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SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

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Solicitud de Patente de Invención "Composiciones insecticidas cuya materia activa es de tipo fenil-pirazol, y procedimiento de lucha contra los insectos"

Solicitante Aventis CropScience S A

RESPUESTA AL AUTO NOTIFICADO POR FIJACIÓN EN LISTA No 382**DEL 2 DE NOVIEMBRE DE 2006, OFICIO NO 12656 (EXAMEN DE FONDO)**

ALVARO CORREA ORDÓÑEZ, mayor de edad y vecino de Bogotá D C , identificado tal como aparece al pie de mi firma, en mi carácter de apoderado sustituto de la sociedad en referencia, doy respuesta al auto emanado por ese Despacho dentro del término legal

Objeciones del Examinador**Documentos**

Con base en el artículo 46 de la Decisión 486 su Despacho solicita se alleguen cinco documentos con el objeto de realizar el examen de patentabilidad de la presente solicitud de patente

En respuesta a su solicitud anexo a este memorial los siguientes documentos

- 1 Traduction en Anglais de JPA-08 175910
- 2 JOURNAL OF ECONOMIC ENTOMOLOGY, Vol 76, No 4, 08/1983, pg 850-855

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ga

- 3 DATABASE CHEMICAL ABSTRACTS, [en ligne] C A ACCESSION No 97 87063 ca, xp002135193 & jp-a-57062201
- 4 DATABASE WPI, section ch, Week 198928, AN 1989-204057, XP002135105 & JP-A- 01143806
- 5 DATABASE CABA [en ligne] accession No 97,101520 CABI XP002135104 & INTERNATIONAL CONFERENCE ON PESTS IN AGRICULTURE, 6-8 JANUARY 1997, AT LE CORUM, MONTPELIER, FRANCE, vol 3, 1997, pages 1021 – 1028

Atentamente,


ALVARO CORREA ORDÓÑEZ
C C No 79 143 366 de Usaquén
T P 20.281

Anexos Los documentos anunciados (70 hojas)
Sustitución de poder

DDS/BOGDMS-68831 V1 P2000_000141_0710 DOC

RAISBECK, LARA, RODRÍGUEZ & RUEDA
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Señores

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO

DIVISION DE NUEVAS CREACIONES

E S D

Ref Expediente No 00 067 188

Solicitud de Patente de Invención Titulada "Composiciones
insecticidas cuya materia activa es de tipo
fenil-pirazol, y procedimientos de lucha contra
los insectos"

Solicitante Aventis CropScience S A

SUSTITUCIÓN DE PODER

CARLOS R. OLARTE, mayor y vecino de Bogotá D C, identificado como aparece al pie de mi firma, actuando en mi carácter de apoderado de la sociedad de la referencia, respetuosamente me permito manifestar que SUSTITUYO el poder a mi conferido por la mencionada sociedad en el doctor ALVARO CORREA ORDOÑEZ, identificado con la Cédula de Ciudadanía número 79 143 366 de Usaquén y con la Tarjeta Profesional número 20 281, para que sea él quien en adelante, asuma el trámite de la presente solicitud

El apoderado sustituto queda con las mismas facultades del principal

Atentamente,



CARLOS R. OLARTE

C C No 79 782 747 de Bogotá

T P No 74 295 del Consejo Superior de la Judicatura

**DILIGENCIA DE RECONOCIMIENTO
Y PRESENTACION PERSONAL**

Ante el Notario Once del Circulo de Santa Fe de
Bogotá compareció

Quien exhibió la C C No 79.782.747
expedida en TP 74295
y declaró que la firma y huella que aparecen en
el presente memorial son suyas y que el conte-
nido del mismo es cierto

Memorial dirigido a INTERESAL

20 OCT 2003

Santa Fe de Bogotá

Firma del Declarante HUELLA

Autorizo la anterior Diligencia

NOTARIO ONCE DEL CIRCULO DE SANTA FE DE BOGOTA



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(C)

Japanese Patent Lay-out Publication JP H08-175910
Publication date July 9, 1996
Application No H06-315192 in Japan
Application date December 19, 1994
Applicant SUMITOMO CHEMICAL INDUSTRY CO LTD

[Title of Document] Specification

[Title of Invention] Poisonous baits for controlling ants

[Patent Claims]

[Claim 1] Poisonous baits for controlling ants characterized by containing as insecticide active ingredient 5-amin-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulfinylpyrazol

[Detailed Explanation of the Invention]

[0001]

[Technical Field of Invention]

This invention relates to poisonous baits for controlling ants

[0002]

[Prior arts and Problems to be solved by the Invention]

Up to now, poisonous baits have been used for controlling cockroaches, et al
On the other hand, poisonous baits for controlling ants are also known, however, their effects are not sufficient enough. Generally speaking since a huge number of ants are habitable in one burrow (underground hole), it is much more effective to destroy a whole burrow by carrying poisonous baits into a burrow rather than to kill ants one by one

For this purpose, various characters described later are required, however, it is not yet clarified at the present time what kinds of characters are suitable as such insecticide active ingredient

[0003]

Namely, it is impossible to destroy a whole burrow by carrying poisonous baits into a burrow as far as using insecticide active ingredient which has evasive function or those which kill ants immediately after contacting. In the other words, it was necessary to find insecticide active ingredients showing high oral toxicity against ants without evasive function and also without acute lethal effect by contacting

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[0004]

[Means to solve the Problems]

To solve the above problems this invention can supply poisonous baits for controlling ants characterized by containing as insecticide active ingredient 5-amin-3-cyano-1-(2,6-dichlor-4-trifluoromethylphenyl)-4-trifluoromethylsulfinylpyrazole [hitherto, this can be named as Compound (1)] described in the Laid-opening Publication No Sho 63-316771

[0005]

The poisonous baits of this invention contain usually 0.001 - 90 % (w/w) of Compound (1) as insecticide active ingredient, and base substance which can be used for usual poisonous baits as auxiliary, for example, cereal such as wheat flour, corn

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flour, potato starch, etc , sugar such as granulated sugar, honey, etc , oil such as butter, peanut oil etc , animal substance such as krill powder (powder made of *Euphausiacea*), pupa powder etc , flavor such as milk, onion, etc , binding agent such as nitrocellulose etc , solvent for moistening such as glycerin, ethylene glycol, etc , gelling agent such as gelatin, carrageenan, agar agar, etc In addition, if necessary, it may allow to contain some other auxiliaries such as an antiseptic agent and an antioxidant

[0006]

The poisonous baits of this invention can be prepared by mixing an insecticide active ingredient and base substance described above and ground to form powder, or can be prepared by kneading and granulating the said powder above with adding water thereto Furthermore, they can be prepared as in either jellied or liquid form

Poisonous baits of this invention can be applied by placing at a habitat of ants or any places for controlling ants, alone or by packing into an appropriate container

[0007]

The poisonous baits of this invention are effective on various ants, for example, Kuroyama ari (*Formica fusca japonica*), Tobiroshuwa ari (*Tetramorium caespitum*), Tobiro keari (*Lasius niger*), Ishime ari (*Monomorium pharaonis*), Tsuyashinage ari (*Crematogaster sp*), Amime ari (*Pristomyrmex pungens*) Hime ari (*Monomorium nipponense*), Oozu ari (*Pheidole nodus*), Oohari ari (*Brachyponera chinensis*), Kuro-oo ari (*Camponotus japonicus*), Ruri ari (*Iridomyrmex iloi*) Fire ant Carpenter ant, etc , therefore, can be used for the controlling of these various ants

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[0008]

[Application Examples]

Furthermore, this invention will be explained in detail with some application examples

Firstly here are shown some application examples for the preparation of poisonous baits for controlling ants of this invention

Preparation Example

The Compound (1) (0.01 weight parts), wheat flour (30 weight parts), pupa powder (20 weight parts), peanut oil (10 weight parts), granulated sugar (20 weight parts) and dextrin (19.99 weight parts) were mixed , kneaded with adding appropriate amount of water, granulated with pushing, dried and ground to obtain poisonous baits for controlling ants

[0009]

Next, here are shown some test examples by using the poisonous baits of this invention In the test examples described below, the insecticide active ingredients (Compound A and Compound B) used as reference for comparison are the following Compound A 3-methyl-1-(2,6-dichlor-4-trifluoromethylphenyl)-4-(trifluoromethylthio)pyrazole [the compound described in the Laid-open Publication No Sho 61-268671]

[0010]

Test Example 1

Poisonous baits (50 granules) obtained in the said preparation example

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above were placed at the feeding place in the container in which Kuroyama ant (*Formica fusca japonica*) (80 adults) were transferred After one day, the number of survived ants in the container were counted In addition, similar test was achieved with the poisonous baits formulated with Compound A or Compound B prepared in similar manners as described in the Preparation Example said above

The number of survived ants was zero in the test examples with the poisonous baits for controlling ants of this invention, however, it was 80 adults in test examples with Compound A or Compound B Based on these results, it was clarified that the compounds showing evasive function such as pyrethroids are not suitable as insecticide active ingredients for the poisonous baits for controlling ants, and that Compound A or Compound B being classified in the same arylpyrazole compounds as like as Compound (I) are also not suitable

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[0011]

Test Example 2

The poisonous baits (300 granules) obtained in the said preparation example above were placed around a burrow of wild type of Kuroyama ant (*Formica fusca japonica*) After placing the poisonous baits, 113 ants were observed as coming into and going out from the burrow per every 10 minutes However, no ants were observed at all after 2 days and 7 days from the date of placing the baits

[0012]

[Effect of the Invention]

The poisonous baits for controlling ants of this invention using as insecticide active ingredient 5-amin-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulfinylpyrazole show excellent effect

[Title of Document] Abstract

[Abstract]

[Constitution] Poisonous baits for controlling ants containing as insecticide active ingredient 5-amin-3-cyano-1-(2,6-dichloro-4-trifluoromethylphenyl)-4-trifluoromethylsulfinylpyrazole

[Effect] The poisonous baits for controlling ants of this invention show excellent effect by destroying a whole burrow by carrying the poisonous baits into a burrow

[Selected Figure] None

This patent application was translated from the original manuscript being previously received from SUMITOMO CHEMICAL INDUSTRY CO , LTD

On September 10, 2001
Itsuo Kurobane (Dr)

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Evaluation of Baiting Techniques for Sampling Wireworms (Coleoptera: Elateridae) Infesting Wheat in Washington¹

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J Econ Entomol 76: 850-855 (1983)

ABSTRACT Field comparisons of several baits in attracting wireworms, primarily Great Basin wireworms, *Ctenicera pruinosa* (Horn) showed that fewer wireworms were found at stations baited with carrot potato or wheat bran than at those baited with a 1:1 whole wheat-corn mixture or wheat flour. Counts at stations baited with whole ground wheat, whole wheat and whole corn were intermediate. Baits consisting of a 1:1 wheat-corn mixture either dry or presoaked in water, either covered with a polyethylene sheet or not and exposed for 1, 2, or 3 weeks during March through June in fallow ground, were evaluated for their efficiency in attracting wireworms. In general, presoaking or covering baits made little difference in the mean number of wireworms attracted as compared with dry or uncovered baits. However, the bait combination attracting the highest number of wireworms was soaked, covered, and exposed for 3 weeks in April. Low soil temperature was apparently the limiting factor in attracting wireworms to baits in March, whereas low soil moisture was the limiting factor in June. When the mean number of wireworms from all unbaited soil samples was compared with that at baits, different ratios were obtained for each of three exposure periods each month. However, if additional studies in other areas can verify the efficacy of the baiting technique, it could be used to estimate wireworm population densities in the field.

In the past, baiting was used primarily to concentrate wireworms to reduce the population by removing the pests at the baits, or by killing them with chemicals incorporated in the baits or with fumigants (Thomas 1940). More recently, the baiting technique was investigated for detecting wireworm populations and for monitoring their seasonal activity (Ward and Keaster 1977, Doane 1981).

Until recently, the only reliable field method of estimating wireworm population densities has been soil sampling (Jones 1937, Yates and Finney 1942, Salt and Hollick 1944, Finney 1945, Onsager 1969, Doane 1977). Soil sampling is laborious and time consuming and is impractical for large areas such as grain or forage fields. Baiting is less demanding and could be a convenient method of estimating wireworm populations if the number of wireworms collected could be related to the population density.

Thomas (1940) reviewed the use of different baits by various investigators and concluded that grains or grain products were generally both effective and economical. More recently, Apablaza et al. (1977) found in laboratory choice tests that a corn-wheat mixture was very attractive to wireworm species infesting corn. Further, more, Ward and Keaster (1977) reported that, in field tests, a corn-wheat mixture bait covered with a polyethylene sheet resulted in significantly higher attractancy to corn infesting wireworms than did uncovered baits.

We conducted a field test to determine the relative attractiveness of several baits to the Great Basin wireworm (GBW), *Ctenicera pruinosa* (Horn), a species common to the Pacific Northwest particularly in dry land wheat-growing areas. We then conducted a field test to determine the attractiveness of baits consisting of a corn-wheat mixture prepared in different ways and

exposed for various lengths of time during four different months. We also sought to determine if the number of wireworms found at baits was related to the number found in unbaited soil samples, as well as to soil temperature or moisture.

Materials and Methods

Tests were conducted at Pasco, Wash., on fallow ground which had been in dryland wheat for a number of years. The soil was Ritzville silt loam (Calcicorthidic Haploxerolls), with an organic matter content of less than 0.5%.

In a bait evaluation test conducted in May 1976, a square block with 64 bait stations, 2 m apart, was baited with the following materials: potato (1-cm cubes), carrot (1-cm cubes), wheat flour, wheat bran, ground wheat, whole wheat, whole corn, and 1:1 mixture of whole wheat and corn, using an 8 × 8 Latin square design. Whole grains were soaked in water 1 day before testing, and wheat products were moistened with water on the test date. At each station, a 15-cm-deep hole was dug with a 5-cm-diameter bulb planter; ca. 50 ml of a bait was placed in it and then covered with the same soil that had been removed. One week later, the baits, with soil around them, were removed with a 16-cm diameter posthole digger to a depth of 25 cm, and examined for the number and identity of wireworms found. Two trials were conducted twice, 2 weeks apart.

The baiting technique test was conducted during March and through June 1980. Plots at 10 locations, each considered a replicate, were divided into four randomized blocks, one for each of the months of March, April, May, and June. Each block contained 15 stations, 2 m apart, in a 3 by 5 array. Treatments applied at these stations were randomized in a complete block design and exposed for 1, 2, or 3 weeks.

In each block, baits consisting of a 1:1 mixture of

¹This study was partially supported by the Washington State Potato Commission. Received for publication 23 August 1982; accepted 15 February 1983.

