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March 30, 2015

Ms. Michelle Arsenault
National Organic Standards Board
USDA-AMS-NOP
1400 Independence Ave. SW
Room 2648-S, Mail Stop 0268
Washington, DC 20250-0268

Re. CS: Hydrated lime, hydrogen peroxide, lime sulfur, horticultural oils, potassium bicarbonate, elemental sulfur.

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.

Current Listings

§205.601(i) As plant disease control.

(2) Coppers, fixed—copper hydroxide, copper oxide, copper oxychloride, includes products exempted from EPA tolerance, *Provided*, That, copper-based materials must be used in a manner that minimizes accumulation in the soil and shall not be used as herbicides.

(3) Copper sulfate—Substance must be used in a manner that minimizes accumulation of copper in the soil.

(4) Hydrated lime.

(5) Hydrogen peroxide.

(6) Lime sulfur.

(7) Oils, horticultural, narrow range oils as dormant, suffocating, and summer oils.

(9) Potassium bicarbonate.

(10) Elemental sulfur.

Fixed coppers and copper sulfate

See separate comments on coppers.

Hydrated lime

Most of the negative impacts cited below pertain to the use as a soil amendment, not the listed use, and thus support the restriction to plant disease control.

The material was approved by the NOSB for listing in April 1995 as part of Bordeaux mix: The vote was on Bordeaux mixes (copper sulfate and hydrated lime) with the annotation, "This material must be used in a manner that minimizes accumulation of copper in the soil."¹

In November 16, 2005 meeting, the NOSB was reminded of the discrepancy between the NOSB vote and the listing in the rule:²

Also, hydrated lime was a mistake in the original. Emily pointed out why, but it was reviewed as part of Bordeaux mix. The annotation that was approved by the NOSB and should have been in the list was for use only with copper sulphate as part of Bordeaux mix. That did not happen and there's been no way to comment on that until now because they couldn't change the National List the way it was.

So I do recommend that you figure out a way to put it back on as copper and fix the old mistake so that it's part of Bordeaux mix.

You may wish to additionally review its uses as an insecticide because it can be used for that.

Hydrated lime can pose human and environmental hazards.

In direct soil application, "it would create a strong imbalance of soluble calcium which would negatively affect soil microbes..."³ Excess lime can make some nutrients unavailable. It reacts strongly with humic acids and increases rate of organic matter decomposition.⁴ It can cause chemical burns, irritant to eyes, skin, and mucous membranes.⁵ It may affect earthworms, enzymes, and microbial populations.⁶

There are alternative materials and practices.

Alternative materials include copper, sulfur, hydrogen peroxide, and lime sulfur.⁷ Hydrated lime is preferable to some of these. Alternative disease control methods include crop rotation, resistant crops, sanitation, managing soil to suppress disease, nutrient management.⁸

¹ Minutes of April 1995 meeting, lines 815-816.

² Transcript, NOSB meeting November 16, 2005. Page 149, lines 6-19. Comments of Zea Sonnabend.

³ 1995 TAP, p. 6.

⁴ 2002 TAP lines 187-194.

⁵ 2002 TAP lines 218-223.

⁶ 2002 TAP lines 233-256.

⁷ 1995 TAP, p. 6. Coppers 2011 TR line 966.

⁸ Coppers 2011 TR lines 1014-1019.

Hydrated lime has had limited acceptance in organic production.

Hydrated lime has not been considered acceptable as a soil additive in organic production for reasons mentioned above.⁹ Its use as a component of Bordeaux mix is historically accepted.¹⁰

Conclusion

Although the annotation limiting the use of hydrated lime to disease control eliminates objectionable use as a soil additive, correcting the annotation to read, “as a part of Bordeaux mix” would be more consistent with the recommendation of the NOSB.

Hydrogen peroxide

See our comments on sanitizers.

Lime sulfur

Lime sulfur is also listed for insect control at §205.601(j). We addressed the insecticide use of lime sulfur in our comments on animal control materials.

Lime sulfur poses hazards to humans and the environment.

Lime sulfur poses serious hazards if misused, or in the case of accidental spills.¹¹ If mixed with acids or phosphate fertilizers, it can release deadly hydrogen sulfide gas.¹² 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.”¹³

Use of lime sulfur 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.¹⁴ San Jose scale is well known as an insect naturally controlled by predators that becomes a secondary pest when

⁹ 2002 TAP lines 319-324.

¹⁰ 1995 TAP p. 5.

¹¹ TR lines 342-348.

¹² 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>.

¹³ TR lines 395-396; 420-422.

¹⁴ 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.

broad-spectrum insecticides are used.¹⁵ Biological control is also a successful means of controlling aphids.¹⁶

Lime sulfur plays an important role in management of fire blight without antibiotics. While early season use of lime sulfur for managing disease may have little impact on natural biological controls, increasing the frequency and rate of lime sulfur use—as in use for thinning and applications when arthropod predators and parasites are present—can have a negative effect on biological control.¹⁷ It also interferes with the action of biological controls of the fire blight organism and must not be used simultaneously with them.

Use of lime sulfur 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. The creation of secondary pests—that is, the use of materials that kill predators and parasites—is a major contributor to the “pesticide treadmill.”

Conclusion

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

Horticultural oils

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.¹⁸ It is an irritant to skin, eyes, and mucous membranes.¹⁹ It kills mostly by smothering, and may kill predatory mites, soft-bodied predaceous insects.²⁰ It is a medium hazard to honeybees.²¹ Some plants are sensitive to it.²²

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

In addition to their action on plant diseases, horticultural oils are broad-spectrum insecticides/miticides. They kill predators and parasitoids along with pests, thus disrupting

¹⁵ Gulmahamad, H., & DeBach, P. (1978). Biological control of the San Jose scale *Quadraspidotus perniciosus* (Comstock)(Homoptera: Diaspididae) in southern California. *Hilgardia*, 46(7), 205-238.

¹⁶ 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.

¹⁷ It should be noted that lime sulfur is not listed for fruit thinning.

¹⁸ HSDB, Mineral oil. <http://toxnet.nlm.nih.gov/cgi-bin/sis/search/a?dbs+hsdb:@term+@DOCNO+192>.

¹⁹ TAP, p. 6.

²⁰ Colorado State Extension, Pest and disease control using horticultural oils.

<http://www.colostate.edu/Dept/CoopExt/4dmg/PHC/hortoil.htm>.

²¹ UC Davis, Horticultural Oil. <http://www.ipm.ucdavis.edu/TOOLS/PNAI/pnaishow.php?id=39>.

²² TAP, p. 6.

the agroecosystem and creating a dependence on pesticides. For this reason, they are incompatible with organic production if used when predators and parasites are present.

Conclusion

The listing for horticultural oils should be annotated in a way that protects workers from inhalation hazards, and nontarget arthropods from harm. If this is not possible, horticultural oils should be delisted. We suggest this worker protection annotation: "Steps to meet worker protection standards must be documented in the Organic System Plan."

Potassium bicarbonate

Potassium bicarbonate has minor environmental and health impacts. It is useful for controlling a number of diseases that are difficult to control organically. Potassium bicarbonate in many situations may be more environmentally sound and safer for applicators and other farmworkers than the other synthetic alternatives.²³ It does not appear to interfere with biological control organisms. However, it does not fit into any of the categories in §6517(c)(1)(B)(i) of OFPA.

Elemental sulfur

See comments on plant and soil amendments.

Thank you for your consideration of these comments.

Sincerely,



Terry Shistar, Ph.D.
Board of Directors

²³ 1999 TAP, p. 3.