Product Review: Materials Allowed For Use in Organic Tree Fruit Production

Maury Wills, Iowa Department of Agriculture and Land Stewardship

As the Administrator of the Iowa Organic Certification Program and a fellow organic apple grower, I will review in a series of newsletter articles, a variety of products that can be used in organic tree fruit production. Product rates and frequency of application will not be covered since the product label provides that type of information.

In this first article my review is limited to just a few products in a class known as **bio-insecticides**. The active ingredients in these products have been isolated from natural sources, which are allowed under National Organic Program (NOP) regulations. These products require minimal protective wear such as coveralls, waterproof gloves, socks, and shoes. None of these products require the use of eye or respiratory protection. The Restricted Entry Interval (REI) is also minimal for the use of these products, usually four hours.

Before purchasing and using crop protection products for the organic farm, there are several important things to keep in mind. First, since most of the bio-insecticide products do not work like conventional chemical products, it may take longer before insect or disease pressure is reduced to commercially acceptable levels. Second, it is important to note that there is not necessarily an effective *product solution* available for every pest problem on an organic farm even though some input vendors might like you to think that. Third, all products used on organic fields and crops must comply with NOP regulations. This determination is made by the organic certification organization. When in doubt it is best to contact the certifier before purchasing and using new products.

Bacillus thuringiensis (B.t.) is a naturally occurring soil bacterium that causes disease in moth larvae when ingested. It may be used to control a number of pests including leaf rollers, Oriental Fruit Moth, Codling Moth, and Green Fruit Worm. B.t. is the active ingredient in products such as **Dipel** and **Deliver**. Both products are allowed under the NOP. B.t. is considered ideal for pest management because of its toxicity to pests and lack of toxicity to humans or the natural enemies of many crop pests. B.t. must be eaten by larvae during their feeding stage of development. It is not effective against adult moths and it is not a knock-down killer. However, larvae stop feeding shortly after ingestion and die after a period of hours.

B.t. products are registered for use on many crops including berries, small fruit, cucurbits, and tree fruit crops such as cherry, plum, peach, pear and apple. Look for B.t. dry, flowable products under the brand names listed above. Liquid B.t. products often contain petroleum distillates and are not allowed for use on organic crops. The dry, flowable product is mixed with water and used as a foliar spray.

Another substance that may be valuable for organic tree fruit producers is the **cydia pomonella granulosis virus**. This virus is specific to codling moth. Once consumed by codling moth larvae the virus multiplies. More of the virus is then released into the environment after the larvae dies. The virus is not very UV stable and should be sprayed at dusk.

The product **CYD–X** by Certis USA is formulated with the granulosis virus. It is allowed for use under NOP regulations. CYD-X was introduced approximately eight years ago for a period of one year. It was reintroduced in the western U.S. just two years ago and in the eastern U.S. and in Michigan just last year. It now appears to be widely available. This liquid product is sold in 32-ounce containers that should be kept refrigerated. It is mixed with water and applied as a foliar spray. CYD-X is registered for use on tree fruit crops such as apple, pear, plum and walnut.

Spinosad represents another bio-insecticide derived from natural soil organisms. Spinosad is the active ingredient in the product **Entrust** manufactured by Dow AgroSciences. Entrust has been commercially available only since 2003 and is registered for use on a wide range of fruits and vegetables for a variety of pests including codling moth, leafrollers and oriental fruit moth. This product is approved for

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according to ripening dates. For example, they have apples near peaches, and cherries and pears in another area. They do not know if this strategy will work or if others have tried this before, so the jury is still out.

I was particularly interested to hear their soil fertility plan given Leslie's past position at the University of Wisconsin-Madison as a compost specialist. Their orchard ground was previously in row crops with the 2002 corn stubble to deal with. The soil structure was lost and it crusted badly. Their first step was to have their soil analyzed for the usual soil fertility parameters as well as micronutrients. For the soil analysis they divided their land into five regions or plots from which they pulled separate samples. They found a good deal of heterogeneity throughout the five acres. That helped them plan to better match soil features better with plant needs. So a region low in pH, for example, was where the blueberries went since they need an acidic soil.