Table 1 Mean number of wireworms found at various baits in a field test at Pasco, Wash., 1976

Bait	No. of wireworms/bait*
1:1 Whole wheat-corn mixture	2.5a
Wheat flour	2.3a
Ground wheat	2.2ab
Whole wheat	2.1ab
Whole corn	2.1ab
Carrot	1.2bc
Potato	0.8c
Wheat bran	0.5c

*Means of four trials, eight replicates per trial
*Means followed by the same letter are not significantly different at $P = 0.05$ (Duncan's multiple range test)

whole wheat and corn were placed in the soil as described previously, at 12 stations 6 with soaked seeds and 6 with dry seeds. Immediately after placement of the baits three stations each with soaked or dry seeds were covered with a clear 1-m² polyethylene sheet (6 mil thick) centered over the station. The edges of the sheets were then covered with soil. The remaining six baited stations were left uncovered. Three stations without bait acted as controls, i.e., unbaited soil samples. At the end of each exposure period, baits from each of the four bait treatments, with surrounding soil, were removed, as described previously, and placed separately into polyethylene bags. Soil temperatures were taken at depths of 12 and 25 cm concurrently at each bait station. On each date baits were removed an unbaited soil sample 60 cm in 15-cm increments was obtained with a 16-cm-diameter posthole digger. Soil from each increment was bagged separately. Soil temperatures were taken at depths of 15, 30, 45, and 60 cm. Bagged baits and soil were taken to the laboratory for examination and to determine the number and identity of wireworms collected. A sample of soil from each bag was dried in an oven to evaluate the moisture content. The entire procedure was repeated in each block at each location starting on 11 March, 8 April, 6 May, and 3 June.

Data were analyzed by analysis of variance (randomized complete block design for the bait evaluation test, and split-plot design for the baiting technique test) and Duncan's multiple range test. Wireworm data were first transformed to $\sqrt{X + 0.5}$ before analysis.

Results and Discussion

Bait Evaluation Test

Of 427 wireworms found at baits 88% were GBW and the remainder were the Pacific Coast wireworm (PCW) *Limonius canus* LeConte. The percentages for the two species were most likely true reflections of the size of populations rather than of the effect of differential attractancy to baits since these ratios are comparable to those obtained on this farm over the past several years. However, no records were kept of wireworm numbers for each species at each bait. Additionally, 19 *Cardiophorus* sp. (Elateridae) larvae were found but these were not included in the tabulations and analysis.

More wireworms were found at stations baited with a 1:1 wheat-corn mixture or wheat flour than at those baited with potato, carrot, or wheat bran, whereas those baited with ground wheat, wheat, or corn were intermediate (Table 1). Our results are similar to those found by Apablaza et al. (1977) in laboratory tests in which larvae of three species of *Melanotus* were shown to be attracted to wheat or a corn-wheat mixture more often than to carrot or potato. Corn was also less preferred by the three species and by *Limonius dubians* (LeConte), the latter being attracted more to potato, wheat, or carrot. That species differences may exist is also evident from Spuler's (1925) work in which *Limonius californicus* (Mannerheim) larvae were attracted, in decreasing order, to graham flour, bran, potato, and carrot in one test, and to graham flour, corn, and potato in another test. Furthermore, Apablaza et al. (1975) found that a corn-wheat mixture attracted more corn-infesting wireworms than did corn or wheat alone in field tests, whereas the number of wireworms at these three baits in our test did not differ significantly.

Although the number of wireworms found at baits was considered to be a measure of attractancy, wireworms did not necessarily remain at certain baits, indicating that perhaps they did not prefer the baits after feeding on them. For example, feeding holes were observed on potato and carrot baits at several stations even though no wireworms were found. Also the low numbers found at the wheat bran bait stations may have been due to the dry condition of the bait, since bran does not retain moisture.

Baiting Technique Test

Of 397 wireworms collected at baits in this test 83% were GBW and the remainder were PCW. Not included in the analyses but found at the baits were 36 larvae of *Cardiophorus* sp. and 42 larvae of unknown false wireworm species (Tenebrionidae).

There were no significant differences in mean number of wireworms responding to the four bait treatments (Table 2). The bait combination with the highest number of wireworms was soaked, covered, and exposed for 3 weeks in April. Further analyses of the data showed that there were no significant differences in mean number of wireworms responding to dry or soaked baits, or to covered or uncovered bait stations. However, more wireworms were found at baits in April than in May and June, and fewer in March. Also, more wireworms were found at baits exposed for 3 weeks than were found at those exposed for only 1 week, particularly in April and May.

A total of 26 wireworms were found in 120 unbaited soil samples (Table 2). Because of this low number of wireworms, no correlations could be drawn between number, time, and depth of collection. However, 77 of them were found in the top 15 cm of soil.

It could be assumed that the number of wireworms found in unbaited soil samples below the 25-cm depth, the limit of our sampling, is minimal. It could also be assumed that soil sampling can be used to accurately

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Table 2. Number of wireworms found at stations baited with a 2:1 wheat-corn mixture after various exposure periods during 4 months in a field test, Pasco, Wash., 1961

Treatment of bait	X No. of wireworms/bait after indicated exposure (wk)												Mean
	March			April			May			June			
	1	2	3	1	2	3	1	2	3	1	2	3	
Soaked covered	0.0 ^a D	0.3 ^a CD	0.6 ^a BCD	0.4 ^a BCD	1.7 ^a B	3.5 ^a A	0.5 ^a CD	0.9 ^a BCD	1.1 ^a BC	0.8 ^a BCD	0.8 ^a BCD	0.1 ^a CD	0.9 ^a
Soaked, uncovered	0.1 ^a C	0 ^a C	0.4 ^a BCD	1.3 ^a ABC	1.9 ^a A	1.7 ^a AB	0.3 ^a BC	1.0 ^a ABC	0.8 ^a ABC	1.2 ^a ABC	1.0 ^a ABC	0.1 ^a ABC	0.9 ^a
Dry covered	0.1 ^a C	0.1 ^a C	0.3 ^a BC	1.1 ^a BC	1.5 ^a AB	2.2 ^a AB	0.8 ^a BC	0.6 ^a BC	1.0 ^a BC	0.7 ^a BC	0.3 ^a BC	0.6 ^a BC	0.8 ^a
Dry uncovered	0.1 ^a BCD	0.1 ^a D	0.2 ^a CD	1.3 ^a ABC	0.9 ^a ABCD	1.9 ^a AB	0.3 ^a BCD	0.3 ^a BCD	1.2 ^a ABCD	0.3 ^a BCD	1.4 ^a AB	0.6 ^a ABCD	0.7 ^a
Mean	0.10	0.10	0.40	1.18	1.54	2.34	0.50	0.70	1.08	0.88	0.98	0.50	
No. of wireworms/ unbaited soil sample	0.3	0.1	0	0.3	0.2	0.3	0	0.3	0.1	0.2	0.2	0.4	

Means of 10 replicates.

Means followed by the same lowercase letter within a column are not significantly different at $P = 0.05$ (Duncan's multiple range test).Means followed by the same capital letter within a row are not significantly different at $P = 0.05$ (Duncan's multiple range test).Table 3. Ratio of mean number of wireworms per bait:1 wireworm per 929 cm² (1 ft²), based on soil sampling^a

Month	Ratio of wireworms/bait:1 wireworm/929 cm ² after indicated exposure (wk) of bait:		
	1	2	3
March	0.13	0.13	0.42
April	1.27	1.70	2.63
May	0.53	0.79	1.16
June	0.85	0.99	0.59

^aMean of soil sampling was 0.88 wireworms per 929 cm².

estimate the wireworm density because each core sample has an equal probability of containing wireworms. Thus, the mean number of wireworms that we found in the 120 unbaited soil samples was 0.22 wireworms per sample. Wireworm density based on soil sampling has been customarily expressed as number of wireworms per ft² of soil surface. Since four samples equal ca. 929 cm² (1 ft²), the estimated density was ca. 0.88 wireworms per 929 cm². To determine the efficiency of the baiting technique compared with the unbaited soil sampling technique, we calculated the ratio of wireworms per bait:1 wireworm per 929 cm² for the three exposure periods during the 4 months (Table 3).

Soil temperatures shown in Table 4 are averages of temperatures taken at the 12- and 25-cm depths. Although no significant differences in temperature existed between stations containing soaked and dry baits, the temperatures at covered stations were significantly higher than those at uncovered stations except week 1 in March. Mean temperatures at the uncovered stations began with a low of ca. 5.5°C in March and increased to a high of ca. 22°C in June.

Soil moisture was determined by drying composite samples and therefore, represents an average from an entire core rather than one from soil immediately surrounding a bait (Table 5). Percentages at covered stations were significantly higher than those at uncovered stations, with the exception of three exposure periods. Two of these exceptions were the result of rainfall (week 3 in May and week 2 in June). Under these circumstances, percentages would be expected to be higher in soil from uncovered stations than in soil from covered stations.

In their study of seasonal vertical distribution of *Li. monius* species, predominantly *L. canus*, in fallow ground at Walla Walla, Wash., Jones and Shurck (1942) found that only 19% of the larvae were in the top 15 cm of soil in March when the mean soil temperature was 7.2°C and soil moisture was 26%. However, 47, 78, and 45 were found at this depth in April, May, and June respectively, when soil temperatures increased from 12.8 to 23.3°C and soil moisture decreased from 22 to 8%. Thus, although no correlation could be found in our test between the number of wireworms per bait and either soil temperature or moisture, it appears that movement of wireworms to the baits was probably limited by low temperatures in March and by low moisture in June (Fig. 1). For example, significantly more wireworms were

August 1983

TOBA AND TURNER BAITING TECHNIQUES FOR SAMPLING WIREWORMS

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Table 4 Soil temperature at stations baited with a 11 wheat-corn mixture at the end of various exposure periods

Treatment of bait	Soil temp (°C) after bait exposed for indicated time with											
	March			April			May			June		
	1	2	3	1	2	3	1	2	3	1	2	3
Soaked, covered	5.4a	7.7a	8.7a	11.6a	15.5a	16.6a	19.7a	20.7a	14.7ab	23.4a	23.1a	24.4a
Soaked, uncovered	5.6a	6.7b	6.5b	11.6b	14.1b	16.0b	17.7b	20.0b	14.7bc	21.4b	20.7b	22.0c
Dry covered	5.4	7.8a	8.6a	13.7a	15.6a	18.7a	20.2a	20.8a	14.9a	23.4a	23.4a	24.4b
Dry uncovered	5.3a	5.7b	6.5b	11.7b	11.9b	14.9b	17.8b	19.8b	13.8c	21.3b	20.4b	22.4c
Mean	5.4K	6.8J	7.6J	11.5H	14.8G	17.3F	18.8E	20.3D	14.4G	21.4B	21.3C	22.4A

*Means of 10 replicates.
*Means followed by the same lowercase letter within a column are not significantly different at $P = 0.05$ (Duncan's multiple range test).
*Means followed by the same capital letter within a row are not significantly different at $P = 0.05$ (Duncan's multiple range test).

Table 5 Percent moisture of soil from stations baited with a 11 wheat-corn mixture taken at the end of various exposure periods

Treatment of bait	Soil moisture after baits exposed for indicated time (wt %)											
	March			April			May			June		
	1	2	3	1	2	3	1	2	3	1	2	3
Soaked, covered	11.2a	12.8a	12.2a	7.5b	8.2a	9.1b	7.1b	6.4a	7.9d	5.4a	6.1c	4.7d
Soaked, uncovered	10.4b	10.3d	10.0d	5.9d	5.3c	6.2c	6.4c	3.9d	11.3b	4.2c	8.8a	4.3c
Dry covered	11.2a	12.4b	11.8b	7.8a	7.5b	9.2a	7.2a	5.7b	8.1c	5.3b	5.9d	5.0b
Dry uncovered	9.3c	11.1c	10.1c	6.2c	4.7d	6.1d	6.3d	3.9c	11.6a	4.2d	8.5b	7.3d
Mean	10.6C	11.7A	11.0B	6.8G	6.4I	7.7E	6.8H	5.0F	9.7D	4.8L	7.3F	4.9K
Rainfall (cm)	1.50	0	0.36	0.10	0.13	0.38	1.14	0.33	2.97	0	2.16	0.30

*Means of 10 replicates.
*Means followed by the same lowercase letter within a column are not significantly different at $P = 0.05$ (Duncan's multiple range test).
*Means followed by the same capital letter within a row are not significantly different at $P = 0.05$ (Duncan's multiple range test).
*Rainfall during the week preceding the start of the test on each month was (in cm): 0.21, 0.35, 0.64, and 0.30 for March, April, May, and June respectively.

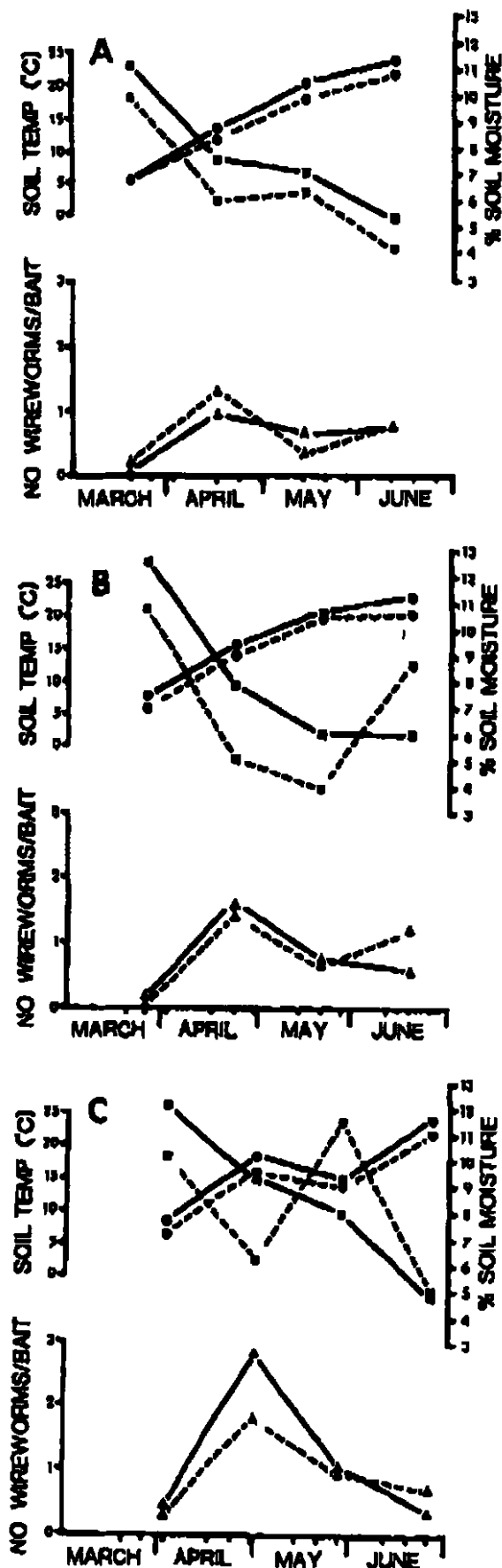


FIG. 1. Mean number of wireworms at baits (▲) that were either covered with polyethylene sheets (—) or uncovered (---) and the corresponding mean soil temperatures at 15-cm depth (●) and mean percent soil moisture of soil cores (■) (A) One week of exposure, (B) 2 weeks of exposure, and (C) 3 weeks of exposure.

collected at uncovered baits than at covered baits in June after 2 and 3 weeks exposure, probably due to rainfall during week 2. There was also significant rainfall during week 3 in May, however, it occurred at the end of that period, which probably was too late to have any effect on wireworm behavior. Campbell (1937) showed that larvae of *L. californicus* preferred soil having moisture contents between 6 and 16% in a moisture gradient of 4 to 24%, and Jones (1951) demonstrated that given a moisture gradient of 4 to 15% most *L. canus* and *L. californicus* larvae were found in sections containing 12 and 15% moisture. However, Zacharuk (1962) found that the behavior of *Ctenicera destructor* larvae was affected by both temperature and moisture, since larvae were more apt to avoid dry soil at higher temperatures than at lower ones. In our test, it appears that movement of wireworms to baits in May and June may have been limited by high soil temperatures, low soil moisture, or both (Fig. 1).

