

two anticoagulant rodenticides are on the positive list of for a reduced time period of seven years instead of the usual ten.

Development of new rodenticides is particularly difficult, since it is unlikely that a selective mode of action for the control of rodents exists that would not affect other vertebrates. Due to the limited prospects of success, there is practically no research in this field. As a consequence, the availability of chemical control agents against rodents will decrease even more in the future.

Conclusions

The discussion on chemical products for the control of harmful organisms has been shifting from a factual to an emotional debate in the past years. Consumers are concerned about chemicals in the environment and what they perceive to be the potential dangers from these omnipresent but invisible substances. A wide variety of fresh foods year-round and clean drinking water are taken as a matter of course, while the necessity and benefits of plant protection and biocidal products are ignored by the general public.

Similarly, regulatory decisions are becoming more and more political instead of science-based. Both the revision of the Plant Protection as well as that of the Biocidal Products Directive are targeted to eliminating substances perceived to be of concern and promoting non-chemical alternatives, by applying the precautionary principle. The fact that there are no "zero risk" situations in life and that the benefits of chemical pesticides (comprising plant protection products and biocides) outweigh their risks if they are applied correctly must therefore be made clear to decision-makers as well as to the public.

As the bi-annual reports of the German government on the progress of implementation of the BPD and on the substitution of high-risk products (3) clearly point out, non-chemical alternatives are scarce and have so far proven insufficient in terms of efficacy and costs. On the other hand, an increasing bureaucracy blocks the development of innovative chemical products without adding to consumer or environmental safety.

The report on the impacts of the Biocidal Products Directive (4) points out that small and mid-sized companies are most affected by the requirements of the legislation. Similar conclusions had been drawn for the Plant Protection Directive in 2001 (5). Many of the niche products supplied by those smaller companies have already disappeared from the market, resulting in gaps especially for minor uses. The research-based industry will not be able to deliver new solutions for all calamities in the future. How this situation will be dealt with in case of emergencies remains open.

Literature

Review Programme of existing pesticides, http://ec.europa.eu/food/plant/protection/evaluation/rev_prog_exist_pest_en.htm

Position of the European Parliament adopted at second reading on 13 January 2009 with a view to the adoption of Regulation (EC) No .../2009 of the European Parliament and of the Council concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC (P6_TC2-COD(2006)0136).
<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2009-0011+0+DOC+XML+V0//EN&language=EN#BKMD-17>

Zweiter Bericht über die Substitution risikoreicher durch risikoärmere Biozid-Wirkstoffe und Biozid-Produkte, über den aktuellen Sachstand zur Umsetzung der Biozid-Richtlinie und des Überprüfungs-Programmes der Altwirkstoffe sowie der aktuellen Entwicklungen auf EU-Ebene (Bundestags-Drucksache 16/2909)

Study on Impact of the implementation of Directive 98/8/EC concerning the placing on the market of biocidal products, http://circa.europa.eu/Public/irc/env/bio_reports/library?l=/study_implementation/report_101007pdf_EN_1.0_&a=d

Report from the Commission to the European Parliament and the Council: Evaluation of the active substances of plant protection products (doc. COM (2001) 444), 25 July 2001

20- Actual registrations for post harvest disinfestations and perspectives in France

Ducom, Patrick

Laboratoire National d'Études de Techniques de Fumigation
et de Protection des Denrées Stockées
Villeneuve d'Ornon, France 33140

Abstract

During the last few years, many pesticides were banned. For SPP, in France, this situation is particularly critical since they were key compounds. For grain, DDVP was used to meet the requirement of zero insect when the grain was sold, for mills, methyl bromide and DDVP were the base of the disinfestation.

France is reluctant to employ gases like phosphine for grain, but as long as contact insecticides will be permitted, they will be used. Ethyl formate, applied as a liquid, but acting as a gas, could be an interesting compromise. Research shows good results but sorption, and then distribution in the grain, is the main problem to overcome. Mills are in a bad position since DDVP has no alternative and, as a result, curative disinfestation is not an option, heat or fumigation.

Introduction

Heat is not yet used in France for many reasons and fumigation with sulfuryl fluoride is not so easy to apply properly and expensive. The need for a chemical alternative is urgent, and unlikely like DDVP. A fumigant could be added to SF, with a complimentary nature, the old and controversial formonitril, more known as HCN.

- The concept of Integrated Pest Management (IPM) comprises control of pest insects when infestation has occurred.
- The insect population has to be reduced or totally killed.
- There exist physical ways to perform pest control like application of cold or heat.
- Still, chemical compounds are an integral part of IPM. The presentation focuses on these chemicals.

The application of insecticides requires in any case a registration for the envisaged purpose. Therefore, it is important to know about the registrations in each member state.

Agro-food industry sector: structures

Chemical disinfestation includes:

- 1) Application of long lasting insecticide on surfaces.
- 2) Fogging when flying insects are seen.
- 3) Once a year, a curative total disinfestation by fumigation.

For structures, the following registrations are in place

Fogging:

- Pyrethrum 12 mg/m³ + Piperonyl butoxid (PBO).
- This compound is not an alternative to the phased out DDVP!
- The loss of DDVP is a serious concern for two main reasons.
 - 1) The high vapour pressure of 10-2 mm Hg and correlated efficacy compared with 10-10 mm Hg for pyrethroids.
 - 2) The good efficiency against all insects, even *Tribolium* spp.

Dichlorvos (DDVP) has been phased out:

- The grain industry is very affected by the ban of DDVP.