In summer 2003, they planted buckwheat (as suggested in Michael Phillip's book). It flowered twice that year before they incorporated it into the soil in the fall. They were going to apply compost in the fall but did not get it on until early spring 2004. They used two different sources of compost. The first was from the local fair grounds and was primarily livestock bedding with some manure. They spread one to two inches of it and disked it in to soil before planting. However, to find good quality compost that met organic certification requirements provided our compost specialist "with a huge reality check." Leslie searched high and low and finally purchased compost from Fresh Air Farms in Ohio. The pricing was competitive with sources in Illinois despite the shipping. This compost was added to every tree hole at planting. The buckwheat self-seeded between the rows in 2004. They have disked that in and already are seeing improvements in soil structure. They are now establishing a permanent cover comprising a diverse mix of warm and cool season grasses and legumes. They will mow this and let it self-mulch. The habitat plantings for beneficial insects will not be mowed.

They do not have an irrigation system, but are seriously considering one now as they endure a major dry spell. However, last year the rains were plentiful and well-timed.

An electrical fence of three dimensions and about five feet high (from Premier) around the entire farm is keeping the deer at bay. So far they have been diligent to keep it mowed under the fence so the grass does not touch a lower strand and short it out.

Leslie and Wes are quite optimistic about their farm-based businesses. They feel there is a real hunger for high quality, diverse fruit raised locally and organically. Wes and Leslie hope to show you all this. Stay tuned for a Network field day at Prairie Fruits Farm in 2006! ó

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use under NOP regulations.

While researchers have indicated that Entrust is most effective against leafrollers, it may significantly reduce codling moth populations especially if used in conjunction with CYD-X. Entrust is a wettable powder product that should be mixed with water and applied as a foliar spray. Entrust and CYD-X may be especially helpful for producers who have smaller organic tree fruit blocks where pheromone mating disruption products may not be effective.

Please submit your questions or comments regarding organic tree fruit products that you would like addressed in future articles to the network coordinator or via email to maury.wills@idals.state.ia.us. ó

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Review of Products Allowed in Organic Tree Fruit Production – Part II

(Maury Wills, Iowa Department of Agriculture and Land Stewardship)

This is the second in a series of articles on new products allowed for use in the organic orchard. The first article was in the last issue of *Just Picked*, issue #3, which is available on the web at www.mosesorganic.org/treefruit/newsletters/htm. Alternatively you can contact the Network Coordinator for a hardcopy.

Azadirachtin is an extract from the seed of the Neem tree. This extract is the active ingredient in **Aza-Direct**® by Gowan and **Neemix**® by Certis, USA. Both products are allowed for use in organic operations. The percent of active ingredient varies between these two products. Neemix contains 4.5% of the active ingredient azadirachtin and Aza-Direct contains 1.2% of this ingredient. [Editor's Note: It can also be bought as pure, cold pressed, wild-crafted, 100% neem oil from Ahimsa Organics in Minnesota. It is OMRI-listed.] Keep this in mind when comparing prices.

Azadirachtin acts as an insect growth regulator. Aza-Direct and Neemix are registered for use on many food crops and for use against many insects such as aphids, peachtree borers, peach twig borers, tarnished plant bug, leafrollers, mites, pear psylla, scale and a number of other pests such as caterpillars and loopers. B.t. products may control some of the insects listed above more cost-effectively. (See article in previous newsletter.) It appears that the niche for this product may be in managing the tarnished plant bug.

Plum curculio remains on the *most wanted* list of pests that seems to escape the tools and methodologies of organic orchardists. Unless you intend to tap the branches of your trees to jar these little critters from their roost, there is no sure-fire way to rid your orchard of this pest. One product that has provided limited success is **Surround**® **WP**, manufactured by Engelhard Corporation. This product is not an insecticide as it does not kill insects but rather it deters them and suppresses their activity. (Garlic products generally would also fall into this category.) Surround is made from a natural, mined substance called kaolin clay. This very fine powdery clay product has been manufactured to cling to plant material and anything that comes into contact with it. Therefore, it is an irritant to insects that get it on their body. It can also be an irritant to you, the applicator, making it a challenge to work with. It is wise to wear gloves and a mask while adding this product to your spray tank. Sprayers should be equipped to re-circulate the water and provide agitation to keep the product in suspension.

