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Referencia: Expediente No. 05.096.782

Solicitud de Patente de Invención titulada: "Cebo para caracoles"

Solicitante: Bayer CropScience AG

**RESPUESTA AL AUTO NOTIFICADO POR FIJACIÓN EN LISTA NO. 210 DEL 9 DE JUNIO DE 2011, OFICIO NO. 09284 (EXAMEN DE FONDO)**

ÁLVARO 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 de la sociedad en referencia, doy respuesta al auto emanado por ese Despacho dentro del término legal:

## 1. Objeciones del Examinador

### 1.1. De la solicitud de patente

Reivindicaciones

Menciona su Despacho que habría un error en la frase *"separar una mezcla"* por cuanto no tendría soporte en la descripción y no encaja dentro del contexto del la redacción de la reivindicación.

En cuanto a la reivindicación 1 se dice que esta no estaría enteramente sustentada por cuanto no existe evidencia de que todas las sales mencionadas en dicha reivindicación resuelven el problema técnico de la invención.

1.2. Unidad de Invención

En cuanto a la unidad de invención considera su Despacho que la reivindicación 4 no tendría unidad de invención por cuanto lo que se plantea en las reivindicaciones de producto y de procedimiento no coincide por cuanto las sales mencionadas aparecen como alternativa unidas con la conjunción "o" mientras que en dicha reivindicación aparecen como adición unidas con la conjunción "y".

1.3. Nivel Inventivo

Sobre el requisito del nivel inventivo, el Examinador establece que el nivel inventivo de la reivindicación 4 estaría afectada por la divulgación hecha por el documento DE 3612161. Considera su Despacho que la única diferencia de la presente invención con relación al documento D1 sería la extrusión y el desmenuzamiento antes de secarla.

**2. Argumentos a favor de la patentabilidad de la solicitud**

2.1 De la solicitud de patente

En cuanto a la observación de su Despacho en relación con las reivindicaciones 1 y 4, el solicitante ha decidido presentar un nuevo capítulo reivindicatorio en el cual ha eliminado la alusión genérica al éster de ácido fosfónico y sus sales y la ha sustituido por "fosfato férrico III" que es el compuesto específicamente mencionado en el ejemplo 1. Por otro lado en cuanto a la reivindicación 4 esta se ha ajustado teniendo en cuenta la observación de su Despacho y ahora aparece la conjunción "o" en lugar de la conjunción "y" y, además, se ha modificado el verbo "separar" por le verbo "preparar" que es el correcto. De acuerdo con lo anterior se han atendido a cabalidad todas las observaciones formales de su Despacho.

2.2. Unidad de invención

Como se mencionó en el párrafo anterior la observación de falta de unidad de invención se debe considerar como superada teniendo en cuenta la modificación hecha.

2.3. Nivel inventivo

El nivel inventivo de una solicitud se encuentra definido en el Artículo 18 de la Decisión 486 y se establece cuando "*si para una persona del oficio normalmente versada en la materia técnica correspondiente, esa invención no hubiese resultado obvia ni se hubiese derivado de manera evidente del estado de la técnica*".

Contrario a lo que plantea su Despacho, el documento del arte previo citado no afecta el nivel inventivo de la reivindicación 4 de la presente solicitud por cuanto no es posible derivar la presente invención a partir de las enseñanzas presentadas en el documento D1.

Por favor tenga en cuenta que siendo novedoso e inventivo el producto de la presente solicitud tal como lo ha reconocido su Despacho, debe ser claro que el método para elaborar dicho producto es nuevo e inventivo, por cuanto no es posible elaborar un producto completamente nuevo e inventivo mediante un procedimiento no nuevo e inventivo.

**3. Solicitudes concedidas en otros países para esta misma invención.**

A manera informativa, pongo en conocimiento del Examinador que la patente EP 1 599 094 B1 equivalente a la presente solicitud colombiana ha sido otorgada. Aún cuando entiendo que estas decisiones de ninguna manera obligan al Despacho para decidir de igual forma, considero que por tratarse de una pregunta fáctica la determinación de la existencia de nivel inventivo, las decisiones de otras oficinas de patentes constituyen un antecedente persuasivo en la materia.

## REIVINDICACIONES

1- Composición que contiene

1) fosfato férrico (III);

2) harina de cereales de grano fino, seleccionada entre: harina de trigo, harina de centeno, harina de arroz, harina de trigo duro y harina de trigo blando;

3) un aglutinante seleccionado entre: almidones modificados, substancias disociables del formaldehído, acetato de polivinilo parcialmente saponificado y melaza; y

4) uno o más aditivos seleccionados entre agentes para la conservación, colorantes, productos atrayentes para los caracoles, agentes auxiliares para la molienda, productos amargantes, repelentes para los animales de sangre caliente y agentes antiaglutinantes, agua y otros productos activos molusquicidas.

2- Composición según la reivindicación 1, caracterizada porque puede comprender además aglutinantes seleccionados entre: almidones modificados, substancias disociadoras de formaldehído, acetato de polivinilo parcialmente saponificado y melazas.

3- Composición según la reivindicación1, caracterizada porque puede comprender además aditivos seleccionados entre: agentes para la conservación, colorantes, productos atrayentes para los caracoles, agentes auxiliares para la molienda, productos amargantes, repelentes para los animales de sangre caliente, agentes antiaglutinantes, agua y otros productos activos molusquicidas.

4- Procedimiento para la obtención de composiciones según las reivindicaciones 1, 2 ó 3 caracterizado porque

1) se prepara una mezcla constituida por

- ésteres de ácido fosfórico de fórmula (I-1)

ó

Carbonatos, sulfatos y fosfatos de amonio de los ésteres de ácido fosfórico de la fórmula (I-1)

US006384082B1

(12) **United States Patent**
**Wirth et al.**

(10) **Patent No.:** **US 6,384,082 B1**
(45) **Date of Patent:** **May 7, 2002**

(54) **SNAIL BAIT**


(75) Inventors: **Wolfgang Wirth**, Bergisch Gladbach; **Hans-Jürgen Schnorbach**, Monheim, *both of (DE)*

(73) Assignee: **Bayer Akitengesellschaft**, Leverkusen (DE)



( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/763,649**

(22) PCT Filed: **Aug. 18, 1999**

(86) PCT No.: **PCT/EP99/06045**

§ 371 Date: **Feb. 26, 2001**

§ 102(e) Date: **Feb. 26, 2001**

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PCT Pub. Date: **Mar. 9, 2000**

(30) **Foreign Application Priority Data**

Aug. 29, 1998 (DE) ........................................ 198 39 480

(51) **Int. Cl.**$^7$ ........................................ **A61K 31/135**
(52) **U.S. Cl.** ........................................ **514/646**
(58) **Field of Search** ........................................ 514/646



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*Primary Examiner*—Alton Pryor
(74) *Attorney, Agent, or Firm*—Joseph C. Gil

(57) ***ABSTRACT***


Novel slug and snail baits, comprising

a) 3,5-dimethyl-4-methylthio-phenyl methylcarbamate, optionally in a mixture with one or more other molluscicidally active compounds,
b) fine cereal flour,
c) modified starch and a formaldehyde-releasing substance,
d) molasses and
e) optionally additives,

a process for preparing these slug and snail baits and their use for controlling terrestrial slugs and snails.

**17 Claims, 4 Drawing Sheets**

# SNAIL BAIT

This application is a 371 of PCT/EP99/06045, filed Aug. 18, 1999.

## FIELD OF THE INVENTION

The present invention relates to novel slug and snail baits, to a process for their preparation and to their use for controlling slugs and snails.

## BACKGROUND OF THE INVENTION

It is already known to control terrestrial slugs and snails using baits which comprise feedstuffs and molluscicidally active compounds, such as methiocarb, metaldehyde or metal chelates (cf. DE-A 35 03 608, DE 36 12 161 and WO 96-05 728).

Such slug and snail baits can be prepared, for example, by pressing one or more molluscicidally active compounds with feedstuff, carrier material, adhesives and other customary additives essentially dry into shaped articles. These baits have the disadvantage that they have a relatively rough surface, which causes undesirable abrasion during packaging, during transport and also during application. Moreover, it is unfavourable that these shaped articles are relatively unstable under the influence of rainwater, losing some of their activity owing to the beginning decomposition.

Furthermore, it is already known that slug and snail baits based on metaldehyde can be prepared by mixing the active component with the other constituents, but without adhesive, followed, after addition of water, by extrusion and processing into pellets. The activity of these shaped articles is good, but the physical properties under practice conditions are not always sufficient.

