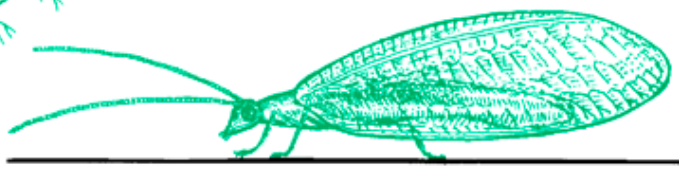
SINCE 1950

CATALOG OF BENEFICIALS



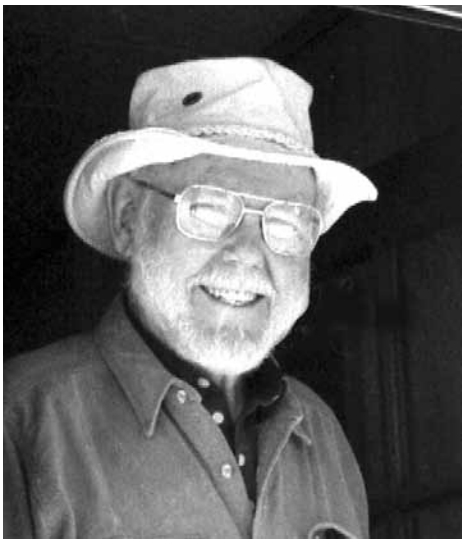
RINCON-VITOVA

INSECTARIES, INC.

www.rinconvitova.com

TOWARDS ECOLOGICALLY-BASED AGRICULTURE WHERE BENEFICIAL ORGANISMS ARE RELEASED AND ENCOURAGED TO CONTROL PESTS

From the Bug Farm



Everett J. (Deke) Dietrick

Rincon-Vitova produces beneficial insects (bugs that eat other bugs). We are experts in the biological control of pests in a wide variety of situations, including

- Commercial farms and production nurseries and greenhouses
- Professional consulting and landscape service companies
- Landscapes, home gardens and interior plantscapes
- Universities, schools, zoos, botanical gardens, conservatories, theme parks
- Race tracks, stables, horse boarding facilities
- Dairies, feed lots, poultry and compost operations

Our founding entomologist, Everett J. (Deke) Dietrick, defined our philosophy with an emphasis on the conservation of natural enemies through habitat diversity, and, after fifty years, the rest of the world is finally catching up with his vision. He saw a bug-eat-bug environment in farm fields, where a complex of natural enemies controls a pest. He often said "Food drives all these systems" - we can still hear him saying that.

Deke passed away on December 23, 2008 and left a legacy for our company, our industry and our profession. He remained pleased with the current staff's know-how and initiative to offer the best resources for safe and effective pest control. In respect of Deke's vision and mission, Rincon-Vitova continues to support the educational and promotional projects of the *Dietrick Institute for Applied Insect Ecology* and has also taken over his company producing the *D-Vac Vacuum Insect Net*.

We are proud to have worked with Deke and to be among the next generation promoting biological control by natural enemies and habitat diversity. We're also proud of our commitment to green business practices, see greenbiz webpage and Ventura County's www.*builditsmartvc.org/vc/vc4.php*.

Also in Deke's tribute, this year's **Catalog of Beneficials** is organized in categories coinciding with the *Five Features of Integrated Pest Management* set forth by Deke in 1969.

Online at **rinconvitova.com**:

- on-line ordering (in the works)
- updated web bulletins
- **bugfarm.us**: day-to-day happenings and reflections via our blog
- **biocontrolbeat.com**: news you can use by Joel Grossman

We truly appreciate both loyal and new customers and strive to give complete information and supply both high quality products and the best customer service possible. We look forward to hearing from you and helping you control your pest problems naturally.

Deke's Five Features of IPM

The Five Features of Integrated Pest Management (IPM) outlined by Everett 'Deke' Dietrick in 1969, emphasize that control depends on a series of mutually reinforcing activities. It's not just one thing! IPM (the pure definition) conserves and fosters natural enemies, suppresses pest levels within tolerable levels, and uses pesticides only as a last resort.

Table of Contents

Releasing Beneficial Organisms

Maximize predators, parasites, pathogens and antagonists that are often principal controlling factors. Naturally occurring biocontrols are a little too little, and a little too late, so be proactive! Beneficials like those shown are collected or grown for control of the following pests, BUT FIRST manage the ants with boric acid baits and barriers!

Build Beneficial Refuges & Habitats

Plant unsprayed, irrigated, flowering vegetation that provides shelter, prey, pollen and nectar, so beneficials, both natural and released, live longer and reproduce better.

Monitor Insect Ecology

Systematically observe the relative numbers of pests and beneficials. The ratios indicate what kind of intervention is needed.

Can't find what you need? Have questions?
Call 800-248-BUGS
M-F 8:00 AM to 4:30 PM Pacific

Integrate Cultural Practices

Plan ways to mulch, inoculate, bait, trap, till, irrigate, rotate crops, harvest in strips and other cultural practices that will help to tip the balance in favor of beneficials.

Use Soft Pesticides and Avoid Toxic Chemicals

By poisoning beneficials as well as pests you create natural enemy free space vulnerable to new pest invasions. Instead, spot treat with soft or less disruptive pesticides.

KEY TO SHIPPING CODES
P = Perishable,
N = Non-Perishable,
S = Ships Separately

Releasing Beneficial Organisms

Ant Control

Ant control is essential for the biological control of honeydew-secreting pests, like aphid, whitefly, mealybug, psyllid, and soft scale. Ants attack and often drive beneficial insects away from these pests in order to protect them as a source of nutritious honeydew syrup. Use bait stations or dispensers to deliver low-toxicity borate ant bait to the colony, where the bait will gradually build up to kill the queen. Disrupt ant mounds and runs with a shovel and exclude ants by placing sticky barriers around tree trunks and bench legs to starve ant colonies by blocking access to insect honeydew.

GOURMET LIQUID ANT BAIT

One percent disodium octaborate tetrahydrate (like borax). Specially formulated to mimic the natural "honeydew" that ants seek. Controls ants (carpenter, ghost, Argentine, crazy, white footed and big headed ants), roaches, and numerous other insects.

Dilute 1:1 with water and place in AntPro™ or Ants-No-More bait dispensers.

ANTGABQT / quart / (2.5 lb) N
per quart..... 13.50

ANTGABG / gallon / (10 lb) N
per gallon..... 58.00

ANTGAB2.5 / 2.5 gallon / (27 lb) N
per unit..... 79.00

BORIC ACID

Technical powder that is less toxic than table salt to mammals. Can be used in Boric Acid Syrup.

BOR4 / 4 ounce / (0.5 lb) N
per unit..... 4.50

BOR16 / pound / (1.1 lb) N
per unit..... 10.50

NIBAN

Five percent boric acid granular bait for structural use. Moisture resistant granules do not degrade in heat or sunlight. Niban kills insects by blocking enzyme production and causing starvation. For ant, cockroach, silverfish, cricket, mole cricket, snail, slug and earwig.

Available in fine (FG) or course (CG) granules.

NIBANFG1 / pound FG / (1 lb) N
per pound..... 17.50

NIBANCG5 / 5 pound CG / (5 lb) N
per unit..... 49.00

ANTS-NO-MORE BAIT STATION

Bait dispenser on a stake holds 4 oz in two compartments that accommodate granular, liquid or gel baits. Green color and form blends in with bedding plants. Spill and child resistant. UV protected for longer bait efficacy.

Use 1 station per 300 sq ft.

ANTSNO / 2 per box / (0.5 lb) N
per box..... 7.50
12+ boxes 6.90

ANTPRO™ BAIT DISPENSER

High volume dispenser holds 20 oz liquid bait. Durable polypropylene container with specially designed screw-on platform, dispenser lid, stake for stabilizing and securing screw that deters tampering. Protects bait from drying out, flooding or being diluted by rain. Excludes non-target insects like bees. Provides reliable long-term ant control for farm, garden and landscape.

Use with Gourmet Liquid Ant Bait, or bait made from recipe. Place 1 bait dispenser every 500 sq ft (home use) or 4-20 dispensers per acre (agricultural). For structural use, put at least one AntPro™ dispenser on each side of affected buildings.

ANTPRO / dispenser / (1.5 lb) N
per dispenser.....26.00

4+ dispensers 24.50
10+ dispensers..... 22.70
35 per case, each..... 21.40

TANGLEFOOT ADHESIVES

Adhesive for making traps and sticky barriers. Stays sticky until covered with bugs or debris. One ounce makes a 2 inch wide sticky band 1 ft long. Make traps with brush cap on 8 ounce Insect Trap Coating.

TANGL6 / 6 oz squeeze tube / (0.5 lb) N
per tube.....8.30

TANGL10.5 /10.5 oz caulk tube / (0.8 lb) N
per tube.....11.50

TANGL15 /15 oz tub / (1.0 lb) N
per tub.....11.50

TANGLBC /8 oz can / (0.6 lb) N
per can.....9.30

TANGLP5 / 5 lb pail / (5.5 lb) N
per pail.....42.00

TANGLP15 /15 lb pail/ (16.0 lb) N
per pail.....100.00

TANGLP25 /25 lb pail / (26.0 lb) N
per pail.....156.00

ANT TIP: BORIC ACID SYRUP

1 cup sugar
2 level tsp boric acid
2 cups water
(1% boric acid in 25% sugar syrup by wt)

Stir to dissolve and pour into bait dispensers, like AntPro™ or Ants-No-More.

Aphid Biocontrols

Aphidoletes, Hippodamia (convergent lady beetles), Chrysoperla (green lacewing) larvae, Aphidius and Aphelinus are used depending on environmental conditions and aphid species. Aphidoletes are proactively introduced in low numbers onto low-level aphid populations. If aphid populations increase as growing temperatures warm up, adding green lacewings will help to clean aphids off leaves that are not too hairy. In cold weather (before it is warm enough for lacewing eggs to hatch) lady beetles are a more effective predator. Aphidius and Aphelinus (specific to different aphids) are more cost-effective in greenhouses than outdoors. Insect Food (page 24) and Predalure (page 32) will also help draw in beneficial aphid predators. Plants with flowers will also attract lacewing adults and other beneficials (page 24). Ant control is also critical for this honeydew producing pest.

Lacewing – 'The Aphid Lion' – Our Most Cost-Effective General Predator

Green lacewing, *Chrysoperla rufilabris*, is available in all life stages and packaging for every situation. The larval stage is the predator and feeds on all soft-bodied insects, including aphid, mite, whitefly, scale, mealybug, thrips, psyllid, lerp, leafhooper and small caterpillars. Ants will attack and eat lacewing eggs and larvae. Lacewing adult stage requires nectar, honeydew and pollen to lay eggs. Use Insecta-Flora or Beneficial Blend seed mix (page 25) to keep lacewing adults and other beneficial insects in cultivated areas. *(Left photo: Five day old larva spearing aphid.)*

LACEWING EGGS

Eggs packaged in cups or bags of 1,000, 5,000 or 10,000 eggs per unit. Cups contain only the eggs and bags contain rice hulls as a carrier. Tiny larvae eat mites, mite eggs and insect eggs. Within about a week they start eating aphids.

Release 2,000-3,000 eggs per acre every 2 weeks, 2-4 times OR 1 per 20 pests OR 2 per sq ft in greenhouses OR 1,000 per eucalyptus tree for lerp psyllid. Release when hatching begins: incubate cups or bags (ideal conditions 80° F, 60% RH), check each morning until tiny larvae appear in 1-4 days, sprinkle on plants directly or into paper cups placed in foliage.