We have shown that efficiency of baits in attracting wireworms in the field depended on when and how long baits were exposed. However, since the baiting technique is more convenient than the soil sampling technique, additional studies should be conducted in other areas to verify the efficacy of this technique in estimating population densities.

Acknowledgment

We thank T&R Farms, Inc., Pasco, Wash., for allowing us to conduct our tests, and Mark Weiss of this laboratory for his technical assistance with the statistical analysis.

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CA COPYRIGHT 2000 ACS
AN 97 87063 CA
TI Insecticide ***bait*** composition containing water-absorbent polymers
PA Sumitomo Chemical Co., Ltd, Japan, Sankei Chemicals Co, Ltd
SO Jpn Kokai Tokkyo Koho, 7 pp
CODEN JKXXAF
YT Patent
Japanese
A01N025-10
5-4 (Agrochemical Bioregulators)
FAN CNT 1

	PATENT NO	KIND	DATE	APPLICATION NO.	DATE
PI	JP 57062201	A2	19820415	JP 1980-137230	19800930
	JP 63026721	B4	19880531		

AB An insecticidal ***bait*** contg a highly water-absorbent polym r
attracts more insects than a conventional ***bait***. Thus, a mixt
contg 1-naphthyl N-methylcarbamate [63-25-2] 5, rice bran 29,
flour 29, molasses 6, clay 35 5, and CM ***cellulose***
[9004-32-4] 0 5 parts was granulated to give a ***bait*** insecticide
The product attracted more larvae of Prodenia litura in the lab than the
control without CM ***cellulose***
ST water absorbent material ***bait*** insecticide
IT Insecticides
(***bait***, water-absorbent)
IT 63-25-2 3811-49-2 9004-32-4 80497-82-1
RL BIOL (Biological study)
(insecticidal ***bait*** compn contg.)CABA COPYRIGHT 2000 CABI

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(11) Published Unexamined Patent No S57(1982)-062201

(43) Publication Date April 15, 1982

Number of Claims 1 (total of 7 pages)

Unexamined

(51) International Class³ Identification No JPO File No
A 01 N 25/10 6742-4H

(54) Title of the Invention Bait Composition for Insect Pest Control

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Specifications

1 Title of the Invention

Bait Composition for Insect Pest Control

2 Claims

A bait composition for insect pest control characterized by a blend containing a high water-absorption polymer with a water-absorption magnification factor of 10 or more.

3 Detailed Description of the Invention

This invention relates to a bait composition for insect pest control that is characterized by a blend containing a high water-absorption polymer with a water-absorption magnification factor of 10 or more

More specifically, the purpose of this invention is to blend a high water-absorption polymer that has a water-absorption magnification factor of 10 or more with a previous form of a bait agent used for insect pest control, such that said composition maintains water absorption in the field through sources such as rainwater, sprayed water, night dew, muddy soil, etc., and whereby transpiration of moisture occurs even under dry conditions due to clear weather, etc., resulting in the extended maintenance of a moisture level that is higher than that of the surroundings and thus exhibiting superior levels of insect-attracting properties and palatability

Based on information from the inventors, the moisture level of a bait agent significantly affects its levels of insect-attracting properties and palatability. As a result of this information,

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this invention relates to the discovery of technologies for the manufacturing of agents, with the objective of maintaining conditions for bait agents in which the high-temperature conditions in the field are greater than in the normal surroundings, so as to deal with the fluctuations in moisture conditions as a result of weather and other factors. As such, this invention provides a bait agent with a wide range of applicability.

In recent years, problems have arisen in all regions due to the prevalence of harmful soil insects that thrive in muddy areas and spread poison among the roots and soil areas of vegetables. Among the harmful insects are the cutworm and mole cricket, which are responsible for causing serious damage to transplanted vegetables such as cabbage, Chinese cabbage, lettuce, tomatoes, eggplant, and bell peppers, etc., by eating away at the plants until they are separated from their roots. Furthermore, hothouse cultures give rise to large infestations of mole crickets, crickets, wood lice, etc., that eat away at the seedlings and dig tunnels, which cause insufficient levels of moisture in the soil and result in significant losses. On one hand, the reason that these types of harmful soil insects have become so prevalent in such a short time over the past few years is the popularization of hothouse cultures and group cultures, which have given rise to the annualized, large scale production of vegetable cultures. On the other hand, due to restrictions on the use of agents in the soil that are known to have residual effects, the number of highly effective agents has dropped to just a few, making it very difficult to rely on such agents for the control of insects.

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As a method for eliminating harmful soil insects, granular or powdered forms of agents have been mixed into the soil or applied to the plants, but in such cases there is a significant amount of agent used which may lead to soil contamination and thus result in widespread restrictions on the use of such agents. In other cases, liquid agents have been used, but the harmful soil insects have still managed to thrive within the soil, resulting in outbreaks at a later time that can be even more harmful to the plants. Thus, with such a low level of effectiveness from such agents, even small numbers of insects can cause significant harm with very little that can be done to prevent it. As a result of these conditions, it is anticipated that the damage from harmful soil insects will continue to expand, and thus there is a desire to develop a non-labor-intensive means for using pest-controlling agents that will not contaminate the soil.

An example of a pest control method applied through the use of bait is one in which poison is mixed into an artificial form of feed that is attractive and palatable to insects. This type of feed is usually made in the form of pellets that are sprinkled around the base of the plant. Such a method is considered ideal since it requires little labor and does not contaminate the soil. This type of method has been considered secondary in the elimination of harmful soil insects for some time but has quickly become popular over the last few years, resulting in significant levels of use. However, the effectiveness of baits has still proven to be insufficient with regard to the objective of protecting crops, and there is a strong demand for improvements to the attractability and palatability of bait pellets.

An example of the composition of a bait product that has been sold on the market up to now is as follows:

Plant powder	60%
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Vehicle agent	30%
Sugars	Trace amounts
Binding agent	Small amounts (1% or less)
Base components	Appropriate amounts
Preservatives	Minute amounts

Examples of plant powder include wheat bran, rice bran, wheat flour, soy flour, yeast, etc., and there are cases in which animal products such as fish meal etc., are mixed in with the plant powder. Examples of vehicle agents used include mineral catalysts such as talc, clay, etc. Examples of sugars used include molasses, etc., and a binding agent that is normally used is carboxymethyl cellulose.

Although the inventors have made progress in the area of research for the improvement of the attractability and palatability of baits used in controlling harmful insects in order to meet these demands, they have focused on the fact that harmful soil insects are prevalent in damp locations that have an abundance of organic materials. Thus, moisture is added to bait that is commonly found on the market for use in controlling insects materials, and through the use of bugs such as cutworm larvae, common cutworms [*Spodoptera litura*], etc., investigations are conducted into the relationship between moisture and attractability. As a result of these investigations it has been determined that moisture has a significant acceleration effect on the attractability as well as the palatability of bait. Accordingly, this invention was completed as a result of an investigation into methods specifically used for manufacturing new types of insect-controlling bait that function in such a way as to maintain moisture levels in the field under dry conditions or when the water level is high. As clarified by the aforementioned course of events, this invention is related to a blend that contains a high water-absorbing polymer with a water-

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absorption magnification factor of 10 or more, which acts as an assisting agent for the acceleration of attractability and palatability in a bait material used for controlling harmful insects. As a result, this invention is applicable for the improvement of attractability and palatability in all marketed forms of bait material used for controlling harmful insects.

The high water-absorbing polymer used to accomplish the objective of this invention must possess at least the following conditions: (1) no obstruction of attractability or palatability with respect to harmful insects, (2) strong water absorption and water retention properties, (3) a reversible action in which water absorption and water discharge are repeated, (4) no binding action that would cause the bait material to change, (5) a primary agent that does not react to the poison within the composition, (6) no generation of mold, and (7) ease in obtaining stable quality.

The high water-absorbing polymer used in this invention in order to satisfy these conditions is an electrolytic polymer that has an ion base and is slightly cross-linked both physically and chemically. Examples may include a hydrolytic substance comprising a starch-acrylonitrile graft polymer, a cross-linked substance comprising a starch-acrylic acid soda polymer, a polyacrylic acid chloride soda cross-linked substance comprising a styrene-maleic acid anhydride copolymer, a polyvinyl alcohol-acrylic acid salt graft copolymer, and a saponifiable substance comprising a vinyl ester-ethylene type unsaturated carboxylic acid or a copolymer of a derivative thereof.

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Among these, the high water-absorbing polymers that are electrolytic polymers, which do not include natural polymers such as starch, etc., but do include synthetic carboxylic acid salts and hydroxyl groups, have a high water-absorption magnification factor and a superior water retention capability as well as excellent strength after water absorption occurs, all of which make these the preferred polymers to be used. Especially given the case where the main component comprises vinyl ester (X) and an ethylene type unsaturated carboxylic acid or a derivative thereof (Y), a polyvinyl alcohol - acrylic acid salt graft copolymer as well as a saponifiable substance comprising a copolymer with a mol% construction within a range of $X : Y = 20 : 80 - 80 : 20$ {Sumika Gel® S-50 (a registered trademark of Sumitomo Chem. Co., Ltd., same as below)} are particularly superior due to their high level of strength after water absorption as well as their water retention capability. As such, the composition described in this invention is useful in that it provides maintenance of a high moisture level over an extended period under field conditions in order to maintain the attractability and palatability of bait.

The high water-absorbing polymers used in this invention can vary among several levels of water retention capability, ranging from several hundred times their own weight to a thousand times their own weight. Therefore, the appropriate polymer can be selected to meet the prescribed conditions so that the bait composition can provide the desired level of water retention capability. The high water-absorbing polymer used in this invention is one in which there is no obstruction of attractability or palatability with respect to harmful insects, and one that has strong water absorption as well as a water retention characteristic in which water absorption and water discharge are repeated. Furthermore, since the substance has no binding action, does not react to the primary agent and does not generate mold, there are no particular restrictions on the amount

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that can be mixed into baits used for controlling harmful insects. However, from a practical standpoint the preferred level is 0.1 – 10% when considering water retention time given the standard drying amount.

Substances with a water absorption magnification factor of less than 10 are insufficient from the standpoint of the water retention rate even if they contain extreme amounts of such additives. Furthermore, excessive amounts of additives can alter the physical nature of the bait, making it impossible to obtain the desired results.

The method used in this invention for mixing a high water-absorbing polymer into bait material calls for simply mixing the additives into the powder used in the manufacture of the bait material during one of the processes in order to achieve the proper mix, and there is no call for any particular technique to be used.

In addition, when the bait material is in granular form, it is acceptable to apply an appropriate type of assisting agent to the surface of the material. Also keep in mind that when the high water-absorbing polymer is mixed into water and heated, the water-soluble portions increase along with the rise in temperature, resulting in the formation of an aqueous solution, and therefore it is acceptable for use. For example, in the case of Sumika Gel® S-50, approximately 3% dissolves into water at 120°C and remains in liquid form even after it returns to room temperature. Therefore, when this material is used it is possible to apply a wet pellet-forming method in order to obtain a granular form of bait in accordance with this invention.

The bait composition described in this invention is designed to expand as it absorbs water in the field, and therefore the concentration of the insecticide component per unit weight drops in inverse proportion to the increase in moisture. Thus, regardless of the increase in the amount of palatability on the part of the insects, there is a delay in the lethal effect. Accordingly, there is a

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need to increase the amount of the insecticide component in order to ensure a rapid effect. Furthermore, the same consideration should be made with regard to the attraction component in order to make it possible to obtain a bait composition with a high level of performance in controlling insects. Also, in order to prevent crumbling of the pellets as expansion occurs, the amount of binding material can be increased and there are measures that can be applied using commonly known techniques in order to accomplish this.

In addition, the high water-absorbing polymer used in this invention can be designed to absorb water within a sealed container such that the humidity is decreased, thus making it possible to mix [the polymer] into the bait material while applying the objective of maintaining quality. This quality stability effect further enhances the practical value of this invention.

The following are examples for reference, testing, and embodiment purposes. While these will help to explain this invention in greater detail, note that this invention is not limited to these examples.

Reference Example 1 Manufacturing Method for Test Bait

As a base agent, 29 parts rice bran is used along with 29 parts wheat flour, 6 parts molasses, and 35.5 parts clay. As a binding agent, 0.5 parts carboxymethyl cellulose is mixed into the above, and water is then added. After the mixture is stirred, it is extruded and placed into a pellet-forming device that produces pellets with a diameter of 3 mm – 5 mm. Ventilation drying is then applied, resulting in the formation of bait material to be used for testing.

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Reference Example 2 Attractability Testing on Sixth-Stage Cutworm Larvae

[Four] plastic planters (56 cm L x 18 cm W x 16 cm H) are filled with presoaked vermiculite to a depth of 7 cm and two plastic cups (6 cm diameter x 7 cm depth) are buried into the ends of each planter at a location 15 cm from the center of the planter so that the openings of the cups are flush with the surface of the vermiculite [The cups are set up as follows] One type contains two grams of test bait, another contains two grams of test bait onto which 2 ml of water is dripped using a pipette, and yet another is left empty. The planters are arranged with [four different] combinations of cups, and four rounds of testing are conducted in order to release 15 test insects into the center of each planter at a temperature of 25°C under dark conditions. At the end of one day, an investigation is conducted to determine the rate at which the insects have dropped into the cups.

