

Organic Crop Protectants

Organic crop protectants are plant protection products which contain biological control agents (microbials, pheromones, plant extracts) for use as agricultural, horticultural and home garden pesticides.

They manage pests in ways that leave little or no toxic residues, have minimal impact on non target organisms, and are not prone to resistance.

Organic crop protectants

Organic crop protectants are used to control pests, pathogens, and weeds by a variety of means.

Microbial organic crop protectants may include a pathogen or parasite that infects the target

Biochemical organic crop protectants can also act through a variety of mechanisms. Some act by inhibiting the growth, feeding, development or reproduction of a pest or pathogen.

Organic crop protectants may also be used to form a barrier on the host, so as

**What are the economic and
environmental benefits of these
products?**

Crop Quality and Yield

Agriculture and horticulture growers face significant challenges to maximise the returns on their investments. While part of this equation involves the efficient possible use of inputs, a grower's income is ultimately dependent upon crop quality and yield. Organic crop protectants included as "standard" inputs in production programs as a means to significantly improve quality and yield of crops under challenging conditions.

Organic crop protectants help to promote crop health thereby increasing its salability. In organic production systems, organic crop protectants represent some of the most significant crop protection tools that a grower has to produce a quality crop.

Labor and Harvest Flexibility

Growers list labor availability and the coordinated timing of harvest as critical operational variables related to profitability

Most organic crop protectants provide growers with more options to maximize their labor force and optimize harvest times.

Most organic crop protectants have short worker re entry intervals allowing workers to safely return to the fields with minimum delay after treatment.

Organic crop protectants have shorter withholding periods allowing harvest and shipping schedules to be better maintained after required pesticide applications.

IPM Compatibility

Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices.

The IPM approach combines cultural, biological and chemical means to control

Resistance Management

Pest resistance to conventional chemical pesticides is a significant grower and industry concern.

Scientific research has repeatedly demonstrated that continuous use of the same class of pesticides will result in the emergence of a pest population resistant to those products.

Organic crop protectants have long been used in combination with synthetic chemistries to provide the basis for excellent control programs that effectively manage resistance.

Organic crop protectants typically have modes of action that are unique from synthetic pesticides and do not rely on a single target site for efficacy.

Environmental Safety

Organic crop protectants provide growers with valuable tools on both fronts by delivering solutions that are highly effective in managing pests, without creating negative impacts on the environment.

Overall, organic crop protectants have very limited toxicity to birds, fish, bees, and other wildlife.

They help to maintain beneficial insect populations, break down quickly in the environment, and may serve to reduce conventional pesticide applications through their effective use in resistance management programs.

Where do they come from ?

Plant Extracts

Plants are, in effect, natural laboratories in which a great number of chemicals are biosynthesized. Many plants have developed natural, biochemical mechanisms to defend themselves from weed, insect and fungal attacks.

Plant extracts have long been used to control insects. Dating as far back as 400 B.C., children were deloused using a powder obtained from the dried flowers of the pyrethrum plant

The first botanical insecticide dates back to the 17th century, when it was shown that nicotine from tobacco leaves killed plum beetles.

Insect Growth Regulators Plant extracts that prevent insects from reaching the reproductive stage.

Feeding Deterrents A compound that, once ingested by the insect pest, causes it to stop feeding and eventually, to starve to death.

Repellents Typically compounds which release odors that are unappealing or irritating to insects. Examples include garlic or pepper-based insecticides.

Confusants Compounds that imitate food sources and are used as traps or decoys to draw damaging insects away from crops.

Plant Growth Regulation

Some plant oils can act as effective contact herbicides through a variety of mechanisms such as disrupting cell membranes in plant tissue, inhibiting amino acid synthesis, or precluding production of enzymes necessary for photosynthesis.

Pheromones

Pheromones are chemical signals that trigger a natural response in another member of the same species. Insects release pheromones to serve many functions. These include secretion of pheromones to indicate the location of food sources, to warn others around about potential dangers, or locate a potential mate for reproduction.