All units: (0.1 lb) P

LW1-CUP	1,000/cup	.7.50
LW1-BAG	1,000/bag	.7.50
LW5	5,000/bag	.22.00
	5+ bags	.17.00
	10+ bags	.14.20
	20+ bags	.13.50
LW10	10,000/bag	.34.00
	5+ bags	.27.00
	10+ bags	.23.00
	30+ bags	.21.50

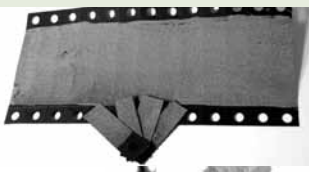
LACEWING EGGS, BULK

LW eggs can be sprinkled on plants directly, mixed with carrier or suspended in water and sprayed onto plants.

All units: (0.1 lb) P

LWBULK	5,000+	4.60/1,000
	10,000+	4.00/1,000
	20,000+	3.10/1,000
	200,000+	2.10/1,000
	1,000,000+	1.90/1,000
	Minimum order 5,000	

LACEWING EGGS ON CARDS



Eggs glued on cards yielding 1,000, 3,000, 5,000 or 10,000 eggs per card. Perforated into 0.75 x 2.2 inch tabs with hook for hanging on twigs. All cards except 1,000 egg unit separate into 30 tabs. LWC1 is 1/3 LWC3 and contains 1,000 eggs on 10 hanging tabs.

Cut cards, incubate until eggs are near hatching (green color turns to translucent gray). Hang 1-2 units per bush OR 1-5 units per tree OR 1-2 units per trellised tomato every 2 weeks, 2-4 times. Do not use if ants are present.

All units: (0.1 lb) P

LWC1	1,000/card	14.00
	5+ cards	11.20
	20+ cards	8.60
LWC3	3,000/card	18.50
	5+ cards	14.50
	20+ cards	10.50
	40+ cards	9.10
LWC5	5,000/card	24.00
	5+ cards	16.50
	20+ cards	14.50
	50+ cards	13.50
LWC10	10,000/card	35.00
	5+ cards	28.00
	20+ cards	25.00
	50+ cards	23.00

FUN FACT: The eggs of the lacewing are born on stalks. When freshly deposited, our lacewing eggs are a vibrant light green color. As they incubate in warm temperatures they become increasingly pale and eventually turn silvery grey indicating that the tiny larvae are about to emerge.

LACEWING LARVAE

Cardboard verticel honeycomb holds 400 larvae ready to feed on pests as soon as they hit the plant. Honeycomb unit has paper on one side, organdy mesh on the other, with one larva in each cell. Larvae can walk as far as 7 miles, ranging up to 100 feet while looking for pests. During 2-3 weeks of life, one lone lacewing larva can consume 250 leafhopper nymphs in grapes, 300-400 aphids, 11,200 spider mites, 3,780 coccid scale crawlers or 6,500 scale eggs. Interfering ants, waxy coatings or hard shells on pests and low temperatures deter lacewings from dining on and destroying pests.

Remove organdy mesh from a few cells at a time, turn over, tap larvae onto plants near pest hotspots. Release 100 per tree, 20 per bush, 4 per 10 sq ft.

LWLAR / 400 larvae / (0.1 lb) P

per unit 24.00	10+ units 15.00
5+ units 16.50	20+ units 14.40

LACEWING LARVAE IN BOTTLES

Bottles contain 1,000 larvae in rice hulls with food.

Sprinkle contents onto plants near pests.

LWLBOT / 1,000 larvae / (0.3 lb) P S

2+ bottles 28.00
5+ bottles..... 19.50

Shipped Monday, order by previous Monday. Minimum order two bottles.

LACEWING ADULTS

After a week of good nutrition from nectar, pollen and insect honeydew in a natural ecosystem, females may lay on average 550 eggs during an average 30 to 100-day ovipositional period. Contain > 50% females.

200-500 per acre OR 1-3 per 200 sq ft in greenhouses OR 100 per tree.

All units: (0.4 lb) P S

LWA100 / 100 adults

per unit 48.00

Shipped MTW, order by previous Friday.

LWA250 / 250 adults

per unit 62.50
5+ units 53.50
10+ units..... 49.50

GABRIEL RUDE
Shipping and Receiving

Kyra previously knew Gabriel's good work habits from working together in an Indiana butcher shop, and she knew a job with insects might somehow jibe with Gabe's other passion for watching sci-fi and horror movies. Gabe helps us over-deliver on our promises and takes excellent care of regular customer accounts.

DUKE GRIBBLE
Customer Service Associate, Writer, Gardener

A Sunday morning gardening gig led to the beneficial-butterfly-bee garden project from whence Duke got tied to computer writing for our website revamp. A naturalist, writer and teacher, all these hats fit. He focuses his attention for details on customer service during our seasonal peak.

KYRA ANKENBRUCK
Assistant Manager for Production

Kyra's first bugfarm.us blog post tells how she found our post-graduate internship through an Environmental Toxicology class. Degrees in biology and culinary arts prepared her for anything an insectary needs done. She virtually glows with delight about the insects, the future of our industry depends on talent and enthusiasm like Kyra's.

TRACY JENSEN
Front Office

Tracy has a deep practical desire to understand and solve pest problems without toxic pesticides. She is eager to help determine the most cost-effective options and handle her customer's orders with care. She is always creating new hands-on learning experiences to share with Jaeden, her seven-year old entomologist son.

LADYBUGS

Hippodamia convergens or Convergent lady beetle adults and larvae eat aphids and require an aphid diet to lay eggs. When aphid populations are low, they will eat whitefly and some other soft-bodied insects or subsist on pollen and nectar. The convergent ladybug migrates to hibernation sites in mountain valleys where it congregates seasonally. They are collected (not grown at the insectary) in variable and recently declining numbers. So, while valuable in early spring, supplies of ladybugs are often low. As summer approaches, lady beetles can be collected again. Summer beetles disperse quickly unless contained by screening.

Plan 1 per sq ft in greenhouses OR ½-1 gal per acre, 1-2 times. Release after dark, while they are cold and slow moving. Sprinkle area with water, place beetles near pests. Attract and keep ladybugs around cultivated areas with Insect Food (page 24) and Predalure (page 32).

LB500 / 500 beetles / (0.2 lb) P
unit..... 7.00

LB4.5K / 4,500 beetles / (0.6 lb) P
½ pint.....15.00

LB18K / 18,000 beetles / (2.0 lb) P S
quart.....49.00

LBHG / 36,000 beetles / (3.0 lb) P S
half-gallon 72.00

LBG / 72,000 beetles / (7.0 lb) P S
per gallon.....95.00
5+ gallons.....86.00
20+ gallons 82.00

DEBUG YOUR EARTH DAY: Activities with ladybugs are a popular way to celebrate Earth Day. Unfortunately, April is also a time when, due to migratory behavior, there is often a shortage of ladybugs available in nature. Before the seasonal increase in supply (mid-June), farmers sometimes need them to help with early aphids especially when it is too cool for lacewing eggs to be used. Scarce winter lady beetles become a valuable biocontrol tool at this time. This is why we enjoy helping customers find activities for educational events that don't require lady beetles in early spring.

APHIDOLETES

Aphidoletes aphidimyza is a predatory midge (a small fly). The orange maggot stage (see lower right) targets over 60 species of aphids and psyllids. Very cost-effective for preventive control at low aphid levels. May colonize in protected gardens and orchards, appearing year after year at first sign of aphids in spring. Reproduces in greenhouses. Pupae diapause with daylight < 16 hours, at temperatures < 54° F. Supplemental light in winter encourages new generations, but is not required. Larvae drop to soil to pupate – avoid disturbing soil. Shipped as pupae in trays or vials with vermiculite, or in blisters on cards.

1-6 per plant OR 2-5 per tree OR 250 per acre. Incubate and release mated females daily from trays. Cut corner of lid (see upper left) and set out on third day. Release away from hot spots in evening when winds are calm. Two weekly introductions establish all life stages.

ALL UNITS: (0.3 lb) P

AA250 / 250 pupae
per tray 16.00
5+ trays 13.00

AA1 / 1,000 pupae
per tray 33.00
5+ trays 28.00
10+ trays..... 24.00

AA250H / 250 pupae in hanging vial
per vial..... 19.60
5+ vials..... 14.50
10+ vials..... 12.50

AA3 / 3,000 pupae
per vial..... 55.00
5+ vials..... 48.00
10+ vials..... 45.50

Shipped Wednesday, order by previous Friday.

ANOTHER DAY AT THE BUG FARM...

Rincon-Vitova is in an oilfield in the Ventura River Valley, three miles from where the river flows into the Pacific Ocean and near downtown Ventura. In 1967 founder Deke chose this land because there is usually a breeze in the valley to protect against extremely hot weather that can destroy insect cultures. Our rooms have never needed air conditioning.

When Rincon-Vitova produced Trichogramma, moth eggs were grown in 21 cargo shipping containers (and a few local barns). Now the containers are used for fabrication, inventory and libraries with expansion room for new projects. We grow insects in three dormitory buildings (20 rooms) built in 1922 for migrant farm worker housing for the Ventura Citrus Association.

We enjoy walking outdoors between work areas and along the demonstration gardens on 1,000 feet of easement on the Ventura River Trail.

Aphidius and Aphelinus

Parasitic wasps that reproduce by laying eggs in over 40 species of aphids. A new adult wasp emerges out of a mummified aphid host. Host feeding also reduces aphid populations. Excellent with Aphidoletes for preventive programs in greenhouses. Those shipped as pupae may emerge in transit. Release in morning or evening during cool temperatures and low light levels, far from yellow sticky cards. *(Left photo: Aphid mummy with hole where Aphidius emerged, in a clump of green peach aphids.)*

COLEMANI

Aphidius colemani prefers to eat green peach, cotton/melon, tobacco, and closely related aphid species.

1-5 per 100 sq ft for prevention OR 50 per 100 sq ft for a problem, 2-3 times OR 500-3,000 per acre every week.

ACOL500-S / 500 pupae / (0.1 lb) P
per vial..... 44.00
ACOL1 / 1,000 pupae / (0.1 lb) P S
per vial..... 58.00
5+ vials..... 50.60

ACOL10K-S / 10,000 pupae / (0.1 lb) P S
per vial..... 276.00
5+ vials..... 260.00

Shipped Tuesday, order by previous Wednesday.

ERVI

Aphidius ervi prefers to eat potato, greenhouse potato, pea, and green peach aphid among others. This larger parasite selects larger hosts than *A. colemani*, and has a longer lifecycle. Not active above 86° F. Best used as a preventive or at first sign of aphids.

1-3 per 60 sq ft weekly OR 250 per 5,000-15,500 sq ft 3-6 times, weekly for prevention up to every 3 days for heavy infestations.

AERVI / 250 pupae / (0.1 lb) P
per vial 62.00
5+ vials..... 52.00
10+ vials..... 49.00

Shipped Tuesday, order by previous Wednesday.

COLEMANI:ERVI (CE) MIX

Aphidius colemani and *Aphidius ervi* combined in a 1:1 ratio. Use where cotton/melon and potato aphids are both common.

1-5 per 100 sq ft for prevention OR 50 per 100 sq ft for a problem, 2-3 times OR 500-3,000 per acre every week.

A-CE5 / 500 pupae / (0.1 lb) P
per bottle..... 61.00
5+ bottles..... 51.00

Shipped Tuesday, order by previous Wednesday.

MATRICARIAE

Aphidius matricariae is good for green peach and 40 other aphid species. However, for cotton/melon, especially on cucumber, *A. colemani* is more efficient. For potato aphid, *A. ervi* is better. No diapause – good for use year round. Performance is reduced in late summer/fall due to naturally occurring hyperparasites. Tolerates low night temps of 50° F and short-term high temps in the high 90's. Actively seeks scattered aphid colonies.