## SUMMARY OF THE INVENTION

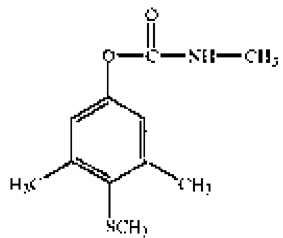
A slug and snail bait includes 3,5-dimethyl-4-methylthio-phenyl methylcarbamate, fine cereal flour, modified starch, a formaldehyde-releasing substance, and molasses.

## DETAILED DESCRIPTION

This invention, accordingly, provides novel slug and snail baits, comprising

a) 3,5-dimethyl-4-methylthio-phenyl methylcarbamate of the formula,

(I)



optionally in a mixture with one or more other molluscicidally active compounds,

b) fine cereal flour,

c) modified starch and a formaldehyde-releasing substance,



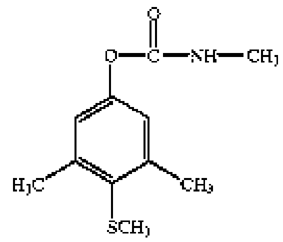
d) molasses and

e) optionally additives.

Furthermore, it has been found that the novel slug and snail baits can be obtained when

(1) 3,5-dimethyl-4-methylthio-phenyl methylcarbamate of the formula,

(I)



optionally in a mixture with one or more other molluscicidally active compounds,
and optionally in a mixture with additives, is mixed and finely ground,

(2) the resulting premix is mixed with
fine cereal flour,
modified starch and a formaldehyde-releasing substance and then sprayed with molasses,

(3) the resulting homogeneous mixture is admixed with sufficient water to form a dough,

(4) the dough is extruded and comminuted and

(5) the resulting product is dried.

Finally, it has been found that the novel slug and snail baits are highly suitable for controlling terrestrial slugs and snails.

It is extremely surprising that the slug and snail baits according to the invention have a better stability than the prior-art shaped articles for the same intended use. It is particularly unexpected that the baits according to the invention, in spite of containing a relatively small amount of adhesive, are, in particular with respect to rain water, considerably more stable than corresponding baits prepared by dry pressing which contain a considerably higher quantity of adhesive.

The slug and snail baits according to the invention have a number of advantages. Thus, they have high abrasion resistance. It is furthermore favourable that they maintain their shape and activity even after prolonged watering.

The slug and snail baits according to the invention are characterized by the constituents listed under (a) to (e).

The molluscicidally active compound that is contained in the baits according to the invention is in each case 3,5-dimethyl-4-methylthio-phenyl methylcarbamate of the formula (I), which is known under the common name methiocarb.

Other molluscidically active compounds which may additionally be present are preferably metaldehyde and metal chelates, such as complexes of ethylenediamine-tetraacetic acid and iron or copper ions.

The cereal flours that may be contained in the slug and snail baits according to the invention are commercial flours, such as wheat flour, rye flour, rice starch, inter alia. Preference is given to durum wheat flour and wheat flour. The flour is present in a fine form, preferably in particle sizes below 250μ.

In the present case, modified starch is to be understood as meaning commercial products of this type. Preference is given to cold-swelling maize starch.

As formaldehyde-releasing substances, the baits may comprise all customary products which are suitable for releasing formaldehyde. Preference is given to urea/formaldehyde condensates.

In the present case, molasses are to be understood as customary syrup-like mother liquors obtained in the manufacture of sugar.

Suitable additives which may be contained in the baits according to the invention are preferably preservatives, colorants, slug and snail attractants, grinding auxiliaries, bitter substances, homeotherm repellents and anticaking agents, and also water.

Examples of preservatives which may be mentioned are 2-hydroxybiphenyl, sorbic acid, p-hydroxy-benzaldehyde, methyl p-hydroxy-benzoate, benzaldehyde, benzoic acid, propyl p-hydroxy-benzoate and p-nitro phenol.

Examples of colorants which may be mentioned are inorganic pigments, iron oxide, titanium dioxide and Prussian Blue, and also organic dyes, such as anthraquinone, azo and metal phthalocyanine dyes.

Suitable slug and snail attractants are all customary substances suitable for this purpose. Examples which may be mentioned are plant extracts and derivatives thereof, and products of animal origin.

Suitable grinding auxiliaries are all substances which can customarily be used for this purpose. Kaolins, aluminas, talc, chalk, quartz powder and finely divided silica may be mentioned as being preferred.

Suitable homeotherm repellents which have a repellent effect on warm-blooded organisms, such as dogs or hedgehogs, are all components which are customary for this purpose. The example which may be mentioned is nonyloic acid vanillamide.

Suitable bitter substances are all substances which are customary for this purpose. An example which may be mentioned is denatonium benzoate.

Suitable anticaking agents are all substances which are customary for this purpose and which prevent lumping and caking. Examples which may be mentioned are moisture-adsorbing powders of kieselguhr, pyrogenic silica, tricalcium phosphate, calcium silicates, aluminium oxide, magnesium oxide, magnesium carbonate, zinc oxide, stearates and fatty amines.

The content of the individual components in the slug and snail baits according to the invention can be varied within a certain range. Thus, the concentrations

of active compound of the formula (I), optionally in a mixture with one or more other molluscicidally active compounds, are generally between 0.5 and 15% by weight, preferably between 1.0 and 13% by weight,

of cereal flour are generally between 60 and 90% by weight, preferably between 65 and 85% by weight,

of modified starch and formaldehyde-releasing substance are generally between 0.1 and 6% by weight, preferably between 0.2 and 5% by weight,

of molasses are generally between 1 and 10% by weight, preferably between 2 and 4% by weight, and

of additives are generally between 0 and 5% by weight, preferably between 0 and 3% by weight.

When carrying out the process according to the invention, preference is given to using those components which have already been mentioned as being preferred in connection with the description of the slug and snail baits according to the invention for the constituents listed under (a) to (e).

The quantities of the individual components are chosen such that the substances are present in the slug and snail baits according to the invention in the weight ratios mentioned above. However, the amount of water is such that a dough is formed in Step (3) of the process. In general, the amount of water used is between 25 and 35% by weight, preferably between 27 and 34% by weight, based on the other constituents. However, in the slug and snail baits according to the invention, the water content is considerably lower, since the product, which is initially obtained in moist form, is then dried in Step (5) of the preparation process. What remains is virtually only the residual moisture present in the cereal flour.

When carrying out the process according to the invention, the temperatures can be varied within a certain range.

Step (1) is generally carried out at temperatures between 0° C. and 30° C., preferably at room temperature,

Step (2) is generally carried out at temperatures between 0° C. and 30° C., preferably at room temperature,

Step (3) is generally carried out at temperatures between 0° C. and 40° C, preferably between 10° C. and 30° C.,

Step (4) is generally carried out at temperatures between 20° C. and 60° C., preferably between 30° C. and 50° C. and

Step (5) is generally carried out at temperatures between 20° C. and 90° C., preferably between 30° C. and 80° C.

Steps (1) to (3) and (5) of the process according to the invention are generally carried out under atmospheric pressure. However, it is also possible to carry out the drying process in Step (5) under reduced pressure. Step (4) is generally carried out under elevated pressure, preferably under a pressure between 30 and 100 bar.

All equipment which is customarily used for such processes can be employed for carrying out the process according to the invention. Thus, for comminuting the material in Step (1), customary grinding equipment, such as, for example, airjet mills, are used.

Suitable mixers for the mixing processes in Steps (2) and (3) are customary mixers into which additional substances, such as molasses and water, can be injected during the mixing process. Preference is given to using ploughshare mixers, paddle mixers and twin-screw extruders.

Suitable for the extrusion in Step (4) is the equipment which is customary in the food industry and which can be used to extrude a dough through perforated discs and then to comminute the extrudate.

Suitable for drying the moist product in Step (5) are customary apparatuses which are suitable for removing moisture from particulate solid substances. In a preferred embodiment, the moist product is initially predried in a fluidized bed and then dried to the desired final moisture in a separate piece of equipment.

Specifically, the process according to the invention is carried out by

mixing, in Step (1), the active compound of the formula (I), optionally in a mixture with one or more other molluscicidally active compounds and optionally with additives, such as, for example, grinding auxiliaries, preservatives, colorants, and the like, and finely grinding the resulting mixture,

mixing, in Step (2), the resulting premix with fine cereal flour, modified starch and formaldehyde-releasing substance, then adding molasses in liquid form and mixing the components to a homogeneous product,

adding, in Step (3), a sufficient quantity of water with mixing and kneading, so that a dough is formed,

extruding under pressure and comminuting, in Step (4), the dough and initially predrying and then drying, in

Step (5), the particulate material, followed by cooling to room temperature.