Synthetic pheromones can be used in a number of ways to disrupt pest ecology and reduce crop damage.

A common use of synthetic pheromones is mating disruption. Growers saturate the environment with a sex pheromone so the male moths cannot easily locate females, disrupting their ability to mate. No insect mating means no fertilized eggs, and no larvae to damage crops.

Minerals

Minerals play a key role in a wide range of organic crop protectant applications

Potassium silicate is another example of this type of organic crop protectant, it is a dessicant to soft bodies insects and mites.

Diatomaceous earth (DE) is an example of a mineral organic crop protectant that combats insect infestations through abrasion. DE contains fossilized microscopic plants, giving the compound a sharp surface that cuts through insects' exoskeletons, a process that leads to dessication of the insect.

Mineral oils are used to smother insect pests in nesting stages.

Plant-incorporated protectants

Plant-incorporated protectants are pesticidal substances produced by plants and the genetic material necessary for the plant to produce the substance.

For example, scientists can take the gene for a specific Bt pesticidal protein, and introduce the gene into the plant's genetic material. Then the plant manufactures the pesticidal protein that controls the pest when it feeds on the plant.

Organic Crop Protectants in the USA

In the USA the Environmental Protection Agency (EPA) has encouraged the development of pest management techniques that offer alternatives to conventional chemical control.

EPA gives priority in its registration program for conventional chemical pesticides to pesticides that meet **reduced risk criteria**.

The goal of this program is to quickly register commercially viable alternatives to riskier conventional pesticides

This ensures that these reduced risk pesticide uses get into the marketplace and are available to growers as soon as possible.

The EU has set up a fast track system where by low risk or biological products have priority similar to the US.

Organic Crop Protectants in Australia

The Agricultural Biological Products Working Group was set up in November 2009 by the APVMA in recognition of the growing demand for Agricultural Biological Products (organic crop protectants)

Terms of Reference

- Serve as a specialist/focus group for Agricultural Biological products (organic crop protectants) within the APVMA;
- Serve as the primary point of contact for enquires and pre-submission interaction for prospective applicants and others on Agricultural Biological products;
- Review and update current APVMA guidance documents on Agricultural Biological products;
- Monitor and maintain a brief on current and emerging issues associated with Agricultural Biological products;
- Conduct associated project work as required.

Organic Crop Protectants in Australia

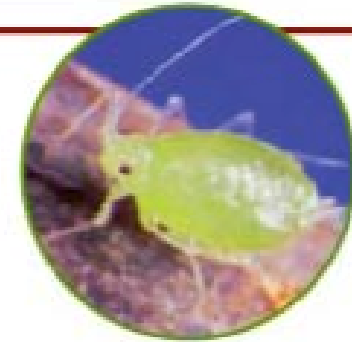
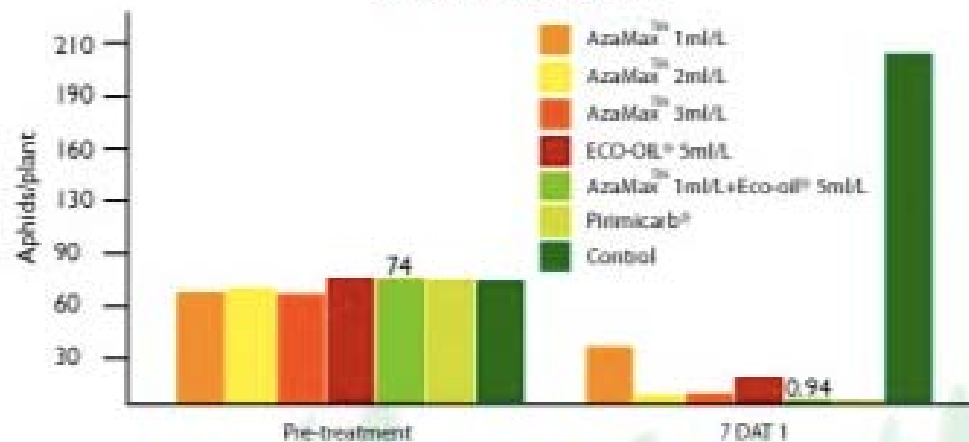