In addition to its insect deterrent properties, Englehard claims that Surround can enhance tree growth and reduce heat stress and sunburn. While you may use this product throughout the entire season it may be most cost-effective to use it only through plum curculio season. A light rain will not wash off the product but strong or frequent rains will. Surround is easily washed from harvested fruit.

Disease Control Products

Sulfur is a traditional disease control substance that may be used in organic orchards. However, not all sulfur products available in the market place are allowed. Consult with your certifier to be sure. One sulfur product that is allowed is **That**® **Flowable Sulfur** by Stoller Enterprises, Inc.

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This liquid sulfur product is registered for use on a number of fruits and vegetable crops including apple, pear, cherry and peach. This product may be used to control scab and powdery mildew in apple trees. The label cautions the use of this product during periods of high temperature and advises not using it with oil or within 4 weeks of an oil application unless in dormant, or delayed dormant oils. Sprayer agitation is required to avoid settling.

Non-traditional disease control products, known as bio-fungicides, contain microbial organisms that can destroy pathogens and occupy pathogen foothold sites on foliage and fruit. These products are environmentally benign. This class includes products such as Sonata® and Serenade® by AgraQuest. The active ingredient in Sonata® is Bacillus pumilis, which produces an antifungal sugar compound that disrupts fungal cell metabolism. Sonata® may be used to control powdery mildew in apricot, cherry, plum, apple and pear. It also suppresses fireblight and scab in apples and pears. The active ingredient in Serenade® is Bacillus subtilis. This product may also be used to control powdery mildew, a variety of rusts, and to suppress scab.

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leaving half the population in the trees, which was too many to Keith. The limb jarring not only knocked the PC out, but also helped him find the three areas from which they were entering the orchard. So now he can concentrate his efforts on about 50 of his trees.

He also tried pasturing chickens in the orchard using an electric woven-wire fence. "Their manure really stimulated the trees. It was noticeable. But I did not see a significant reduction in the PC population," Keith explained. Some chickens needed to be over-wintered so that they were in the orchard by late April. But it was a challenge to rotate them through the entire orchard in the one month that plum curculio are a particular problem. As the chickens were further from the house, they fell victim increasingly to predators. PC can fall from the trees at the slightest disturbance and then the chickens can get them. But if there is a week or more of nice weather, the PC may stay up in the branches and avoid becoming chicken feed. Keith had the chickens out of the orchard by mid-July to keep the nitrogen in their manure from stimulating the trees when fall was approaching. After about eight years of this effort, with up to 150 birds, he decided that he was too busy with his carpentry work to effectively manage them.

But the fact that he added another acre of 100 trees on M-7 in 1995 must have meant he was having some success. So we moved from discussing plum curculio to scab.

Scab. "When we first planted the orchard", he said, "we were totally ignorant of scab and scab-resistant varieties." Over time he got rid of most of his MacIntosh and Honey Gold among other scab-prone varieties that were not very productive under organic management. They were keeping the populations of scab spores high.

He sprays sulfur in 2/3 of the orchard from five to seven times a year, trying to keep his sprays to a minimum. Some years the winds seem to blow the scab spores into the orchard, and other years, they seem to blow them out of the orchard, which is more long and narrow than square-shaped. On the other third, he has no scab.

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Review of Products Allowed For Use in Organic Tree Fruit Production – Part III

By Maury Wills, Iowa Department of Agriculture and Land Stewardship

How to identify allowed organic inputs

There are numerous agricultural and horticultural input products available today. Each product manufacturer claims that their product is the solution to your problem. Deciding on what product to use for the particular challenges that you are facing in your orchard is difficult enough. What's worse is that you can't use just any product out there but only those that are allowed in an organic production situation.

Whether you are transitioning land into organic production or your operation is already organic, you have to make sure that you do not use a product that will negatively impact your organic operation and certification.