When carrying out the process according to the invention, the size of the slug and snail baits can be varied within a certain range in the particular desired manner. In general, the dough is comminuted such that pellets or strand-shaped particles are formed. The average diameter or the average length of the particles is generally between 1 and 4 mm, preferably between 1.5 and 3 mm.

The slug and snail baits according to the invention are highly suitable for controlling terrestrial slugs and snails in agriculture and horticulture. The slugs and snails include all terrestrial slugs and snails, most of which occur as polyphagous pests in agricultural and horticultural crops. Important pests of these types are slugs, such as *Arion rufus* (red slug), *Arion ater* and other Arionidae, Limax species, furthermore field slugs, such as *Deroceras reticulatum* and *Deroceras agreste* from the family Limacidae, and species from the family Milacidae, and moreover harmful snails, such as those from the genera Cepaea, Discus, Helicigona and Helicella.

In the control of slugs and snails, the application rate of the baits according to the invention can be varied within a wide range. In general, between 2 and 15 kg of slug and snail bait are used per hectare, preferably between 3 and 7 kg per hectare.

The slug and snail baits according to the invention can be applied by customary methods, such as, for example, by scattering and drilling.

The invention is illustrated by the examples below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1–4: Slug and snail bait in the form of pellets.

EXAMPLE 1

Preparation of slug and snail bait according to the invention.

A mixture of

400 g of 3,5-dimethyl-4-methylthio-phenyl methylcarbamate,

15 g of p-nitrophenol,

29 g of blue colour pigment and

56 g of finely divided silica

is finely ground at room temperature. The resulting premix is mixed in a mixer with

8500 g of wheat flour of a particle size of less than 250μ,

250 g of cold-swelling maize starch and

50 g of urea/formaldehyde condensate,

with stirring at room temperature. With further stirring, 700 g of liquid molasses are then sprayed on at room temperature. At room temperature, the resulting mixture is mixed with 3000 g of water and mixed and kneaded until a homogeneous dough has formed. The dough is then, at 40° C. and under a pressure of 60 bar, extruded in the form of strands through a perforated disc, and the strands are comminuted into segments of a length of 2 to 3 mm. The resulting material is initially dried in a fluidized bed at temperatures between 30° C. and 80° C. and then in a separate drier at temperatures between 30° C. and 80° C. This gives 10,000 g of slug and snail bait in the form of pellets, which are shown in enlarged form in FIG. 1.

It is noticeable that the particles have a relatively smooth surface.

Comparative Example

Preparation of known slug and snail bait.

A mixture of

400 g of 3,5-dimethyl-4-methylthio-phenyl methylcarbamate,

15 g of p-nitrophenol,

29 g of blue colour pigment and

56 g of finely divided silica

is finely ground at room temperature. The resulting premix is mixed in a mixer with

7600 g of coarse wheat meal of a particle size of about 500μ and

1200 g of binder

with stirring at room temperature. With further stirring, 700 g of liquid molasses are then sprayed on at room temperature. At a temperature of 60° C., the resulting mixture is extruded under pressure through an annular die to give elongated particles having an average length of 2 to 3 mm. In this manner, 10,000 g of slug and snail bait in the form of elongated particles are obtained, an enlarged picture of which is shown in FIG. 2. It is noticeable that the particles have rough broken edges.

Stability Test

In a glass dish, in each case

0.5 g of slug and snail bait according to Example 1 or

0.5 g of slug and snail bait according to the comparative example

is in each case applied over the entire area, covered with in each case 100 ml of water and allowed to stand for 24 hours. The baits are then assessed visually.

FIG. 3 shows slug and snail baits according to Example 1 after the treatment with water.

FIG. 4 shows slug and snail baits according to the comparative example after the treatment with water.

It can be seen that

the bait material according to the invention is, even after the treatment with water, present in its original form and still virtually intact, whereas

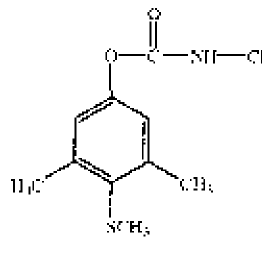
most of the bait material according to the comparative example is present in disintegrated form.

What is claimed is:

1. A slug and snail bait, comprising

a) 3,5-dimethyl-4-methylthio-phenyl methylcarbamate of the formula,

(I)




optionally in a mixture with one or more other molluscicidally active compounds,

b) fine wheat or durum wheat flour having a particle size below 250μ

c) modified starch and an urea/formaldehyde condensate,

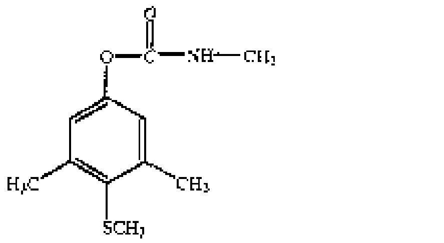
d) molasses and

e) one or more additives selected from the group consisting of preservatives, colorants, slug and snail attractants, grinding auxiliaries, bitter substances, homeotherm repellents and anticaking agents and water.

2. A process for preparing a slug and snail bait according to claim 1, comprising the steps of

(1) finely grinding a 3,5-dimethyl-4-methylthio-phenyl methylcarbamate of the formula,

(I)



optionally in a mixture with one or more other molluscicidally active compounds, and in a mixture with additives,

(2) mixing resulting premix with the fine wheat or durum wheat flour having a particle size below 250μ, and said modified starch and an urea/aldehyde condensate and then spraying the premix with molasses,

(3) admixing the resulting homogeneous mixture with sufficient water to form a dough,

(4) extruding and comminuting the dough, and

(5) drying the resulting product.

3. A method for controlling terrestrial slugs and snails, comprising the step of applying a slug and snail bait according to claim **1** to the habitat of the slugs and snails.

4. A slug and snail bait according to claim 1, wherein the slug and snail bait is in the form of particles having an average diameter of between 1 and 4 mm and an average length of between 1 and 4 mm.

5. A slug and snail bait according to claim **1**, comprising

a) between 0.5 and 15% by weight of active compound of the formula (I),

b) between 60 and 90% by weight said wheat flour,

c) between 0.1 and 6% by weight of said modified starch and said urea/formaldehyde formaldehyde-condensate,

d) between 1 and 10% by weight of molasses.

6. A slug and snail bait according to claim **5**, comprising between 0 and 5% by weight of said additives.

7. A method according to claim **3**, wherein the slug and snail bait is applied at a rate of between 2 and 15 kg of bait per hectare.

8. A slug and snail bait comprising:

a) 3,5-dimethyl-4-methylthio-phenyl methylcarbamate,

b) fine cereal flour,

c) modified starch and an urea/formaldehyde condensate,

d) molasses,

e) an additive selected from the group consisting of preservatives, colorants, slug and snail attractants, grinding auxiliaries, bitter substances, homeotherm repellents and anticaking agents, water and mixtures thereof, and

f) a molluscidically active compound selected from complexes of ethylenediamine-tetraacetic acid and iron or copper ions.

9. A slug and snail bait according to claim **8**, wherein the fomaldehyde releasing substance is selected from the group consisting of urea/formaldehyde condensates and the modified starch the modified starch is a cold-swelling maize starch.

10. A slug and snail bait comprising:

a) 3,5-dimethyl-4-methylthio-phenyl methylcarbamate,

b) fine cereal flour,

c) modified starch and an urea/formaldehyde condensate,

d) molasses, and

e) an additive selected from the group nonyloic acid vanillamide, denatonium benzoate, 2-hydroxybiphenyl, sorbic acid, p-hydroxy-benzaldehyde, methyl p-hydroxy-benzoate, benzaldehyde, benzoic acid, propyl p-hydroxy-benzoate, p-nitro phenol and mixtures thereof.

11. A method of improving stability of a slug and snail bait to rainwater comprising the steps of:

(1) finely grinding 3,5-dimethyl-4-methylthio-phenyl methylcarbamate to obtain a premix,

(2) mixing the premix with fine cereal flour having a particle size below 250μ, modified starch and an urea/formaldehyde condensate and then adding molasses to obtain a homogeneous mixture,

(3) admixing the resulting homogeneous mixture with sufficient water to form a dough,

(4) extruding and comminuting the dough to obtain a product, and

(5) drying the product.

12. A method according to claim **11**, wherein the cereal flour is selected from the group consisting of wheat flour, rye flour, rice starch, and mixtures thereof, the modified starch is a cold-swelling maize starch, and the formaldehyde-releasing substance is selected from the group consisting of urea/formaldehyde condensates.

