

Trouble in store

Organophosphate sheep dip can poison farmers, but the effects of other OPs are less well documented. Pirimiphos-methyl is one of these: nearly everyone in arable farming is aware of its use, but few would admit that it is as controversial as OP sheep dips. John Harvey reports.

Pirimiphos-methyl is the active ingredient of a product called Actellic which is manufactured by Zeneca. It is used as a spray and a dust on stored grain to kill insect pests. Actellic is the market leader by a long way. The only other available products are both OPs: Satisfar, based on the active ingredient etrimfos, is made by Novartis; and Reldan, based on the active ingredient chlorpyrifos, is made by Dow Elanco. Reldan is not a competitor in the real sense, because it is only available as an emulsion for spraying on to grain, and is not used as a dust.

Zeneca insists that Actellic has been used all over the world safely for 25 years as an admixture on grain as well as in a range of public health applications. The company says Actellic has a low mammalian toxicity and was only recently reviewed by the Pesticides Safety Directorate and given a full label registration.

But, and it is a very big but, the evidence against using Actellic D is persuasive. Three of the men profiled here either say they have been made ill by the product or that it is possible to store grain without using it. A fourth will not use it on his wheat and appears to have suffered no penalties from the grain buyers as a consequence. Perhaps most important of all, the Health and Safety Executive (HSE) admits that it has monitored workers using Actellic and found some evidence of 'significant exposure' to OP chemicals. There is also evidence that more and more insects are becoming resistant to Actellic treatment (see box).

The obvious question is whether it is right to go on using a product which may damage human health, is not effective against some grain pests, and can be avoided by engineering changes to grain stores. This question should be in the minds of members of the Advisory Committee on Pesticides, who have been asked by the Government to re-review all anti-cholinesterase OPs, including pirimiphos-methyl. To help the review process, here are the experiences of three men who have used pirimiphos-methyl and one who has avoided it.



"I don't think protective clothing made any difference, I still had stomach upset, breathing problems, headaches, sweating..."

Richard Bruce

Richard Bruce lives on the Isle of Wight and has been diagnosed with OP poisoning. He is sensitive to light, perfumes and has lost the feeling in his hands.

Before 1978, Mr Bruce used Actellic smoke and wore very little protective clothing. "I don't think it was a requirement at the time." From about 1980, Actellic was used to treat the barn walls and surfaces because storage mites had shown resistance to another product. Actellic dust was used in grain fed to the cows from 1985 until the herd was sold in 1991. "I used Actellic on the farm in a garden sprayer with a 12 foot pole to keep the spray away from me. This was a liquid form used inside the barn where we stored grain to feed to cattle."

"We had problems with resistant mites so we used to treat the barn walls and surfaces with Actellic, the grain with dust and every year we used the smoke to get into the crevices which we couldn't reach with the

sprayer."

Once he was farm manager and responsible for buying his clothing, Mr Bruce "dressed up like a spaceman. I wore a complete overall, carbon filter mask, a face visor, goggles, rubber boots and rubber gauntlets."

"I don't think protective clothing made any difference because every year we used the product, even though I was dressed up like that, I still had stomach upset, breathing problems, headaches, sweating and stuff like that, but it was only a transient thing." Mr Bruce noticed some odd effects on his heart "in that it raced more than it should and I was always carrying handkerchiefs because my nose was running all the time. But you didn't put those things down to the chemical because you were always being told it was safe."

Gradually, over the years, Mr Bruce said farmers were instructed by the Government to ensure there was no insect contamination of the grain. "ADAS (the Agricultural Development and Advisory Service) used to send out instructions on how to clean and fumigate your barn and it was something everyone had to do and still have to do now."

Most of the grain grown on the farm was fed to the cattle. "Now I find it difficult to hold a conversation for any length of time if I have to concentrate as well. I very rarely go out of the house because if I get a touch of perfume I'm finished." Mr Bruce has been diagnosed six times as having OP poisoning and the condition has been written on sick notes. "No less a person than the head of the National Poisons Unit, Dr Glyn Volans, confirmed that I should be treated as having been poisoned by organophosphates. But unfortunately, on the same day, he said he would withdraw that diagnosis, so he's a bit confused."



