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Re. CS: Insecticides: ammonium carbonate, boric acid, elemental sulfur, lime sulfur, horticultural oils, insecticidal soaps, sticky traps/barriers, sucrose octanoate esters Pheromones
Rodenticide: vitamin D3

These comments to the National Organic Standards Board (NOSB) on its Spring 2015 agenda are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that reduce or eliminate a reliance on pesticides. Our membership and network span the 50 states and groups around the world.

These comments relate to 2017 sunset materials used for controlling insects and other animals. See also insecticidal soaps and sucrose octanoate esters in comments on soaps and elemental sulfur in comments on plant and soil amendments.

Current listings

§205.601(e) As insecticides (including acaricides or mite control).
(1) Ammonium carbonate—for use as bait in insect traps only, no direct contact with crop or soil.
(3) Boric acid—structural pest control, no direct contact with organic food or crops.
(5) Elemental sulfur.
(6) Lime sulfur—including calcium polysulfide.
(7) Oils, horticultural—narrow range oils as dormant, suffocating, and summer oils.
(8) Soaps, insecticidal.
(9) Sticky traps/barriers.
(10) Sucrose octanoate esters (CAS #s—42922-74-7; 58064-47-4)—in accordance with approved labeling.
(f) As insect management. Pheromones.

(g) As rodenticides. Vitamin D_3.

Insecticidal soaps and sucrose octanoate esters are addressed in comments on soaps. Elemental sulfur is addressed in comments on plant and soil amendments.

Ammonium carbonate

Ammonium carbonate is volatile, and irritating to eyes and nose. It is used in small quantities as an attractant in traps. Little damage would be expected other than the attraction of other insects. The main alternatives are manure management and enhancement of predators and parasitoids, but its use to trap adult flies complements the use of other methods that control egg-laying and immature stages.

We support the relisting of ammonium carbonate.

Boric acid

Although boric acid has long been considered a "least-toxic" pesticide when placed in traps as non-volatile bait or gel formulations that eliminate direct exposure, its use as a dust in structures can result in exposure and hazards for exposed people. There are alternative materials and practices that may be less harmful.

Boric acid is harmful to humans and the environment.

Boric acid is a reproductive toxicant, a suspected endocrine disruptor, and toxic to plants and animals. Borax mining results in environmental damage.[1]

Boric acid is not essential.

Natural alternatives include diatomaceous earth[2] and boiling water.[3] Management practices include sanitation, exclusion, sticky barriers, sticky traps[4] and removal of host plants for aphids.[5]

Conclusion

With the challenging issues of health and environmental/mining impacts and available alternative materials and practices that may be less harmful, if boric acid remains on the National List, it should be further annotated, "for use only as bait or in gel formulations."

Elemental sulfur

See comments on plant and soil amendments.

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[1] "How Green are Boron Cleansers?" Scientific American, 2009. http://www.scientificamerican.com/article/how-green-are-boron-cleansers/

[2] TAP, p. 10.

[3] NCAP factsheet, Ants. http://www.pesticide.org/Alternatives/phase-2-solutions-for-consumers/ants

[4] TAP, p. 10.

[5] NCAP factsheet, Ants. http://www.pesticide.org/Alternatives/phase-2-solutions-for-consumers/ants

Lime sulfur

Lime sulfur is also listed for plant disease control at §205.601(i).

Lime sulfur poses hazards to humans and the environment.

Lime sulfur poses serious hazards if misused, or in the case of accidental spills.[6] If mixed with acids or phosphate fertilizers, it can release deadly hydrogen sulfide gas.[7] The TR says, "The available literature suggests that large volume releases of lime sulfur will adversely affect the viability and reproduction of non-target microorganisms, including beneficial soil bacteria and fungi." "It is highly probable that both target and non-target plants, insects, mites and fungi will be impacted by lime sulfur treatments to some extent due to direct application and/or spray drift to neighboring areas."[8]

Use of lime sulfur as an insecticide can interfere with biological control.

Labels list scales, mites, aphids, "over-wintering insect eggs," case bearers, and peach twig borers as targets of lime sulfur applications. Lime sulfur kills adults and larvae of predator mites, as well as reducing the feeding rate and fecundity of survivors.[9] San Jose scale is well known as an insect naturally controlled by predators that becomes a secondary pest when broad-spectrum insecticides are used.[10] Biological control is also a successful means of controlling aphids.[11] While early season use of lime sulfur for managing disease may have little impact on natural biological control of mites, increasing the frequency and rate of lime sulfur use –as in use for thinning or later season insect control—can have a negative effect on biological control.