13. A method according to claim **11**, wherein the step of finely grinding 3,5-dimethyl-4-methylthio-phenyl methylcarbamate to obtain said premix occurs in the presence of one or more other molluscicidally active compounds.

14. A method according to claim **11**, wherein the step of finely grinding 3,5-dimethyl-4-methylthio-phenyl methylcarbamate to obtain said premix occurs in the presence of one or more additives.

15. A method according to claim **11**, wherein the step of admixing the homogeneous mixture with sufficient water to form a dough comprises adding an amount of water between 25% and 35% by weight of the homogeneous mixture.

16. A method according to claim **11**, wherein the dough further comprises an additive selected from the group nonyloic acid vanillamide, denatonium benzoate, 2-hydroxybiphenyl, sorbic acid, p-hydroxy-benzaldehyde, methyl p-hydroxy-benzoate, benzaldehyde, benzoic acid, propyl p-hydroxy-benzoate, p-nitro phenol and mixtures thereof.

17. A method according to claim **11**, wherein the dough further comprises a molluscidically active compound selected from complexes of ethylenediamine-tetraacetic acid and iron or copper ions.

* * * * *

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# Field tests with a molluscicide containing iron phosphate

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**Abstract**

The effect of slug pellets containing iron phosphate was evaluated in field trials. In comparison with untreated controls, iron phosphate reduced leaf loss of lettuce, increased the number of marketable lettuce heads and reduced numbers of the slug *Arion lusitanicus*. The reference treatment metaldehyde was more effective in preventing slug damage and reduced numbers of all slug species present (*A. lusitanicus*, *A. hortensis* and *Deroceras reticulatum*). In rape, iron phosphate reduced the percentage of seedlings with slug damage, but did not affect the total number of seedlings per unit area. Iron phosphate seems promising for organic agriculture, where other chemical molluscicides cannot be used. 

*Keywords:* Arion lusitanicus; Arion hortensis; Deroceras reticulatum; Iron phosphate; Molluscicide; Organic farming; Slug

## 1. Introduction

Slugs occur in temperate and humid habitats all over the world and are important pests in a wide range of agricultural and horticultural crops (reviews in Godan, 1979; Port and Port, 1986; South, 1992). Their importance as pest organisms has drastically increased in the past few decades, as illustrated by the 70-fold increase of molluscicide usage in the UK over the last 30 years (Garthwaite and Thomas, 1996). In Central Europe, arable crops (particularly rape, but also sugar beet, maize, potato, soybean and winter cereals), vegetables (particularly lettuce and many Brassicaceae), strawberries and ornamentals are especially susceptible to slug damage, but a large array of other crops is also damaged occasionally (Godan, 1979; South, 1992).

The economically most important species of pest slugs in Central Europe are *Deroceras reticulatum* Müller (Agriolimacidae), *Arion lusitanicus* Mabille (Arionidae) and the *A. hortensis* aggregate. *D. reticulatum* is the most widespread slug species worldwide, occurring in temperate regions of Europe, Asia, North and South America, Australia and New Zealand (Godan, 1979; South, 1992). In economic terms, this species is responsible for most of the slug damage worldwide. The slug species *A. lusitanicus* was originally endemic to the Iberian peninsula, but has become a serious pest throughout Central Europe in recent years (Fechter and Falkner, 1990; Turner et al., 1998). The *A. hortensis* aggregate is divided into three species, which can only be identified safely by internal anatomy: *A. hortensis* (sensu stricto, s.s.), *A. distinctus* and *A. owenii* (Davies, 1977, 1979). *A. hortensis* s.s. and *A. distinctus* occur in Central Europe, and both were found at the study site (Iglesias and Speiser, 2001). Species of the *A. hortensis* aggregate are among the most important slug pests of field crops in the United Kingdom (Port and Port, 1986) and France (Chabert et al., 1997), but are probably less important in Switzerland. The individual species forming the *A. hortensis* aggregate are rarely separated in the agronomic literature.

Slugs are mainly controlled with bait pellets which usually contain either metaldehyde or a carbamate as active ingredients (Garthwaite and Thomas, 1996; Speiser, in press). In organic agriculture, the use of such slug pellets is not allowed or severely restricted: the EU regulations for organic farming still allow the use of molluscicides containing metaldehyde, with the restriction that they must contain repellents for higher animals, and that they must be used in traps (Schmidt and Haccius, 1992). The requirement to apply the molluscicide in traps prevents any large-scale application because it is very laborious. In addition, many national or regional organic farmers' associations

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completely prohibit the use of molluscicides containing metaldehyde. This is also the case for Switzerland (FiBL-Dokumentation, 2000). Recently, a biocontrol method for slugs based on the nematode *Phasmarhabditis hermaphrodita* has been developed (Glen et al., 1996). This method can be used in organic farming, but its practical application is limited by the high price, the short shelf life, temperature sensitivity and low efficacy against large Arionids. Thus, practicable solutions for slug problems in organic agriculture are almost lacking. Organic vegetable growers in Great Britain and Switzerland named slugs as the most important pests (Peacock and Norton, 1990; Kesper and Imhof, 1998).

A number of iron, aluminium and copper compounds show molluscicidal properties (Henderson et al., 1989, 1990; Henderson and Martin, 1990; Bullock et al., 1992; Davis et al., 1996; Young, 1996). Iron (III) phosphate is among the least toxic for mammals (EPA, 1998). Iron (III) phosphate occurs in nature in the form of the minerals strengite and metastrengite, and also as a component of several other minerals (Roberts et al., 1990; Clark, 1993). It might therefore potentially be used in organic agriculture (although none of the organic label organizations worldwide allows its use to date). Therefore, we tested the effect of a commercially available slug pellet containing 1% iron phosphate in a series of small-scale field trials. The trials were carried out in lettuce and rape because they are among the most slug sensitive vegetable and arable crops, respectively.

## 2. Materials and methods

### 2.1. Lettuce miniplot trials

Lettuce miniplot trials were established in Frick (Northwestern Switzerland) in spring 1999 and 2000. Plots, measuring 4.5 m × 4.5 m each, were arranged in a grass-clover meadow. The centre of each plot (1 m × 1 m) was mechanically cleared, and nine plantlets of lettuce with four true leaves were planted (on May 12, 1999 and on April 27, 2000). The plots were left untreated, or treated either with metaldehyde or iron phosphate. There were nine replicates in 1999 and six replicates in 2000, arranged in a completely randomized design. On one side, the meadow with the experimental plots bordered on a wildflower strip.

The timing and dosage of molluscicides were adjusted to the weather conditions, which were extremely wet at the beginning of the experiment in 1999, and drier in 2000. Metaldehyde (Metarex R.G.®; Siegfried, Switzerland; 5% active ingredient) was applied by hand at 1.5 g/m$^2$ in 1999 and at 0.75 g/m$^2$ in 2000, as recommended by the manufacturer for different intensities of slug pressure. Iron phosphate (Ferramol®; Neudorff, Germany; 1% active ingredient) was applied by hand at 5 g/m$^2$ in both years (= recommended rate; no adaptation to slug pressure recommended). Molluscicides were applied on May 12, 14 and 17 in 1999, and on April 27, May 3, 15 and June 6 in 2000.

For each lettuce plant, percentage leaf loss was assessed three times during the first week, and then once every week until harvest. Lettuces were harvested on June 16, 1999 and on June 14, 2000. At harvest, each head of lettuce was scored for the presence or absence of slug damage and weighed.

In 2000, the slug populations of each plot were estimated on May 19, 30 and 31 with traps. Flowerpot saucers (diameter 11 cm) covered with aluminium foil to reflect the sunlight were placed upside down, baited with two slices of cucumber (thickness 5 mm) underneath. Two traps were placed in each plot, on a flat spot in the meadow vegetation approximately 50 cm away from the cleared area. Traps were laid out in the evening and checked on the next morning between 7 and 9.30 a.m. All slugs inside traps were recorded, distinguishing three categories: *D. reticulatum*, *A. lusitanicus* and the *A. hortensis* aggregate. A few specimens of other slug species were also seen, but these were too rare to determine their reactions towards the experimental treatments.

### 2.2. Rape on-farm trial

The rape trial was installed in autumn 2000 in a commercial rape field in Oberwil-Lieli (Northwestern Switzerland). Twelve plots, measuring 6 m × 8 m each, were arranged along one edge of the field, bordering on a grass-clover meadow with their long edge. There were six untreated plots and six plots treated with iron phosphate, grouped in six blocks. A metaldehyde treatment could not be included in this experiment because the farm is managed organically. The rape was sown on August 29. Iron phosphate (Ferramol, applied at 5 g/m$^2$) was applied on September 1 and 12. Assessments were made on September 12, 19 and October 13. A frame measuring 40 × 60 cm$^2$ was randomly placed on the field. All rape plants within the frame were assessed for the presence or absence of slug damage. This assessment was done twice in each plot and averaged.

