

Organic Processing and the Use of Pesticides

Univar USA

Professional Products and Services

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Overview:

With many commercial and private operations in the United States interested in producing or processing “organic” food products, there is increased interest in having a list of pesticides available that would be appropriate to use in an organic facility. This is an effort to create that list for customers of Univar USA, with respect to products for use in professional pest management.

This is a very difficult topic. While the “guidelines” are established by government agencies to define what may be permissible in organic facilities, these agencies may shy away from creating lists of specific active ingredients, and even more so from naming specific product trade names.

There also is a trend toward establishing “Green” buildings and facilities, which brand themselves as environmentally concerned with this designation. This also can be difficult with respect to recommending specific pest control products, and the term “green” seems to be defined in varying ways by various entities.

DO NOT CONFUSE “GREEN” WITH “ORGANIC” !

DO NOT CONFUSE “NATURAL” WITH “ORGANIC” !

There are very specific allowances and prohibitions with respect to organic pest management, whereas green and natural are much more subjective.

We begin with an overview of the federal agencies that regulate the use of pesticides that are listed as Organic or Natural.

- The EPA – CFR Title 40 – Protection of the Environment – via the federal EPA
- OMRI – the Organic Materials Review Institute
- NOP – the National Organic Programs

CFR Title 40 – EPA and Protection of the Environment:

The Code of Federal Regulations (CFR), Title 40, Subchapter E – deals with “Pesticide Programs” in Parts 150 to 189. Within these regulations Part 152 deals with “Pesticide Registration and Classification Procedures”, and section 152.25 is entitled “Exemptions for pesticides of a character not requiring FIFRA regulation”. Many of these products are now found sold as pesticide active ingredients, most botanical in origin, and thus do not require EPA Registration.

A list of Exempt products will be found on Page 4 of this document.

40 CFR 152.25 – also provides an extensive list of “inert” ingredients that may be in pesticide formulations that are allowed as “exempt” materials. Those considered Exempt must be listed in the most current List 4A. Some inert ingredients of interest will be discussed on page 5 of this document.

The OMRI:

The Organic Materials Review Institute – OMRI – a private organization which reviews products and trade names and determines whether or not they are NOP compliant.

Their website – www.omri.org – provides some lists of trade names of pesticides approved for organic use. Their complete listing of trade names can be found at http://www.omri.org/OMRI_products_list.html.

Please Note – OMRI is a private organization. Pesticide products may be appropriate for use in Organic facilities without being listed on the OMRI list.

The OMRI applies codes to the products they list:

- A = Allowed – indicates no restrictions on the use of the product
- R = Restricted – indicates certain use restrictions exist in order to be in compliance with NOP standards. The R status is assigned to the generic ingredient and thus pertains to each trade name product.
- N = Not Allowed – a designation that may be used on other lists, such as state lists, but does not exist on the OMRI lists. The OMRI only lists products that are allowed, and products NOT allowed simply do not show.

The NOP:

NOP = National Organic Programs compliant – the NOP is affiliated with the USDA (United States Department of Agriculture), and lists the standards that must be met to be organic-approved. It lists basic ingredients that may or may not be included in organic products.

Guidelines for the NOP are in The Act – the Organic Foods Production Act of 1990. The full text of their regulations in The Act can be found on the internet at <http://www.ams.usda.gov/nop/NOP/standards/FullReqTextOnly.html>. This text begins with extensive definitions, and for the sake of simplifying this resource on PestWeb we will include only a few terms which are important to pest management. The definitions are not word for word, but are summaries of those found in The Act.

- Buffer zone – an area located between an organic operation and adjacent non-organic operations, sufficient to prevent the possibility of unintended contact of prohibited substances from the non-organic operation onto the organic lands.
- Co-mingling – physical contact between unpackaged organic and non-organic products during production, processing, storage, transportation, or handling.