- AzaMax contains up to 100 natural chemicals all aimed at having negative impacts on insect pests. This makes AzaMax a very versatile insecticide that effectively eliminates the potential for insects to develop any chemical resistance.
- AzaMax intensifies the effectiveness of other insecticides by weakening the insect's chemical defence, this in turn reduces the onset of resistance of the pest to the chemical being applied. This feature makes AzaMax an excellent tank mix with other insecticides.
- AzaMax is very safe to users, the environment and non-target insects including bees, spiders and most other beneficial predators and parasitoids.

Organic Crop Protectants in Australia

Aphids

Green peach aphids NSW DPI, Gosford, 2000

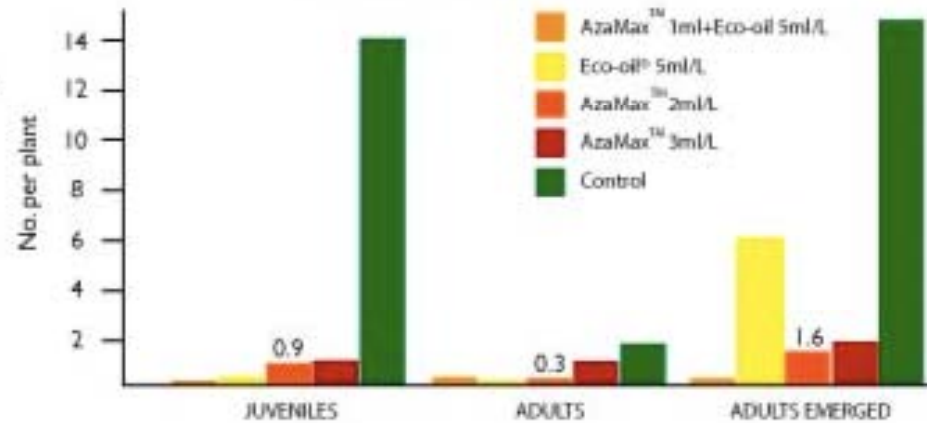


AzaMax is effective against Mites and Aphids because it effects all life stages. This is very important when targeting these sorts of pests with short life cycles, multiple generations and many offspring. In other trials the addition of the miticide ECO-OIL[®] @ 5ml/L has been shown to enhance the 1ml/L AzaMax rate to be equal to or better than the 3ml/L AzaMax rate.

Organic Crop Protectants in Australia

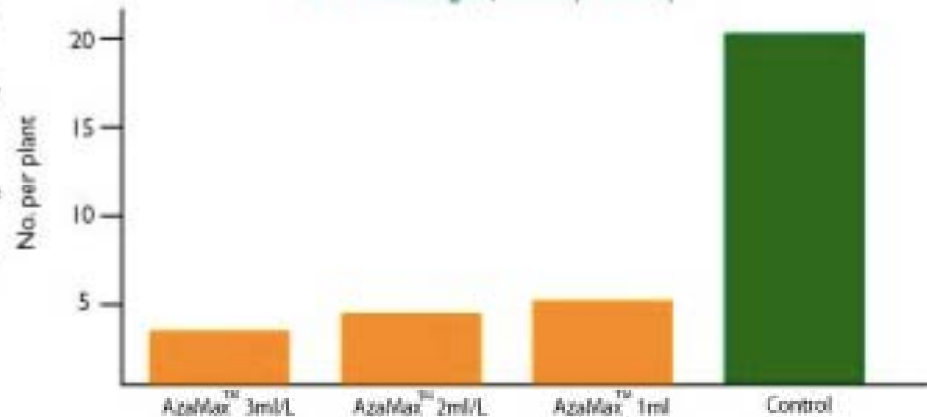
Trials conducted by the NSW Department of Agriculture (Dr Stephen Goodwin) and IPM Technologies (Peter Cole) have confirmed that AzaMax is very effective against Greenhouse whitefly at dose rates as low as 1 ml/L.