"An invitation to HSE to show us how to dust grain has been very curtly and abruptly refused"

Michael Pearce

Michael Pearce runs a company specialising in the treatment of stored grain, and lives near Yeovil in Somerset. He has used Actellic, and says current government advice about storing grain is flawed and encourages use of the chemical.

"The present policy laid down by the Central Science Laboratory that you trickle ventilate from the bottom (of the stored grain) pushing warm air to the top. This is almost guaranteed in the average farm situation to give you these pests." Traps have been introduced to show where the insects are, but Mr Pearce said you could "almost guarantee" to find them. "The whole thing has been designed to manufacture a problem."

Most of Mr Pearce's customers buying his services almost never have to use any pirimiphos-methyl or another product. "There is a long history of very successful stores, particularly in the brewing trade, where no insecticide is either allowed or used because all these problems can be controlled by engineering."

There are two ways of ventilating grain: either start at the bottom of the stored heap and blow air to the top or take it from the top and pull it out at the bottom. "There is no doubt about it if you pull it down from the top, the top stays dry, stays cold and is totally inhospitable to roaming bugs and they do not multiply there because the temperature isn't right, and there is no water and without those essential ingredients they don't prosper. If you blow it, you provide those things, you can't help it happening. Now this argument has gone on for years, but the interesting thing is that the people who do it down and out don't get the problem: it's as simple as that."

Applying Actellic dust to grain is "a bit like putting stuff on your garden. You have a bucket or container, good gloves and you have to spread it around. It is very vague and an invitation to HSE to show us how to do it has been very curtly and abruptly refused.

"If you are in a store with 15 feet high grain at a safe moisture content, every time you put your foot down you will sink nearly to your knees. It's a very laborious business, and if you are wearing protective gear and clutching your Actellic container, it is very exhausting."

Mr Pearce remembers an instruction from the Home Grown Cereals Authority to farmers last year about applying Actellic and digging it in. "Of course, the very thought of that while wearing all those clothes is a death sentence for someone like me who is a bit over-weight and a bit elderly."



"I have suffered increasing health problems associated with OP use"

John Coyte

John Coyte farms near Plymouth in Devon. He grew his own grain, stored it, used Actellic and fed the grain to his cattle. He has lost feeling in the lower half of one of his legs and has the symptoms of OP poisoning. "I have used pirimiphos methyl in dust form dating back to the years of imperial measurement at seven ounces per tonne, surface incorporated. But over recent years I have suffered increasing health problems associated with OP use."

"Following my problems with exposure in July this year with full safety gear, I removed all OPs from this farm. I discussed my problems with Dr Tim Marrs, senior toxicologist at the Department of Health, regarding late arrhythmias (heart disturbances)."

"I feel it is my duty to point out to anyone using these chemicals the risk to their health. I am concerned that higher standards of treatment in grain stores will persuade farmers to use increasing amounts leading to low-level exposure and chronic ill health."

Bob Wright

Bob Wright has an arable farm in a family partnership near Leamington Spa in Warwickshire where wheat, oilseed rape and linseed are grown. Actellic has not been used on the stored wheat, but Mr Wright has occasionally used Actellic dust on stored rape seed to control weevils.

"Just over a year ago, the first two loads of a 500 tonne contract of Riband wheat were rejected by E.W. Berrows, the grain storers, because it contained mites. We stored the wheat for 16 months without putting any OP chemical on it, and two months ago we sold it to the maltsters Wallpole and Wright for £90 a tonne. So we stored the same wheat in the same building and achieved a premium on it without using any chemical."

The secret to successful grain storage is ventilation, Mr Wright said. He uses on-floor drying and blows freezing air through the grain once a fortnight during the winter. Mr Wright bakes his own bread using flour from a nearby mill, but he is not a convert to organic farming. He avoids OP chemicals because he thinks storage mites are resistant to the chemicals and because there should be no OP residues in food.