Three more trials with the same design were established on other organically managed farms in Wegenstetten, Oftringen and Reuenthal (Northwestern Switzerland). Because the rape suffered little slug damage in these trials, they are only briefly mentioned in the text.

### 2.3. Data analysis

Leaf loss in lettuce was integrated over time and standardized for the duration of the experiment (Speiser, 1997). Heads weighing at least 200 g and lacking severe slug damage were considered marketable, while heads weighing less than 200 g or showing severe slug damage were considered non-marketable. Statistical analyses were made with JMP (SAS Institute, USA). Leaf loss data were not distributed normally, and were therefore log-transformed. The treatment effects on leaf loss and on the number of marketable heads were determined with analysis of covariance, treating the distance from each plot to the wildflower strip as covariable; treatments were compared with the Tukey test.

The number of slugs of each species found under both traps in the same plot were added, and data for all three assessments were averaged. The treatment effects on the number of slugs of each species were determined as described above.

The number of rape plants counted in the frames was converted to numbers of intact and damaged plants/m$^2$. The total number of plants (intact and damaged) and the percentage of damaged plants were then determined. Because these variables were not distributed normally, they were log-transformed before being analysed with two-way analysis of variance.

## 3. Results

### 3.1. Slug damage to lettuce

In both years, leaf loss of untreated lettuce increased rapidly within the first 14 days, but remained almost constant thereafter (Fig. 1). Casual observations revealed that *A. lusitanicus* was the most important slug species causing damage to the lettuce. In both years, there were highly significant ($p<0.001$) differences among treatments in leaf loss and in the number of marketable lettuce heads harvested per plot (Table 1). In the untreated plots, leaf loss was highest and the fewest marketable heads were harvested. In the metaldehyde treated plots, leaf loss was lowest and the highest number of marketable heads was harvested. The iron phosphate treatment was intermediate with respect to leaf loss and the number of marketable heads. The two molluscicides metaldehyde and iron phosphate were not significantly different from each other except for the number of marketable heads in 1999. Metaldehyde was always significantly different from untreated. Iron phosphate was significantly different from untreated except for the number of marketable heads in 1999.

In 1999, lettuces close to the wildflower strip were damaged more ($p<0.001$), and there were fewer marketable lettuce heads ($p<0.05$) than towards the centre of the field. In 2000, distance to the wildflower strip affected neither slug damage nor the number of marketable heads ($p>0.5$).

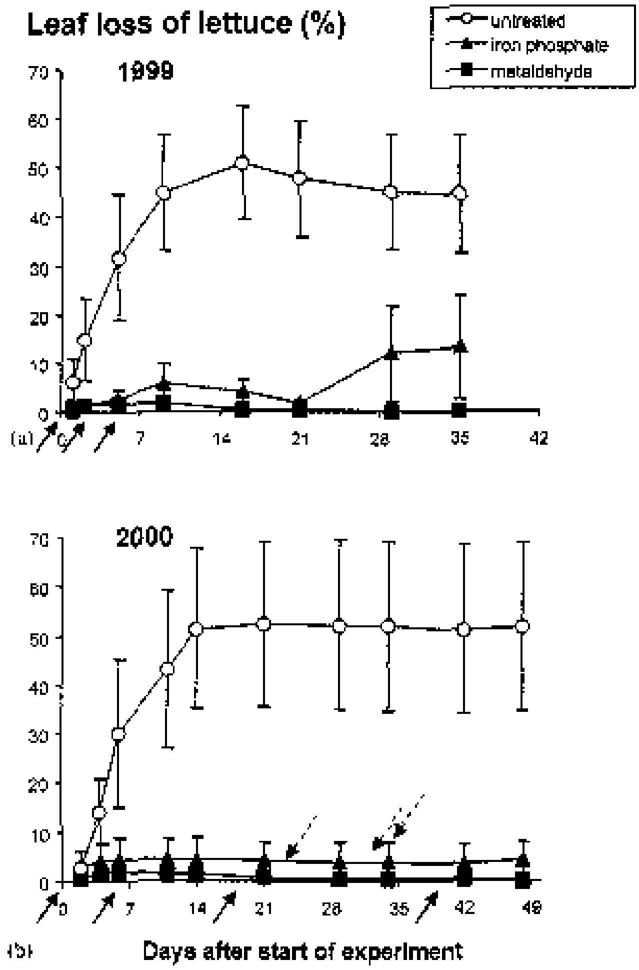


Fig. 1. Time course of leaf loss of lettuce in miniplot field trials. Error bars indicate one standard error; full line arrows indicate molluscicide applications; dashed arrows indicate assessments of slug populations (only in 2000).

Table 1
Mean leaf loss (A) and number of marketable heads of lettuce (B) in miniplot field trials in 1999 and 2000[a]

| Treatment | 1999 | 2000 |
|---|---|---|
| (A) *Leaf loss* | | |
| Untreated | 42.7 ± 11.2a | 46.5 ± 15.6a |
| Iron phosphate | 5.8 ± 4.1b*** | 4.0 ± 3.9b*** |
| Metaldehyde | 0.7 ± 0.3b*** | 0.7 ± 0.6b*** |
| (B) *Marketable heads* | | |
| Untreated | 1.6 ± 0.5a*** | 2.2 ± 1.2a |
| Iron phosphate | 3.2 ± 1.0a** | 6.2 ± 0.5b* |
| Metaldehyde | 7.2 ± 0.5b | 8.8 ± 0.2b*** |

[a] *Note*: Leaf loss is expressed as standardized integral over time, ranging from 0% to 100% (see Section 2.3); the number of marketable heads per plot can range from 0 to 9. Figures are means ± standard error. Means sharing the same letter are not significantly different ($p>0.05$). For different means, asterisks indicate the level of significance (***$p<0.001$; **$p<0.01$; *$p<0.05$).

### 3.2. *Slugs in miniplots*

The number of *D. reticulatum* was significantly lower in the metaldehyde treated plots than in the iron phosphate treated plots ($p<0.01$; Fig. 2). The number in the untreated plots was not significantly different from either the metaldehyde or the iron phosphate treated plots ($p>0.05$). The distance to the wildflower strip did not affect the number of *D. reticulatum* ($p>0.5$).

The number of *A. lusitanicus* in plots treated with metaldehyde ($p<0.01$) and iron phosphate ($p<0.05$) was significantly lower than in the untreated plots, while metaldehyde and iron phosphate were not significantly different from each other. *A. lusitanicus* was more frequent close to the wildflower strip than further away ($p<0.05$).

The number of *A. hortensis* in the metaldehyde treated plots was significantly lower than in the untreated plots ($p<0.05$), while the other treatments were not significantly different from each other. The distance to the wildflower strip did not affect the number of *A. hortensis* ($p>0.5$).

### 3.3. *Rape trial*

For the trial in Oberwil-Lieli, numbers of intact and damaged rape plants are shown in Fig. 3. The total number of rape plants (intact and damaged) was similar in the untreated and in the iron phosphate treated plots at all three assessments ($p>0.1$). The percentage of damaged rape plants was lower in the iron phosphate treated plots than in the untreated plots. However, the difference between treatments was only significant in the first two assessments (Table 2). Slug damage was distributed heterogeneously among the blocks.

At the other three sites, slug damage was generally lower than at Oberwil-Lieli, but the same pattern was observed at the first assessment: in the untreated plots, a higher percentage of plants was damaged than in the iron phosphate treated plots. However, the treatment effect was not significant in these trials. In Wegenstetten, 18% of the untreated and 11% of the treated plants were damaged ($p>0.1$). In Oftringen, 3.3% of the untreated and 0.7% of the treated plants were damaged ($p>0.5$) and in Reuenthal, 21% of the untreated and 19% of the treated plants were damaged ($p>0.5$).