Whitefly Control in Gerberas
NSW DPI, Gosford, 2000. (7 DAT 3)



A significant benefits of AzaMax is its minimal impact on beneficial insects. One of the most effective bio-control agents for Whitefly, namely *Encarsia formosa*, is virtually unaffected by AzaMax. This is in contrast to some of the current mainstream pesticides which can cause up to 100% mortality and have residual effects for weeks after application. This makes AzaMax ideal when used as part of an IPM strategy that incorporates beneficial insects.

Whitefly Control in Gerberas
IPM Technologies, 2005 (7 DAT 3)



Organic Crop Protectants in Australia



EcoCarb is an ACO Registered Organic Fungicide. EcoCarb is based on activated potassium bicarbonate and a proprietary surfactant system that increases the distribution of bicarbonate ions over plant surfaces.

EcoCarb changes the pH on leaf surfaces to highly alkaline as well as creating a strong osmotic imbalance between microscopic organisms and the surrounding solution on the plant surface. This has the effect of severely disrupting spores and fungi cell walls.

EcoCarb is registered for the control of Powdery mildew in Grapes and Roses with further research progressing in Cucurbits, Tomatoes, Cutflowers, and Strawberries.

Organic Crop Protectants in Australia



Eco-Oil is Australia's first Botanical Oil based Miticide / Insecticide registered to control *Tetranychus urticae* (Two-spotted mite) and Aphids in home gardens, commercial covered crops and nursery situations. Eco-Oil combines the insecticidal properties of three natural oils emulsified in a unique surfactant system.

Organic Crop Protectants in Australia

BioWeed™ Herbicide



BioWeed™ Herbicide is not a systemic herbicide but rather works by stripping the outer coating of contacted plant and seed material, causing cell collapse and desiccation.

BioWeed™ Herbicide offers a proven solution for sustainable weed control, providing long term, environmental and economic benefits.

Made entirely from plant sources BioWeed™ Herbicide

Herbicide has a unique pre-emergent activity which kills weed seed in the soil. This reduces emerging weed pressure and can save up to 50% of your normal spray requirements. kills under soil weed seed bank with no harm to roots or soil microbiareduces the number of sprays needed per year by up to 50%reduces time, labor and equipment/fuel input costskills seeds in set weeds heads on the plantkills seeds by immediate desiccation not by residual chemical actionallows weed and biohazard eradication instead of control

Broad Spectrum Insecticide and Miticide

Ecotec®

**KEEP OUT
OF REACH OF
CHILDREN
CAUTION**

See enclosed booklet for complete
Precautionary Statements and
Directions For Use.

Active Ingredients
Rosemary Oil 10.00%
Peppermint Oil 2.00%
Other Ingredients* 88.00%
Total 100.00%

* Wintergreen Oil, Lactic acid,
n-butyl ester, Vanillin and Lecithin.

FIFRA 25(b) Exempt Pesticide

This product has not been registered by the United States Environmental Protection Agency. Brandt Consolidated, Inc. represents that it is exempt from registration under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