Table 1

Test Material within Cups	Insect Drop Rate (%)
2 g of bait + 2 ml of water	70.3
2 g of bait	33.3
2 g of bait + 2 ml of water	91.7
Empty cup	6.7
2 g of bait	81.7
Empty cup	6.7
Empty cup	21.7
Empty cup	18.3

Reference Example 3 Attractability Testing on Sixth-Stage Mole Cricket Larvae

[Four] plastic planters (56 cm L x 18 cm W x 16 cm H) are filled with presoaked vermiculite to a depth of 7 cm, and two plastic cups (6 cm diameter x 7 cm depth) are buried into the ends of each planter at a location 15 cm from the center of the planter so that the openings of the cups are flush with the surface of the vermiculite [The cups are set up as follows] One type

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contains two grams of test bait, another contains two grams of test bait onto which 2 ml of water is dripped using a pipette, and yet another is left empty. The planters are arranged with [four different] combinations of cups, and four rounds of testing are conducted in order to release 20 test insects into the center of each planter at a temperature of 25°C under dark conditions. At the end of one day, an investigation is conducted to determine the rate at which the insects have dropped into the cups.

Table 2

Test Material within Cups	Insect Drop Rate (%)
2 g of bait + 2 ml of water	65.0
2 g of bait	21.3
2 g of bait + 2 ml of water	80.0
Empty cup	2.5
2 g of bait	60.0
Empty cup	8.8
Empty cup	21.3
Empty cup	15.0

Reference examples 2 and 3 are used to illustrate the testing methods and results thereof in order to determine the extent to which adding water to the bait affects the attractability of the bait. The results confirm that this has a remarkable acceleration effect with respect to cutworms and mole crickets.

Reference Example 4 Ingestion Level Test on Sixth-Stage Cutworm Larvae

Plastic containers (31 cm L x 17 cm W x 10 cm H) are filled with amount of presoaked vermiculite to a depth of 2 cm, and a plastic dish (0.9 cm H) is placed inside each container at a distance of 2 cm from the wall of the container. Two grams of test bait are then placed into each dish, and a pipette is used to drip water onto the bait in the following amounts: 0 ml, 0.5 ml, 1.0 ml, and 2.0 ml. Then, 10 test insects are released into the center of the container under dark

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conditions One day after releasing the insects, an investigation is conducted to determine the amount of bait that has been ingested by the insects

Table 3

Water Dripping Amount (ml) per 2g of Bait	Bait Ingestion Amount (mg) per 10 Test Insects
0 0	67
0 5	130
1 0	287
2 0	307

Embodiment 1

A prescribed amount of the high water-absorption polymer Sumika Gel® S-50 is mixed with the following one part 2 - methoxy - 4H - 1, 3, 2 - benzodioxaphosphorine - 2 - sulfide (Salithion®, a registered trademark of Sumitomo Chem Co, Ltd, same as below), 25 parts wheat flour, and 0 5 parts carboxymethyl cellulose Clay is then added to complete the 100 parts, and water is added after mixing, followed by the extraction and drying process in order to obtain a 1% solution of Salithion® bait The following are the results of tests that are conducted using this product and which pertain to physical properties

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Test Example 1 Amount of added high water-absorption polymer (Sumika Gel® S-50), maximum water retention amount of same, and rate of volume expansion of pellet agent during maximum water retention amount of same

After soaking one test pellet in water overnight, the water along the surface is absorbed away using filter paper, and the maximum water retention amount per gram of bait is calculated using the formula below This is then compared to a sample in which no Sumika Gel® S-50 was added

Calculation formula

$$\text{Maximum water retention amount (g)} = \frac{\text{Weight of bait after soaking (g)} - \text{Weight of bait before soaking (g)}}{\text{Weight of bait before soaking (g)}}$$

The diameter (D) and length (L) of a bait pellet are also measured after soaking, and the following formula is used to determine the rate of volume expansion

$$\text{Bait volume} = (\pi/4) \times D^2 \times L$$

Calculation formula

$$\text{Volume expansion rate} = \frac{\text{Bait volume after soaking in water}}{\text{Bait volume before soaking in water}}$$

Results

Table 5

Water-retentive high polymer addition rate	0	1	3	5	10	20	30
Maximum water retention per gram of bait	10	19	26	37	50	150	256
Volume expansion rate at maximum water retention	16	35	38	45	49	51	75

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Bait compositions that contain the high water-absorbing polymer Sumika Gel® S-50 have an increase in the water retention amount proportionate to the amount of the polymer that is added. The same trend holds with respect to the volume expansion rate.

Test Example 2 Water retention time for bait composition containing the high water-absorbing polymer Sumika Gel® S-50

After allowing bait compositions containing different levels of water retentive high polymers to absorb water to their maximum water retention amounts, the bait samples are left at room temperature to determine the amount of time required for the added water content to evaporate, and these results are compared to the water retention time.

Table 6

Mixing rate (%) of Sumika Gel® S-50	0	1	3	5	10	20	30
Water retention time in hours	3	5	7	9	13	16	20

As clarified by the table above, the water retention time is extended in proportion to the mixing rate of the Sumika Gel® S-50.

Test Example 3 Transition of retained water content on a soil surface when using bait that contains the high water-absorbing polymer Sumika Gel® S-50

The test bait is sprinkled over the surface of soil from a cultivated field every other day, after which it is collected and measured for water content using a KETT infrared moisture meter (F 1B type) to determine the amount of water retained. Then, an investigation is conducted to determine the level of absorption as a result of the use of Sumika Gel® S-50. (This test is

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conducted indoors, with a soil moisture level of approximately 25% and under stable temperature and humidity conditions)

Results Bait compositions containing Sumika Gel® S-50 maintain a high level of water content on the soil surface in proportion to the amount of Sumika Gel® S-50 that is used (Figure 1)

Test Example 4 Transition of retained water content in bait compositions that contain the high water-absorbing polymer Sumika Gel® S-50 in cases where the bait is sprinkled outside

The test bait is sprinkled over a cultivated field every other day, and investigations are conducted at 8 00 a m and 4 00 p m to determine the levels of water retention

Results During the morning hours, water is absorbed due to the effect from the levels of dew present, and during the afternoon hours, the moisture level drops due to the drying that occurs throughout the day However, it is apparent that substances in which high water-absorbing polymers have been added maintain a high level of moisture when compared to substances that have not received such additions (Figure 2)

Embodiment 2

Five parts 1 - naphthyl N - methylcarbamate, 25 parts wheat flour, 25 parts rice bran, 6 parts molasses, and 0.5 parts carboxymethyl cellulose are mixed at each stage with 0.3, 1, and 3 parts high water absorbing polymer Sumika Gel® S-50 or a polyacrylic acid soda cross-linked substance (methylene-bis acrylamide 0.1% is added to form a cross-link, resulting in a water absorption magnification factor of 500), after which clay is added to complete the 100 parts Then, water is added and stirred into the substance, which is then extracted and formed into pellets The pellets are then dried to obtain a granular bait material

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Embodiment Example 3 Testing the Preventative Effect on Sixth-Stage Cutworm Larvae

Plastic planters (40 cm L x 10 cm W x 15 cm H) are filled with soil to a depth of 10 cm, and 10 test insects are released into each planter and allowed to bury themselves in the soil. Then five pieces of potato cut into 6 cm³ cubes are lined up on top of the soil surface so that they are evenly spaced, and bait pellets that have been prepared according to the procedure in Embodiment 2 are scattered over the soil surface, 1 g per planter. Then, in order to provide moisture to the bait, two methods are used, one in which 50 ml of water is sprinkled from above using a watering can everyday after treatment, and one in which water is continuously fed upward through feed holes in the bottom of the planter. After four days of treatment, an investigation is conducted to determine the rate at which the potato cubes were eaten away as well as the death rate of the insect larvae.

Test Bait	Water Sprinkled from Above		Water Fed from Below	
	Feed Rate (% of volume)	Death Rate (%)	Feed Rate (% of volume)	Death Rate (%)

3% * (NAC Bait)	12.3	94.9	5.9	96.7
1%	26.4	86.7	21.6	82.4
0.3%	32.8	83.3	25.4	85.0

3% ** (NAC Bait)	12.0	94.5	5.5	97.1
1% "	25.9	87.1	21.4	83.2
0.3% "	32.5	83.0	24.9	84.5

None Added (NAC Bait)	37.3	80.0	37.7	83.3
No Treatment	91.3	3.3	90.0	0.0

* Indicates the mixing rate of Sumika Gel® S-50

** Indicates mixing rate of polyacrylic acid soda cross-linked substance

*** 1 - naphthyl N - methylcarbamate

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4 Brief Description of the Drawings

Figure 1 illustrates the changes in water retention amounts of bait containing Sumika Gel® S 50 that has been sprinkled over the soil surface as described in Test Example 3. The y-axis represents the water retention amount (%), and the x-axis represents the number of days that have elapsed since application. The lines indicated by -Δ-, -●-, and -○- represent the amounts of Sumika Gel® S-50 contained within the bait, respectively 5%, 3%, and 0%.

Figure 2 illustrates the transition of water retention amounts within bait containing Sumika Gel® S-50 that has been sprinkled outside as described in Test Example 4. The y-axis represents the water retention amount (%), and the x-axis represents the days since application. The lines indicated by -Δ-, -●-, and -○- represent the amounts of Sumika Gel® S-50 contained within the bait, respectively 5%, 3%, and 0%.

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(7)

Figure 1

Figure 2

[x-axis] Day 1 Day 2 Day 3 Day 4

Procedural Revisions (Voluntary)

November [illegible], 1980 [Showa 55]

[seal.] [illegible]

To Patent Office Chief Mr Haruki Shimada

- 1 Case Indications
Patent Application No 137230, 1980 [Showa 55]
- 2 Name of Invention Bait Composition for Insect Pest Control
- 3 Person Making the Revisions
Relationship to the case Applicant
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- 5 Object of Revision
The "Detailed Description of the Invention" within the Specifications
- 6 Contents of Revision

(1) Line 6 of Section 2 of the Specifications, which reads, "high-temperature conditions" is revised to read, "high-humidity conditions "

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(2) Line 1 of Section 5 of the Specifications, which reads, "these demands" is revised to read,
"the aforementioned demands "

(19)



JAPANESE PATENT OFFICE

PATENT ABSTRACTS OF JAPAN

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KITAHARA SHUJI(54) BAIT COMPOSITION FOR CONTROLLING
INSECT PEST

(57) Abstract

PURPOSE. A bait composition for controlling insect pests such as cutworm or mole cricket that contains a specific high water-absorption polymer as an auxiliary agent, thus keeping a high level of water retention even under dry conditions in the field and showing high insect-attracting property and palatability.

CONSTITUTION A high water-absorption polymer that absorbs water more than 10 times the weight of the

polymer itself is used to produce the bait composition for controlling insect pests. The high water-absorption polymer is preferable a saponified product of a copolymer mainly consisting of a vinyl ester (X) and an ethylenically unsaturated carboxylic acid or its derivative (Y) at a molar ratio X/Y of 20/80 to 80/20 and a polyvinyl alcohol-acrylate salt graft polymer. The resultant composition absorbs rain sprayed water or night dew and keeps the water at a higher level than the surroundings even under drying conditions such as under clear weathers for a long time.

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① 特許出願公開
 昭57-62201

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(全 7 頁)

④ 害虫防除用ハイト剤組成物

① 特 願 昭55-137230
 出 願 昭55(1980)9月30日

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明 細 書

1 発明の名称

害虫防除用ハイト剤組成物

2 特許請求の範囲

低水倍率が10倍以上である高吸水性ポリマーを配合してあることを特徴とする害虫防除用ハイト剤組成物。

3 発明の詳解を説明

本発明は低水倍率が10倍以上である高吸水性ポリマーを配合してあることを特徴とする害虫防除用ハイト剤組成物に係る。

さらに詳しくは 本発明は従来の害虫防除用ハイト剤に低水倍率が10倍以上である高吸水性ポリマーを配合することにより 野外において降雨 灌水 夜つゆ 土壌水分などを吸水保持し 晴天などの乾燥条件下において水分を蒸散しつつ 長時間にわたり周辺よりも高水準の水分を保持することによって すぐれた誘引性と取食能を死滅させることを目的とする害虫防除用ハイト剤組成物である。

本発明者らの知見によるとハイト剤中の高水分は害虫のハイト剤の誘引性と取食能を高く向上させるものである。本発明はこの知見をもとに天候 その他の要因によって水分条件の変化する野外においてハイト剤を常に周辺よりも高水準に保持することを目的として見出された技術に係るものであって 広い応用性と有用性を有するものである。

近年 土壌中に発生して野菜の地脚部や根節を被害する土壌害虫が多発して各地で問題になっている。なかでもネキリムシ類、ヨトウムシ類は白菜、キャベツ、レタス、トマト、ナス、ピーマン等の根節部を定植後に食害を及ぼすから切断して重大な被害を与えている。また、ハウス線虫ではワタ、コオロギ、ダンゴムシなどが大発生して幼苗を食害したり、トノサバを駆って水分不足を起したりする中で、本発明に防除されるようになった。このように近年土壌害虫が急速に増大してきた理由は、ハウス栽培や施設栽培の普及により、野菜栽培が周年化

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大規模化している反面 一方において補助性の
ある土壌用肥薬剤の使用規制により 本剤を
採り取れが少なくなり 薬剤防除がきわめて難
化になっているためである。

土壌害虫の防除法としては 殺菌や殺虫剤の土
壌混和や撒布時の作業施用が行われてきたが
防除は薬剤施用量が多く また土壌汚染を免ず
るため使用薬剤が大幅に規制されている。また
害菌の散布も行われるが 土壌害虫は地中に生
息して、^{手廻り}しつぷりに出放加害するので被害が低
く 少敵でも大害を与えるので被害防止はきわ
めて困難である。このような事情から土壌害虫
の被害は今後ますます拡大すると予想され、土
壌内殺菌のない省力的な薬剤防除法の開発が望
まれている。

バイト剤による防除は害菌の形や人工的な
餌に虫物を誘入して誘引餌食させて防除する方
法で、中に殺菌剤に薬剤して殺菌に散布する方
法で行われるので省力的な土壌汚染性の少ない
環境的な方法である。本発明は、従来からも土壌

本発明者らはこの要題にたいへん早く害菌防
除用バイト剤の誘引餌食性の改良研究を進めて
きたが 土壌害虫が有棲性の多い場所
多いことに鑑みし 市販の害菌防除用バイト剤
に水分を加えてカプラー ハスモノコト
^{水分と餌の両方を同時に与えること}を用いて水分がバイト剤の誘引性および餌
食性に大きな促進効果を持つことが判明した。
そこで野外において殺菌剤にも高水率の水分を
保持する機能を持つ新薬害菌防除用バイト剤
を具体的に作製する方法について鋭意の調査、
本発明を完成するに至ったのである。以上の
経過によって明らかのように 本発明は高水率
高水率以上の高水率性ポリマーを害菌
防除用バイト剤の誘引性および餌食性を促進す
るための補助剤として配合することに係るもの
である。それ故本発明は 市販されるすべての
害菌防除用バイト剤の誘引性と餌食性の改良に
を用いるものである。