Outdoor ornamentals 1-5 per plant or per 10 sq ft weekly OR preventive in greenhouse peppers 400 per acre OR curative in greenhouse tomatoes 1 per 10 plants OR in greenhouse cucumbers 1 per plant weekly OR outdoor curative 2,000 per acre, 2-3 times, 1 week apart.

AM500 / 500 adults / (0.1 lb) P
per bottle..... 42.00
5+ bottles..... 36.00
10+ bottles..... 33.40

Shipped Wednesday, order by previous Friday.

ABDOMINALIS

Aphelinus abdominalis is a good parasitic wasp for greenhouse, potato and foxglove aphid. Not good when principal pest is cotton/melon, green peach or tobacco aphid. Not very mobile, remains on crop and does not readily leave the greenhouse. Longer lifecycle and more offspring produced than the other aphid parasites. Cannot eliminate a high population of aphids alone, so combine with another predator or parasite for a preventive program.

2-5 per 100 sq ft, once a week, 2-4 times.

APA250 / 250 pupae / (0.1 lb) P
per vial..... 62.00
5+ vials..... 52.00

Shipped Tuesday, order by previous Wednesday.

ABDOMINALIS:COLEMANI:ERVI (ACE) MIX

Aphidius colemani, A. ervi, Aphelinus abdominalis in a 2:1:1 ratio. Targets 25 different species of aphids.

1-5 per 100 sq ft for prevention OR 50 per 100 sq ft for a problem, 2-4 times OR 500-3,000 per acre every week.

A-ACE5 / 500 pupae / (0.1 lb) P
per bottle..... 63.00
5+ bottles..... 56.00

Shipped Tuesday, order by previous Wednesday.

Beetle Biocontrols

PEDIOBIUS

Pediobius foveolatus is a parasitic wasp for Mexican bean beetle (MBB) larvae. Timing of one spring release is critical to control MBB for the season. MBB larvae must be present, so order when adults first appear. Does not overwinter. Shipped as adult wasps or mummies that each yield 20 wasps per mummy.

1000 wasps per 3,600 sq ft or 1,200 ft row OR 1 mummy per 75 sq ft OR 25 ft row of beans, once.

PED1K / 1,000 wasps / (0.1 lb) P
per unit 69.00
5+ units 59.00
10+ units..... 55.50

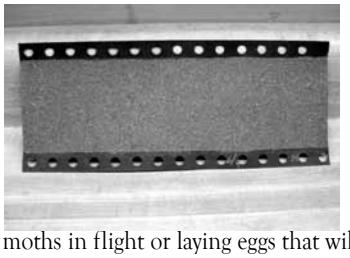
PEDMUM / 40 mummies / (0.1 lb) P
per unit 69.00
5+ units 59.00
10+ units..... 55.50

Shipped MTW, order by previous Friday

See also: Hb nematodes, page 11.
Podisus for Mexican bean beetle and Colorado potato beetle eggs and larvae, page 10.
Spinosad products for leaf feeding beetles, page 41.

Caterpillar Biocontrols

Trichogramma Wasps – Parasitic Wasps Kill Moth Eggs



Trichogramma wasps are 0.01 inch (0.254 mm) long and destroy eggs of over 200 pest moth species, preventing caterpillars or worms from hatching and devouring crops. Trichogramma attack the eggs of pests, so the time to release is when you see moths in flight or laying eggs that will become pest caterpillars. Weekly trap counts indicate the start of moth flights and the time to call to start pre-arranged shipments. Call Great Lakes IPM for traps and lures. Trichogramma are shipped as pupae inside parasitized grain moth eggs that are usually glued to perforated cards. There are approximately 100,000 Trichogramma per card. Each card can be broken into 30 tabs with 3,300 parasites per sq inch and a built-in hook that fits over a quarter-inch stem.

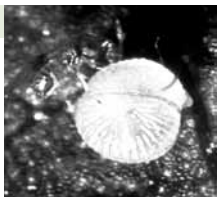
Often used in programs with lacewing, beneficial nematodes, and/or cultural practices that conserve natural predators, trap moths, or disrupt pest moth flights and mating. Loose Trichogramma eggs (not glued on cards) available at a slightly lower price with advance notice. *(Left photo: Trichogramma card)*

Discounts for pre-arranged schedules: 6% for 2-3 shipments, 10% for 4-6 shipments, 14% for 7-9 shipments, and 15% for 10+ shipments.

Use 0.1 to 2 cards per acre per week of moth flight, depending on crop. For corn and tomatoes, use 0.1 card (3 tabs) per acre per week. For apple orchards with codling moth, 1-2 cards per acre. On arrival, cut card into tabs, incubate until near emergence, and hang tabs on or near foliage to be protected. Frequent releases and wide distribution are helpful, but Trichogramma can spread. Protect tabs from ants.

All cards: (0.1 lb) P (S if large quantity)

PRETIOSUM



Trichogramma pretiosum targets many Lepidopteran (moth and butterfly) pest insects, including corn earworm, tomato fruitworm, cotton bollworm, tobacco budworm, alfalfa worm, omnivorous leafroller, cabbage looper, diamondback moth and others in field crops, vineyards and stored grain. Tolerant to hot and dry conditions with adaptable host range, commonly found in row crops in North America. Some strains dominate in trees as well as in fields.

TPR3 / 30,000 per 1/3 card
1/3 card 16.00
TPR1 / 100,000 per card
1 card..... 36.00
2+ cards 26.70
5+ cards 19.20
10+ cards..... 16.20
20+ cards 14.60
40+ cards 14.00
200+ cards..... 13.40

Shipped MTW, order previous Thursday. Order 5+ cards 2 months ahead to assure supply. Ship date & quantity are adjustable per moth trap counts .

PLATNERI

Trichogramma platneri targets many Lepidopteran pests, including looper, amorbia, leaf rollers, navel orangeworm, and codling moth. Used in greenhouses, interior plantscapes, orchards, vineyards, field crops. *T. platneri* is the most commonly found Trichogramma west of the Rockies (especially found in trees), but parasitizes moth eggs in many other settings. All-purpose, slightly less tolerant than *T. pretiosum* of hot and dry weather.

TPL3 / 30,000 per 1/3 card
1/3 card 16.00
TPL1 / 100,000 per card
1 card..... 36.00
2+ cards 26.70
5+ cards 19.20
10+ cards..... 16.20
20+ cards..... 14.60
40+ cards 14.00
200+ cards..... 13.40

Shipped MTW, order previous Thursday. Order 5+ cards 2 months ahead to assure supply. Ship date & quantity adjustable per moth trap counts.

PODISUS

Podisus maculiventris (Spiny soldier bug) targets caterpillars, loopers, webworm, armyworm, hornworm, beetle grubs, Mexican bean beetle, Colorado potato beetle. Available as eggs (PODIEGG) OR nymphs and adults (PODI50).

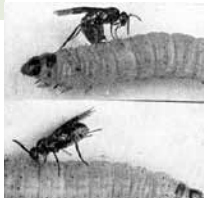
1-10 per plant, distribute in crop to minimize cannibalism.

PODIEGG / 250 eggs / (0.1 lb) P
per vial..... 63.00
5+ vials..... 55.00
10+ vials..... 52.00

PODI50 / 50 nymphs & adults / (0.1 lb) P
per bottle..... 86.00
5+ bottles..... 80.00

Shipped Wednesday, order by previous Wednesday. Handling charges apply.

BRACON



Bracon hebetor is a parasitic wasp that lays its eggs on the larvae of various Lepidopteran (moth) larvae in any stored cereal grain product, raw or processed, bagged or bulk. It controls Indian meal, Mediterranean flour and almond moths. It locates and kills larvae on internal/external walls of storage facilities and in cracks and crevices. Minimum order 60 units of 100 wasps in parasitized caterpillars.

2 wasps per 10 sq ft if < 10 pest larvae present. For 10+ pest larvae per 10 sq ft, use up to 20 every 10 sq ft. Release wasps on top of stored grains and into air vents every 2 weeks during the warm season.

BRACON1 / 100 wasps / (2 lb) P S
per unit..... 15.90

Shipped MT, order previous Wednesday.

GONIOZUS

Goniozus legneri is a parasitic wasp for the control of navel orangeworm (NOW), carob moth, pink bollworm, codling moth and related worm pests in almonds, walnuts, apples, dates, pecans, pistachios, prunes, cotton, etc. The adult female permanently paralyzes the worms in the fruit and lays her eggs on the worm. The eggs hatch and develop in 12-15 days, consuming the entire host. Adults can live 70+ days with nectar or honey sources available. Minimum order 10,000.

Release 2-3 times a year for a total of up to 1,000 per acre. Collect nuts left in field and place in screened container to trap any moths and allow parasitic wasps escape through screen to build up from year to year.

GO1 / 1,000 wasps / (0.5) lb P S
per unit..... 45.00
2+ units..... 36.50

Shipped MTW, order by previous Friday.

Fungus Gnats and Soil-Dwelling Pest Biocontrols

Our associates at Applied Bio-Nomics insectary track fungus gnats with raw potato slices. Place on the soil surface for one hour and record the number of gnat larvae on them to detect change in population. Once detected, prompt action is vital. Apply Hypoaspis followed in one week by an application of Sf or Hb nematodes. Nematodes kill fungus gnat larvae and supplement Hypoaspis' food supply helping them to spread. Introduce Atheta once if the soil is loose. Gnatrol (Bti) is an alternative to beneficials, but expensive and is of no use for prevention at low pest levels. If fungus gnat populations tend to explode, try using a little less coir or other undecomposed hygroscopic organic matter in the soil mix.

ATHETA (ROVE BEETLE)

Predatory rove beetle *Atheta coriaria* targets western flower thrips that build up in soil under greenhouse benches. Also attacks fungus gnats and shore flies.

1 beetle per 10 sq ft (or 1 sq m) once a week.

ATHET1- AB /100 beetles /(0.2 lb) P
per vial..... 26.00
5+ vials..... 20.00

ATHET1K- AB / 1,000 beetles / (0.2 lb) P
per liter..... 83.00
5+ liters..... 73.00

Shipped Wednesday, order by previous Friday.

HYPOASPIS OR GAEOLAELAPS

Hypoaspis miles is a predatory mite that eats larva of fungus gnat. Plans are to replace it with a similar mite named *Gaeolaelaps gillespiei*. Also feeds on western flower thrips (WFT) pupae and springtail (especially in house plants). Lives in top layer of soil, feeds on small, soil-inhabiting insects, mites and all stages of springtails. Can adapt to many different growth media and capillary mats. No diapause: can be used year round. Active at temps > 54° F . Can survive low pest densities. Helps clean up greenhouses and mushroom production, as well as controlling mites on tarantulas, lizards and bees. Should not be applied to soil that has been treated with lime or copper sulfate mixtures. Atheta is a predator of Hypoaspis; Hypoaspis eats nematodes, good and bad.

10-13 L per acre OR 50 mites per 10 sq ft. Twice monthly, 2-5 times overall. Most effective applied prior to heavy infestations and for end of crop clean-up.

HYLTR / 25,000 mites / (0.7 lb) P
per liter..... 30.00
5+ liters..... 26.50
10+ liters..... 25.00

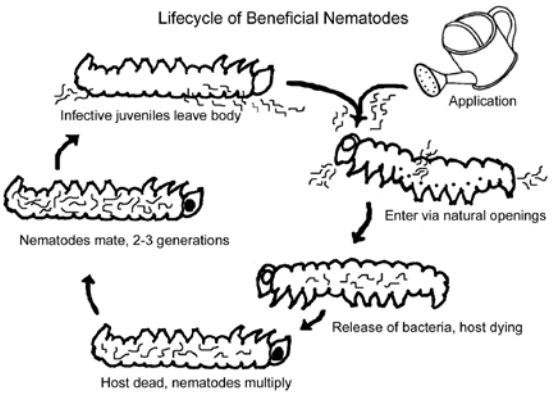
Shipped Wednesday, order by previous Friday.