Use of lime sulfur as an insecticide may be incompatible with organic production.

It appears that most, if not all, arthropod targets of lime sulfur sprays can be controlled biologically, and that use of lime sulfur when the pest (and its predator or parasite) are present would be disruptive of the agroecosystem.

Conclusion

The Crops Subcommittee must investigate the particular uses of lime sulfur as an insecticide to determine whether they are necessary, and whether lime sulfur can be used as an insecticide without disrupting natural controls. If it can, the CS should propose an annotation for its use. Otherwise, the use of lime sulfur as an insecticide should be delisted.

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[6] TR lines 342-348.

[7] Oregon OSHA, Hazard Alert: Lime sulfur reacts to form deadly hydrogen sulfide gas. http://www.cbs.state.or.us/external/osha/pdf/hazards/2993-19.pdf.

[8] TR lines 395-396; 420-422.

[9] Beers, E. H., Martinez-Rocha, L., Talley, R. R., & Dunley, J. E. (2009). Lethal, sublethal, and behavioral effects of sulfur-containing products in bioassays of three species of orchard mites. *Journal of economic entomology*, *102*(1), 324-335.

[10] Gulmahamad, H., & DeBach, P. (1978). Biological control of the San Jose scale Quadraspidiotus perniciosus (Comstock)(Homoptera: Diaspididae) in southern California. *Hilgardia*, *46*(7), 205-238.

[11] Hågvar, E. B., & Hofsvang, T. (1991). Aphid parasitoids (Hymenoptera, Aphidiidae): biology, host selection and use in biological control. *Biocontrol news and Information*, *12*(1), 13-42.

Oils, horticultural

A number of health and environmental hazards are associated with the manufacture and use of horticultural oils.

As an aerosol of petroleum, it may produce lipid pneumonitis by those inhaling the mist.[12] It is an irritant to skin, eyes, and mucous membranes.[13] It kills mostly by smothering, and may kill predatory mites and soft-bodied predaceous insects.[14] It is a medium hazard to honeybees.[15] Some plants are sensitive to it.[16]

Horticultural oils can interfere with biological control of insects and mites.

Horticultural oils are broad-spectrum insecticides/miticides. They kill predators and parasitoids along with pests, thus disrupting the agroecosystem and creating a dependence on pesticides. For this reason, they are both ineffective and incompatible with organic production.

Conclusion

The listing for horticultural oils should be annotated in a way that protects workers from inhalation hazards and nontarget insects from harm. If this is not possible, horticultural oils should be delisted.

Soaps, insecticidal

See comments on soaps.

Sticky traps/barriers

This listing covers a wide range of traps and coatings made with a number of different materials. Some are coated paper, some are coated plastic, and some are a sticky chemical that is brushed on plants. Coated plastic, at least, produces plastic waste that goes to the landfill. The sticky coating may contain petroleum distillates, and the traps may contain volatile attractants. Most are non-specific and kill non-target insects, spiders, mites, reptiles, and amphibians. One TAP reviewer suggested the traps are compatible with organic only in processing plants.[17] Another suggested they should be used only for monitoring or mass trapping.[18] Some sticky traps can result in much suffering by animals caught in them.

Like a number of other materials in this section, sticky traps suffer from the shortcoming of having the potential to kill non-target organisms. Many can be used in such a way that the likelihood of trapping non-target animals is low. The CS should explore the possibility of an annotation that ensures the targeted use of these traps.

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[12] HSDB, Mineral oil. http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+192.
[13] TAP, p. 6.
[14] Colorado State Extension, Pest and disease control using horticultural oils. http://www.colostate.edu/Dept/CoopExt/4dmg/PHC/hortoil.htm.
[15] UC Davis, Horticultural Oil. http://www.ipm.ucdavis.edu/TOOLS/PNAI/pnaishow.php?id=39.
[16] TAP, p. 6.
[17] TAP, pp. 5-6; 9.
[18] TAP, p. 3.

Sucrose octanoate esters

See comments on soaps.

Pheromones

Pheromones may have adverse impacts on human health and the environment.

