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The Costs of "Organic" Insecticides

Linda J. Cox[1], Theodore J. Radovich[2] and Jari Sugano[2]
[1]Department of Natural Resources and Environmental Management
[2]Department of Tropical Plant and Soil Sciences

Moving an agricultural operation towards greater sustainability generally means looking first at other options than chemical pesticides. Reducing chemical pesticide use helps in turn to reduce the environmental, human health, and financial costs of chemical inputs. A primary focus for a sustainable agricultural system is to promote and maintain plant health; several approaches to this can be considered, including the following:

1. Use seed or plant stock selected from hardy, disease-resistant varieties that are adapted to your area.
2. Build organic matter in the soil. For commercial farmers, a combination of cover crops and compost is a common approach.
3. Understand and meet the crop's growing requirements. A plant that obtains the proper amount of water, fertilizer, and sunlight, and grows in soil of the appropriate pH level, etc., will be more productive and less prone to pest and disease problems.
4. Introduce flowering plants to the system that attract beneficial insects, such as pollinators and natural enemies of pests. Plants in the carrot, mint, and cabbage families are likely to fulfill this requirement. Weed flowers also often attract beneficial insects.
5. Use inputs that promote plant growth, including compost, vermicompost, seaweed extract, humic acid, etc.
6. Rotate your crops in order to discourage pests and diseases that tend to thrive in a monoculture environment and to allow the soil to recover from crops that drain specific nutrients.

Organic growers rely heavily on these cultural practices to manage plant health. However, if pest pressure builds up and chemical intervention is needed, compounds such as soaps, microbial products, and botanical extracts are approved "with restrictions" for use in certified organic systems (Table 1). Organic rules stipulate that cultural practices like those listed above must be followed first before pesticides may be applied. The Environmental Protection Agency (EPA) defines a pesticide as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Many people mistakenly think pesticides are the same as insecticides, but this is not the case. Insecticides are pesticides, but the term "pesticide" also applies to herbicides, fungicides, and various other substances used to control pests. In the United States the legal definition of a pesticide also includes any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

The EPA has registered several products as commercial organic pesticides. Pesticides with labels bearing the OMRI logo have been determined by the Organic Materials Review Institute to be compliant with the National Organic Program (NOP) guidelines for all ingredients. Users of these pesticides, however, are still subject to EPA's pesticide regulations. This means that everyone who applies an OMRI pesticide should wear the appropriate protection, as specified by its label. And when product is used in the production of agricultural plants, the employer must ensure compliance with both the general and the label-specific rules of the federal Worker Protection Standard.

Adverse impacts to the environment and human health represent potential non-monetary costs of using pesticides, even organic ones. The pesticide label is a legal document, and its guidelines must be followed when applying organic pesticides. The pesticide label and any document it may refer to describe actions required to reduce potential environmental and human health hazards

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(Figure 1). Potential hazards may include eye damage, skin irritation, respiratory damage, and toxicity to fish and bees.

Pesticide applications can also represent significant financial cost to the grower (Table 1). Costs of application per acre may be calculated from the labeled rate of use and the bulk cost of the product. The costs are dependent on the amount used, which can vary by crop and pest. Also, more than one application may be required during the crop cycle.

Figure 1. Sample label for an organic pesticide

Kills/repels a variety of insect pests including whiteflies, caterpillars, leafminers, aphids, and diamondback moths.

FOR ORGANIC PRODUCTION

OMRI Listed
Organic Materials Review Institute

ACTIVE INGREDIENT:
Azadirachtin 4.5%
OTHER INGREDIENTS: 95.5%
TOTAL: 100.0%

Net Contents: 1 Quart
EPA Reg
EPA Est.
Lot Number:

This product contains 0.34 pounds of azadirachtin per U.S. gallon.

KEEP OUT OF REACH OF CHILDREN
WARNING AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail).

SEE SIDE/BACK PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS AND FIRST AID

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
WARNING
Causes substantial but temporary eye injury. Do not get in eyes or on clothing. Wear goggles and/or face shield. Harmful if absorbed through skin. Avoid contact with skin, eyes, or clothing. Harmful if inhaled. Avoid breathing spray mist. Harmful if swallowed. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum, or using tobacco. Remove and wash contaminated clothing before reuse.

FIRST AID
If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

If on skin or clothing: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. Call a poison control center or doctor for treatment advice.

If swallowed: Call a poison control center or doctor immediately for treatment advice. Have person sip a glass of water if able to swallow. Do not induce vomiting unless told to do so by a poison control center or doctor. Do not give anything to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. Hot Line Number: 1-800-255-3924.

Personal Protective Equipment:
Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category C on an EPA chemical-resistance category selection chart.

Applicators and other handlers must wear:
- Long-sleeved shirt and long pants.
- Chemical-resistant gloves, such as barrier laminate or butyl rubber or nitrile rubber or neoprene rubber or polyvinylchloride (PVC) or Viton.
- Shoes plus socks.
- Protective Eyewear

Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not re-use them.

USER SAFETY RECOMMENDATIONS
Users Should:
- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

ENVIRONMENTAL HAZARDS
This product is hazardous to fish and aquatic invertebrates. For terrestrial uses: Do not apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters or rinsate.

Table 1. Selected active ingredients, the pests against which the active ingredient is effective, one or more trade name(s) of the pesticide, the single-acre application rate, the bulk cost of the pesticide, and the cost of a one-acre application. Costs reflect price quotes obtained in July 2010. Trade names are used for example only and do not imply endorsement of a product.

Active Ingredients	Mode of Action	Targeted pest	Trade Name(s)	Single-Acre Application Rate	Bulk Cost of the Pesticide	Pesticide Cost per One-Acre Application
Potassium salts of fatty acids (soaps)	Disrupts cell membranes upon contact	Soft-bodied insects like aphids, mealy bugs, scale	M-Pede®	1 gal.	$61.00 per 2.5 gal.	$24.00
Neem oil	Repels; prevents feeding and molting upon contact and ingestion; antimicrobial	Broad-spectrum insecticide and fungicide	Trilogy®	0.25 – 2 gal.	$103.40 per 2.5 gal.	$10.34 – $82.72
Adzirdaractin (from neem)	Repels; prevents feeding and molting upon contact and ingestion	Broad-spectrum insecticide	Neemix® Agroneem Plus Ag®	4 – 16 fl. oz. 48 fl. oz.	$170.30 per qt. $115.45 per 1.25 gal.	$21.29 – $85.15 $34.64
Pyrethrin	Works upon contact; affects nervous system	Broad-spectrum insecticide	Pyganic®	0.5 – 2 qt.	$168.15 per gal.	$21.19 – $84.08
Bacillus thuringiensis (BT)	Works upon ingestion; poisons in the stomach. Resistance can develop with continuous use of single strain	Lepidopteran larvae (worms, caterpillars, loopers, etc.)	Xentari® (Aizawi strain) DiPel® (Kurstaki strain)	0.25 – 2 lbs 0.5 – 2 lbs	$89.40 per 5 lbs. $14.55 per lb.	$8.94 – $35.76 $7.25 – $29.10
Spinosad	Excites nervous system upon contact and ingestion	Broad-spectrum insecticide	Entrust®	0.5 – 3 fl. oz.	$538.90 per 16 oz.	$16.84 – $101.04