See also: Cucumeris, page 20. Hb/Sf nematodes, pages 12, 13. Gnatrol, page 41. Sticky cards, page 29.

Beneficial Parasitic Nematodes

Rincon-Vitova supplies *H. bacteriophora* (Hb) , *S. carpocapse* (Sc) and *S. feltiae* (Sf) as well as *H. megidis* (Hm) , *S. riobravis* (Sr), *S. kraussei* (Sk) and *S. scapterisci* (Ss) in various packs and sizes. A popular form of Hb, Sc and Sf in small quantities of 10, 25 and 50 million nematodes is the paste in a pouch. All species are available in bulk trays of 5, 10, 25, 50, 150, 250 million, 1 billion and 2 billion quantities with minimum orders of 2 to 5 trays depending on species and pack. An economical pack for high quantities is the bulk 1 billion in concentrated suspension. Besides the paste form, *S. carpocapse* can also be purchased in bulk in the conventional polyacrylamide gel matrix as Millenium in bulk trays (minimum order of 5 trays) or in the home size Termask (6 million in vermiculite). S. feltiae also comes as Nemasys and Scanmask (7 million in vermiculite). The season is different for different species, generally May through September. Becker-Underwood limits supply of certain species in late fall to early spring.

Nematodes control pests that live in the soil or drop there to pupate, including fungus gnats, thrips, and many other pests. *Heterorhabditis bacteriophora* is especially good for white grubs and beetles. *Steinernema carpocapsae* is great for fleas, weevils, and more. *H. bacteriophora* is more active than *S. carpocapsae*, but *S. carpocapsae* is more tolerant of cold.



H. megidis is especially effective against black vine weevil, and is also cold tolerant. *S. feltiae* controls a variety of pests, including fungus gnats, soil pupating flies and root-knot nematodes.

The OMRI listed Becker-Underwood BioNem line is approved for organic use. They are packed in a carrier of diatomaceous earth, whereas Becker-Underwood's conventional (safe, but not approved for organic) bulk trays in the Nemasys line (*S. feltiae, H. bacteriophora*, and *H. megidis*) are packed in polyacrylamide gel with a preservative. *(Left photo: Hb nematodes bursting out of an infected grub.)*

All nematodes are shipped MTW by overnight service with no same day orders.

Hold in a refrigerator at 40°-45° F until release. If it is necessary to hold more than 4 days, ask a customer service associate how long the particular product may be stored. Different species and packs can be held longer than others, from a few days to a month.

Species[1]	RVI Packed in paste[2]	Becker-Underwood Packed in gel[3] *Minimum order sizes*	Becker-Underwood Packed in DE; OMRI listed *Minimum order sizes*
Heterorhabditis bacteriophora (Hb)	**Hb**	**Nemasys G** *5 X 50, 2 X 250*	**BioNem H coming soon** *5 X 250*
Heterorhabditis megidis, *cold tolerant* (Hm)		**Nemasys H** *5 X 50*	
Steinernema carpocapsae (Sc)	**Sc**[4]	**Millenium** *5 X 250*	**BioNem C** *5 X 250*
Steinemema feltiae (Sf)	**Sf**[5]	**Nemasys** *5 X 50, 5 X 150, or 1,250/case*	**BioNem F** *5 X 250*
Steinemema riobravis (Sr)		**BioVector 2 billion** *No minimum*	

[1] *Steinernema kraussei* **(Sk)** for Black Vine Weevil **(BVW)** and *Steinernema scapterisci* **(Ss)** for BVW, Cranberry Girdler, Mole Crickets available bulk on special order.

[2] Packed 10M, 25M, 50M in paste and 1 billion units bulk solution. Paste and bulk shipments require $6.50 handling charge plus $8.00 for 25M, 50M and billion and off-season shipments of 10M.

[3] Packed 5M, 10M, 25M granular in trays (except **Hm**) seasonally or by special order.

[4] Also available as Termask, 6M granular (in vermiculite for treating termite-infested soil).

[5] Also available as Scanmask, 7M granular (in vermiculite for treating soil infested with fungus gnats).

KEY TO ITEM CODES FOR NEMATODES

NE – nematodes

Hb, Hm, Sc, Sf, Sr, Sk, Ss – indicates species

5, 10, 25, 50, 150, 250, 1250 – indicates number of millions

P - packaged in paste in plastic pouch

BU - packaged in gel in trays by Becker-Underwood (2 or 5 tray minimum)

BUO – packaged in DE carrier, approved for organic

G - dry granular for spreading on soil, turf and pots

B - indicates bulk in concentrated water suspension (1 billion+)

Hb NEMATODES

Heterorhabditis bacteriophora (= H. heliothedis) targets white grubs, cucumber, scarab, Colorado potato, Japanese and flea beetles, chafer, thrips, white grub, corn root worm, billbug, black vine weevil, root mealybug. Best used at 68°-86°F. The Becker-Underwood line is called Nemasys. An organic option in DE is awaiting EPA registration.

Release once every 3-6 weeks for infestations OR once every 60 days as a preventive. 1 million per 60 sq ft OR 1 billion per acre OR for pre-treating potting soil, 1-2 million per cu yd.

NEHB10P / 10 million / (0.1 lb) P S
per pouch 34.00
5+ pouches 22.00
10+ pouches.... 18.50
Handling charge 6.50 - 14.50

NEHB25P / 25 million / (0.1 lb) P S
per pouch 59.00
5+ pouches 49.00
10+ pouches.... 45.90
Handling charge 14.50

NEHB50P / 50 million / (0.1 lb) P S
per pouch 99.00
5+ pouches 86.00
Handling charge 14.50

NEHB5-BU / 5 million / (0.3 lb) P S
5+ trays 13.10
20+ trays 9.10
Minimum order 5 trays

NEHB10-BU / 10 million / (0.1 lb) P S
5+ trays 17.60
10+ trays 14.90
Minimum order 5 trays

NEHB25-BU / 25 million / (0.1 lb) P S
5+ trays 26.80
20+ trays 22.60
Minimum order 5 trays

NEHB50-BU / 50 million / (0.5 lb) P S
5+ trays 29.00
10+ trays 26.90
Minimum order 5 trays

NEHB250-BU /250 million / (0.7 lb) P S
2+ trays 76.00
5+ trays 70.00
Minimum order 2 trays

Hm NEMATODES

Heterorhabditis megidis (Nemasys H) are released April-June and August-November for black vine weevil (BVW). Ideal temperatures 55°-85° F. Becker-Underwood's label is Nemasys H.

Release once every 3-6 weeks for infestations OR once every 60 days as a preventive. 1 million per 60 sq ft OR 1 billion per acre OR for pre-treating potting soil, 1-2 million per cu yd.

NEHM50-BU /50 million / (0.7 lb) P S
5+ trays 37.80
10+ trays 34.20
Minimum order 5 trays

NEHM250-BU /250 million / (0.7 lb) P S
2+ trays 121.00
5+ trays 116.00
Minimum order 2 trays

Sc NEMATODES

Steinernema carpocapse (=*Neoaplectana carpocapse*) targets flea, codling moth, cutworm, leafminer, armyworm, sod web worm, mole cricket, caterpillars in lawn, codling moth on tree trunks, field bins. Cold tolerant. Ideal temperatures 55°-80° F. Tolerates as low as 50° F. The Becker-Underwood trays are called Millenium; organic is BioNem C. The 6 million per cup packed in vermiculite has the label Termask.

Release once every 3-6 weeks for infestations or once every 60 days as a preventive. 1 million per 60 sq ft OR 1 billion per acre OR for pre-treating potting soil, 1-2 million per cu yd.

NESC6G / 6 million / (0.1 lb) P S
1 tub 45.00
5+ tubs 32.00
Handling charge 14.50

NESC10P / 10 million / (0.1 lb) P S
1 pouch..... 35.00
5+ pouches 23.00
10+ pouches.... 19.80
Handling charge 6.50 - 14.50

NESC25P / 25 million / (0.1 lb) P S
1 pouch 54.00
5+ pouches 45.00
10+ pouches ... 42.00
Handling charge 14.50

NESC50P / 50 million / (0.1 lb) P S
1 pouch..... 91.00
5+ pouches 78.00
10+ pouches ... 75.50
Handling charge 14.50

NESC5-BU / 5 million / (0.3 lb) P S
5+ trays 10.90
10+ trays 8.20
Minimum order 5 trays

NESC10-BU /10 million /(0.3 lb) P S
5+ trays 13.60
10+ trays 10.90
20+ trays 9.60
Minimum order 5 trays

NESC25-BU / 25 million / (0.3 lb) P S
5+ trays 17.20
10+ trays 14.50
Minimum order 5 trays

NESC250-BU (gel) / 250 million / (0.3 lb) P S
5+ trays 44.10
10+ trays 41.70
Minimum order 5 trays

NESC250-BUO (DE organic) / 250 million / (0.7 lb) P S
5+ trays 62.50
10+ trays 59.00
Minimum order 5 trays

NESCB / billion / (1.0 lb) P S
per million 1.25
Minimum order
1,000 million (1 billion)
Handling charge 14.50

See also: Trichogramma, page 9, Podisus, page 10, Bt, page 41, for biocontrol of caterpillars.

Sf NEMATODES

Steinernema feltiae targets fungus gnat, shore fly, fruit fly, western flower thrips, plant parasitic nematode, root-knot nematode, fire ant, leafcutter ant. Ideal temperatures 55°-85° F. The Becker-Underwood label is Nemasys. Also a 7 million cup in vermiculite (Scanmask) is available year-round.

Release every 3-6 weeks for infestations OR every 60 days as a preventative. 1 million per 60 sq ft OR 1 billion per acre OR for pre-treating potting soil, 1-2 million per cu yd.

NESF7G / 7 million / (0.2 lb) P S
per cup..... 29.00
5+ cups..... 19.00
Handling charge 14.50

NESF10P / 10 million / (0.1 lb) P S
per pouch..... 35.00
5+ pouches..... 23.00
10+ pouches.... 19.80
20+ pouches.... 18.50
Handling charge 6.50 - 14.50

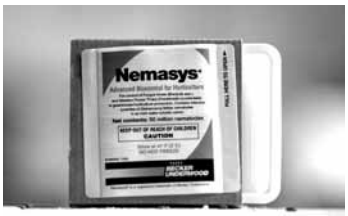
NESF25P / 25 million / (0.1 lb) P S
per pouch..... 54.00
5+ pouches..... 45.00
10+ pouches.... 42.00
Handling charge 14.50

NESF50P /50 million /(0.1 lb) P S
per pouch..... 91.00
5+ pouches..... 78.00
10+ pouches.... 75.50
Handling charge 14.50

NESF5-BU / 5 million / (0.3 lb) P S
5+ trays..... 11.80
10+ trays..... 9.30
20+ trays..... 7.90
Minimum order 5 trays

NESF10-BU/10 million /(0.1 lb) P S
5+ trays..... 15.30
10+ trays..... 12.90
20+ trays..... 11.50
Minimum order 5 trays

NESF25-BU / 25 million /(0.1 lb) P S
5+ trays..... 31.60
10+ trays..... 29.50
20+ trays..... 28.20
Minimum order 5 trays



NESF50-BU (gel) /
50 million / (0.1 lb) / P S
5+ trays 40.90
10+ trays..... 33.70
Minimum order 5 trays

NESF50-BUO (DE for organic) /
50 million / (0.1 lb) P S
5+ trays 48.00
10+ trays..... 44.00
Minimum order 5 trays

NESF150-BU / (gel) /
150 million / (0.1 lb) P S
5+ trays 69.20
10+ trays..... 65.90
Minimum order 5 trays

NESF1250-BU (gel)/
1250 million / (0.1 lb) P S
per case 239.00
3+ cases..... 217.00

NESF1250-BUO (DE organic)/
1250 million / (0.1 lb) P S
per case 366.00
3+ cases..... 350.00

See also: Hypoaspis, page 10, and Gnatrol, page 41, for biocontrol of fungus gnats.