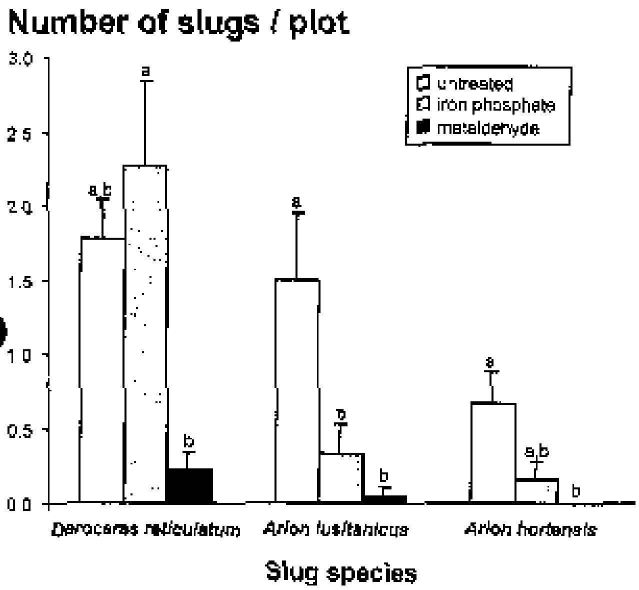


Fig. 2. Mean number of slugs of three different species trapped in the miniplots at three dates in 2000. Error bars indicate one standard error. Means sharing the same letter are not significantly different ($p>0.05$). Statistical comparisons were calculated with log-transformed data, while graph shows untransformed data.

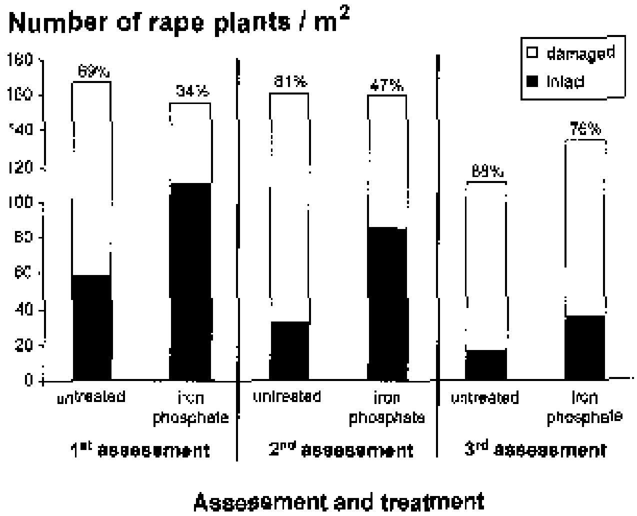


Fig. 3. Average numbers of intact and damaged rape plants (black and white bars), and percentage of damaged plants (percentages above bars), assessed three times in an on-farm field trial in Oberwil-Lieli. For significance of differences see Table 2

Table 2
Significance of treatment, block and treatment × block interaction effect on the percentage of damaged rape plants, determined with analysis of variance. Data are shown in Fig. 3

| Factors | 1st assessment | 2nd assessment | 3rd assessment |
|---|---|---|---|
| Treatment | $p<0.001$ | $p<0.01$ | $p>0.1$ |
| Block | $p<0.001$ | $p<0.001$ | $p<0.05$ |
| Treatment × block interaction | $p<0.05$ | $p>0.1$ | $p>0.1$ |

## 4. Discussion

In the present experiments, iron phosphate clearly reduced slug damage in lettuce, although it was less effective than metaldehyde. In rape, it caused a clear reduction of slug damage in one field, and non-significant reductions in three other fields. Reduction of slug damage by iron phosphate has been observed under laboratory and glasshouse conditions (Jäckel, 1999; Koch et al., 2000; Iglesias and Speiser, in press). Other molluscicidal iron compounds have been shown to be equally effective as metaldehyde or methiocarb (Henderson et al., 1989; Henderson and Martin, 1990; Young, 1996). However, none of these compounds is commercially available as molluscicides in Central Europe, and none is likely to be permitted in organic agriculture because of their synthetic nature. All pest slug species of major importance for open fields in Central Europe, *D. reticulatum*, *A. lusitanicus* and *A. hortensis*, were affected by iron phosphate in one of the studies mentioned or in the present investigation. By contrast, the formulation of iron phosphate used here was ineffective against the glasshouse slug *Lehmannia valentiana* Müller (Koch et al., 2000).

The lettuce experiment was carried out under conditions of extreme slug pressure by the large, voracious species *A. lusitanicus*. These conditions are untypical for most of the commercial vegetable growing areas but they reflect the situation at field margins and in home gardens. Under these extreme conditions, iron phosphate reduced leaf loss of lettuce by a factor of 7 in 1999 and by a factor of 11 in 2000. In contrast, the number of marketable heads was only increased by a factor of 2 in 1999 and by a factor of 2.8 in 2000. Most of the leaf loss (often total defoliation) occurred within the first two weeks after planting of lettuce, showing that lettuce is particularly susceptible shortly after planting (see Fig. 1). Later, entire heads were occasionally devoured by slugs, but more frequently, slugs only caused feeding holes in the outer leaves. These feeding holes were negligible in terms of percentage leaf loss, but they rendered a head of lettuce unmarketable. Apparently, iron phosphate was more effective at reducing early slug damage (responsible for most of the leaf loss) than late slug damage (which mainly affects the number of marketable heads). This may be partially explained by the timing of molluscicide applications, which was biased towards the early stages of the lettuce, especially in 1999. Our observations suggest that Ferramol pellets decayed more quickly than the Metarex pellets. In the neighbourhood of the wildflower strip, slug damage was elevated in 1999, but not in 2000. Probably, the wet weather in 1999 favoured extensive emigration of slugs from the wildflower strip into the study area. As evident from the trapping results, this was mainly the case for *A. lusitanicus*, which is consistent with the literature (Frank, 1998a, c).

Rape is among the most sensitive arable crops grown in Central Europe and can be completely destroyed by slugs (Godan, 1979; Chabert and Maurin, 1994; Chabert et al., 1997; Frank, 1998b, c). In Switzerland, only a minority of the fields are generally affected in any given year, and only if several unfavourable factors coincide, such as high slug populations, unfavourable soil conditions, high moisture and humidity. In this study, slug damage was negligible in economic terms, as hardly any plants were killed. Nevertheless, slug damage was substantially reduced by iron phosphate. The spatial heterogeneity observed in this trial is typical for slugs (Bohan et al., 2000).

Iron phosphate is known to cause both feeding inhibition and mortality in slugs (Koch et al., 2000; Iglesias and Speiser, in press). In the lettuce trial in 2000, iron phosphate did not reduce the number of *D. reticulatum*, but strongly reduced *A. lusitanicus* and *A. hortensis*. Whether slugs were killed, immobilized or their behaviour altered in such a way that they were found less in the traps cannot be determined from these data. A large proportion of the trapped *D. reticulatum* were freshly hatched individuals. These may have hatched after molluscicide application, and therefore escaped contact with the molluscicides. By contrast, all specimens of *A. lusitanicus* and *A. hortensis* were larger and must have been present in the field at the time of molluscicide application. Slug populations were estimated approximately two weeks after most of the slug damage occurred. Therefore, slug numbers cannot be related directly to slug damage.

In comparison to metaldehyde, iron phosphate was less effective and had to be applied at higher rates. Because of the higher recommended rate, application of iron phosphate is more expensive than application of metaldehyde. Nevertheless, iron phosphate might be competitive to conventional molluscicides in certain niche markets. In organic farming, iron phosphate would facilitate production of a number of crops considerably, and it could protect organic farmers from severe losses through slug damage. However, the use of iron phosphate as a molluscicide is not allowed in organic agriculture at present. Secondly, home gardeners might appreciate that iron phosphate is less toxic to mammals than metaldehyde or carbamates. In home gardens, slug pellets are often applied according to personal preferences rather than recommended rates (Hörler, 1992), and costs for molluscicides are less important than in commercial agriculture or horticulture. In such niche markets, iron phosphate may be an agronomically and commercially successful molluscicide.

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No. Sol. Internacional: PCT/EP2004/001421
Fecha de Presentación Internacional: 2004-09-10

Como resultado del Examen de Fondo realizado, con fundamento en el Artículo 48 de la Decisión 486 de la Comisión de la Comunidad Andina, se comunica:

## 1. Documentos estudiados

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| Descripción: | Folios 25-44 y 48 | 2005-09-23 |
| Reivindicaciones: | Folios 45-46 | 2005-09-23 |
| | Folios 88-89 | 2009-09-28 |
| | Folios 101-102 | 2010-01-21 |
| | Folios 113-114 | 2011-08-19 |
| Respuesta del solicitante: | Folios 84-86 | 2009-09-28 |
| | Folios 95-97 | 2010-01-21 |
| | Folios 109-112 | 2011-08-19 |
| Prioridad: DE10308108.9 | Folio 1 | 2003-02-26 |

## 2. Análisis de la Prioridad

*Se acepta la reivindicación de prioridad porque ésta solicitud fue presentada* dentro del plazo establecido (Art. 9 D 486) y su contenido técnico corresponde con el de la prioridad reivindicada.