First, become familiar with the National Organic Program regulation. Too few producers have spent time reviewing the regulation that they are operating under. A copy of the regulation can be found at www.ams.usda.gov/nop or by contacting an USDA-accredited certifier. An up-to-date list on certifiers is the New Farm Guide to US Organic Certifiers located on the web at http://www.newfarm.org/ocdbt/.

So, let's start with an insect or disease problem that you may have in your orchard. You have followed the NOP requirements for dealing with pest problems without success. So now you can turn to a product-based solution. But how do you go about determining if a particular product is permissible in your organic orchard?

Active product ingredients that are synthetic must be listed in the regulation (NOP 205.601). A quick read of the product label will usually tell you what the active ingredient is. You can then take a look at the regulation to see if it is listed there. If it is, then great! You are one step closer to making a decision. If the synthetic active ingredient cannot be found in the regulation, do not use this product if you wish your practice to be certified organic.

Product formulations not only contain active ingredients but may also contain inert ingredients. Product labels not only list the specific active ingredient but also indicate the percent of inert ingredients found within the product. Often the label does not list these specific inert ingredients. There are allowed and prohibited inert ingredients according to the NOP regulation. The wrong inert can be a deal-breaker on whether or not a product can be used in an organic situation.

Inert ingredients are used in products to enhance product shelf life, stabilize product effectiveness in rain or sunlight, or for a number of other reasons. The Environmental Protection Agency (EPA) classifies inerts on Lists 1 through 4. Only EPA List 4 – Inerts of Minimal Concern are allowed in products for organic use. The product label will probably not tell you on which EPA list their inerts are found. In addition, if you contact the product manufacturer they may not tell you which inerts are in their product for proprietary reasons. Nevertheless, you still need to know.

Most certifiers, if they have already reviewed the particular product in which you are interested, will tell you if it can be used or not. If the certifier has not reviewed the

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Managing Plum Curculio

While disease and other insect damage were identified during this trial, they were not found to be commercially significant except for plum curculio (PC). In fact some PC damage may not be accounted for because many PC damaged apples drop from the trees in June and therefore would not be counted at harvest time. It also appears that specific varieties are more susceptible to PC feeding.

Further research and product development is needed to provide products and methodologies that will successfully manage PC. The use of the kaolin clay product Surround™ to manage PC may prove to be too harsh on beneficial insects to use frequently. It may be better to limit the use of this product to early control of PC and discontinue after the primary egg-laying period is completed. *Since organic management strategies and inputs do not act quickly on organic systems the grower should establish thresholds unlike conventional thresholds for determining action levels whether it be for fertility, insect or disease challenges.* Establishing action-level threshold for organic apple growers should be researched.

Soil Fertility

Leaf analysis indicated some disease and variation in nitrogen content among cultivars. However, neither yield nor quality appeared to be effected by either. Composted poultry manure was applied at the base of each tree in this trial. This provides a slow release of nitrogen and other nutrients to the tree. It would take time before increased nitrogen levels would be seen in a foliar analysis even if a higher nitrogen level would be desired.

Project Impacts

This trial resulted in the production of higher quality fruit due to a dramatic reduction in codling moth damage. This translated into more salable apples. Without such improvements in organic pest management, commercial organic apple production in the Upper Midwest may not be possible. Since bioinsecticides are currently more costly than conventional pest management products, organic producers must receive a premium return on their organic apples to pay for input costs.

Based on Maury Wills' SARE project FNC-469/03 *final report.*

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product of concern, they may not review it until you apply for certification as it takes staff time to collect pertinent product data before making their decision.

Another good resource to explore before making a purchase decision is the Organic Materials Review Institute (OMRI). OMRI is not a regulatory agency but a non-profit organization started in the early 90s to review products for compliance with organic regulations. Consequently products do not need to be listed with OMRI to be allowed for use in organic operations. However, if OMRI has listed a product as "allowed" it is a very good indicator that it probably can be used. Nevertheless, the final decision maker in this process about what can and cannot be used is your organic certifier. The OMRI website is www.omri.org or call 541-343-7600.

Therefore, it is advisable to ask your certifier to sign off on organic inputs before you use them. You will save the certifier time by submitting product labels, website addresses and additional product information. You may possibly save the organic status of your organic tree fruit operation.

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