本発明の目的に使用する高水率性ポリマーは
少なくとも下記の条件を具備することが必要

害菌の防除に順次的に行われていたが 近年急
速に普及し噴霧器使用されるようになってきた。
しかし バイト剤の効力はいまだに作物保護の
目的から充分なものではなく その中薬を少な
く引取と餌食性の改良が強く望まれている。

従来 市販されているバイト剤の組成はたと
えば以下のようである。

植物 部	60%
殺 菌 剤	30%
粘 着 剤	10%
配 合 剤	少量(1%以下)
完 成 分	適当量
防 菌 剤	微量

植物部としては ふすま、米ぬか、小麦、
大豆粉、イーストなどがあり、これに殺菌剤
などの植物性餌料を配合することもある。殺菌
剤としては カルボ、クレール等の殺菌剤が
用いられる。粘着剤としては糊粉などが 水分
配合剤としては通常カルボキソポリマーが用いられる。

である。① 害菌に対する誘引性 餌食性を誘
げないこと ② 強力な吸水性と保水性がある
こと ③ 吸水と放水を繰り返す可逆作用がある
こと ④ 糊合作用がなくバイト剤の効果を減
さないこと ⑤ 虫類として餌食される植物と
反応性がないこと ⑥ カビの発生がないこと
⑦ 安定な品質のものが入手しやすいこと。

これらの条件を満たした本発明に用いられる
高水率性ポリマーは、イオン性をもった電解
質ポリマーを物理的・化学的にわずかに変性せ
たものであり、たとえばでんぷん-アクリロニ
トリルグラフト重合体の加水分解物、でんぷん
-アクリル酸リノール酸グラフト重合体の重合物
スチレン-酢酸マレイノ酸重合体重合物の電
解質アクリル酸ノード重合体、ポリビニルアル
コール-アクリル酸グラフト重合体、ビニ
ルエチレン-エチレン系不飽和カルボン酸または
その重合体の重合体のケノ化物などをあげ
ることができる。なかでもでんぷん系との共重合
ポリマーを含まず、合成系のカルボン酸と水

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吸着をよくし電解質ポリマーである高吸水性ポリマーは、吸水容量が高く、保水^力性にもすぐれかつ吸水後の強度にもすぐれているのでこれを用いることが望ましい。特にビニルエステル^力とエチレン不飽和カルボン酸またはその誘導体^力の少なくとも一種を主成分として、 $x = 30 \sim 100$ 、 $y = 10 \sim 100$ の範囲のモル比で組成される共重合体のケン化物（スミカゲル^力） $x-y$ （各文化学品登録商標、以下同じ）およびポリビニルアルコール-アクリル酸グラフト重合体は、ことに吸水後の強度が高く保水^力性にもすぐれ、本発明組成物の誘引性、保水性を野外条件において長期間高水準に維持するうえで役立つものである。

本発明に用いる高吸水性ポリマーは、現在市販の数百倍〜千倍の水を吸水保持するものまで各種の形状のものがあるので、用途・条件と配合して適当なものを選択して、任意にベイト剤組成物に配合して所望の水分保持量を決定することができる。本発明に用いる高吸水性ポリ

これを用いてもよい。たとえばスミカゲル^力 $x-y$ は、120 において水に約 3 倍溶解し、管腔に於いても身体状態を保つのでこれを用いて膜状被覆材で本発明ベイト剤の被覆を得ることができる。

本発明によるベイト剤組成物は野外において吸水すると膨潤するので水分の上昇と共に単位容積当たりの酸素成分濃度が逆比例的に低下する。そのため害虫による興食量が漸次増加しているにもかかわらず、致死効果の面で過熱的になることがあるので、透物性を確保するために酸素成分含量を高めておく必要がある。また、細孔^力に対しては同様の処理を行うことによって高透性の害虫忌避用ベイト剤組成物を得ることである。また、細孔^力による腐れを防止するために、バインダーの増量を行うこともあるが、これらの措置は風害の性質的知識で決定し得るものである。

さらに本発明で用いられる高吸水性ポリマーは、別開示特許において水を吸収し、強度を保

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マ-は、害虫の誘引性、興食性を高めることとく、強力な吸水性と保水性を有して吸水と放出を繰返す。また、バインダー的作用はなく、虫類との反応性もなく、カビも生じないので、害虫忌避用ベイト剤に配合する量については、特に制限すべき事項はないが、実用的には保水^力時間を考慮して乾重基準で 0.1 ~ 1.0 が望ましい。吸水倍率が 1.0 倍未満のものはその増加量を秤量に多くしても保水^力性のうえでは不満足なものであり、かつベイトの効果があらわなくなって、所望の効果が得られない。

本発明の高吸水性ポリマーをベイト剤に配合する方法については、その粉末をベイト剤製造工程中の任意の工程に単に添加混合することによって達成され、なんら特別の技術を必要としない。

また、ベイト剤が殺剤である場合はその殺剤に適当な助剤を用いて付着させてもよい。また、高吸水性^力は水に懸濁させて添加すると殺剤の上昇と共に水溶解成分を増して水溶解とあるので

下させるので、ベイト剤に配合して虫害抑制の目的に適用することができる。この虫害抑制化効果はさらに本発明の実用価値を高めるものである。

以下に本発明、実施例および変形例をあげ、本発明の内容をさらに詳しく説明するが、本発明はもちろんとこれらのみに限定されるものではない。
実施例 1 低濃ベイト剤の作製方法

基剤として米ぬかより、小炭粉より、膨潤剤としてカルボキシルセルロースのナトリウム塩とバインダーとしてカルボキシルセルロースのナトリウム塩とを混合し、これに水を加えて攪拌混合したもの、これを濾過機を用いて粒径 3 ~ 5 mm に篩分し、乾燥機で乾燥して低濃ベイト剤を調製した。

実施例 2 カブラヤガの幼虫に対する誘引試験

プラスチック製プラノター（長さ 6 cm、幅 1.5 cm、高さ 1.5 cm）に厚さ 2 mm の透明な保水させたバーミキュライトを入れ、その中にプラスチック製キャブ（径 4 cm、厚さ 2 mm）

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製フロンター（厚40mm、鉄ノリ0.04 高を
1.5mm）に保水板をフロンター裏ノリで敷
き、土質中に埋ノさせた。埋入後6mmの角
切りノ、ガイモ5個を土質表面に等間隔に
ばへ、既述例2に準じて既述したベイト剤を
フロンター裏ノリで敷き敷いた。ベイト用
の水分供給は、毎週毎週水50ccを上から
リ、口で灌水したものとフロンター下野の表
水れより常時水を供給しあげさせたものと
通りわたった。経過5日後にリ、ガイモの食害
率と幼虫死亡率を調査した。

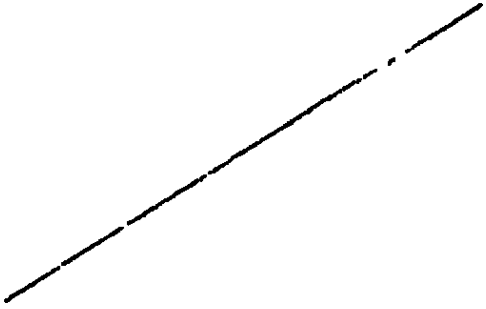


表 3

試 験 用 具	上 から 灌 水		下 灌 水		幼虫死亡率 (%)
	試 験 用 具	試 験 用 具	試 験 用 具	試 験 用 具	
30cc (50cc)	12.3	19.9	5.9	5.9	24.7
15	24.9	6.7	2.4	2.4	22.8
0.35	32.8	22.3	22.4	22.4	23.0
15cc (50cc)	12.3	19.9	5.9	5.9	27.1
15	24.9	6.7	2.4	2.4	23.2
0.35	32.8	22.3	22.4	22.4	28.3
合計 (50cc)	57.3	50.0	57.7	57.7	63.3
合計 (15cc)	57.3	50.0	57.7	57.7	63.3

注 スミカゲル[®]とガイモの配合を示す。
既述 水リフケリム[®]とガイモの配合を示す。
既述 ノーダマ[®]とガイモの配合を示す。

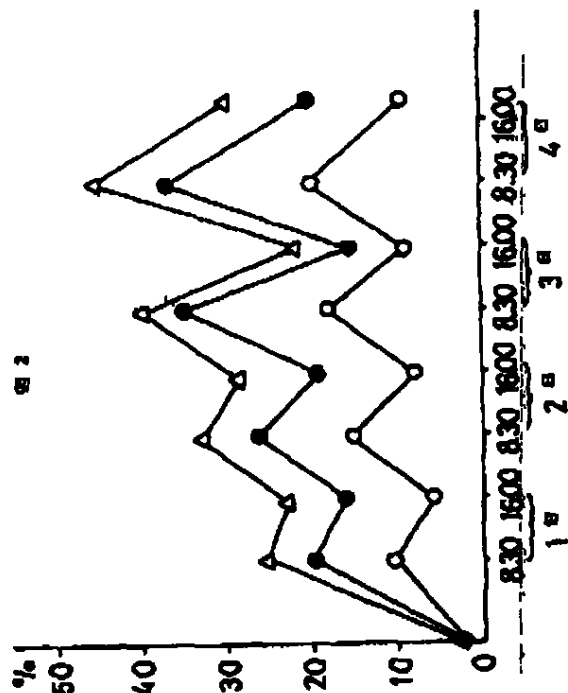
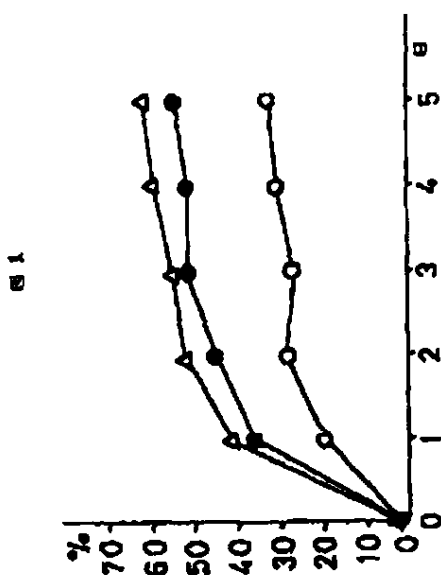
4 両方の結果を説明

図1は既述例2における土質表面に散布した
スミカゲル[®]とガイモ配合ベイトの保持水分量
の变化を示す。縦軸は保持水分量¹、横軸は散
布後経過日数を表わす。-△- -△-とび
-○-は、各々スミカゲル[®]とガイモ含有量
15ccとび0.35のベイトを表わす。

図2は既述例2における土質内に散布したスミ
カゲル[®]とガイモ配合ベイトの水分保持量の变
化を示す。縦軸は保持水分量¹、横軸は散
布の日数を表わす。-△- -△-とび-○-
は、各々スミカゲル[®]とガイモ含有量15cc
とび0.35のベイトを表わす。

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特開57-62201(7)



手続補正書 (自発)

昭和55年1月10日

特許庁長官 島田 孝 閣 下

1 事件の表示

昭和55年 特許第137280号

2 発明の名称

害虫防除用ベイト剤組成物

3 補正をする者

事件との関係 特許出願人

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5 補正の対象

附随書の発明の詳細な説明の欄

6 補正の内容

- (1) 明細書第2頁第6行目に「高濃状態」とあるのを「高濃度状態」と訂正する。
- (2) 同第6頁第1行目に「この状態」とあるのを「前述の状態」と訂正する。

以上

XP-002135105

(C4)

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J01143806]
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DC - C03
DR - 0038-U 0134-U 0135-U 1852-U 1863-U
FS - CPI
IC - A01N25/10 , A01N25/34 , A01N35/10 , A01N37/18 , A01N37/36 , A01N43/40 ,
A01N47/34 , A01N47/36
MC - C04-A07D2 C04-B01C1 C04-C02A1 C04 D01 C10-A13D C10-G02 C12-M11B
C12-N02 C12-N03
M1 - [01] M423 M431 M782 M903 M904 M910 P002 P341 P350 R038 V0 V711,
R01852-M, 1704-X 1724-X 1711-X 1714-X
- [06] M423 M431 M782 M903 M904 M910 P002 P341 P350 R038 V0 V723,
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- [09] M423 M431 M782 M903 P002 P341 P350 R038 V780, 1704-X 1724-X
1711-X 1714-X
- [10] M423 M431 M782 M903 P002 P341 P350 R038 V794, 1704-X 1724-X
1711-X 1714-X
- [11] M423 M431 M782 M903 P002 P341 P350 R038 V400 V406, 1704-X 1724 X
1711-X 1714-X
M2 - [02] H5 H581 H7 H724 H8 J0 J011 J2 J271 M210 M211 M213 M232 M272 M282
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R038, R07984-M, 1704-X 1724-X 1711-X 1714-X
- [03] H7 H724 J0 J011 J2 J271 M210 M212 M225 M232 M262 M272 M281 M320
M416 M431 M782 M903 M904 P002 P341 P350 R038, R13376-M, 1704-X 1724-X
1711-X 1714-X
- [04] F012 F013 F015 F016 F431 F551 G011 G013 G014 G017 G018 G100 H541
H6 H601 H602 H603 H608 H609 H641 H643 H684 H685 H689 K0 L4 L431 L5
L532 L943 M113 M210 M211 M240 M280 M281 M311 M312 M320 M321 M332 M344
M353 M362 M391 M413 M414 M431 M510 M520 M521 M532 M540 M782 M903 M904
P002 P341 P350 R038, R08124-M R11595-M R15679-M R16478-M R17583-M
R18030-M, 1704-X 1724-X 1711-X 1714-X
- [05] F012 F013 F014 F015 F016 F017 F019 F113 F123 H4 H405 H424 H483 H5
H521 H8 K0 L8 L814 L818 L822 L831 M1 M126 M141 M280 M311 M323 M342
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- [07] H4 H405 H484 H8 J4 J471 K0 L8 L814 L821 L831 M280 M315 M321 M332
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R038, R00038-M, 1704-X 1724-X 1711-X 1714-X
- [08] H4 H405 H484 H8 J5 J581 K0 L8 L818 L821 L831 M280 M311 M314 M321
M332 M342 M344 M349 M381 M392 M416 M431 M620 M782 M903 M904 M910 P002
P341 P350 R038, R00134-M, 1704-X 1724-X 1711-X 1714-X
- [12] F012 F017 F100 G013 G100 H5 H541 H7 H721 H8 M210 M211 M212 M240
M282 M315 M321 M331 M342 M373 M391 M413 M431 M510 M521 M531 M540 M782
M903 M904 P002 P341 P350 R038, 00012, R18031-M, 1704-X 1724-X 1711-X
1714-X
PA - (SUMO) SUMITOMO CHEM IND KK
PN - JP1143806 A 19890606 DW198928 007pp
JP2585319B2 B2 19970226 DW199713 A01N47/36 006pp
PR - JP19870304142 19871130

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XA - C1989-090781

**XIC - A01N-025/10 , A01N-025/34 , A01N-035/10 , A01N-037/18 , A01N-037/36 ,
A01N-043/40 , A01N-047/34 , A01N-047/36**

AB - J01143806 Poison bait tablets contain at least 1 insect juvenile hormone like cpd and insect chitin formation inhibitor, microcrystalline cellulose and cereal powder, and 0.1-10.0 wt % of vegetable oil and 10.0-40.0 wt % of sugar to the total compsn
- Specifically the juvenile hormone like cpd and insect chitin formation inhibitors are e.g. methoprene, hydroxyurea, S-21149, S-21150 and R-20458 for juvenile hormones, and diflubenzuron, BAY SIR-8514, EL 494, CME-134, CGA-112913 and XRD-473 for insect chitin formation inhibitors. The agents are added in an amt of 0.01-2.0 wt % to the total amt of the compsn. The vegetable oils include e.g. soy bean oil, rapeseed oil, sesame oil and wheat embryo oil, and the sugars include sucrose, glucose, fructose, and unrefined sugar. The cereal powders include e.g. starch, corn flour, wheat flour. Other additives e.g. flavour, antioxidant, stabilisers and insect propellant are opt added. The tablets are used against cockroaches, ants, and ground beetles.