## 3. Objeto de la invención

*Título de la solicitud: Cebo para caracoles.* Folio 1.

Objeto de la invención: El objeto de la presente solicitud de patente de invención *se refiere a un cebo para caracoles a base de ésteres del ácido fosfónico y* procedimientos para su obtención.

La solicitud indica que aunque ya se conocen diferentes tipos de cebos para combatir caracoles terrestres, su actividad no siempre es satisfactoria, por lo tanto, el problema técnico planteado en esta solicitud radica en la necesidad de diseñar nuevos cebos que tengan una mejor actividad molusquicida. Para solucionar ese problema técnico la solicitud plantea un cebo que comprende esteres de acido fosfónico de la formula (I) y sales de amonio, de metales alcalinos, de metales alcalinotérreos y/o de hierro o sales de amonio, de metales alcalinos, de metales alcalinotérreos y/o de hierro de los esteres del ácido fosfónico de la formula (I).

*El objeto de la presente solicitud se relaciona con la* Clasificación Internacional de Patentes (CIP): A01N25/00.

**4. De la solicitud de Patente**

Reivindicaciones *(articulo 30 D 486)*

Se le aclara al solicitante que las reivindicaciones deben ser claras por sí mismas, por lo tanto sírvase presentar la figura correspondiente al compuesto de fórmula (I-1) dentro del capitulo reivindicatorio y asimismo corregir la expresión "acido fosfórico" la cual se cree corresponde a un error y más bien hace referencia al acido fosfónico. De no ser así explique.

*Ahora bien, en términos generales el nuevo capitulo reivindicatorio no es claro en* cuanto a que mediante el procedimiento de la reivindicación 4 no se logra obtener la composición reclamada en la reivindicación 1. Nótese que mientras la reivindicación 1 hace referencia especifica al fosfato de hierro (III) como único ingrediente activo, el procedimiento de obtención de la reivindicación 4 hace referencia a la mezcla de varios ingredientes activos, no solo los esteres de ácido "fosfórico" sino además a sus carbonatos, sulfatos y fosfato de amonio y además en ninguna parte se hace referencia al catión Fe (III). Por lo tanto el procedimiento de la reivindicación 4 no lleva a la obtención de la composición de la reivindicación 1.
Sírvase corregir y reclamar específicamente el procedimiento para la obtención inequívoca del producto reclamado en la reivindicación 1.
Asimismo sírvase aclarar si el acido fosfónico reacciona de alguna manera con el *fosfato de hierro (III) para formar otra especia química o si simplemente se trata* de una mezcla de componentes para luego ser extruidos.

Ahora bien, la composición de la nueva reivindicación 1 no se encuentra enteramente sustentada en la descripción puesto que contrario a lo que afirma el solicitante el ejemplo 1 no solamente utiliza el fosfato de hierro (III) como ingrediente activo, sino que además incluye el 600g de ácido fosfónico al 60%, los cuales también pueden actuar como molusquicidas. Por lo tanto la composición ahora reclamada podría considerarse una ampliación de materia, en tanto que se suprime una caracteristica técnica esencial sin ninguna razón técnica.

Se le sugiere al solicitante que defina cada uno de los componentes del cebo de interés que se encuentren enteramente soportados en la descripción y que indique en el preámbulo de la reivindicación que el objeto de la invención se refiere a "una composición de cebo para el control de caracoles" con el fin de facilitar la ubicación de la materia de invención, en un campo tecnológico determinado.

En consecuencia, el capitulo reivindicatorio no cumple con el requisito de claridad y sustento en la descripción de acuerdo al art. 30 de la Decisión 486 y el art.22 del Tratado PCT.

**5. Determinación del Estado de la Técnica**

Considerando que la fecha de la solitud prioritaria 2003-02-26 se realizó la búsqueda en el estado de la técnica y se encontraron los documentos relacionados a continuación que pueden afectar la patentabilidad del objeto de la presente solicitud:

| *Nº* | *Documento* | *Título* | *Fecha de publicación* |
|---|---|---|---|
| *D2* | *US 6384082* | *Snail bait* | *2002-05-07* |
| *D3* | ***Crop Protection, Volume 21, Issue 5, June 2002, Pages 389-394*** | Field tests with a molluscicide containing iron phosphate<br>B Speiser, C Kistler | *2002-06* |

*El solicitante podrá consultar los documentos citados en las siguientes URL s*
D2:
http://worldwide.espacenet.com/publicationDetails/originalDocument?CC=US&NR=6384082B1&KC=B1&FT=D&ND=4&date=20020507&DB=EPODOC&locale=en_EP
D3: anexo al expediente

El documento D2 divulga cebos para el control de caracoles y babosas que comprenden: a) 3,5-dimetil-4-metiltio-fenil metilcarbamato, opcionalmente en combinación con uno o más de otros compuestos molusquicidas, b) harina de cereales, c) almidón modificado y una sustancia que libera formaldehído, d) la melaza y opcionalmente aditivos y su proceso de preparación.

El documento D3 divulga un estudio que demuestra el efecto anti babosas del fosfato de hierro y lo postula como un ingrediente activo molusquicida prometedor para el control eficaz de babosas en cultivos útiles de agricultura.

**6. Examen de patentabilidad (artículo 14 D486)**

Nivel Inventivo *(artículo18 D486)*

*La solicitud de patente en estudio presenta en su reivindicación* 1 una composición que contiene 1) fosfato férrico (III); 2) harina de cereales de grano fino, seleccionada entre: harina de trigo, harina de centeno, harina de arroz, harina de trigo duro y harina de trigo blando, 3) un aglutinante seleccionado entre: almidones modificados, substancias disociables del formaldehído, acetato de polivinilo parcialmente saponificado y melaza y 4) uno o más aditivos...

| *Características esenciales de la invención* | *Características esenciales del documento D2* | *Características esenciales del documento D3* |
|---|---|---|
| *composición que contiene* | *Composición de cebo para caracoles que comprende:* | *Composición molusquicida* |
| *1) fosfato férrico (III);* | *3,5-dimetil-4-metiltio-fenil metilcarbamato y opcionalmente en combinación con uno o más de otros compuestos molusquicidas entre los cuales se sugiere quelatos de metales especificamente de hierro o hierro-cobre* Columna 2. 50-58 | *Fosfato de hierro Pagina 390* |
| *2) harina de cereales de grano fino, seleccionada entre: harina de trigo, harina de centeno, harina de arroz, harina de trigo duro y harina de trigo blando* | *harina de cereales de grano fino, seleccionada entre: harina de trigo, harina de centeno, harina de arroz, harina de trigo duro y harina de trigo blando* Columna 2. 59-65 | *No hace referencia especifica* |
| *3) un aglutinante seleccionado entre: almidones modificados, substancias disociables del formaldehído, acetato de polivinilo parcialmente saponificado y melaza* | *un aglutinante seleccionado entre: almidones modificados, substancias disociables del formaldehído, acetato de polivinilo parcialmente saponificado y melaza* Columna 2. 64-columna 3. 7 | *No hace referencia especifica* |
| *4) uno o más aditivos* | *Otros aditivos* columna 3. 8-12 | *No hace referencia especifica* |

Los documentos D1 y D2 se consideran el estado de la técnica cercano a la invención definida en la reivindicación 1 porque:

El *documento D2 divulga cebos para el control de caracoles* y babosas que comprenden un ingrediente activo molusquicida que es 3,5-dimetil-4-metiltio-fenil metilcarbamato el cual puede estar opcionalmente en combinación con uno o más de otros compuestos molusquicidas, entre los cuales se cita especificamente quelatos complejos de iones hierro (columna 2 linea 57). Asimismo dichos cebos comprenden los mismos componentes del cebo de esta solicitud, *a saber: harina de cereales, almidón modificado, sustancias disociables* del formaldehído, melaza y otros aditivos de formulación.
Es así como desde el documento D2 ya se conocían cebos para el control de caracoles que en su formulación básica comprenden los mismos componentes del cebo de esta invención. Así como también desde D2 se conoce que las sales de hierro tenían actividad molusquicida.

Entonces la diferencia de D2 con la presente solicitud de patente radica en que el documento D2 no incluye fosfato de hierro de (III) como componente molusquicida de su cebo sino que utiliza el derivado 3,5-dimetil-4-metiltio-fenil metilcarbamato.