The way they used to work with DDVP was:

- Grain ventilation.
- Sometimes use of long lasting insecticide.
- When the grain moved out of the silo, DDVP was systematically applied or only when a live insect was detected.

Long lasting contact insecticides:

- Chlorpyrifos-methyl 0.5 g/m².
- Pyrimiphos-methyl 0.2 g/m².
- Deltamethrin 0.125 (+ PBO; 10 times application).

Fumigation:

- Sulfuryl fluoride CTP max 1500 gh/m³.

About border lines between Plant Protection Products (PPP) and Biocidal Products (BP), the target pest should be part of the decision: a *Tribolium* beetle is a storage pest to be treated with authorised PPP pest even if it appears in a bakery or pasta factory! These beetles with their biology and possibilities to be avoided and controlled are studied by storage specialists. Responsible scientists and administrators for the biocidal products normally are involved in control of cockroaches, flies and fleas, the typical pests with impact for human hygiene and not with *Tribolium*

spp., typical stored product pest insects. For the industry it is a heavy burden to have to apply for two registrations with different national authorities and different data packages. Harmonisation seems to be the way for the future.

Agro-food industry sector: stored products

For stored products, like dried fruits, nuts, beverages, herbs, etc. registrations are

- phosphine generators,
- aluminum phosphide and magnesium phosphide,
- the Canadian Cytec company tried to register ECO2fume but abandoned this idea last year.

Agro-food sector: legumes and oil seeds sector

Registrations are:

- Beans have a deltamethrin registration.
- For all other products, generators of phosphine, aluminium phosphide (AIP) and magnesium phosphide (Mg3P2) for the grain sector.

Grain sector includes three categories:

- Cereals (wheat, barley, oat, triticale).
- Maize.
- Rice (paddy, brown or cargo and white rice).

Contact insecticides registered in France:

- Active ingredient g/t.
- Chlorpyrifos-methyl 2.5 cereals.
- Cypermethrin 1.67 (+PBO; 3 times) cereals.
- Pyrimiphos-methyl 4.
- Deltamethrin 0.5 (+PBO; 10 times).
- Pyrethrum 3 (+PBO) 4 to 8 litres of ready to use formulation for 100 t.

Insecticide efficacy (s = susceptible):

- Organo-P – Pyrethroids.
- *Sitophilus* spp. - S - Not very S.
- *Rhyzopertha dominica* – tolerant Very S.
- *Tribolium* – S - Not very S.
- Others – S – S.



Fig. 1 Small system for spraying the grain

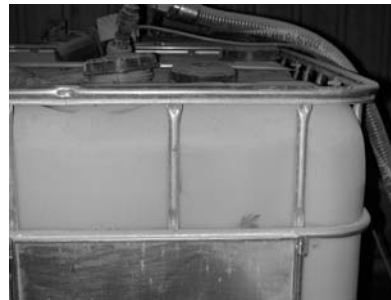


Fig. 2 Insecticide Tank, 1000 litres



Fig. 3 Insecticide application system

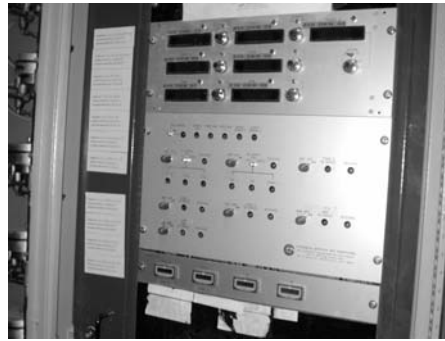


Fig. 4 Local control panel – remote control from the desk

Perspectives for Phosphine (PH₃)

Fumigation of grain in silo bins: During storage, application of the phosphine generating compounds on top of the grain and use of a recirculation system; together with a recirculation system even gas distribution can be achieved; much less safety problems for the workers due to this approach; the rests of the phosphine generating phosphides do not remain in the grain; fumigation can take place at any time without moving the grain.

As phosphine fumigation is a fairly “new” technique for grain in France, the new way of phosphine release avoids

- that the fumigator has to go on the top of the silo to introduce the generating phosphide product,
- the time taken by the chemical reaction to release the gas,
- the necessary reaction of the remaining undecomposed phosphide with liquid water.

Research on new compounds, especially for disinfestation of grain

GLO2, CSIRO patented a mixture of Ethyl Formate and 5% Allyl Iso Thio Cyanate. This compound could also be of interest for the French grain sector: It is a fumigant that can be applied as a liquid, like a contact insecticide. The appropriate dosage has still to be defined. The Australian climatic conditions are too different to use the Australian dosages directly also for France concerning the different temperature and moisture content. Dosage has to be higher, more than 80 g/m³ and flammability is close to this concentration. Very big tendency for sorption: in some hours the whole amount is sorbed on grain. Vapormate is not an option in French conditions with not very gas tight grain bins.

Research on new compounds

In France, research is dealing with

- Ethane dinitrile (EDN) for museum fungi as an alternative to ethylen oxide: is very effective if the relative humidity is high.
- Methyl iodide (MJ) as preliminary work on grain as a model. Seems to be more effective than methyl bromide.

Research on new ways

For structures, since sulfuryl fluoride (SF) has a very good efficiency towards all stages except eggs, that require much higher ct products than the other stages. SF has a good penetration property. To compensate for the weak effects towards eggs, SF could be combined with formonitril, HCN. HCN kills eggs of *Tribolium castaneum* at a CTP of 5 gh/m³, but does not penetrate more than 4 cm of flour.