips having a width of 250 m about the perimeter of the field. The seed mixture is made of spring oilseed rape and white mustard at a ratio of 1.2 to 0.8. An opportunity is thus created for improving the attractivity of insect pollinators in the alfalfa. Even if pollination is thereby advantageously influenced, the use of insecticides is not thereby prevented.

[0003] Fodder crop seeds for planting in a fodder crop field are known from US 5,859,349 A and consist of a mixture having 97 to 99 volume portions of a seed for a fodder crop having been genetically modified so as to have a resistance against herbicides applied during growth. Here again, avoiding the use of insecticides cannot be ensured.

[0004] DE 41 15 493 A1 intends to make chemical pest control by means of repeated spraying with insecticides unnecessary. To this end, at least one strip of field flowers or field grass is planted, surrounding the crop field on all sides with cultivated plants, and in which phacelia, buckwheat, sunflowers, mallow, mustard, oilseed rape, grass, or clover is planted. The flower or grass strip provides optimal living conditions for so-called beneficial insects, that is, aphid predators, due to the abundance of flowers therein the prime vegetation period of May through September.

[0005] All of said known measures, however, do not provide a solution for controlling pests for oilseed rape plants. The pollen beetle, especially, but also slugs, causes significant damage to oilseed rape crops and leads to substantial losses to the harvest if not controlled. The potential use of insecticides, however, is not allowed for organic crops.

[0006] In the document VEROMANN E ET AL: "Relative attractiveness of Brassica napus, Brassica nigra, Eruca sativa and Raphanus sativus for pollen beetle and their potential for use in trap cropping", ARTHROPODPLANT INTERACTIONS ; AN INTERNATIONAL JOURNAL DEVOTED TO STUDIES ON INTERACTIONS OF INSECTS, MITES, AND OTHER

ARTHROPODS WITH PLANTS, SPRINGER NETHERLANDS, DORDRECHT, Vol. 6, No. 3, 18 April 2012 (2012-04-18), pages 385-394, XP035105501, ISSN: 1872-8847, DOI: 10.1007/S11829-012-9191 -6 it is reported that black mustard (*Brassica nigra*) can be used as a trap plant against beetles. Black mustard is thereby compared with arugula (*Eruca sativa*) and radish (*Raphanus sativus*) with respect to effectiveness in controlling pollen beetles. It is ultimately proposed in the document that a mixture of black mustard (*Brassica nigra*) and radish (*Raphanus sativus*) could help to control the beetle. Because arugula (*Eruca sativa*) and radish (*Raphanus sativus*) are late bloomers, and accordingly have the same effect, said plants can be used alternatively.

10 [0007] The publication LUULE METSPALU ET AL: "Flea beetle (*Chrysomelidae: Alticinae*) species composition and abundance in different cruciferous oilseed crops and the potential for a trap crop system", ACTA AGRICULTURAE SCANDINAVICA. SECTION B. SOIL AND PLANTSCIENCE, Vol. 64, No. 7, 3 October 2014 (2014-10-03), pages 572-582, XP055671801, NO ISSN: 0906-4710, DOI: 10.1080/09064710.2014.933871 compares eight
15 different cross-bred oilseed plants with each other with respect to controlling flea beetles (*Chrysomelidae: Alticinae*). Said document does not contain investigations with respect to the pollen beetle (*Brassicogethes aeneus*).

[0008] SHELTON A MET AL: "Concepts and applications of trap cropping in pest management", ANNUAL REVIEW OF ENTOMOLOGY, ANNUAL REVIEWS, US, Vol. 51, 20 1 January 2006 (2006-01-01), pages 285-308, XP002756181, ISSN: 0066-4170, DOI: 10.1146/AN-NUREV.ENTO.51.110104.150959 [found on 2005-08-03] proposes that plants of different species be planted at the same time to control various beetles. However, no proposal for controlling pollen beetles or slugs in oilseed rape is made.

[0009] In the document Tanja Bohinc ET AL: "Sowing mixtures of *Brassica* trap crops is recommended to reduce *Phyllotreta* beetles injury to cabbage", ACTA AGRICULTURAE SCANDINAVICA. SECTION B. SOIL AND PLANTSCIENCE, Vol. 63, No. 4, 1 May 2013 (2013-05-01), pages 297-303, XP055671890, NO ISSN: 0906-4710, DOI: 25 10.1080/09064710.2012.752858 it is reported that the simultaneous sowing of oil radish, white mustard, and oilseed rape can be effective as multiple trap crops for controlling cabbage flea
30 beetles in cabbage.