- Feed – edible materials consumed by livestock for their nutritional value.
- Fertilizer – a single or blended substance containing one or more recognized plant nutrients.
- Handling Operation – any operation that receives or otherwise acquires agricultural products, and processes, packages, or stores such products.
- Inert Ingredient – any substance other than the active ingredient which is included in any pesticide product.
- National List – a list of allowed and prohibited substances as provided for in The Act.
- Natural / Non-synthetic – synonymous terms meaning a substance derived from mineral, plant, or animal matter that does not undergo any synthetic process.
- Non-toxic – not known to cause any adverse physiological effects in animals, plants, humans, or the environment.
- Organic – refers to an agricultural product produced in accordance with The Act and its regulations.
- Organic Matter – the remains, waste products, or residues of any organism.
- Pesticide – any substance which alone, in chemical combination, or in any formulation with one or more substances is defined as a “pesticide” by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).
 - FIFRA definition – “Any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest”.
 - It includes insecticides, herbicides, fungicides, rodenticides, anti-microbials, as well as growth regulators, defoliants, and desiccants.
- Processing – cooking, baking, curing, heating, drying, mixing, grinding, churning, separating, extracting, slaughtering, cutting, fermenting, distilling, eviscerating, preserving, dehydrating, freezing, chilling, or otherwise manufacturing – and includes the packaging, canning, jarring, or otherwise enclosing food in a container.
- State Organic Program – a state program that meets the requirements of the NOP or may be more restrictive, subject to approval by USDA.
- Synthetic – a substance that is manufactured by a process that chemically changes a substance extracted from naturally occurring plant, animal, or mineral sources, except for substances created by naturally occurring biological processes.

What must be Certified? –

- Each operation that produces or handles crops, livestock, or other agricultural products that will be sold or represented as “100% organic”, “organic”, or “made with organic ingredients”.

Exempt from Certification? –

- Any retail food establishment that handles or sells organic products, but which does not process them.

Organic Production includes the use of “Cultural Practices”, including mechanical and physical methods of pest management, including:

- Use of predators and parasites
- Non-synthetic controls such as lures, traps, and repellents.
- Weed control using mowing, mulching, flame or heat.
- Plant disease control using non-synthetic biological, botanical, or mineral substances.

Facility Pest Management standards – the organic operation MUST use practices such as:

- Removal of pest habitats, food sources, and breeding areas.
- Exclusion to prevent access to the operations and handling areas.
- Management of cultural factors, such as temperature, lighting, humidity, air circulation, to prevent the pest reproduction.
- Control of the pest with:

- Mechanical or physical controls – traps, light, sound
- Lures and repellents with substances consistent with The National List
- A pesticide consistent with The National List only if the other non-chemical steps are not effective or sufficient

The National List of Allowed and Prohibited Substances:

Pesticide Active Ingredients exempt from EPA Registration under 40 CFR – 152.25 “Minimum Risk Pesticides”.

Castor Oil	Cedar Oil	Cinnamon and Cinnamon Oil
Citric Acid	Citronella and Citronella oil	Cloves and Clove Oil
Corn Gluten Meal	Corn Oil	Cottonseed Oil
Dried Blood	Eugenol (= clove oil)	Garlic and Garlic Oil
Geraniol	Geranium Oil	Lauryl sulfate
Lemongrass Oil	Linseed Oil	Malic Acid
Mint and Mint Oil	Peppermint and Peppermint Oil	2-phenethyl propionate
Potassium sorbate	Putrescent whole egg solids	Rosemary and Rosemary oil
Sesame and Sesame oil	Sodium chloride (salt)	Sodium lauryl sulfate
Soybean oil	Thyme and Thyme oil	White pepper

Synthetic substances specifically allowed as organic:

Synthetic substances may be permissible for organic production IF they have been evaluated using the criteria set forth in The Act. Those synthetic substances specifically allowed in organic crop production, under certain guidelines, are:

- As algacides, disinfectants, or sanitizers –
 - alcohols such as ethanol and isopropanol
 - chlorine materials
 - copper sulfate – with restrictions
 - soap-based algacides and de-mossing agents
- As herbicides or weed barriers –
 - Soap-based agents
 - Mulch or coverings – paper, without glossy or colored ink
 - Plastic sheeting or mulch
- As animal repellents –
 - Soaps or ammonia – no soil contact, no contact with edible parts of crops
- As insect or other arthropod control –
 - Ammonium carbonate – only as a bait in insect traps, no soil or crop contact
 - Boric acid – for structural pest control – no direct contact with organic crops/foods
 - Copper sulfate – tadpole shrimp control in rice production only
 - Elemental sulfur and lime sulfur
 - Horticultural oils – dormant and summer oils, suffocating oils
 - Insecticidal soaps
 - Sticky traps and barriers