The technical review points out that the effects on human health depend on the application method, "inerts," and retrieval/disposal.[19] "However, it is important to note that only a small fraction of known insect pheromones (which have effects that are mimicked by commercially available synthetic pheromones) have been thoroughly examined for their toxic or other pharmacological effects on non-target (including mammalian) species."[20]

Pheromones as used in pest management are synthetic analogs of parts of the pheromones found in nature. Because they lack the complexity of natural pheromones, they also lack the specificity of those hormones. Thus, some pheromone products designed to disrupt the mating of pest insects can affect the behavior of many non-pests. Microencapsulated pheromones may be a hazard to honeybees.

Pheromones are an important part of many organic pest management systems.

Despite the lack of specificity, pheromone products have permitted growers to avoid the use of more toxic controls. They can be used in a way that complements alternative methods suggested by the TR: biological controls, traps, repellents, soil management, sanitation, other cultural practices, physical barriers, hand removal.[21]

Conclusion

In the spring of 2011, the CS and NOSB struggled with an annotation describing a group of pheromones that they felt comfortable approving as a class. Lacking a technical review at the time, the Board ended up approving the simple listing. Although EPA standards are not the same as the standards of OFPA, the EPA conditions for pheromone products that are exempt from regulation under FIFRA come close to describing products that could be allowed in organic production without further examination, and we support the following listing, which we believe captures the sense of the conditions for exempting pheromone products from regulation:

> §205.601(f) As insect management. Pheromones, provided that they are identical to or substantially similar to natural pheromones as defined in 40 CFR 152.25(b), in passive dispensers, without added toxicants, and with only approved inert ingredients.

Vitamin D_3

Vitamin D_3 is the "safest" of the rodenticides. Its potential for secondary poisoning, for example, is lower than for anticoagulant rodenticides. However, it still has some potential for nontarget effects, especially when used as loose bait underground. EPA's recent restrictions limit aboveground use to bait stations. The technical review did not examine the advantage of bait stations relative to traps. A compatibility issue is the painful death resulting from vitamin

[19] TR lines 490-519, 554-564, 663-703.
[20] TR lines 468-470.
[21] TR lines 832-873.

D_3 poisoning. Alternatives include traps, barriers, sanitation, flooding tunnels, and conservation of predators.

Vitamin D_3 poses environmental hazards.

Vitamin D_3 must be used in a bait station above ground, but below ground it may used as be loose bait.[22] Nontarget animals may be poisoned directly or through secondary poisoning.[23] Its toxicity to target and nontarget animals has resulted in poisoning of children and pets, as well as nontarget wildlife.[24]

There are alternatives to Vitamin D_3.

Alternative materials include castor bean oil and repellent plants. [25] Alternative practices include traps, barriers, sanitation, flooding burrows, conservation of predators.[26]

Vitamin D_3 is incompatible with organic production.

Besides the hazards it poses to nontarget animals, vitamin D_3 is a cruel means of killing rodents. "Following oral ingestion, vitamin D3 accumulates in the liver. Following ingestion the induction of calcium mobilization occurs which can result in hypercalcemia and mineralization of major organ. An increase in the calcium level results in mobilization of calcium, which circulates dissolved in the blood plasma. An elevated level of the crystals of calcium salts can cause mineralization of major organs. Mineralization results in tissue damage and can cause heart problems and possibly kidney failure. Tissue damage caused hypercalcemia and mineralization of major organs leads to death in rodents."[27]

Conclusion

Vitamin D_3 does not meet the OFPA criteria of absence from harm to health and the environment, essentiality, or compatibility, and should be delisted.

Thank you for your consideration of these comments.

Sincerely,

Terry Shistar, Ph.D.
Board of Directors

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[22] EPA, Restrictions on Rodenticide Products. http://www2.epa.gov/rodenticides/restrictions-rodenticide-products

[23] C.T. Eason, M. Wickstrom, R. Henderson, L. Milne and D. Arthur, 2000. Non-target and secondary poisoning risks associated with cholecalciferol. *New Zealand Plant Protection 53:299-304.* Risk of secondary poisoning exists, though it is lower than from other rodenticides. TR lines 300-305.

[24] TR lines 263-272; 301-303; 323-335; 341-352.

[25] TR lines 375-383; 388-396.

[26] TR lines 398-428.

[27] TR lines 117-122.