[00010] HASSAN BARARI ET AL: "Effect of a turnip rape (*Brassica rapa*) trap crop on stem-mining pests and their parasitoids in winter oilseed rape (*Brassica napus*)",

BIOCONTROL, KLUWER ACADEMIC PUBLISHERS, DO, Vol. 50, No. 1, 1 February, 2005 (2005-02-01), Pages 69-86, XP019230644, ISSN: 1573-8248, DOI: 10.1007/S 10526-004-0895-0 describes the effect of a turnip trap crop on stem-mining pests and their parasitoids in winter oilseed rape (*Brassica napus*). The control of the cabbage stem flea beetle (*Psylliodes chrysocephalus*) and of the spotted cabbage stem weevil (*Ceutorhynchus pallidactylus*) is investigated. It was found that turnips planted in field strips can reduce the infestation of oilseed rape by the cabbage stem flea beetle. This is not the case, however, for the cabbage stem weevil.

[00011] The object of the present invention is thus for oilseed rape cultivation to be able to produce a high yield and thereby to be ecological, particularly bee-friendly, without using insecticides.

[00012] The object is achieved by a seed mixture having oilseed rape seeds and by a cultivation method for protecting oilseed rape from insects and slugs having the features of the in-dependent claims.

[00013] The seed mixture according to the invention comprises mostly oilseed rape seeds for sowing oilseed rape. Seeds of at least one sacrificial and/or denaturing plant from the cabbage family are added to the oilseed rape seeds as pest control, particularly for protecting against insects and/or slugs, at an amount of 0.1 to 15 wt% each of the entire seed mixture. The sacrificial plants are provided so that insects, particularly the pollen beetle, infest said plants and the actual main crop of the seed mixture, namely the oilseed rape, remains largely uninfested. The denaturing plants cause slugs, for example, to keep away from the oilseed rape, particularly by means of root excretions.

[00014] Because the sacrificial and denaturing plants, like the oilseed rape, come from the cabbage family, the insects and slugs dangerous to the cabbage family predominantly infest the sacrificial and denaturing plants and infest the oilseed rape less. Insects and slugs attracted by other families are not present in the field. Effective, bee-friendly, and organic cultivation of oilseed rape is thus made possible while avoiding the use of insecticides. Because the sacrificial and/or denaturing plants are added at a quantity of only 0.1 to 15 wt% each of the seed mixture, the yield of the oilseed rape harvest is not too greatly reduced.

[00015] The seed mixture is suitable for oilseed rape of standard varieties or hybrid varieties. A plurality of different sacrificial or denaturing plants can also be part of the seed mixture as needed.

[00016] By means of the seed mixture, the entire field is sown with oilseed rape and with sacrificial and/or denaturing plants. Comprehensive protection of the oilseed rape is thereby brought about. Sowing only an edge strip of the field would not be able to prevent the pollen beetle and other insects from infesting the main field having the oilseed rape.

5 [00017] It has been found to be particularly important that the seed mixture has seeds of turnips and/or oil radish added to the seed mixture as sacrificial plants in addition to the seeds of oilseed rape. Said sacrificial plants from the cabbage family are preferred over the oilseed rape by the pollen beetle, rape stem weevil, or cabbage stem weevil. Said insects thus predominantly infest said sacrificial plants and spare the oilseed rape.

10 [00018] Because the seed mixture has mustard seeds added as a denaturing plant in addition to the seeds of oilseed rape and the seeds of turnips and oil radish, slugs are repelled by said plants because said plants excrete substances unpleasant to slugs from the roots thereof. The slugs thus avoid said field. Particularly when cultivating winter oilseed rape, the mustard plant also has the advantage of freezing off and thus not preventing the growth of oilseed rape
15 in the spring. It has been found that the mustard having died off in the spring is also particularly favourable for the growth of oilseed rape. Due to the dead mustard plants, less damage, for example in the form of fungi, is found on the oilseed rape. The oilseed rape is again thereby less interesting to further pests, whereby said oilseed rape is further protected.

[00019] The combination according to the invention of the seeds of oilseed rape, turnips,
20 oil radish, and mustard in the seed mixture according to the invention has resulted in a particularly high-yield and low-loss harvest of oilseed rape.

[00020] One particularly advantageous seed mixture is characterized in that the weight per-centage of the seeds of the sacrificial plants in the entire seed mixture is greater than the weight percentage of the seeds of the denaturing plant. For example, the weight percentage of
25 the seeds of the sacrificial plant can be approximately twice as much as the weight percentage of the seeds of the denaturing plant. The individual composition of an optimal seed mixture can be made dependent on the currently expected threat of insects and slugs. Because the threat to the oilseed rape from insects is generally greater than that from slugs, the sacrificial plants can have a greater proportion than the denaturing plants.

30 [00021] When the oilseed rape in the seed mixture is preferably a winter oilseed rape, the seed mixture according to the invention can be applied particularly well, because the

presence of insects and slugs and the repelling thereof by means of the sacrificial and denaturing plants best coincides with the critical vegetation period of the oilseed rape.

[00022] The cultivation method according to the invention for protecting oilseed rape against insects and/or slugs is characterized in that seeds of sacrificial and denaturing plants from the cabbage family are sown at an amount of 0.1 to 15 wt% each of the entire sowing in addition to seeds of oilseed rape. Said sowing takes place by means of a seed mixture from the preceding claims. It is also fundamentally possible, however, that the sowing of oilseed rape and the sowing of the sacrificial plants and/or of the denaturing plant takes place individually, particularly in succession. By cultivating special plants for substantially deterring insects and/or slugs from the actual main crop, namely the oilseed rape, the main crop is protected and leads to a very good yield of the main crop at harvest.