NESR2-BU / 2 billion / (0.7 lb) P S
per tray..... 279.00
5+ trays..... 275.00
No minimum.
No freight charge on 6+ trays of *S. riobravis*.

Leafminer Biocontrols

The parasitic wasps *Dacnusa sibirica* and *Diglyphus isea* parasitize leafminer species that damage many greenhouse crops. Dacnusa has advantages during the winter in colder greenhouses, but it becomes less effective as temps get above 70° F. When it starts getting warmer, it is necessary to release an early inoculation of Diglyphus, which increase rapidly in presence of host insects and warmer temps.

DACNUSA

The wasp *Dacnusa sibirica* is used to attack leafminers at cooler temperatures < 70° F.

500-2,000 per acre OR 1 per 10 leafminers. Once a week, 3-5 times.

DA250-S / 250 wasps / (0.1 lb) P
per bottle..... 64.00
5+ bottles..... 55.50

Shipped Tuesday, order by previous Wednesday.

DIGLYPHUS

The wasp *Diglyphus isea* attacks leafminers at hot temperatures. Targets 2nd and 3rd instar stages, laying eggs next to the larva inside the leaf mine. The eggs hatch and feed on their host over the next 8 days. Adults emerge from darkened pupae and through the leaf surface in about a week.

500-1,000 per acre OR 1-2 per 100 sq ft. Once every 2 weeks, 2-3 times. Release adults from bottle to infested foliage under mild conditions (early morning or late afternoon).

DIG250 / 250 wasps / (0.1 lb) P
per bottle..... 82.00
5+ bottles..... 69.00
10+ bottles 64.00

Shipped Tuesday, order by previous Wednesday.

DIGLYPHUS:DACNUSA

This is a 1:1 mix of the two leafminer parasites for a broad range of temperatures and different leafminer species, including *Liriomyza huidobriensis*, and the chrysanthemum leafminer (*Chromatomiya syngenesiae*).

500-200 per acre OR 1 per 10 leafminers. Once a week, 3-5 times. Avoid using when daytime temperatures regularly reach 77° F. Introduce when numbers of mines are low.

DADI250-S / 250 wasps / (0.1 lb) P
per bottle..... 66.00
5+ bottles..... 58.00

Shipped Tuesday, order by previous Wednesday.

Lygus Biocontrol

Parasitoids of *Lygus lineolaris,* the tarnished plant bug, are not native and are hard to grow. *Peristenus digoneutis* is among species that researchers are trying to establish in untreated alfalfa hay fields. Research is also ongoing to determine which species from Europe are spreading naturally in different regions. *P. digoneutis* is establishing itself in the Northeast USA and is one of two species being released on California's central coast to control lygus in strawberries. The more heat tolerant *P. stygicus* aka *relictus* will hopefully establish from releases by the California Department of Food and Agriculture.

PERISTENUS

Peristenus digoneutis is a quarter-inch long parasitic wasp that attacks lygus nymphs.

Release small colonies in permanent strips or borders of alfalfa refuge that will never be treated with pesticides.

PERIS / 100 wasps / (0.1 lb) P S
per bottle..... 69.00
5+ bottles..... 59.00
10+ bottles 55.50

Shipped MTW.
No same day orders.

See also: Alfalfa-Medic Seed Mix, page 26.

Mealybug Biocontrols

Cryptolaemus montrouzieri, also called Crypts or Mealybug Destroyer, work in warm, humid environments with high mealybug (MB) populations. Crypts are phototropic and fly toward bright windows. If your area is lit from one or two windows or skylights, use lacewing (page 5), which perform well in varied environmental conditions. Lindorus (page 19) will eat but do not reproduce on a sole diet of MB. For citrus MB, Anagyrus and Leptomastix wasps complement use of predators. Mycotrol O or Botanigard or neem oil can be used for knock down before releasing biocontrols. Hb nematodes attack root MB in soil. Manage ants to keep them from protecting MB from beneficials. *(Above photo: Cryptolaemus larva feeding on citrus mealybug)*

ANAGYRUS AND LEPTOMASTIX

These wasps, *Anagyrus pseudococci* (photo bottom) and *Leptomastix dactylopii* (photo top), are highly effective parasitoids of citrus mealybug. Anagyrus also attacks vine mealybug. Begin releasing Anagyrus outdoors in late winter or early spring. Mealybug must be exposed. Leptomastix is generally used in interiorscapes, prefers 78° F and 60-65% RH.

Anagyrus: 15,000 per acre per week for 4 weeks
Leptomastix: 1-2 per 10 sq ft OR 5 per plant.

ANAG5 / 500 wasps / (0.1 lb) P S
per vial..... 125.00
5+ vials..... 110.00
LEP100-K /100 wasps/(0.1 lb) P S
per vial..... 109.00

Shipped Monday, order by previous Tuesday OR shipped Thursday, order by previous Friday.

CRYPTOLAEMUS

Predatory crypts beetles target mealybug (MB), scale, and aphid, but only reproduce on MB. Prefers 60°-90° F and 70-80% RH. Both adult & larvae feed on all stages of MB. Larvae look like MB, but are larger with more waxy filaments. There is an alternate, higher cost source available to ship on MTW with one day notice and when our regular production is off cycle, which sometimes happens in March. Place orders 3-4 weeks ahead to be in line when shortages occur.

5 per plant OR 2-5 per sq yd OR 1,000-2,000 per acre. Release 1-2 times (inoculative release). Hold at room temp or 50° F. Do not refrigerate.

CR100-B / 100 beetles / (0.1 lb) P
per tube..... 35.60
5+ tubes..... 31.50
10+ tubes..... 27.00
CR250-B / 250 beetles / (0.1 lb) P
per tube..... 62.00
4+ tubes..... 52.50
8+ tubes..... 49.00

CR2500-B / 2,500 beetles / (0.1 lb) P
per tub..... 385.00
4+ tubs..... 372.00
10+ tubs 367.00

Shipped Wednesday, order by previous Wednesday. Handling charges apply.

Discounts for prearranged schedules: 1% for each additional shipment up to 9 shipments.

See also: Green lacewing, page 5. Botanigard 22WP and Mycotrol O, page 40. Ant control, page 4. Hb nematodes, page 12.

Mite Biocontrols

Among the predatory mites commercially available to attack two-spotted spider mite, *Tetranychus urticae*, (TSSM), *Phytoseiulus persimilis* and *Amblyseius fallacis* are the most aggressive as long as conditions are not too hot or dry. TSSM reproduces faster at higher temperatures and low humidity, e.g., > 77° F and 40% RH. Therefore, the hotter and drier the weather, the worse a mite flare-up can get. Raising humidity by misting favors most predators over spider mites.

For drier conditions especially outdoors, use *Amblyseius californicus* or *Galendromus occidentalis*. Indoors, use *Mesoseiulus longipes*. *A. fallacis* and *A. californicus* will eat other pest mites besides TSSM. Both are good for low-density infestations or preventive use. Make early, proactive releases of mite predators. In most systems the goal to assure control is a predator to prey ratio of 1:10.

Stethorus and Feltiella (page 18) and Green Lacewing (page 5) also work on mites, especially in hot spots. The first two are more effective in longer crop cycles. Lacewing can help solve an immediate problem. One lacewing larva can eat over 11,000 mite eggs. They are often released with Occidentalis predatory mites in hot, dry field conditions. Using more than one predator and/or at least three different interventions in an integrated strategy adds diversity and stability to a biological control program.
(Above photo: Bean plant with Occidentalis mites placed on grape cane.)

COMBINING DIFFERENT MITE SPECIES

Releasing more than one kind of mite sometimes has advantages. Mixes of Californicus OR Persimilis with Fallacis, Occidentalis, or Longipes take advantage of each mite's food and habitat preferences. Californicus can survive on pollen and small insects so it will persist at lower pest densities than the other predator mites. If you are torn between using two different predator mites because environmental conditions aren't quite ideal for either, a combination may be better than guessing. Californicus is not to be used with Persimilis since it will cancel out the benefit of the more aggressive Persimilis by eating Persimilis eggs.

Handling charges apply for some of the following predator mites in bottles (Handling charges vary for mites on bean leaves)

1- 6 bottles = 4.00
7- 30 bottles = 5.00
31- 68 bottles = 6.00
68+ bottles = 7.00

KEY TO ITEM CODES FOR PREDATORY MITES

PM – predatory mites

P, F, C, O, L, A – indicates species

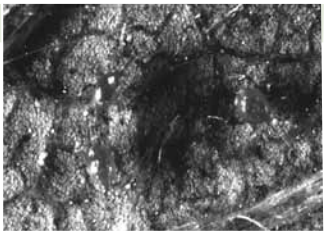
BL – shipped on bean leaves

B – packed in bottle (2-4 oz or 30-40 dram)

V – packed in vial (3/4 -1 oz or 12-16 dram)

S or A - synchronized to ship with other items from Ventura location on Tuesdays only

PERSIMILIS



Aggressive and economical predatory mite for TSSM. Does best on dense, low growing plants. High reproductive rate enables Persimilis to overcome its slower reproducing host in a relatively short time. Shipped in bottles and vials with vermiculite carrier. Vials have less carrier so they are more compact for shipping in large numbers. Ideal conditions: 70°- 81° F, 70% RH. Inactive at < 54° F. Not effective in hot greenhouses or dry interior valleys. With increasing humidity, above 60%, Persimilis can tolerate higher temperatures, but is generally not effective above 86° F.

1-14 per 10 sq ft OR 20,000 - 40,000 per acre OR 1 per 10 mites. Once a week. Mist foliage daily if possible, especially during dry conditions.

PMP1 / 1,000 mites / (0.1 lb) P, S
per bottle..... 28.50
6+ bottles..... 14.70
15+ bottles 12.20
30+ bottles 11.50
80+ bottles 11.00

Handling charges apply
Shipped MTW, no same day orders.

PMP2V-S / 2,000 mites / (0.1lb) P
per bottle..... 39.00
5+ bottles..... 20.50
10+ bottles 17.80
20+ bottles 16.40
80+ bottles 15.40

PMP2B-S / 2,000 mites / (0.1 lb) P
per bottle 34.00
5+ bottles..... 16.60
10+ bottles 14.00
30+ bottles 12.90
80+ bottles 11.70
200+ bottles.... 11.40

Shipped Tuesday, order by previous Wednesday.

PERSIMILIS ON BEAN LEAVES

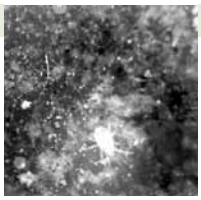
Includes all life stages along with a food source. Starts reproducing faster than Persimilis packaged in vermiculite, so results are seen sooner. Also better for hairy crops such as tomatoes.

Release enough to achieve 1 predator per 10 two-spotted spider mites.

PMPBL2.5-AB /2,500 mites / (0.2 lb) P
- per tray 44.00
- 5+ trays 39.00
- 20+ trays..... 36.50

Shipped Wednesday, order by previous Friday.

FALLACIS



Neoseiulus fallacis (=Amblyseius fallacis), the field mite predator, targets TSSM, Pacific mite, European red mite, Bank's grass mite. More cold tolerant than other predator mites – can overwinter under snow! Survives low prey level - good for prevention. Used in many crops, including mint, hops, berries, and fruit trees. Packaged in dry carrier (corn grit or vermiculite). Tolerates 48°-85° F and 50-85% RH. Ideal conditions: 50°-80° F, > 60% RH. Diapauses with light < 16 hours, temp < 54° F. Supplemental light can prevent diapause.