OMRI®
Listed



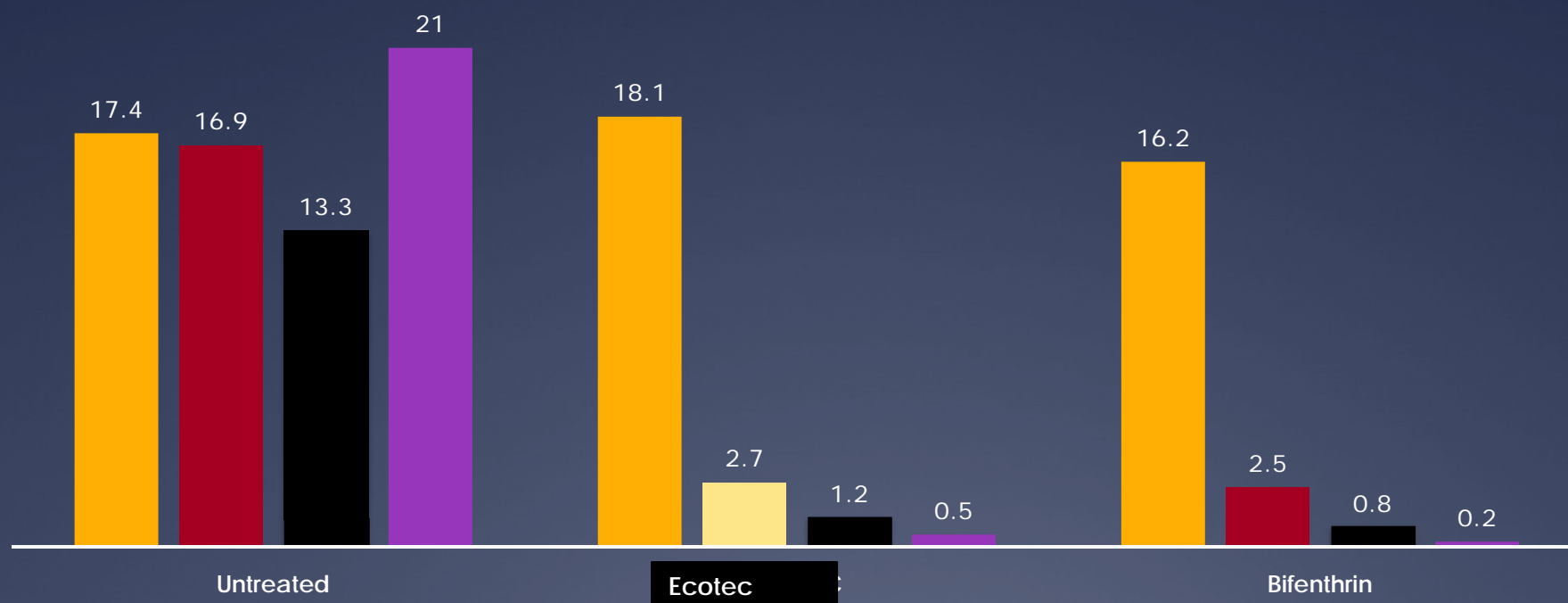
Ecotec: Three Mode of Actions

- * **Contact: Disrupting** plasma membrane integrity
- * **Contact: Suffocation** - Prevents gas exchange and water loss through damage to biomememberane
- * **Blocking the Octopamine receptor** site in insects. Resulting in a breakdown of the insect's central nervous system. **Octopamine** is a key neurotransmitter found in invertebrates (i.e. insects). It regulates their heart rate, movement, behavior and metabolism.

Effectiveness of Ecotec Against Strawberry Aphid on Strawberries. UC Davis, California

Ecotec: 1.5 pt/A (2.0 l/Ha) – 2 Applications
Spray Volume: 75 gal/A (700 l/Ha)

■ Pretreatment ■ 3 DAT
■ 7 DAT ■ 14 DAT



Ecotec: *Active Ingredients*

Rosemary Oil
Pepermint Oil

Sporatec Fungicide

Broad Spectrum Fungicide

Sporatec®

FIFRA 25 (b) Exempt Pesticide
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CHILDREN
CAUTION**

See enclosed booklet for complete Precautionary Statements and Directions For Use.

Active Ingredients	
Rosemary Oil	18.00%
Clove Oil	10.00%
Thyme Oil	10.00%
Other Ingredients*	62.00%
Total	100.00%

* Wintergreen Oil, Lactic Acid, n-butyl ester and Lecithin.