[00023] Because the sacrificial plants and/or the denaturing plants, like the main crop, come from the cabbage family, the same insects and slugs are attracted and repelled, thus protecting the actual main crop. The amount of sacrificial and/or denaturing plants of 0.1 to 15 wt% of the entire seed can be selected individually, depending on the expected infestation of insects and slugs. By means of the present cultivation method according to the invention, organic cultivation of oilseed rape is made possible, wherein the spraying of insecticides is no longer necessary.

[00024] When seeds of turnips and/or oil radish are sown as sacrificial plants in addition to the seeds of oilseed rape, then particularly good control of the pollen beetle or the cabbage stem weevil is achieved, for example. The pollen beetle and cabbage stem weevil primarily infest the turnips or the oil radish. The oilseed rape is thereby largely protected and can grow to a high yield.

[00025] When seeds of mustard are sown as a denaturing plant in addition to the seeds of oilseed rape, then the mustard having died off in the spring is particularly beneficial to the growth of the oilseed rape. Due to the dead mustard plants, less damage, for example in the form of fungi, is found on the oilseed rape. The oilseed rape is again thereby less interesting to further pests, whereby said oilseed rape is further protected. The sowing according to the invention of the combination of the seeds of oilseed rape, turnips, oil radish, and mustard in the seed mixture according to the invention or as individual sowing of the seeds has resulted in a particularly high-yield and low-loss harvest of oilseed rape. Particularly when infesting by slugs is to be expected, the addition of mustard seeds to the oilseed rape seeds is advantageous,

because the root excretions of the mustard plants repel the slugs. The combination of seeds of said four plants accordingly produces the surprising result that not only is the oilseed rape protected against infestation, but also the growth thereof is simultaneously promoted.

5 [00026] For a particularly severe infestation of insects and slugs, of course, it is also possible and can be advantageous that seeds of turnips, oil radish, and mustard are also sown in addition of the seeds of oilseed rape.

[00027] A particularly advantageous cultivation method is that a greater weight percentage of seeds of sacrificial plants than the weight percentage of denaturing plant is sown. Depending on the expected infestation by insects and slugs, it can be accordingly advantageous 10 that twice as many seeds of the sacrificial plants in comparison with the seeds of denaturing plants are sown, for example.

[00028] When a winter oilseed rape is preferably sown as the oilseed rape, a particularly good effect of repelling insects and/or slugs is brought about. Winter oilseed rape is typically sown at the end of August and germinates in October or November. The harvest takes place in 15 the following summer. Slug infestation can be expected in the months of germination. Insect infestation takes place in the spring and early summer if the sown crop is not protected. Winter oilseed rape is accordingly particularly well protected by the cultivation method according to the invention. The cultivation method is also, however, fundamentally suitable for summer oilseed rape.

20 [00029] The present invention is not limited to the embodiment examples shown and described. Modifications in the context of the claims are also possible, as is a combination of the features indicated, even if shown and described in different embodiment examples.

Patentkrav

1. Frøblanding med rapsfrø, hvor der i rapsfrøene som plantebeskyttelse mod insekter og snegle iblandes frø af mindst én offer- og denaturerende plante fra korsblomstfamilien, hvor frøene af offer- og denaturerende plante iblandes i en mængde på 0,1 til 15 vægt-% af den samlede frøblanding, og frøblanding ud over rapsfrøene
5
- som offerplante også iblandes frø af rybs og olieræddike og
- som denaturerende plante også sennepsfrø.

2. Frøblanding ifølge det foregående krav, **kendetegnet ved, at** vægt-%-forholdet af frø af offerplanten i hele frøblanding er højere end vægt-%-andelen af frø af den denaturerende plante.
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3. Frøblanding ifølge et eller flere af de foregående krav, **kendetegnet ved, at** rapsen fortrinsvis er vinterraps.
15

4. Dyrkningsfremgangsmåde til beskyttelse af raps mod insekter og/eller snegle, hvor der i en frøblanding ifølge et eller flere af de foregående krav ud over frø af raps også sås frø af offer- og/eller denaturerende planter fra korsblomstfamilien, hvor der sås frø af offer- og denaturerende plante i en mængde på 0,1 til 15 vægt-% af de samlede frø og
20
- ud over rapsfrøene
- som offerplantefrø sås af rybs og olieræddike og
- som denaturerende plante sennepsfrø.

5. Dyrkningsfremgangsmåde ifølge et eller flere af de foregående krav, **kendetegnet ved, at** der sås en større vægt-% af frø af offerplanter end vægt-% frø af denaturerende planter.
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6. Dyrkningsfremgangsmåde ifølge et eller flere af de foregående krav, **kendetegnet ved, at** der som raps fortrinsvis sås vinterraps.