3 per 10 sq ft OR In greenhouses 1 per sq ft or per plant. 2-3 releases a week apart in greenhouses. One release in mint may establish predators for years.

PMF1 / 1,000 mite / (0.1 lb) P S
- per bottle..... 28.50
- 6+ bottles..... 14.70
- 15+ bottles 12.20
- 30+ bottles 11.80
- 80+ bottles 10.90

Shipped MTW. No same day orders. Handling charges apply.

FALLACIS ON BEAN LEAVES

Includes all life stages along with a food source. Starts reproducing faster than Fallacis in vials or bottles in dry carrier, so results are seen sooner.

3 per 10 sq ft OR In greenhouses 1 per sq ft or per plant. 2-3 releases a week apart in greenhouses, one release in field crops.

PMFBL1 / 1,000 mite / (0.2 lb) P
- per tray 42.00
- 5+ trays 25.80
- 20+ trays..... 22.00

PMFBL2.5 /2,500 mite / (0.2 lb) P
- per tray 44.00
- 5+ trays 40.00
- 20+ trays..... 36.50

Shipped Wednesday, order by previous Friday.

ANDERSONI

Amblyseius andersoni is a predatory mite that targets spider mites, thrips, gall mites, fruit tree red spider mite (*Panonychus ulmi*), bud mites and eriophyiid (rust) mites. It is an important natural predator in Pacific Northwest apple and grape crops. Research shows promising results in fruit trees (especially apples), grapes, greenhouse ornamentals, tree nurseries, greenhouse roses and open field crops. Tolerates high temperatures in humid environments: 43°-104°+ F. PMA25 is a bulk tube of 25,000 mites; PMA250 is a case of 100 sachets with 250 mites per sachet.

Release rates not yet determined. Start with 10 per sq ft and increase depending on monitoring.

PMA25 / 25,000 mites / (0.4 lb) P
- per liter 119.00
- 5+ liters 100.00

PMA250 / 100 sachets / (0.4 lb) P
- per case..... 149.00
- 5+ cases..... 132.00

Shipped Tuesday, order by previous Wednesday.

CALIFORNICUS

Neoseiulus californicus (=Amblyseius californicus) is a general mite predator. Targets TSSM, Pacific, cyclamen, broad, and persea mites. Good for lower spider mite densities – survives on pollen and small insects. Use on strawberry, corn, grape, rose, vegetables, ornamentals, and interiorscapes. Packaged in dry carrier. Prefers warm and humid conditions: 50°-105° F, 40 - 80% RH. Tolerates lower humidity than Persimilis and Fallacis.

2 per sq ft OR 4 per plant OR 10,000 per acre.

PMC1 / 1,000 mites / (0.1 lb) P S
- per bottle..... 28.50
- 6+ bottles..... 14.70
- 15+ bottles 12.20
- 30+ bottles 11.50
- 80+ bottles 11.00

PMC5 / 5,000 mites / (0.1 lb) P S
- per bottle..... 72.00
- 5+ bottles..... 55.00
- 10+ bottles 52.00
- 50+ bottles 50.50

Shipped MTW. No same day orders. Handling charges apply.

PMC1-A / 1,000 mites / (0.1 lb) P S
- per bottle..... 36.00
- 6+ bottles..... 23.80

PMC5-A / 5,000 mites / (0.1 lb) P S
- per bottle..... 112.00
- 6+ bottles..... 97.00

Shipped Tuesday. No same day orders.

CALIFORNICUS ON BEAN LEAVES

Includes all life stages along with a food source. Starts reproducing faster than Californicus in dry carrier, so results are seen sooner.

1-2 per sq ft OR 3-4 per plant OR 5,000-10,000 per acre.

PMCBL1 / 1,000 mites / (0.1 lb) P S
per bag 36.00
5+ bags 19.00

PMCBL2.5 / 2,500 mites/(0.1 lb) P S
per bag 54.00
5+ bags 39.00

Shipped MTW. No same-day orders. Handling charges apply.

OCCIDENTALIS

Galendromus occidentalis (=Metaseiulus occidentalis or *=Typhlodromus occidentalis)* also called western predatory mite, targets TSSM, Pacific, Willamette, russet and eriophyiid mites. Prefers warm weather 80°-110° F, tolerates as low as 50° F. Ideal humidity 30-50% RH. Diapauses in cold temperatures and less than 11 hours day length. Does not do well in cool coastal areas. Use in greenhouse only if near 30% RH is maintained. Packaged in dry carrier.

2,000-5,000 per acre early in season OR 2 per sq ft OR 1 per 5 pest mites.

PMO1 / 1,000 mites / (0.1 lb) P S
per bottle..... 28.50
6+ bottles..... 14.70
15+ bottles 12.20
30+ bottles 11.50
80+ bottles 11.00

Shipped MTW. No same day orders. Handling charges apply.

OCCIDENTALIS ON BEAN LEAVES

Includes all life stages along with a food source. Starts reproducing faster than Occidentalis in bottles in dry carrier, so results are seen sooner. Completes a generation in one to two weeks depending on temperature. Average 250 plants per bag for 10,000 mite unit.

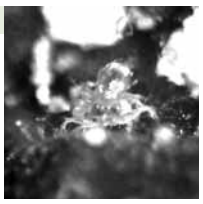
2,000-5,000 per acre early in season OR 1 per 5 pest mites. Lay small bean plants on vines or limbs where mites are found. For example, if there are 1,100 vines on an acre and you want to release predators at a rate of 5,000 per acre, apply 125 plants, distributed every 9th vine.

PMOBL5 / 5,000 mites / (8 lb) P S
per bag 84.00
5+ bags 72.50
10+ bags..... 70.50
20+ bags..... 66.00

PMOBL10 /10,000 mites / (8 lb) P S
per bag 144.00
5+ bags 139.00
10+ bags..... 136.00
40+ bags..... 134.00

Shipped MTW. No same day orders. Handling charges apply.

LONGIPES



Mesoseiulus longipes (=Phytoseiulus longipes) controls TSSM. Prefers > 50% RH, but tolerates dryer (40% RH at 70° F) and hotter conditions than Persimilis. In dry carrier, used in interiorscapes and dry greenhouses.

2,000-20,000 per acre OR 3 per sq ft.

PML1 / 1,000 mites / (0.1 LB) P S
per bottle..... 28.50
6+ bottles..... 14.70
15+ bottles 12.20
30+ bottles 11.50
80+ bottles 11.00

Shipped MTW. No same day orders. Handling charges apply.

MIXTURES OF PREDATOR MITES

Bottles contain two species in a 1:1 ratio. See information on pages 15-17 for the species included.

All mixes 1,000 mites/bottle. (0.1 lb) P. Shipped MTW. No same day orders. Handling charges apply.

PMOL1 = *G. occidentalis – M. longipes,*
PMOC1 = *G. occidentalis – N. californicus*
PMOP1 = *G. occidentalis – P. persimilis*

per bottle..... 28.50
6+ bottles..... 14.70
15+ bottles 12.20
30+ bottles 11.50
80+ bottles 11.00

PMCL1 = *N. californicus – M. longipes*
PMCF1 = *N. californicus – A. fallacis*
PMFP1 = *A. fallacis – P. persimilis*
PMLP1 = *M. longipes – P. persimilis*

per bottle..... 28.50
6+ bottles..... 14.70
15+ bottles 12.20
30+ bottles 11.50
80+ bottles 11.00

RELEASE TIPS: Predatory mites can be released into trees by dividing mites in carrier into french fry bags or recycled envelopes, and stapling a leaf inside the bag. Poles are used to drop portions of mites in carrier into tall trees.
Left photo: Releasing Californicus in avocados to fight Persea mite.
Right photo: Releasing Persimilis in an 80 ft tall palm in a lobby atrium.

FELTIELLA

Feltiella acarisuga is a predatory midge that eats TSSM. Especially good for tomato, strawberry, and greenhouses. Includes Ovi-Stim food to encourage midges to stay near release points and reproduce. Tolerates 50°-98° F, 45% RH or higher and daylight length > 12 hours. Optimum: 72° F (22°), 70-95% RH, 16 hours light.

250 - 1,000 per acre. Once a week, 3 times.

FEL250 / 250 pupae / (0.1 lb) / P
per unit 92.00
5+ units 80.00

Shipped Wednesday, order by previous Wednesday. Handling charges apply.

SIX-SPOTTED THRIPS

Scolothrips sexmaculatus is a specialized predator of spider mites. Pale yellow (becoming reddish after eating reddish mites), prefers early developmental stages of spider mites. Shipped on bean plants, used to control large mite populations, adults eat 1,000-3,000 prey. Will not establish if mite populations are low, they move on before most economic damage thresholds are reached. No diapause. Active at 54°-90° F, 50-85% RH.

Release 500 to 2,000 predatory thrips per acre. A low release rate will achieve knockdown of high-density problems in 3-6 weeks, higher numbers faster.

SIXSPT / 1,000 thrips / (8 lb) P S
per 1,000 ..... 54.00
50+ 51.00

Minimum order 10,000 (one bag). Shipped Wednesday, order by previous Friday. Handling charge $20.00 for less than 30,000 thrips.

STETHORUS

Stethorus punctillum, the Spider Mite Destroyer, is a predatory beetle that targets high densities of TSSM. Especially good for cucumber and pepper, not as effective on tomato or other hairy crops. No diapause. Active at 54°-90° F, 50-85% RH. Found naturally outdoors near hotspots of spider mites; releases rarely cost-effective.

200-500 per acre.

ST100 / 100 beetles / (0.1 lb) P
per vial 40.00
5+ vials 33.00

Shipped Wednesday, order by previous Friday.

REX MEACH
Technical Support and Administrator

Rex replied to an ad for shipping supervisor 17 years ago. A sailor and plant and bird-watcher, he finished one career running a medical lab and wanted to get back into a job in ecological sciences. He currently administers the Dietrick Institute for Applied Insect Ecology and is finishing a book he's written with Deke.

MAGO MARTINEZ
Insectary Technician

Como otros biólogos naturales, Mago viene de México rural, de una granja. Ella ha crecido sobre sus 7 años en la resolución de problemas en un espíritu de unidad e igualdad. Ella es alegre no importa lo que. Here Mago is harvesting fly parasites from fly pupae over a vacuum table. These will go back into the production colony. Mago is also a specialist with the adult flies, assuring production of 20 million eggs a week from April to September.

SUSIE MEACH
Payables

Susie has pitched in mostly in customer service and A/R over the past 14 years and now spends a day a week doing payables. She took over from Gwyn Dietrick who retired last spring after 16 years. Thanks to Gwyn, Kyra over the winter, and now Susie, our marvelous vendors trust us to pay on time!

JOSE ORELLANO
Insectary Team Leader

Jose is from El Salvador. He stays in close touch with his family by phone. He joined RVI in 1999 and works six days a week during the busy season growing flies and fly parasites. In the slow season, he uses his handyman talents for repairs and improvements and making new insect rearing containers.

Scale Biocontrols

The insects commercially available for biocontrol of scale are limited in various ways. Lindorus eat armored scale of all stages and young soft scale. They avoid sticky soft scale, as do Green Lacewing (page 5), though green lacewing can eat over 4,000 scale crawlers. Cybocephalus is specific for euonymous and San Jose scale. Cryptolaemus (page 14) eat scale, but need to eat mealybug to lay eggs. Aphytis attacks only certain armored scale. Hot Pepper Wax (page 38) and managing ants (page 4) can clean up some scale problems. *(Above photo: Releasing Lindorus on ornamentals for black scale.)*

FUN FACTS:

The lady beetles Lindorus and Cryptolaemus, as well as Vedalia (*Rodolia cardinalis*), were imported to California in the 1890's from Australia. Cottony cushion scale (CCS), and some other mealybug and scale pests originated in Australia, so it made sense to search for predators there. Outbreaks of CCS are usually seen when pesticides (like IGRs) disrupt its natural biocontrols. In coastal areas, one biocontrol that needs protection from pesticides is Cryptochaetum, a delicate parasitoid fly. Since it is costly to grow Vedalia, we keep a waiting list of customers in case we run into colonies that we can collect beetles from. *(Left photo: Vedalia is feeding on CCS on this Malawian stamp found in a lady beetle stamp collection at tinyurl.com/mpjqq8.)*

LINDORUS

Lindorus lopanthae (= Rhyzobius lopanthae), the Scale Destroyer, is a predatory beetle that targets hard scale or soft scale until honeydew forms. Will eat some mealybug and other small insects. Larvae and adults are both predators. Prefers 60°-77° F and 20-90% RH.