OMRI
Listed

NET CONTENTS: 2.5 GAL PER BOTTLE. PACKED 2 X 2.5 GAL

Sporatec: Mode of Action

Cell Membrane disruptor

- * Based on scientific papers: Causing water loss through damage to biomembrane of spores and hyphae / mycelium

Sporatec: Active Ingredients

Rosemary Oil

Clove Oil

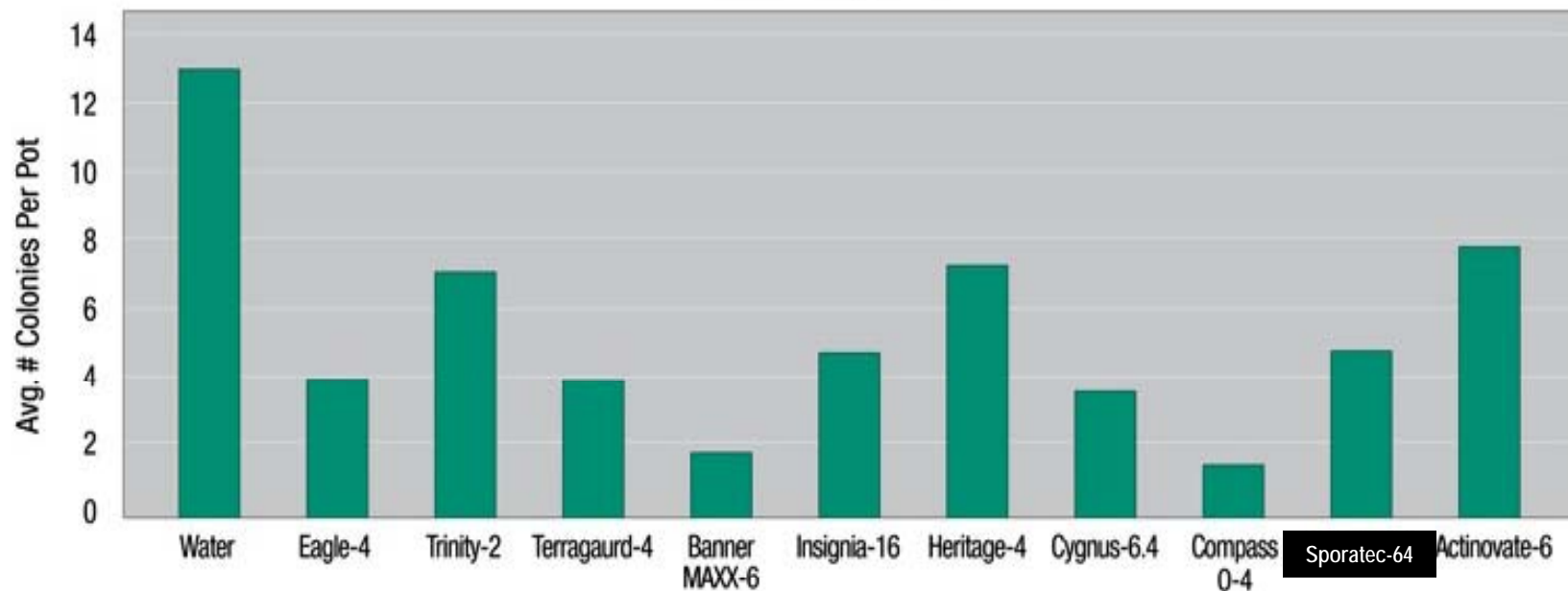
Thyme Oil

Sporatec Fungicide: performed as good statistically as Industry standards

Sporatec: 3 pt / A (4 l/Ha), 1 Application; Spray Volume 125 gal/A (1100 l/Ha)

Effects of Fungicides On Preventing Rose Powdery Mildew

Chase Horticultural Research
A.R. Chase, 2007



The wheel has already been
invented we just have to get it
registered.