Comment

In their last survey for the Ministry of Agriculture, Fisheries and Food, which covered the 1994 harvest going into 1995, the Central Science Laboratory (CSL) found that about 12 tonnes of pirimiphos methyl had been used in farm grain stores. In the survey before that covering 1990/91, the figure was about the same. Although the figure for commercial grain stores varies, it can be up to one tonne. There was a survey of animal feed mills in England and Wales during 1991, but CSL staff regard the data as incomplete. The only category not covered in any detail is export grain silos.

Some of this tonnage goes straight through into food. In 1993, 44 per cent of samples of wholemeal bread contained residues of pirimiphos methyl, and the equivalent data for 1996 still showed residues in 23 per cent of samples.

Many arable farmers in England and Wales will be members of the Assured Combinable Crops Scheme which "... aims to establish standards for the production, harvesting, on farm handling and on farm storage of combinable crops, cereals, oilseeds and protein crops, and to verify producers' compliance with them." In its first year, the scheme has registered 5,081 members and 8,918 farms covering 2.7 million acres and 7.5 million tonnes.

The scheme says that: "Longer term storage (of harvested grain) requires a specific storage strategy. The temperature and condition of grain must be monitored weekly... Appropriate corrective action must be taken to remedy bird and rodent activity and hot spots." But the scheme does not set any engineering standards to help long-term storage.

Evidence is emerging which shows that people are allergic to storage mites, whether alive or dead. It is unlikely that these mites arrive from farms because most will be removed during storage or by the grain buyers. Mites have been found on supermarket shelves and in kitchen cupboards. It is difficult for any parent with an allergic child, for example, to take action against any supplier because, unlike other countries, the UK has not set maximum levels for mite contamination in food.

As there is clear evidence that Actellic causes illness and is ineffective against many strains of mite, it should be banned from use in agriculture. Farmers should be clearly advised how to engineer grain storage through the Assured Combinable Crops Scheme so that they can avoid using any chemical if they wish. One of the new Food Standards Agency's priorities should be to set standards for storage mites in food.

OP resistance extremely widespread

A paper at the recent Brighton Conference may have heralded the end of OP use in grain stores. Dr Ken Wildey from the Central Science Laboratory, a Ministry of Agriculture, Fisheries and Food agency, reports finding 93% of strains of flour mite surviving twice the maximum approved dose of pirimiphos-methyl after 14 days exposure in wheat. "Field populations of the predominant storage beetle pest, the saw-toothed grain beetle, are still likely to be controlled by effective residual applications of pesticide to stored grain, if the grain is stored relatively warm," Dr Wildey has written. "However, in the cooler conditions commonly found in UK grain, disinfestation may not be possible even using the maximum approved dose of the market-leading grain protectant."⁽¹⁾

Mites are highly allergenic and have been found in 21% of cereal based foodstuffs purchased at retail outlets in the UK.

OPs are simply not working. Already, pest resistance has rendered older organochlorines ineffective. Older OPs have engendered resistance problems, and so now has pirimiphos-methyl, the main active used. Pyrethroids also provoke resistance.

There are no new molecules to be used as magic bullets, and the current alternatives are even more toxic. The fumigant methyl bromide is an ozone depleter, and phosphine is highly toxic to users.

If farmers and grain stores continue using even higher doses of OPs, residue levels in food will rise. The Pesticides Trust [now PAN UK] is asking the UK Working Party on Pesticide Residues to monitor levels in cereal products in case of this eventuality.

But are pesticides necessary in grain stores? MAFF's own recent survey² reports that 89% of commercial grain stores used pesticides-and 11% used no pesticides. Organic farmers store grain without pesticides. The main factors that cause infestation in grain are to do with temperature, humidity, ventilation and hygiene coupled with closer monitoring of grain condition. Finding mites in your breakfast cereals may be the final proof that pesticides provide no free lunch.

1. Wildey, K.B., Prickett, A.J., et al., The contribution of resistance in UK stored product pests to control failure and subsequent food contamination, The Brighton Conference: Pests and Diseases, British Crop Protection Council, Surrey, UK, 1998, Vol II pp.

2. Thomas, M.R., Garthwaite D.G., et al., Commercial Grain Stores in Great Britain, Pesticide Usage Survey Report 138, MAFF Publications, London, 1998, 20 pp, £3.

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