- USE/ADVANTAGE - Insecticidal stable tablets do not disperse into the surrounding environment

**CN - R00038-M R00134-M R00135-M R01852-M R01863-M R07984-M R08124-M
R11595-M R13376-M R15679-M R16478-M R17583-M R18030-M R18031-M**

DRL - 1704-X 1711-X 1714-X 1724-X

IW - POISON BAIT TABLET INSECT PEST CONTROL CONTAIN INSECT JUVENILE HORMONE COMPOUND INSECT CHITIN FORMATION INHIBIT CELLULOSE CEREAL POWDER VEGETABLE OIL SUGAR

IKW - POISON BAIT TABLET INSECT PEST CONTROL CONTAIN INSECT JUVENILE HORMONE COMPOUND INSECT CHITIN FORMATION INHIBIT CELLULOSE CEREAL POWDER VEGETABLE OIL SUGAR

NC - 001

OPD - 1987-11-30

ORD - 1989-06-06

PAW - (SUMO) SUMITOMO CHEM IND KK

RRL - 00012

TI - Poison bait tablets for insect pest control - contain insect juvenile hormones like cpd, insect chitin formation inhibitor, cellulose, cereal powder, vegetable oil and sugar

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(21) Application No S62-304142
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Continued on the last page

Specifications

1 Title of the Invention

Poisonous Bait Agent for Insect Pest Extermination

2 Claims

A poisonous bait agent for insect pest extermination, which comes in tablet form and is characterized by the fact that the principal ingredient comprises 01 - 100 wt% essential vegetable oil as well as 100 - 400 wt% sugar with respect to the following one or more types of insect growth-controlling agents, selected from a group composed of hormonal compounds from juvenile insects as well as insect chitin-forming inhibitory compounds; crystalline cellulose, grain powder; and the total amount of poisonous bait agent

3 Detailed Description of the Invention

(Industrial Field of Application)

This invention relates to a poisonous bait agent used for insect pest extermination.

(Prior Art)

Previous bait agents used for insect pest extermination have been marketed in powder form. However, when powder forms of poisonous bait are used, they may come in contact with the hands or spread into areas surrounding the locations where application was specified, causing contamination of the surroundings. Furthermore, if these poisonous bait materials are mistakenly ingested by children or pets, or improperly handled by everyday consumers, several problems can arise, particularly from the aspect of safety. Thus, in order to resolve these types of problems, tablet forms of poisonous bait agents have already been marketed in which the

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primary agent is boric acid, for example. However, from the aspect of efficacy with respect to harmful insects, particularly cockroaches, the amount of boric acid used as an effective ingredient is considerably high at 20 - 30%. As a result, this type of material cannot be considered safe to animals and humans, particularly children. For example, in a report included in the 11th Nikkyoku Manual, Reference No. C-1475, there are examples of infant deaths reported due to the use of talcum powder containing only 5% boric acid. Thus it is clear that the dangers associated with the misuse of boric acid need to be carefully considered. Furthermore, since the process of making boric acid effective in killing cockroaches can end up causing diarrhea [in the cockroaches] which leads to [their] death, it is possible for a significant amount of soft cockroach droppings to be present in the areas where cockroaches live (such as dish shelves and sinks), thus resulting in very unsanitary conditions and causing white walls, cloth material and construction materials to become contaminated and lose their beautiful appearance.

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On the other hand, insect pest control agents that are low in toxicity with respect to animals and humans, such as in the case of tablet forms of bait materials used for exterminating cockroaches in which the effective ingredients include insecticides based on hormonal compounds from juvenile insects or insect chitin-forming inhibitory compounds, the efficacy of these effective ingredients is extremely high compared to cases in which boric acid is used. Accordingly, the amount of effective ingredients included in the manufactured agent can be much lower than in the case of agents that were made with boric acid. From the standpoint of product safety, this can be seen as a movement in the right direction, but when agents are made in the form of tablets using effective ingredients such as standard forms of organic phosphorous compounds, pyrethroid compounds, carbamate compounds, it is known that cockroaches tend to avoid the poison tablets due to the peculiar odors associated with the respective effective ingredients, which results in a drop in the attractant feeding rates as well as a significant drop in the death rate of the insects. And the cases in which the aforementioned hormonal compounds from juvenile insects or insect chitin-forming inhibitory compounds are used are no exception. Furthermore in cases where bait is made using these types of insecticides as the effective ingredients, these ingredients undergo hydrolysis due to exposure to small amounts of moisture within the process causing a reduction in the content of the effective ingredients themselves and resulting in a very poor efficacy level.

(Problem to Be Solved by the Invention)

When controlling agents for harmful insects such as cockroaches are prepared with poisonous material in the form of hormonal compounds from juvenile insects or insect chitin-forming inhibitory compounds, it is safe to say that the stability of the effective ingredients as

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well as the attractant feeding effect on the part of the insects is insufficient along with the death rate

(Means for Solving the Problem)

In order to resolve the aforementioned problems, this invention utilizes a means in the form of a poisonous bait agent for insect pest extermination, which comes in tablet form and has a principal ingredient that comprises 0.1 – 10.0 wt% essential vegetable oil as well as 10.0 – 40.0 wt% sugar with respect to the following one or more types of insect growth-controlling agents, selected from a group composed of hormonal compounds from juvenile insects as well as insect chitin-forming inhibitory compounds, crystalline cellulose, grain powder, and the total amount of poisonous bait agent. The details are discussed below.

First of all, as illustrated in Table 1, examples of hormonal compounds from juvenile insects that are used in this invention include dodecadienoate type compounds, oxime ether type compounds, pyridyl ether type compounds, and carbamate type compounds, etc. Also, as illustrated in Table 2, examples of insect chitin-forming inhibitory compounds used in this invention include benzoylphenyl urea type compounds, etc.

Table 1

Name of Compound (Standard name or code name)	Structural Formula
Methoprene	Isopropyl (2E,4E)-11-methoxy-3,7,11-trimethyl-2,4-dodecadienoate
Hydroprene	Ethyl (2E,4E)-3,7,11-trimethyldodeca-2,4-dienoate
Pyriproxiphen	2-[1-methyl-2-(4-phenoxyphenoxy)ethoxy]pyridine
S-21149	Propionaldehyde oxime o-2-(4-phenoxyphenoxy)ethyl ether
S-21150	Propionaldehyde oxime o-2-(4-phenoxyphenoxy)propyl ether
Phenoxycarb	Ethyl [2-(p-phenoxy)ethyl] carbamate
R 20458	1-(4-ethylphenoxy)-6,7-epoxy-3,7-dimethyl-2-octane

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Table 2

Name of Compound (Standard name or code name)	Structural Formula
Diflu benzuron	1 (4-chlorophenyl) 3-(2, 6-difluorobenzoyl) urea
Trisormuron (BAY SIR-8514)	2-chloro N-(((4-(trifluoromethoxy)-phenyl) amino)-carbonyl)-2, 6-benzamide
EL 494	N (((5-(4-bromophenyl) 6 methyl-2-pyridinyl) amino)-carbonyl) 2, 6-dichlorobenzamide
Teflu benzuron (CMB-134)	1-(3, 5-dichloro-2, 4-difluorophenyl)-3-(2, 6 difluorobenzoyl)-urea
Chlorfluazuron (CGA 112913)	1-[3, 5-dichloro-4-(3-chloro-5 trifluoromethyl-2-pyridyloxy)-phenyl]-3-(2, 6-difluorobenzoyl) urea
XRD-473	N-(((3, 5-dichloro-4-(1, 1, 2, 2 tetrafluoroethoxy) phenyl) amino)-carbonyl)-2, 6 difluorobenzamide

Next, the usage amount of one or more types of insect-killing compounds that are selected from among a group comprising the insect-killing compounds noted in the tables depends upon the types of compounds as well as the targeted harmful insects. Normally, however, the amount is 0.01 – 2.0 wt% of the total amount of poisonous bait agent. Next, as a crystalline cellulose substance, one possible candidate is Avicell made by Asahi Chemical Industry Co. Ltd., and the usage amount is normally 20.0 – 60.0 wt% of the total amount of poisonous bait agent. Next, as a type of cereal flour, it is possible to use starch made from sweet potatoes, corn, etc., or other cereal flours such as wheat flour, rice flour, corn flour, etc., and the amount used is normally 10.0 – 80.0 wt% of the total amount of poisonous bait agent. Next, as an essential vegetable oil, it is preferable to use soybean oil, vegetable oil, sesame oil, wheat germ oil, etc. As for sugar, it is possible to use cane sugar, glucose, fructose, lactose, dark brown sugar, light brown sugar, brown confectionary sugar, etc., and among these, the preferred types are dark brown sugar, light brown sugar, and brown confection sugar.

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Note that in the case of poisonous bait agents used for insect pest extermination as they relate to this invention, it is acceptable to add antioxidants as needed, as well as preservatives, agents to prevent against accidental ingestion, and even fragrances in order to better attract insects. Examples of antioxidants may include erysorbic acid, sodium erysorbate, dibutylhydroxy toluene, dl- α -tocopherol, nordihydroguaialethic acid, methylhydroxy anisole, gallic acid propyl, guaiac oil, L-cysteine hydrochloric acid salt, etc. As for preservatives, possible examples include benzoic acid, sodium benzoate, salicylic acid, diphenyl, sorbic acid, potassium sorbate, dehydroacetic acid, sodium dehydroacetate, paraoxybenzoic acid isobutyl, paraoxybenzoic acid isopropyl, paraoxybenzoic acid ethyl, paraoxybenzoic acid butyl, paraoxybenzoic acid propyl, calcium propionate, sodium propionate, etc. Examples of agents used to prevent accidental ingestion may include cayenne pepper, amaranth, amaranth aluminum lake, erythrocin, erythrocin aluminum lake, new coccine, phloxine, rose bengal, ~~tartrazine~~, tartrazine, tartrazine aluminum lake, Sunset Yellow - FCF, Sunset Yellow - FCF aluminum lake, Fast Green FCF, Fast Green FCF aluminum lake, Brilliant Blue FCF, Brilliant Blue FCF aluminum lake, Indigo Carmine, Indigo Carmine aluminum lake, β -carotene, copper chlorophyll, etc. As for fragrances, examples include cheese fragrance, butter fragrance, peanut fragrance, peach fragrance, strawberry fragrance, milk fragrance, etc.

There are no particular limits on the manufacture of the aforementioned effective ingredients and additives, which are to be used in response to need. However, it is noted that the insect-killing compounds are first mixed together with the essential vegetable oil at room temperature or in a heated state after which the sugar, crystalline cellulose, cereal flour, and

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other substances are added and mixed in a uniform manner. Then, standard methods may be followed in order to form the tablets to the desired size.

Poisonous bait agents related to this invention can be used for the extermination of the following types of insect pests: cockroaches such as American cockroaches, German cockroaches, black cockroaches, etc.; ants such as *Monomorium intrudens*, *Formica japonica*, etc.; beetles such as the tobacco beetle, biscuit beetle, etc.; mealworms such as the red flour beetle, confused flour beetle, etc.; and grain beetles such as the sawtoothed grain beetle, flat grain beetle, etc.

(Embodiments)

Embodiments 1 - 6

Given proportions as shown in Table 3 with respect to pyriproxiphene 0.05% (hereinafter, % refers to wt%), crystalline cellulose 30.0%, sesame seed oil 3.0%, butylhydroxy anisole 0.03%, and dehydroacetic acid 0.1%, sugar is then added along with sweet potato starch. First, the pyriproxiphene and sesame seed oil are mixed, after which the sugar, crystalline cellulose, sweet potato starch, butylhydroxy anisole and dehydroacetic acid are added and the contents are mixed in a uniform manner. Then, pressure is applied at a level of 15 kg/cm² to obtain a poisonous bait agent in the form of a tablet with a weight of approximately 4g (and a diameter of approximately 30 mm). Evaluations are then conducted to determine the stability of the effective ingredients, the attractant feeding effect on cockroaches as well as the inhibitory effects on eclosion and oviposition. The results of these evaluations are as follows:

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Table 3

(Figures = wt%)

Embodiment No		1	2	3	4	5	6
Mixing Amount							
Sugar	Dark brown sugar	-	-	10 00	20 00	30 00	40 00
	Light brown sugar	-	10 00	-	-	-	-
	Brown confection sugar	10 00	-	-	-	-	-
Sweet potato starch		56 82	56 82	56 82	46 82	36 82	26 82

(1) Stability of the effective ingredients

After maintaining the temperature of the poisonous bait agent at 50°C for 10 days, the survival rate of the effective ingredients is calculated using gas chromatography, and a two-stage evaluation is conducted by placing the results of the survival rate into two categories, namely cases in which the rate is 80% or more (indicated with O) and cases in which the rate is less than 80% (indicated with x)

(2) Attractant Feeding Effect

A container with a bottom surface area of 0.12 m² is filled with 50 adult German cockroaches (same number of males and females) along with bait for testing, and calculations for the attractability rate are performed based on the number of test insects that are attracted to the bait within a set period of time. A two-stage evaluation is conducted by placing the results of the attractability rate into two categories, namely cases in which the rate is 70% or more (indicated with +) and cases in which the rate is less than 70% (indicated with -)

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(3) Inhibitory Effects on Eclosion

A container with a bottom surface area of 100 cm² is filled with 10 German cockroaches in their final larva stage (same number of males and females), along with bait for testing, and observations are then conducted to determine the eclosion conditions for adult insects over a specified time frame. After three weeks have elapsed, a two-stage evaluation is conducted by placing the results of the eclosion failure, wing anomalies, and over-aged larvae into two categories, namely cases in which the rate is 80% or more (indicated with +) and cases in which the rate is less than 80% (indicated with -)