- Pheromones – trapping, monitoring
- As rodent control –
 - Sulfur dioxide – underground rodent control only – smoke bombs
 - Vitamin D3
- As mollusk control – slugs and snails –
 - Listed as “no options/none”
 - Sluggo? – iron phosphate?
- As plant disease / pathogen control –
 - Fixed coppers – copper hydroxide, copper oxide, copper oxychloride, and those EPA-exempted for tolerance levels – with restrictions
 - Copper sulfate – minimizing soil contact
 - Hydrated lime, lime sulfur
 - Horticultural oils – dormant, summer, suffocating oils
 - Potassium bicarbonate
 - Elemental sulfur
 - Streptomycin and Tetracycline – for fire blight control
- For use in livestock production – synthetic products -
 - Ivermectin – emergency treatments for parasites when approved methods are not otherwise effective
 - Copper sulfate – topical treatment for parasites

The “inert” ingredients in pesticide formulations are a major concern. EPA has created 4 Lists of synthetic inert ingredients for use with non-synthetic substances/ingredients –

- EPA List 4 – “Inerts of Minimal Concern”
- EPA List 3 – Inerts of Unknown Toxicity
 - Piperonyl butoxide – the most common additive/synergist in pyrethrum products is on List 3, and thus is not approved organic.
- EPA List 2 – potentially toxic inerts, with a high priority for testing
- EPA List 1 – inert ingredients of toxicological concern
- EPA Lists of Inert Ingredients can be found on the internet at <http://www.epa.gov/opprd001/inerts/lists.html>

Natural substances that are specifically prohibited:

Some Natural / Non-synthetic substances are specifically prohibited for use in organic production –

- Arsenic
- Calcium chloride – one exception
- Strychnine
- Nicotine sulfate – tobacco dust
- Diatomaceous Earth – allowed for use only as a food filtering aid for direct contact with organic foods.

Proposed list of pesticides and pest management products that may be appropriate in Organic facilities:

Based on the various qualifying criteria above, following is a growing and evolving list of products sold by Univar USA. DO NOT consider this to be absolute fact, but use your own judgment as well before recommending a product to a customer.

Specifically PROHIBITED substances of interest:

- Isopropyl alcohol – (Ethanol and Methanol are permitted)
- Moth balls and Moth crystals – naphthalene and para-dichlorobenzene (PDB)
- Methyl bromide
- Nicotine – a botanical, due to high toxicity
- Petroleum solvents – considered health hazards
- Piperonyl butoxide – most common synergist in pyrethrin products – originally a plant-derived product, but it goes through significant molecular changes in extraction and processing.
- Synthetic pyrethroids – prohibited as a group
- Sulfur dioxide – cannot be used as a fumigant
- Anti-coagulant rodent baits – all are prohibited, whether or not in bait stations

Approved Products:

Biological products – micro-organisms – cannot be genetically engineered organisms:

- *Bacillus thuringiensis* – B.t. and B.t.i. – only when used without synthetic additives or inert ingredients
 - Dipel
 - Teknar
 - Mosquito Dunks, Mosquito Bits
 - Gnatrol
 - Vectobac
- *Bacillus sphaericus* – byproduct of fermentation of a soil bacterium
 - Spinosad
- *Steinernema carpocapsae* – nematodes for insect larva control
 - Millenium

Biological cleaners for fly breeding site reduction and other surface cleaners:

- DrainGel and DrainGel IBD – bacteria based drain cleaner
- DrainFoam – microbe-based cleaner for drains, corners, crevices
- Micro-Foam – microbe-based, but specific ingredients not disclosed
- Bio-Gel – bacteria-based for drains and general surfaces
- Bio-Mop – bacteria based surface cleaner
- DrainForce – bacteria based drain cleaner

- DF-5000 – bacteria and enzyme based drain cleaner
- Clean Kill – Ionic silver plus citric acid – surface cleaner and disinfectant
- Invade Bio Drain – microbe-based drain cleaner – gel formula
- Invade Bio-Cleaner – microbial formulation with citrus oil for surface cleaning
- Invade Bio Remediation – microbe based for waste digestion and citrus oil for odor control – concentrated liquid formulation
- Invade Bio Zap – microbe based for waste digestion and citrus oil for odor control
- Invade Bio Foam – microbe based for waste digestion and citrus oil for odor control – liquid formulation
- Invade Bio Foam Hot Spot – microbe based for waste digestion and citrus oil for odor control – aerosol formulation