3-5 per plant OR 20-40 per tree OR 1,000-2,000 per acre OR 3-6 per 10 sq ft in greenhouse. Every 3 weeks, 2 times.

LIN50 / 50 beetles / (0.1 lb) P
- per vial..... 39.00
- 5+ vials..... 25.00
- 10+ vials..... 22.00

LIN100 / 100 beetles / (0.1 lb) P
- per vial..... 56.00
- 5+ vials..... 43.00
- 10+ vials..... 40.00

LIN250 / 250 beetles / (0.1 lb) P
- per vial..... 99.00
- 5+ vials..... 88.00
- 10+ vials..... 84.00

APHYTIS

Aphytis melinus (Golden Chalcid) is a parasitic wasp that targets armored scale, such as California red, citrus red, oleander, San Jose, ivy, walnut, *Dytyospermum* sp., and citrus yellow scale. Parasitizes female 2nd and 3rd instar stages, male 2nd instar and pre-pupal stages. Other stages killed by host feeding.

5,000-10,000 per acre OR 1-2 per sq ft in greenhouse OR 5-10 per plant. Once a week, 3 times.

AP5 / 5,000 wasps / (0.1 lb) P
- per cup..... 18.00

AP10 / 10,000 wasps / (0.1 lb) P
- per cup..... 29.90
- 5+ cups..... 23.80
- 10+cups 19.80

Shipped on Tuesday, order by previous Friday.

CYBOCEPHALUS

Cybocephalus nipponicus is an exotic predatory beetle that targets euonymous, San Jose scale.

Release on hot spots to start colonies. Release rate variable. Start with 1-2 bottles and monitor.

CYBO100 /100 per tube / 0.1 lb) P S
- per tube..... 76.00
- 5+ tubes..... 69.00
- 10+ tubes..... 67.00

Shipped MTW, order by previous Friday.

PRACTITIONER SPOTLIGHT: RON EVANS, FOUR E'S TREES

After years of spraying more pesticides and getting less control, many of Ron Evans' Christmas trees were not fit to sell. With U of Illinois researchers, Evans tested the use of Lindorus to attack pine and pine needle scales. Lindorus was trialed in a heavily infested block at his farm, Four E's Trees. Months later, when he was collecting branches for wreaths, he found the block completely cleaned up. The next season he released 2,000 beetles that saved hundreds of trees too infested for sale the previous year. Lindorus does not overwinter in below freezing weather, but two releases in May and June save him $3,000 annually on pest control bills. Now a distributor, he shares Lindorus with growers in the Midwest.

Snail Biocontrol

DECOLLATE SNAILS

Rumina decollata is a predatory snail that eats the brown garden snail (eggs, small snails, injured adults). Also feeds on decomposing plant material (in the same way as earthworms) and keeps fallen fruit cleaned up under trees. Hides in mulch. Doesn't climb. A small release multiplies for several years. In California, only shipped to counties south of Tehachapi Mountains (no restrictions in other states). Numbers per unit are approximate.

100 per backyard OR 1,000 per acre.

DS100 / 100 snails / (0.2 lb) P
per cup 19.00
5+ cups..... 13.00
10+ cups 10.70

DSQT / qt of 625 snails / (1.1 lb) P
per quart 55.00
DSGAL /gal of 2,500 snail /(4.1 lb) P S
per gallon 146.00
5+ gallons 136.00

See also: Snail traps and bait, page 31.

Thrips Biocontrols

Thrips invade when close by areas dry up or are mowed. Prevent thrips damage using Applied BioNomics protocols. Apply Cucumeris to seedlings weekly for five weeks, using slow-release packets on every fifth plant or a small pile of bulk Cucumeris near the base of each plant. Work towards a 1:1 ratio of Cucumeris to thrips. In crops with low thrips tolerance, e.g., cucumbers and peppers, one five-week round gives six to eight weeks of protection. On plants with no pollen, like cucumbers, the slow-release packets provide an alternate food source. If leaf-pupating thrips like Echinothrips establish, double the Cucumeris to at least 200 per plant right away and put out blue sticky cards with lures (page 32) or vanilla to draw them away from the plant. Sprinkle Hypoaspis (page 10) in the root zone to stop the cycle of soil-pupating thrips, such as western flower thrips and onion thrips. Nematodes attack soil pupating thrips better than Hypoaspis in moist media, such as rockwool, but Hypoaspis will establish more reliably. (See Fungus Gnat info on page 10 for using Hypoaspis with nematodes.) Release Orius only when thrips are present. Habitat plants like fennel, coriander or succession corn can provide Orius with a pollen and nectar source and may help establish Cucumeris. Blue or yellow sticky cards (page 29) will strip adults out of the house if they are laced with thrips lures (pages 32) or vanilla extract. *(Above photo: Releasing Orius in greenhouse peppers.)*

Release mites soon after receiving. Hold at 50° F for up to 5 days (in foam box with cold pack).

KEY TO SHIPPING CODES

P – Perishable
N – Non-Perishable
S – Shipped Separately
See page 52.

CUCUMERIS TUBE

Amblyseius cucumeris (=Neoseiulus cucumeris) is a predatory mite shipped in bran carrier. Targets western flower thrips, onion thrips, and to a lesser extent, spider, cyclamen and broad mites. Nymph and adult stages feed on immature stages of thrips, so a decrease in adult thrips populations will show 3 weeks or so after release. Adults also feed on two-spotted spider mites and their eggs. Cucumeris takes 3-4 weeks to establish, so it should be applied before thrips populations appear. Cucumeris also feeds on pollen as an alternate food source. Ideal conditions are 66°-80° F, 65-72% RH. Day lengths less than 12.5 hours with night temperatures less than 70° F induce diapause unless supplemental light is provided.

AC50 / 50,000 predators / (0.6 lb) P
per tube 30.00
5+ tubes..... 23.50
15+ tubes..... 18.80
25+ tubes..... 17.90

Shipped Wednesday, order by previous Friday.

CUCUMERIS SACHETS

Case of 260,000 Cucumeris mites. Contains 260 sachets (small bags) with hangers, each with approx 1,000 mites of all stages with a food source. Great for situations where mites in bran carrier won't work well, e.g., plants with light pollen like cucumbers, peppers, or ornamental baskets. Mites exit over a 6-8 week period to suppress thrips.

Hang 1 sachet per 1-5 plants, 1-4 times per month. Sachets last 2 months, then replace. Remove sachets after 6 weeks in ornamentals.

AC260-S / 1 case / (4.0 lb) S
per case 112.50
5+ cases..... 104.00

Shipped Tuesday, order by previous Wednesday.

CUCUMERIS PACKETS

Slow-release packets contain self-breeding populations in carrier with a food source. Slow-release packets have hanging cardboard tags. Hang packets so they touch plants. Also available in economical case of 260 units. Specify fast-release packets (AC1-F) with no hanger tags for quicker control. Specify slow-release (AC1-S) for prevention use.

10-100 per plant OR 1-30 per sq ft, 1 per wk, 3-6 times, hang or place at base of plants. Remove packets after 6 weeks in ornamentals.

AC1-F / 1,000 mites / (0.3 lb) P
- per packet..... 2.00
- 10+ packets..... 1.10
- 50+ packets..... 0.95
- 100+ packets.. 0.70
- 200+ packets.. 0.55

AC1-S WITH TAG / 1,000 mites / (0.3 lb) P
- per packet..... 2.50
- 10+ packets..... 1.20
- 50+ packets..... 1.00
- 100+ packets.. 0.75
- 200+ packets.. 0.60

Minimum order 5 packets.

See also: Hypoaspis, page 10.
Blue sticky traps and banners, pages 29-30.
Thrips lures, page 32.

ORIUS

Orius insidiosus, or the Minute Pirate Bug, is a general predator that targets thrips, mite, aphid, small caterpillars & other soft-bodied insects. Favorable conditions are moderate temperatures around 59° F, RH > 60%. Diapause occurs with day lengths < 12.5-14 hours. Orius can't survive without prey or pollen, so it is best to release Orius after thrips populations have become established or when pollen is also available. If prey is abundant, Orius will kill more thrips than it needs to survive. If Cucumeris has been released prior to Orius, Orius will feed on Cucumeris to become established. Cucumeris populations will decline briefly and then recover as thrips populations decline.

250-5,000 per acre OR 1-2 per 40 sq ft OR 1-4 per plant. Orius should be released in two applications, two weeks apart, to overlap the adult and immature life stages.

OR500 / 500 per bottle / (0.2 lb) P
- per bottle 58.00
- 5+ bottles..... 43.50
- 10+ bottles 39.50

OR1000 / 1,000 per bottle / (0.3 lb) P
- per bottle 73.00
- 5+ bottles..... 69.50
- 10+ bottles 68.00

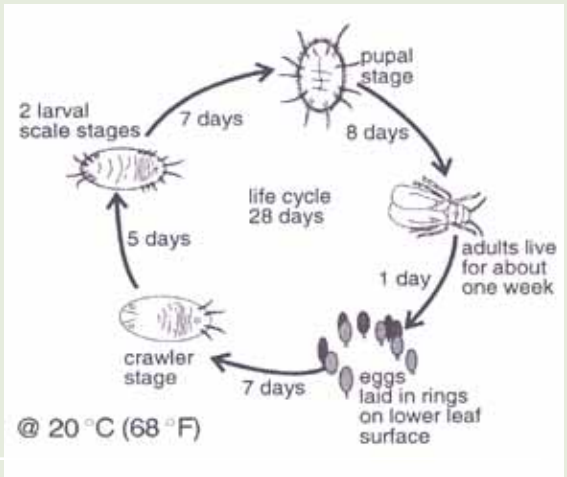
Shipped Tuesday, order by previous Wednesday.

Whitefly Biocontrols

Whitefly can explode quickly, so the only sure control is to prevent buildup. In greenhouses and landscapes, remove host weeds and infested lower leaves of plants. Destroy prunings. Once you have a problem, reduce populations with Mycotrol O, soap and oil (such as, M-Pede or Pharm Solutions and Saf-T-Side from the garden center, local organic pesticide supplier or us), hot water, neem oil or Hot Pepper Wax or with yellow sticky banners.

Encarsia formosa does best on greenhouse whitefly (GHWF) and not so well on Bemesia. Eretmocerus does best against Bemesia, woolly, citrus and bayberry whitefly, and will also parasitize GHWF but higher rates are needed. Encarsia that has not been refrigerated, lives longer, flies farther and searches smarter than refrigerated product. Rincon-Vitova release rates for Encarsia are lower than industry norms, based on our delivery of fresh, unrefrigerated product.

An inoculative early release of Delphastus in whitefly hot spots can be cost-effective in combination with regular releases of parasitoids. One unit of 250 Delphastus will yield 25,000 new beetles in about 3 weeks. Green lacewing are more affordable in larger numbers and control other pests besides whitefly. While green lacewing will eat parasitized whitefly scale, they can control whitefly with weekly releases of one larva every fourth plant if the canopy is touching.