(4) Inhibitory Effects on Oviposition

A container with a bottom surface area of 100 cm² is filled with 10 German cockroaches that are at a stage within one week from the time of eclosion (same number of males and females), along with bait for testing, and observations are then conducted to determine the number of eggs laid as well as the hatching rate over a specified time frame. After four weeks have elapsed, a two-stage evaluation is conducted by placing the results of the inhibitory rate with regard to second-generation propagation among an untreated group into two categories, namely cases in which the rate is 80% or more (indicated with +) and cases in which the rate is less than 80% (indicated with -)

The evaluation results for the above are shown in Table 4

Comparative Examples 1 - 4

As shown in Table 5, the sugar amounts do not approach the range of limitation, and with the exception of cases in which the amount of sweet potato starch has been increased, the exact

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same operations are conducted as in the case of Embodiment 1 The poisonous bait is prepared, and various results are studied The results obtained are noted in Table 5

Table 4

Embodiment No		1	2	3	4	5	6
Characteristics							
Stability of Effective Ingredients		○	○	○	○	○	○
Attractant Feeding Effect	Immediately after the tablet is formed	+	+	+	+	+	+
	After leaving for 10 days at 50°C	+	+	+	+	+	+
Inhibitory Effect on Eclosion	Immediately after the tablet is formed	+	+	+	+	+	+
	After leaving for 10 days at 50°C	+	+	+	+	+	+
Inhibitory Effect on Oviposition	Immediately after the tablet is formed	+	+	+	+	+	+
	After leaving for 10 days at 50°C	+	+	+	+	+	+

As clarified by Tables 3, 4, and 5, although there is no significant difference with regard to the stability of the effective ingredients in cases where absolutely no sugar is added (Comparative example 1) or when the sugar amounts do not approach the range of limitation (comparative examples 2 – 4), the results with regard to the attractant feeding effect as well as the inhibitory effects on eclosion and oviposition are considerably inferior to any of those in Embodiments 1 – 6

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Table 5

(Figures = wt%)

Comparative example No		1	2	3	4
Mixing Amount					
Sugar	Dark brown sugar	---	---	-	5 00
	Light brown sugar	---	-	5 00	---
	Brown confection sugar		5 00	---	---
Sweet Potato Starch		66 82	61 82	61 82	61 82
Stability of Effective Ingredients		0	0	0	0
Attractant Feeding Effect	Immediately after the tablet is formed	-	-	+	+
	After leaving for 10 days at 50°C	-			
Inhibitory Effect on Eclosion	Immediately after the tablet is formed	-	+	+	+
	After leaving for 10 days at 50°C		-		
Inhibitory Effect on Oviposition	Immediately after the tablet is formed	-	+	+	+
	After leaving for 10 days at 50°C		-	-	-

Embodiments 7 - 9

Besides crystalline cellulose 30 0%, brown confection sugar 10 0% butylhydroxy anisole 0 03%, and dehydroacetic acid 0 10%, a mixture is conducted with the ingredients shown in Table 6, and the exact same operations are conducted as in the case of Embodiment 1 The poisonous bait is prepared, and various results are studied The results obtained are noted in Table 6

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Table 6

(Figures = wt%)

Mixed Ingredients & Characteristics		No	Embodiment			Comparative Example		
			7	8	9	5	6	7
Insect-Killing Compounds	Methoprene		1 0			1 0		
	S-21149			0.30			0.30	
	Teflu-benzuron				0.70			0.70
Essential Vegetable Oils	Sesame seed oil		2 00					
	Wheat germ oil			3 00				
	Soybean oil				4 00			
Sweet Potato Starch			56.87	56.57	55.17	58.87	59.57	59.17
Stability of Effective Ingredients			0	0	0	X	X	X
Attractant Feeding Effect	Immediately after the tablet is formed		+	+	+	+	+	+
	After leaving for 10 days at 50°C		+	+	+		-	-
Inhibitory Effect on Eclosion	Immediately after the tablet is formed		+	+	+	+	+	+
	After leaving for 10 days at 50°C		+	+	+		-	-
Inhibitory Effect on Oviposition	Immediately after the tablet is formed		+	+	+		-	-
	After leaving for 10 days at 50°C		+	+	+		-	-

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Comparative Examples 5 - 7

As noted in Table 6, with the exception of cases in which there is absolutely no essential vegetable oil used or cases in which the amount of sweet potato starch is increased slightly to accommodate the lack of vegetable oil use, the exact same operations are conducted as in the case of Embodiments 7 - 9. The poisonous bait is prepared, and various results are studied. The results obtained are noted in Table 6, and these results show that stability, the attractant feeding effect as well as the inhibitory effects on eclosion and oviposition are inferior in all cases of

(Comparative examples 5 - 7

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Comparative Examples 10 - 15

The ingredients in Table 7 are mixed (figures = wt%), the poisonous bait is prepared using the same operations conducted in Embodiment 1 and the various effects are measured. The obtained results are noted in Table 7, and these results prove favorable in all cases with regard to stability, the attractant feeding effect as well as the inhibitory effects on eclosion and oviposition.

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Table 7

Embodiment No		10	11	12	13	14	15
Mixed Ingredients & Characteristics							
Insect-Killing Compounds	Pyriproxiphene	0 05	---	---	---	---	---
	Hydroprene	---	0 5	---	---	---	---
	Phenoxycarb	---	---	0 1	---	---	---
	Diflu-benzuron	---	---	---	1 0	---	---
	XRD-473	---	-	---	-	0 5	---
	Chlorfluazuron	---	---	---	---	---	0 5
Crystalline Cellulose		20 00	60 00	30 00	50 00	40 00	30 00
Sugar	Powdered sugar	-	10 00	---	20 00	---	40 00
	Dark brown sugar	40 00	---	---	---	10 00	---
	Brown confection sugar	---	---	20 00	---	---	---
Essential Oil	Wheat germ oil	---	10 00	---	0 10	5 00	---
	Corn oil	8 00	---	---	---	---	10 00
	Sesame seed oil	---	---	0 50	---	---	---
Cereal	Corn starch	31 95	---	---	28 90	44 50	-
	Sweet potato starch	---	19 50	49 40	---	---	19 50
Stability of Effective Ingredients		0	0	0	0	0	0
Inhibitory Effect on Eclosion	Immediately after the tablet is formed	+	+	+	+	+	+
	After leaving for 10 days at 50°C	+	+	+	+	+	+
Inhibitory Effect on Oviposition	Immediately after the tablet is formed	+	+	+	+	+	+
	After leaving for 10 days at 50°C	+	+	+	+	+	+
Inhibitory Effect on Eclosion	Immediately after the tablet is formed	+	+	+	+	+	+
	After leaving for 10 days at 50°C	+	+	+	+	+	+

(Effects)

As made clear from the discussion above, the poisonous bait agent used for insect pest extermination as described in this invention is far superior to previous forms with regard to the stability of the effective ingredients, the attractant feeding effect on harmful insects, particularly cockroaches, and the inhibitory effects on eclosion and oviposition as well as safety during

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handling In addition, due to the lack of problems related to cracking or crumbling of the manufactured bait product, it is of particular value as a poisonous bait agent for use in the extermination of harmful insects such as cockroaches

Patent Applicant Sumitomo Chem Co, Ltd

Agent for the above Bunji Kamata

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(6)

Continued from Page 1

(51)	International Class *	Identification No	JPO File No
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	35 10)		
	(A 01 N 47/34		
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	37 08)		

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March 2, 1988 [Showa 63]

To Patent Office Chief

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- 2 Title of the Invention Poisonous Bait Agent for Insect Pest Extermination
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6 Object of Revision
The "Detailed Description of the Invention" within the Specifications

7 Contents of Revisions

As attached [seal of] Patent Office, March 3, 1988, Application Dept. No 2,
[Mr] Izumida

Content of Revisions

1 From Line 18 of Section 2 to Line 5 of Section 3, the passage that reads, "While it is said
that on the other hand, [substances that are] toxic to animals and humans, in general is
deleted

2 Line 5 of Section 3, which reads "organic phosphorous compounds" is revised to read,
"organic phosphorous compounds other than boric acid "

3 Line 9 of the same section, which reads, "insect-killing effect" is revised to read,
"extermination effect of harmful insects "

4 Line 11 of the same section, which reads, "insect chitin-type inhibitory" is revised to
read, "insect chitin-forming inhibitory "

5 Line 13 of the same section, which reads, "insect-killing agent" is revised to read, "agent
for the extermination of harmful insects "

6 From Line 18 to Line 20 of the same section, which reads, "cases in which [a substance]
is made into a poisonous bait material hormones of young insect larvae," is deleted.

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~~none~~ 3 *HP*

7 Line 20 of the same section, which reads, "In the case of prior art," is inserted before the section that reads, "effective ingredients "

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8 Line 1 of Section 4, which reads, "insect-killing agent" is revised to read, "agent for the extermination of harmful insects "

9 Line 20 of the same section, which reads, "insect-killing compounds" is revised to read, "compounds for the extermination of harmful insects "

10 In the structural formulas for S21149 and S21150 in Table 1 within Section 5, the respective passages, which read, "o-2-(4-phenoxyphenoxy)" are revised to read, "0-2-(4-phenoxyphenoxy) "

11 In the structural formula for phenoxycarb in Table 1 within the same section, the passage that reads, "ethyl [2-(p-phenoxy) ethyl] carbamate" is revised to read, "0-ethyl N-[2-(4-phenoxyphenoxy) ethyl] carbamate "

12 Line 1 of Section 6, which reads, "insect-killing compound" is revised to read, "compound for the extermination of harmful insects "

13 Line 13 of Section 8, which reads, "insect-killing compound" is revised to read, "compound for the extermination of harmful insects "

14 In the column under the heading for mixed ingredients within Table 6 of Section 14, which reads, "insect-killing compound" is revised to read, "compound for the extermination of harmful insects "

15 In the column under the heading for mixed ingredients within Table 7 of Section 16, which reads, "insect-killing compound" is revised to read, "compound for the extermination of harmful insects "

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(54) POISONOUS BAIT AGENT FOR EXTERMINATING INSECT PEST

(57) Abstract:

PURPOSE: To obtain the title poisonous bait agent containing a specific insect pest exterminating agent as an active ingredient which is stable and having excellent attractant feeding and inhibitory effects on eclosion and oviposition by tableting the above-mentioned active ingredient with crystalline cellulose etc.

CONSTITUTION A poisonous bait agent obtained by using one or more insect growth retarder selected from insect juvenile hormonal compounds, e.g. hydroprene or

pynproxiphen, and insect chitin-forming inhibitory compounds, e.g. diisobenzuron or XRD-473 as an active ingredient and crystalline cellulose or grains e.g. potato starch vegetable essential oil e.g. corn oil or sesame oil, in an amount of 0.1Wt% based on the total amount of the bait agent and saccharide e.g. sucrose or black sugar, in an amount of 10.0Wt% based on the total amount of the bait agent as principal ingredients as necesary adding an antioxidant, preservative perfume etc and tableting and forming the resultant blend into an optional shape according to a conventional method. The above-mentioned agent is useful for exterminating cockroaches, ants and flies, etc.

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TI ***Impact*** off maize soil insecticides on wireworm populations (Agriotes sp , Coleoptera, Elateridae) nnns6
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Effets sur les populations de taupins de l'application des insecticides (sol utilises en culture de maïs (Agriotes sp , Coleoptera, Elaterides)
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CS ACTA Departement Technique, 4 place Gensoul 69287 Lyon Cedex 02, France
SO International conference on pests in agriculture, 6-8 January 1997 at 1: Corum Montpellier, France Volume 3 (1997) pp. 1021-1028, 5 ref
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Meeting Info International conference on pests in agriculture, 6-8 January 1997, at le Corum Montpellier, France Volume 3
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AB The impact of maize soil insecticides on wireworm (Agriotes sp.) populations was studied in Aquitaine and Brittany, France The insecticides under comparison were applied on open ground (lindane), locally along the seed-line (carbofuran, and carbofuran + isophenphos [isofenphos]), or as a seed treatment (***imidacloprid***).
Bait traps were used for population sampling The degree of population reduction obtained using soil insecticides was evaluated in both trials
CC FF600 Pests, Pathogens and Biogenic Diseases of Plants· HH400 Control by Chemicals and Drugs, HH500 Repellents and Attractants
GT France Brittany
BT Zea, Poaceae, Cyperales, monocotyledons; angiosperms, Spermatophyta; plants, Elateridae, Coleoptera, insects, arthropods, invertebrates, animals Western Europe, Europe; Developed Countries European Union Countries, Mediterranean Region OECD Countries, France
CT insect pests· plant pests; seeds; seed treatment, insect control; maize; lindane, carbofuran, isofenphos ***imidacloprid*** ; control; chemical control traps, ***bait*** traps, monitoring, ecology population dynamics, mixtures, cereals biology; techniques, pest control, agricultural entomology
ST International conference on pests in agriculture
58-89-9, 1563-66-2, 25311-71-1
GN Zea mays, Agriotes

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**ANPP - QUATRIEME CONFERENCE INTERNATIONALE SUR LES
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**EFFETS SUR LES POPULATIONS DE TAUPINS
DE L'APPLICATION DES INSECTICIDES DU SOL
UTILISES EN CULTURE DE MAIS
(*Agriotes* sp., Coleoptera, Elatéridés)**

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RESUME

Des études de l'effet des insecticides du sol utilisés en culture de maïs sur des populations de taupins (*Agriotes* sp.) ont été menées conjointement en Aquitaine et en Bretagne. Dans ces essais, les insecticides en comparaison étaient appliqués en plein (lindane), en localisation dans la ligne de semis (carbofuran et carbofuran plus isophenphos) ou en traitement des semences (imidaclopride).

Des pièges alimentaires ont été utilisés pour réaliser les échantillonnages des populations. Les niveaux de réduction des populations obtenus grâce aux insecticides du sol ont pu être estimés dans les deux essais.

MOTS-CLEFS: Elatéridés - *Agriotes* sp. - maïs - insecticides du sol

**SUMMARY. IMPACT OF MAIZE SOIL INSECTICIDES ON WIREWORMS
POPULATION (*Agriotes* sp., Coleoptera, Elatéridés).**

The impact of maize soil insecticides on wireworms (*Agriotes* sp.) population was studied conjointly in Aquitaine and Brittany, France. The insecticides under comparison were applied on open ground (lindane), locally along seed-line (carbofuran and carbofuran plus isophenphos) or for seed treatment (imidaclopride). Baited traps were used for population sampling. The degree of population reduction obtained by soil insecticides was evaluated both trials.