Rodent Control:

- Rodent Bait Products:
 - Detex blox – non-toxic food grade – monitoring only
 - Rode-trol – Corn Oil Concentrate
 - Quintox – cholecalciferol – calcium derivative
 - Strychnine – a botanical extract
- Glue traps for rodents and insects – all glue products without other pesticide additives are okay
- Repellents – must be derived from a natural source without synthetic additives
 - Mole Out Granules, Whole Control – Castor oil
 - Dr T's Deer / Rabbit repellent – putrescent whole egg solids / mint / garlic oil
 - Defence Granules for dogs / cats – natural essential oils
 - Mosquito and Gnat Repelling Granules – natural essential oils

Botanicals:

- Garlic
- Mint Oil
 - Victor Poison Free Ant & Roach aerosol (NOP / OMRI = R)
 - Victor Poison Free Ant Killer (NOP / OMRI = R)
 - Victor Poison Free Flying Insect Killer (NOP / OMRI = R)
 - Victor Poison Free Wasp & Hornet (NOP / OMRI = R)
- Essential tree oils
 - Dust
 - EcoPCO D-X – hexa-hydroxyl + pyrethrins (NOP)
 - EcoExempt D – hexa-hydroxyl + clove oil (NOP)
 - Granules
 - EcoExempt G – clove oil + thyme oil (NOP)
 - Liquid Concentrates / Fogging
 - EcoExempt IC2 – hexa-hydroxyl + rosemary oil + peppermint oil (NOP)
 - EcoExempt IC – hexa-hydroxyl + rosemary oil (NOP / OMRI = R)
 - EcoExempt MC – a.i. is oils of rosemary, cinnamon, lemongrass
Inerts are wintergreen oil, isopropyl myristate, lecithin

- EcoPCO EC-X (NOP)
 - EcoPCO EC – NOT NOP-compliant – contains PBO synergist
 - Wettable Powders
 - EcoPCO WP-X (NOP)
 - Aerosols
 - EcoPCO AR-X - hexa-hydroxyl + pyrethrins (NOP)
 - EcoPCO ACU – hexa-hydroxyl only (NOP)
 - EcoExempt Jet Wasp & Hornet – hexa-hydroxyl + rosemary oil (NOP)
 - ExoPCO Jet-X Wasp & Hornet – NOT NOP-compliant – contains PBO synergist
 - EcoExempt KO – hexa-hydroxyl + clove oil (NOP)
 - Bioganic Flying Insect Killer – eugenol (clove oil) + sesame oil (NOP)
 - Bioganic Crawling Insect Killer – rosemary oil (NOP)
 - Herbicides
 - ExoExempt HC – hexa-hydroxyl + clove oil (NOP)
 - Matran EC – clove oil (NOP / OMRI)
- Pyrethrums – without synergists – piperonyl butoxide is a prohibited substance
 - Liquids
 - Pyganic Pro – with restrictions R
 - Aerosols
 - MotherEarth 2% Py Contact – pyrethrum only with no PBO
 - Dusts
- Neem alone = azadirachtin + liminoids = Azatrol EC – both from seed kernels of the neem fruit tree – upsets insect's hormonal system and prevents proper growth, thus affecting only immature stages
- Sesame Oil – Organocide – combination of sesame oil + fish oil
- Citrus extract and derivatives
 - D-Limonene
 - Pro-citra DL – with restrictions R
 - Orange Guard – with restrictions R
 - Orange Guard Ornamental Plants Concentrate
 - Power Plant
 - XT-2000
 - MotherEarth Wasp/Hornet Jet Spray
- Cinnamon
 - EcoExempt MC – a.i. is oils of rosemary, cinnamon, lemongrass
- Sabadilla – from ground seeds of sabadilla lily – stomach poison

- Rotenone – from roots of tropical legumes – inhibits cellular processes, depriving insects of oxygen in cell tissues
 - Prenfish Toxicant
- Strychnine – allowed for rodent control only. Must not be left on ground surface.
 - Wilco Gopher Getter Type 1 Bait
 - Wilco Gopher Getter Bait AG

Soap – insecticidal soap = sodium/potassium salts + fatty acid

- M-Pede
- Safer brand soaps

Inorganic products – “mined products” shall not have been heated to change molecular structure, nor combined with any synthetic or other prohibited substances:

- Boric Acid / Orthoboric Acid – cannot be used in direct contact with food or in soils
 - Dusts
 - Borid and Borid Turbo – Waterbury
 - Nibor and Boracide – Nisus
 - Boric Acid Dust – Eaton
 - BorActin Insecticide Powder – Rockwell Labs
 - Armor Guard
 - Victor Roach Powder – Victor Woodstream
 - Aerosols
 - Borid Turbo – Waterbury
 - Perma-dust – Whitmire-Microgen
 - Insect Baits
 - Terro PCO
 - Drax Gel – Waterbury
 - Niban Granular – Nisus
 - Niban FG granules – Nisus
 - Intice Ant Granules – Rockwell Labs
 - Intice Sweet Ant Gel – Rockwell Labs
 - Intice Perimeter Bait – Rockwell Labs
 - Intice Granular Bait – Rockwell Labs
 - Intice Roach Bait – Rockwell Labs
 - Green Zone Granular Bait – Rockwell Labs
- Disodium Octaborate Tetrahydrate / Sodium Tetraborate Decahydrate (Borax):
 - Insect Bait products:
 - Gourmet Ant Bait – liquid or gel
 - Uncle Albert’s Super Smart Ant Bait – gel
 - Intice Ant Bait – Rockwell Labs
 - Intice Ant Gel – Rockwell Labs
 - Dust Formulations:

- Borrada D
 - Nibor D
 - Liquid or Gel Concentrates:
 - Bora-Care
 - Borrada LP
 - BoraSol Liquid
 - Jecta Diffusible Boracide – gel in syringe
 - Dry Formula Concentrates and solid forms:
 - Tim-Bor
 - Impel Rods
- Pentahydrate Borax:
 - Boracide Borate Powder
- Silica gel / silicon dioxide / amorphous silica dioxide:
 - Drione and Tri-Die not allowed – they contain Piperonyl Butoxide which is prohibited
 - Diatect II - NOT NOP-compliant – contains PBO synergist
 - Diatect III – NOT NOP-compliant – contains PBO synergist
 - Diatect V – silicon dioxide + pyrethrins – with R restrictions
- Limestone
 - NIC Pro dust – 1 and 10 lb containers
- Diatomaceous earth – non-heated forms only, without synthetic additives
 - Dust products:
 - Insecto – with R restrictions – saltwater derived DE
 - MotherEarth D – from Whitmire-Microgen – 8 oz and 10 lb – freshwater derived DE
 - Granules:
 - MotherEarth Exempt Granules – 25 lb – freshwater derived DE
 - Baits
 - MotherEarth Granular Bait – 4 lb and 40 lb – freshwater derived DE
- Potassium bicarbonate (= baking soda) – used as fungicide on ornamentals, often combined with oils - may create conditions fungi cannot survive on
- Iron phosphate
 - Sluggo – snail and slug control
- Copper products – includes Fixed Copper, Copper Sulfate, Copper Hydroxide – generally grouped as “Bordeaux Mixtures”
 - Copper Count-M – metallic copper
 - Copper Sulfate – copper sulfate pentahydrate
 - Kocide DF – fixed coppers

- Kocide 2000 – fixed coppers
- Iron sulfate, Zinc sulfate – used as fertilizers or soil amendments
- Petroleum Oil derivatives - Horticultural oils – smothering effect – may be either synthetic or natural – petroleum, fish oil, plant oils
 - Mosquito Larvacide Oil – mineral oil
 - Saf-T-Side Spray Oil – petroleum oil
 - Loveland 415 Oil – mineral oil
 - Purespray Green (WMMG) – paraffinic oils – OMRI Certified
 - Damoil Dormant & Summer Spray Oil – petroleum oil

Odor Control:

- Earthcare bags and pouches

Growth Regulators

- Prohibited – any synthetic products such as IBA and NAA
- Allowed:
 - natural growth regulators such as IAA
 - insect juvenile hormones – recommend naturally derived, but synthetic mimics okay
 - methoprene – Altosid, Precor IGR, Extinguish Pro Fire Ant Bait
 - hydroprene – Gentrol aerosol, IGR Concentrate, and Point Source
 - Nylar (Pyriproxyfen) – Archer, Pyri-Shield EC, IG Regulator, Nyguard IGR, Distance IGR and Distance Fire Ant Bait
 - Fenoxycarb – Award Fire Ant Bait