Ahora bien, el documento D3 divulga un estudio donde se evaluó la efectividad del *fosfato de hierro (III) para el control efectivo de babosas y su impacto sobre* cultivos de lechuga. Es así como desde la publicación del documento D3 se sabía que específicamente, el fosfato de hierro (III), tenía una buena actividad molusquicida y se sabía que dicho compuesto podría ser potencialmente útil para el control efectivo de babosas y caracoles en cultivos agrícola útiles. Se llama la atención en cuento a que en el numeral 4. "Discusión" del documento D3, se indica claramente que el fosfato de hierro (III) es una sustancia prometedora como molusquicida y es recomendado por su alta efectividad.

Así entonces, la diferencia de D3 con la presente solicitud radica en que el documento D3 no divulga específicamente una formulación tipo cebo, sino que utiliza pellets de fosfato de hierro al 1%. No obstante, la enseñanza fundamental del documento D3 está dada en cuanto a que allí se indica que el fosfato de hierro (II) es un fuerte molusquicida y es ya comercializado en forma de pellets.

De este modo, el efecto que logra el incluir el fosfato de hierro (III) como componente molusquicida de un cebo para el control de caracoles o babosas es que al parecer se mejora la actividad de la formulación.
Por lo tanto, el Problema Técnico Objetivo que pretende resolver esta invención se puede formular así: "cómo modificar el cebo conocido en D2 para aumentar la actividad de la formulación y tener un mejor control de caracoles."
Sin embargo, el documento D3 ya había presentado el fosfato de hierro (III) como un activo molusquicida prometedor que tenía excelente control de babosas en cultivos de lechuga.

En consecuencia, la persona del oficio normalmente versada en la materia, plantearía un cebo para caracoles incluyendo fosfato de hierro (III) como ingrediente activo debido a su excelente potencial molusquicida, tal como lo divulga D3, en una formulación tipo cebo tal como la de D2. Por lo esta oficina considera que la composición de esta invención se deriva de manera obvia del *estado del arte*, no provoca *ningún efecto técnico sorprendente o inesperado y* carece de nivel inventivo.

Se llama la atención del solicitante en cuanto a que los estudios presentados en el capitulo descriptivo no demuestran ningún efecto técnico sorprendente o inesperado para la composición reclamada en la reivindicación 1. Nótese que la composición de los ejemplos comprende una mezcla entre fosfato de hierro (III) y acido fosfónico y no se hace referencia a una composición cuyo único ingrediente *activo sea fosfato de hierro (III).*

Ahora bien, la reivindicación 4 plantea un procedimiento para la obtención de composiciones según la reivindicación 1, 2 o 3 caracterizado porque:

1) Se prepara una mezcla constituida por esteres de acido fosfórico de la formula (I-1) o carbonatos, sulfatos y fosfatos de amonio de los ésteres de ácido fosfórico de la formula (I-1), al menos un diluyente y en caso dado un aditivo.
2) Le mezcla obtenida de este modo, se combina con harina de cereales de grano fino, en caso dado con aglutinantes y en caso dado con aditivos.
3) La mezcla resultante se agita en caso dado con la cantidad de agua necesaria para que resulte una pasta homogénea
4) La pasta se extruye se desmenuza y
5) Se seca el producto obtenido.

| *Características esenciales de la invención* | *Características esenciales del documento D2* | *Características esenciales del documento D3* |
|---|---|---|
| procedimiento para la obtención de composiciones según la *reivindicación* 1, 2 o 3, que comprende: | *Procedimiento para la obtención de un cebo para caracoles que comprende: Columna 4 línea 52 a columna 5 línea 2.* | *No hace referencia al procedimiento de obtención de un cebo* |
| Mezclar esteres de acido fosfórico de la formula (I-1) o carbonatos, sulfatos y fosfatos de amonio de los ésteres de ácido fosfórico de la formula (I-1), al menos un diluyente y en caso dado un aditivo. | *Mezcla los ingredientes activos molusquicidas con los aditivos necesarios* | *Hace referencia a pellets que contiene fosfato de hierro (III) al 1%* |
| Combinar con harina de cereales de grano fino, en caso dado con aglutinantes y en caso dado con aditivos. | *Combinar con harina, en caso dado almidón o melaza* | *No hace referencia* |
| Agitar en caso dado con la cantidad de agua necesaria para que resulte una pasta homogénea | *Agitar con la cantidad de agua necesaria par al formación de una pasta homogénea* | *No hace referencia* |
| Extruir y desmenuzar | *Extruir* | *No hace referencia* |
| Secar el producto obtenido. | *Secar el producto* | *No hace referencia* |

Los documentos D2 y D3 se consideran el estado de la técnica cercano a la invención definida en la reivindicación 1 porque:

El documento D2 divulga un procedimiento para la obtención de un cebo para caracoles que comprende las mismas etapas del procedimiento de esta solicitud, una mezcla inicial entre el ingrediente activo, al menos un diluyente y en caso dado un aditivo, posterior combinación con *harina y otros aglutinantes, la adición* de agua hasta formar una pasta homogénea, posterior extrusión y por último el secado del producto así obtenido

Así, la diferencia de D2 con la presente solicitud radica en que el documento D2 no utiliza fosfato de hierro (III) como ingrediente molusquicida principal.
El efecto dicha diferencia es que se obtiene un cebo alternativo que al parecer según la divulgación inicial tiene mejor actividad.
Por lo tanto, el Problema Técnico Objetivo que pretende resolver esta invención se puede formular así: "cómo modificar el proceso conocido en D2 para obtener un cebo de mayor actividad"

Ahora bien, como ya se indicó el documento D3 enseña la prometedora efectividad del fosfato de hierro (III) como agente molusquicida, la cual quedo demostrada por su excelente control de babosas en cultivos de lechuga.

En consecuencia, la persona del oficio normalmente versada en la materia, plantearía el mismo proceso de obtención de un cebo conocido desde D2, pero esta vez utilizado el fosfato de hierro (III) como ingrediente molusquicida, para si obtener un cebo alternativo y potencialmente mejorado según lo indicado en D3. Por lo esta oficina considera que el proceso de interés se deriva de manera obvia del estado del arte, no provoca ningún efecto técnico sorprendente o inesperado y carece de nivel inventivo.

En este mismo sentido se le aclara al solicitante que si bien el producto no es inventivo su proceso de obtención tampoco lo es. Pero además se llama la atención, igual que en el análisis de patentabilidad para la composición, en cuanto a que los estudios presentados solo muestran la obtención de una composición que comprende la mezcla entre fosfato de hierro (III) y acido fosfónico (que al parecer seria mas activa en el sistema estudiado) y en ningún momento se mostró la obtención de una composición donde el único ingrediente molusquicida fuera el fosfato de hierro (III).

## 7. Conclusión

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados así:

| N° | Documento N° | Reivindicaciones afectadas | Requisito que afecta |
|---|---|---|---|
| D1 | US 6384082 | 1-4 | Nivel Inventivo |
| D2 | Crop Protection, Volume 21, Issue 5, June 2002, Pages 389-394 | 1-4 | Nivel Inventivo |

## 8. Respuesta a los argumentos del solicitante

- El solicitante indica que ha decido presenta un nuevo capitulo reivindicatorio en el cual se ha eliminado la alusión genérica al éster de acido fosfónico y sus sales y la ha sustituido por "fosfato férrico III" que es el componente específicamente mencionado en el ejemplo 1.

Esta oficina aclara al solicitante que en el ejemplo 1 de la divulgación inicial no se incluye únicamente el fosfato de hierro (III) como ingrediente activo, sino que además se adiciona una solución de ácido fosfónico, la cual se suma al efecto total molusquicida del cebo final. En ese orden de ideas, la actividad molusquicida del cebo de interés no debe entonces atribuirse exclusivamente a la presencia del fosfato de hierro (III) sino que se debe a la mezcla del fosfato de hierro (III) y el acido fosfonico.

Asimismo, se le aclara al solicitante que dicha modificación también podría entenderse como una adición de materia en tanto que se esta retirando una característica técnica esencial de la invención y de esta manera, la composición de interés es diferente.

*Ahora bien, se da por superada la objeción respecto a la falta de unidad de* invención y se da por superada la afectación de nivel inventivo respecto al documento D1: DE3612161.

Notifíquese el presente oficio conforme a lo dispuesto en el numeral 5.2, literal e), del capítulo quinto del título primero de la Circular Única N° 10 de 2001.

**JOSE LUIS SALAZAR LÓPEZ**
Director de Nuevas Creaciones (C)

El anterior requerimiento fue notificado por fijación en lista, de fecha
23 [illegible]

Elaborado por: Sandra Isabel Calderón.
Revisado por: Jacqueline Alfonso OK. [illegible]
Aprobado por: José Luis Salazar.