Key-words Elatéridés-*Agriotes* sp. - maize - soil insecticides

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INTRODUCTION

Les traitements insecticides du sol en culture de maïs concernent des surfaces considérables. Ces produits peuvent être appliqués en plein, en localisation dans la ligne de semis ou en traitement des semences. De nombreuses études ont porté sur l'efficacité de ces insecticides et sur leur mode d'application (BLOT *et al.*, 1983, NAIBO, 1995). Par contre, très peu de connaissances existent en ce qui concerne les conséquences de l'utilisation de ces insecticides sur ces populations larvaires. En effet, la mise en oeuvre d'un échantillonnage à l'aide de méthodes basées sur le sondage et le tamisage de terre représente une charge de travail très importante. Il a été possible d'envisager le renouvellement de ce sujet d'étude grâce à l'utilisation du piège adapté de KIRFMAN (CHABERT et BLOT, 1990). Ce piège permet une réduction considérable du temps de travail nécessaire à l'échantillonnage.

La connaissance du devenir des populations larvaires de taupins suite à la réalisation de traitements permettrait de mieux appréhender le risque que ces ravageurs présentent pour les cultures. Ces éléments seraient à prendre en compte dans le choix des stratégies de traitements.

MATERIELS ET METHODES

Essai en Aquitaine.

L'essai a été mis en place à Amou (40), en sol de Touyas (limon avec 4 % de matière organique), dans une parcelle cultivée en maïs depuis plus de 10 ans. Les semis ont eu lieu le 5 mai en 1992, le 7 mai en 1993 et le 5 mai en 1994. La variété de maïs semée a été VOLGA à la densité de 84 000 plantes / ha. L'espacement entre les lignes de semis est de 80 cm. L'essai comportait 4 blocs et des parcelles élémentaires de 9,6 m x 20 m. Des allées de un mètre de large délimitent les blocs.

Les objets étudiés étaient les suivants.

- témoin non traité,
- lindane N 1350 g/ha de matière active (LINDAFLO FLO),
- carbofuran N 600 g/ha de m a (CURATER),
- lindane 4N 5400 g/ha de m a ,
- carbofuran 4N 2400 g/ha de m a .

Le lindane est appliqué en plein avec un pulvérisateur à dos et ensuite incorporé dans les quinze premiers centimètres du sol à l'aide d'un motoculteur. Le carbofuran est distribué dans la ligne de semis par le semoir lors de la mise en place de l'essai. Dans ce premier essai de ce type, le surdosage des insecticides à quatre fois la dose homologuée a été réalisé pour des raisons méthodologiques. En effet, ces modalités

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de l'essai amplifient l'effet des produits et, par voie de conséquences, permettent d'obtenir une discrimination plus fine entre traitements, sans devoir augmenter le nombre de blocs. En 1992, en 1993 et en 1994, chaque traitement a été effectué au même emplacement

Essai de Bretagne

L'essai a été mis en place dans une parcelle qui était en prairie depuis 10 ans. La variété DEA a été semée pour la première fois le 15 mai 1993 à une densité de 100000 grains/ha avec un interrang de 0,75 m.

La première année, trois traitements ont été comparés à une parcelle témoin non traitée dans un dispositif bloc. La prise en compte de l'effet année est obtenue grâce à un dispositif en split-plot en 1994 où les blocs de 1993 ont été divisés en deux.

L'essai comportait 4 blocs séparés par une allée de 3 m. Les parcelles élémentaires mesuraient 15 x 7,50 m en 1993 et 7,50 x 7,50 m en 1994. Les objets étudiés étaient:

- témoin non traité,
- lindane: 1 350 g/ha de matière active, LINDAFLO FLO
- imidaclopride: 490 g/q, GAUCHO
- carbofuran plus isophenphox: 480 plus 240 g/ha, CARMA

Méthode de piégeage de larves de taupins

L'échantillonnage des larves de taupins est réalisé à l'aide de 2 à 5 pièges alimentaires (KIRFMAN *et al*, 1986, CHABERT *et al*, 1990) disposés régulièrement dans chaque parcelle élémentaire. Les pièges ont été répartis également sur le rang et dans l'interrang en Aquitaine et uniquement dans l'interrang en Bretagne.

RÉSULTATS

Essai en Aquitaine

Le tableau I présente les résultats des échantillonnages réalisés durant les trois années de l'étude.

Seuls sont présentés les résultats des piégeages qui ont été effectués dans des conditions d'activité des larves de taupins. De nombreux autres échantillonnages ont été perturbés par des conditions climatiques froides durant la période de piégeage, notamment au cours des automnes et des printemps 1992, 1993. Dans certains cas, le fort niveau et l'homogénéité des captures ont permis de montrer des différences statistiquement significatives.

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non 70 Hg

Tableau I. Conséquences de l'application des insecticides du sol (Essai d' Aquitaine)
Soil insecticides impact (Aquitaine trial)

TRAITEMENTS	LARVES PAR PIEGE				
	JUIN 1992 (J+30)		JUIL. 93 (J+65)	AOÛT 1993 (J+80)	
TEMOIN	3,69	A	1,63	1,63	
LINDANE N	1,19	BC	1,00	0,69	
CARBOFURAN	2,19	B	1,25	1,00	
LINDANE 4 N	0,38	C	0,69	0,44	
CARBOFURAN 4N	1,19	BC	0,94	1,00	
ETR (CV)	2,53	(36,7%)	0,44 (40%)	0,77 (80%)	
	MARS 94 (J-30)		JUIN 94 (J+30)	AOÛT 94 (J+100)	
TEMOIN	4		2,38	12,50	A
LINDANE N	2,88		1,33	6,38	B
CARBOFURAN N	3,75		1,54	13,38	A
LINDANE 4N	2		0,67	4,81	B
CARBOFURAN 4N	3,06		1,67	9,94	AB
ETR (CV)	1,49	(47%)	0,82 (54%)	3,16 (34%)	

J correspond à la date de traitement. Les lettres représentent les groupes homogènes établis grâce au test de NEWMAN et KEULS

Dans cette parcelle, cultivée depuis plus de 10 ans en monoculture de maïs, les larves de taupins ont été piégées depuis mai 1990. Les niveaux de captures dans les témoins de juin 1992 et de mars et juin 1994 sont habituels. Par contre, ceux de 1993 sont relativement faibles alors que ceux d'août 1994 sont très élevés. Des fluctuations des captures de même ampleur ont déjà été observées. Le faible niveau de captures observées en 1993 pourrait s'expliquer par le fait que l'essai a reçu un orage qui a déversé environ 80 mm d'eau au stade deux feuilles du maïs. Ces précipitations ont provoqué un tassement du sol, qui aurait limité les possibilités de déplacements des larves.

En juin 1992 et en août 1994, les captures réalisées dans toutes les parcelles non traitées sont significativement différentes de celles obtenues dans certaines parcelles traitées. Dans les autres échantillonnages, malgré l'absence de différences statistiquement significatives, les proportions de réduction sont comparables (Tableau II). Il est à remarquer que l'effet dose des produits est très souvent marqué.

En juillet 1993, le niveau de captures élevé, observé dans toutes les parcelles traitées, indique que l'effet des traitements 1992 ne s'est pas maintenu jusqu'en 1993.

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Tableau II Pourcentages de réduction des captures dans l'essai réalisé en Aquitaine
 Percentage capture drop (Aquitaine trial)

TRAITEMENTS	JUIN 92 (J+30)	JUILLET 93 (J+65)	AOUT 93 (J+80)
LINDANE N	68 %	38 %	58 %
CARBOFURAN	41 %	23 %	38 %
LINDANE 4 N	89 %	57 %	73 %
CARBOFURAN 4N	68 %	42 %	38 %
	MARS 94 (J-30)	JUIN 94 (J+30)	AOUT 94 (J+100)
LINDANE N	28 %	44 %	49 %
CARBOFURAN N	6 %	35 %	0 %
LINDANE 4N	50 %	72 %	62 %
CARBOFURAN 4N	24 %	30 %	21 %

J correspond à la date de traitement

Les variations d'efficacité mesurées dans cet essai proviennent probablement des conditions d'humidité du sol qui influencent le comportement des larves.

Ces résultats présentés, dans le tableau II indiquent qu'à court terme pour le lindane les réductions de populations sont de 68 % en juin 92, de 38 % en juillet 93 et de 44 % en juin 94, pour le carbofuran à ces dates, elles sont respectivement de 41 %, 23 % et 35 %

L'échantillonnage réalisé en mars 1994 décrit l'action des produits à plus long terme. Les conséquences de l'application du carbofuran se sont estompées, même lorsqu'il est épandu à 4 fois la dose homologuée. Le seul effet, qui semble persister, est celui du lindane à quatre fois la dose homologuée (50 %). Dans ces situations, les produits ont à moyen terme une efficacité très limitée sur les populations de taupins.

Le manque d'effet des traitements à moyen terme peut être lié à la nature du sol, à la mobilité des larves et/ou au fort niveau des populations dans cette parcelle. Ces facteurs peuvent expliquer une recolonisation rapide des parcelles traitées.

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00072Essai de Bretagne

Tableau III Nombre de larves par piège et pourcentage de réduction des captures de taupins dans l'essai réalisé en Bretagne. [Larvae per trap and percentage capture drop (Brittany trial)]

TRAITEMENTS		AVRIL 94 (J+330)			
TEMOIN		2,33			
LINDANE 93		1,33		43 %	
GAUCHO 93		2,67		0 %	
CARMA 93		1		57 %	
		JUN 94		OCTOBRE 94	
TEMOIN	4,75	A		1,75	
LINDANE 93	1,25	B	68 %	1	43 %
GAUCHO 93	2,25	AB	53 %	1,25	29 %
CARMA 93	2,75	AB	42 %	0,75	57 %
TEMOIN	3		(J+30)	1,5	(J+140)
LINDANE 93 + 94	1,75		42 %	0,25	83 %
GAUCHO 93 + 94	1,76		42 %	0,83	45 %
CARMA 93 + 94	2,25		25 %	0,87	42 %

Avant l'implantation, de l'essai des séries de piégeage effectuées sur la prairie ont permis d'estimer un effectif moyen des captures de 2,76 larves par piège.

A cause d'une inondation, l'échantillonnage suivant n'a pas pu être fait avant le printemps, le 11 avril 1994. L'analyse statistique des données montre alors qu'il n'y a pas de différences significatives entre les traitements. Cependant, dans tous les cas, les moyennes des captures sont supérieures au niveau du seuil de risque de 0,5 larve. Le pourcentage de réduction du nombre de larves par rapport au témoin représente 43 % pour le lindane, 57 % pour le carbofuran plus isophenphos et il est nul pour l'imidaclopride. Les populations larvaires de taupins restent importantes dans le sol suite au premier traitement.

En 1994, le niveau de captures dans les parcelles traitées seulement en 1993 est plus élevé en juin qu'en avril. Cela a permis de mettre en évidence des différences significatives entre traitements. En octobre, le faible niveau de larves piégées ne permet plus de différencier l'effet des traitements et l'effet de l'année. Le nombre moyen de larves capturées dans les parcelles traitées les deux années est de 1,5 larve pour le témoin, de 0,25 pour le lindane, de 0,83 pour l'imidaclopride et, de 0,87 pour le carbofuran plus isophenphos.

Si on considère que le seuil de risque est 0,5 larve par piège (CHABERT et BLOT 1992) seul le traitement au lindane deux années consécutives a permis d'abaisser le niveau des populations, en dessous de ce niveau. Les autres traitements réduisent les populations mais leur effectif reste près de ce seuil de risque. Il est important de souligner que les populations sont toujours élevées dans les parcelles témoins.

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DISCUSSION

Le tableau IV présente une synthèse des effets observés dans les deux essais

Tableau IV Récapitulatif des résultats des deux essais

(Recapitulation of results for both trials)

0 effet inférieur à 25 %, * effet compris entre 25 et 40 % de réduction,

** effet compris entre 40 et 75 %, *** effet supérieur à 75 %

AQUITAINE	ANNEE 1	ANNEE 2	
TRAITEMENTS	JUIN 1992 (J+30)	JUILLET 1993 (J+65)	AOUT 1993 (J+80)
LINDANE N	**	*	**
CARBOFURAN	**	0	*
LINDANE 4 N	***	**	**
CARBOFURAN 4N	**	**	*
ANNEE 3	MARS 94 J-30	JUIN 94 J+30	AOUT 94 J+100
LINDANE N	0	**	**
CARBOFURAN N	0	*	0
LINDANE 4N	**	**	**
CARBOFURAN 4N	0	*	*
BRETAGNE	AVRIL 94 (J+330)	JUIN 94 (J+30)	OCTOBRE 94 (J+140)
LINDANE 93	**	**	**
GAUCHO 93	0	**	*
CARMA 93	**	**	**
LINDANE 93 + 94	-	**	***
GAUCHO 93 + 94	-	**	**
CARMA 93 + 94	-	*	**

La mesure de la baisse des populations larvaires de taupins dans le sol n'a été réalisée que dans deux situations. Les résultats doivent donc être pris avec prudence. En effet, il n'a pas toujours été possible de mettre en évidence des différences statistiquement significatives. Ces difficultés proviennent sûrement de la distribution de type agrégatif des larves dans le sol (BRUNEL *et al.*, 1992). Néanmoins, ces essais ont permis d'établir une première estimation du niveau de l'impact des insecticides du sol.

Dans l'essai d'Aquitaine, l'effet à court terme des insecticides du sol sur les populations larvaires de taupins lors des trois années d'expérimentation est situé dans la catégorie 40-75 % pour le lindane et 25-40 % pour le carbofuran (Tableau IV). L'effet à moyen terme ne se maintient pas. Les niveaux de populations de taupins sont restés importants dans les parcelles traitées jusqu'à quatre fois la dose homologuée, et trois ans de suite. Dans ces sols de Touyas, l'impact des insecticides du sol sur les

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populations larvaires de taupins est donc limité. Les niveaux de captures de 12 larves / piège indiquent que les populations peuvent être très élevées dans ces situations. Il est envisageable qu'il y ait une possibilité importante de recolonisation des parcelles par les populations de taupins lorsque les produits n'ont plus d'activité insecticide.

En Bretagne, la situation est différente et doit être plus représentative du cas général. Les mêmes proportions sont obtenues pour l'impact des insecticides à court terme. Comme en Aquitaine, c'est le lindane qui réduit le plus les populations. Le carbofuran plus isophenphos et l'imidaclopride ont un effet plus marqué que le carbofuran seul en Aquitaine.

En Bretagne, une application de lindane deux années consécutives a réduit les populations de 83 % alors qu'en Aquitaine les populations semblent se rétablir entre les traitements. Ces divergences concernant la persistance de l'effet des insecticides du sol peuvent venir de différences d'ordre pédologique. Les produits utilisés n'ont peut-être pas le même comportement vis à vis des larves de taupins dans les deux types de sols étudiés. Des raisons d'ordre biologique sont également envisageables. En effet, dans l'essai de Bretagne, l'espèce présente est *Agriotes lineatus* alors que dans l'essai d'Aquitaine l'espèce capturée est *A. sordidus*.

A l'échelle parcellaire, l'évolution des populations larvaires de taupins est sous la dépendance de la nature des antécédents insecticides du sol et, de facteurs locaux (pédologiques, agronomiques, espèces présentes)

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