Eggplant or tomato are helpful for monitoring along with yellow sticky cards. Two eggplant per acre in the aisles will pull WF out of a crop. Whitefly can then be vacuumed or treated. *(Graphic above: whitefly life cycle from Applied BioNomics Technical Manual.)*

ENCARSIA

Encarsia formosa is a parasitic wasp that targets greenhouse whitefly (GHWF) and, to a limited extent, *Bemesia tabaci* and possibly other whitefly. Targets 2nd instar of GHWF (scale on underside of leaf). Parasitized scale turn black. Double Encarsia release rates to control *Bemesia*. Adult Encarsia will also feed on whitefly honeydew and kill whitefly scale through host feeding. Excessive honeydew hampers activity of the parasite, so avoid high whitefly populations. Bring populations down with a soft pesticide, such as Mycotrol O or soap and oil, then release biocontrols. Encarsia are good flyers and will seek out prey, but tend to remain in regions where whitefly are concentrated. Even distribution is important in greenhouses. No diapause but inactive < 54° F. Proactive weekly releases for 8 to 10 weeks recommended for susceptible crops such as poinsettia. Optimal conditions are > 64° F and > 60% RH with bright light. Sold as 1,000 parasitized scale glued on a perforated card (strip) with hooks. Each strip can be separated into 10 tabs with 100 wasps each.

0.2 to 0.25 per 10 sq ft OR 4 per plant when WF have not been detected and Encarsia have not been refrigerated. Once a week, 4-6 times. Double to 0.5 to 0.6 per 10 sq ft OR 8 per plant for tomatoes if Encarsia have been refrigerated.

EN1 / 1 strip / (0.1 lb) P

per strip	12.30
5+ strips	8.80
10+ strips	7.40
20+ strips	6.40
40+ strips	5.90

Shipped Wednesday, order by previous Friday.

Discounts for prearranged schedules: 1% for each additional shipment, up to 9 shipments.

BULK ENCARSIA

Loose *Encarsia formosa* in parasitized whitefly scales in increments of 1,000. Lower cost. Better, quicker distribution from shaker than from cards. See EN1 above for prevention program.

4-8 wasps per 10 sq ft if greater than 10 WF on sticky cards, increase up to 10 if Encarsia was refrigerated

ENBULK / 1,000 LOOSE / (0.1 lb) P

per 1,000	8.30
10+ loose	6.80
20+ loose	6.00
40+ loose	5.15

Shipped Wednesday, order by previous Friday.

Minimum order of 5,000.

Discounts for prearranged schedules: 1% for each additional shipment, up to 9 shipments.

ENCARSIA:ERETMOCERUS

Eretmocerus eremicus and *Encarsia formosa* together as parasitized whitefly scale on cards. Set of 10,000 parasites on 40 cards with 250 parasites per card. Targets both GHWF and *Bemesia*.

Use information and release rates for Eretmocerus.

ENERCD / 40 cards per set / (0.4 lb) P

per set	105.00
5+ sets	90.50
10+ sets	87.00

Shipped Tuesday, order by previous Wednesday.

Discounts for prearranged schedules: 1% for each additional shipment, up to 9 shipments.

ERETMOCERUS

Eretmocerous californicus (= *E. eremicus*) is a parasitic wasp targeting *Bemesia tabaci*, silverleaf, woolly, citrus, bayberry, and to a lesser extent, GHWF. Eretmocerus should be introduced as soon the first whiteflies are observed or as a preventive. Minimum effective temperatures: 50° F night and 65° F day. Useful at higher temperatures with optimal conditions > 75° F. Female adult wasps parasitize the 2nd and 3rd instar larval stages of the whitefly (on underside of leaf) and also host feed. Parasitized whitefly scale will turn yellow, rather than black. Supplied as loose parasitized whitefly scale in a bran carrier.

0.5-20 wasps per 10 sq ft.

ER3 / 3,000 per bottle / (0.1 lb) P

per bottle	53.00
5+ bottles	43.00
10+ bottles	39.90

ER10 / 10,000 per bottle / (0.2 lb) P

per bottle	125.00
5+ bottles	116.00

ER15 / 15,000 per bottle / (0.3 lb) P

per bottle	196.00
3+ bottles	186.00

Shipped Tuesday, order by previous Wednesday.

Discounts for prearranged schedules: 1% for each additional shipment, up to 9 shipments.

ERETMOCERUS BLISTER CARDS

20 separate blister-pack cards, each card has 250 parasitized scale. Total 5,000 parasitic wasps per set.

0.5-20 wasps per 10 ft sq. Suspend the cards in the crop, if possible, approximately 2.5 feet under plant head, not in direct sunlight. Avoid touching the pupae.

ERCARDS / 1 set of 20 / (0.2 lb) P

per set	89.90
5+ sets	79.00

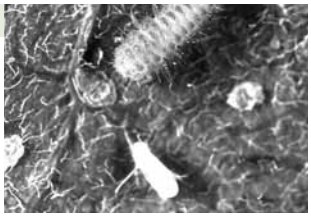
Shipped Tuesday, order by previous Wednesday.

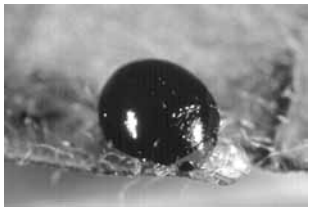
Discounts for prearranged schedules: 1% for each additional shipment, up to 9 shipments.

See also: Yellow sticky traps and banners, pages 29-30. Green Lacewing, page 5. Mycotrol O/Botanigard, page 40. Armorex, Neem and/or Orange Oil, pages 38-39. Soaps and oils are usually available locally. Ask if you want help obtaining soap or oil.

PARASITE OR PARASITOID? We have used the word parasite on purpose to describe wasps that are really parasitoids. We decided parasite is a common enough substitute in conversation. We applied the "keep it simple" principle.

DELPHASTUS





Delphastus catalinae (=*D. pusillus*) is a predatory beetle targeting GHWF, banded-winged, sweet potato, silverleaf, woolly, azalea, hibiscus, cloudywinged, citrus and rhododendron whiteflies, and citrus blackfly. Optimum conditions are temperatures of 61°-90° F. Delphastus does not fly at temperatures below 55° F. Delphastus controls whitefly in commercial vegetable and flower greenhouses and semi-tropical or tropical plantings. Delphastus is useful for high-density whitefly populations, while parasites (Encarsia and Eretmocerus), do better at lower densities. Delphastus avoids feeding on parasitized whiteflies and may be used as an inoculant or in combination with other biological controls at high whitefly densities. Delphastus does not survive in the absence of prey, therefore should be released only after whiteflies are detected. Delphastus does not diapause and will survive mild winters and medium frosts. Prolonged temperatures below freezing will kill them. Low light levels and low temperatures slow down their reproductive rate, but they will still grow. Both adults and larvae feed on whitefly eggs and immature stages. If food is scarce, they will also feed on other small arthropods, such as spider mite and aphid, and will even cannibalize its own species.

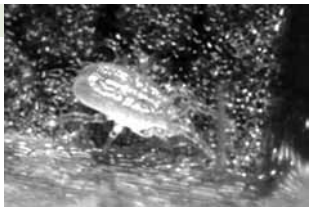
1-2 per 100 sq ft, one release for inoculation.

DE100 / 100 per bottle / (0.1 lb) P
per bottle 25.00
5+ bottles..... 20.00

DE1K / 1,000 per bottle / (0.2 lb) P
per bottle 112.00
5+ bottles..... 98.00

Shipped Wednesday, order by previous Friday.

SWIRSKII



Amblyseius swirskii is a predatory mite that feeds on various thrips species' larvae and eggs, the larvae of whitefly (GHWF and *Bemisia tabaci*) and spider mites. Swirskii is tolerant of high temperatures and requires >70° F day temps for development. It does not diapause and can be used year round. It has less difficulty on plants with glandular hairs (except tomatoes) than Cucumeris and is advantageous on crops with 2nd and 3rd cultivation cycles, i.e., where infestations of whitefly and thrips may already be established from the start of the cultivation cycle. Avoid where aphid control depends on Aphidoletes: the two are not compatible. Packed in shaker bottles with corn grit. Apply Swirskii preventively on low prey populations only if pollen is also available as food source. Good for sweet pepper, cucumber, eggplant, gerbera, and roses.

2 per sq ft proactively on sweet pepper, eggplant OR 5 per sq ft if thrips or whitefly present OR 10 per sq ft on hot spots in combination with other beneficials.

PMS1-B / 1,000 mites / (0.1 lb) P
per bottle..... 36.00
6+ bottles..... 17.40
15+ bottles 14.50

PMS25-S / 25,000 mites / (0.4 lb) P
per tube 68.00
5+ tubes..... 54.00

PMS50-K / 50K mites / (0.5 lb) P
per tube 115.00
5+ tubes..... 99.00

PMS125-S / 125K mites / (4.0 lb) P
per bag 260.00
5+ bags 247.00

PMS100-K / 100 sachets per box / (2.0 lb) P
250 mites per sachet
per box..... 76.00
3+ boxes..... 72.90

PMS500-S /500 sachets per box / (5.0 lb) P S
1,000 mites per sachet
per box..... 260.00
3+ boxes..... 247.00

Shipped Monday or Tuesday, order by previous Wednesday.

TIPS FOR IDENTIFYING WHITEFLY

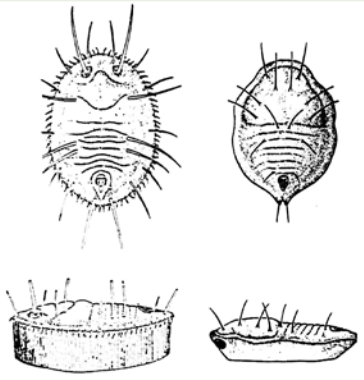
There are many kinds of whitefly. Common ones in horticulture and landscape are *Trialeurodes vaporariorum* (greenhouse whitefly, GHWF, not just seen in greenhouses), and *Bemesia tabaci* (sweet potato or SPWF) or *Bemesia argentifolii* (silverleaf or SLWF). Bemesia is harder to monitor because it does not distribute evenly the way GHWF does.

Looking at the fourth instar nymphs through a hand lens is the easiest way to tell them apart. A fringe rings the edge of white GHWF nymphs and no eye-spots are visible.

Bemesia nymphs are yellow with no fringe, rounded in profile and with eye spots visible.

GHWF adult bodies are white, wings together flat to leaf surface. Bemesia adults are yellow, wings slightly apart showing abdomen and at an angle to leaf surface.

GHWF lays eggs in circular patterns, Bemesia singly.



Whitefly scale nymphs, dorsal views above, profiles below, greenhouse whitefly on left, Bemesia on right.

Build Beneficial Refuges and Habitats

Many biological control organisms require nectar and/or pollen for proper maturation and reproduction. The insects need a habitat in which they can thrive, or many of them will die off or leave the farm or garden. Until natural sources of pollen and nectar mature, beneficials can be drawn in with simulations, like our Insect Food and Predalure, both with optional wintergreen oil scent to attract predators (see on page 32).

INSECT FOOD

Attract and increase the number of predatory insects that occur in gardens and farms with our kairomone feeding attractant. Also available with natural wintergreen oil, it attracts green and brown lacewing, predatory beetles of all kinds, syrphid flies and other predatory fly adults, as well as spiders that use it as a supplemental food source. Beneficials are drawn to the tiny droplets and may lay as many as ten times more eggs with one application. The result is more predators to attack aphids, whitefly, caterpillars, mites and other pests.

Contains toasted organic soy flour, nutritional yeast, and sucrose. No genetically modified ingredients. Insect Food contains 22% protein with the full range of amino acids and trace minerals. It supplies a diet that is nutritionally balanced and available to support beneficial insect populations when you need them. Insect Food is designed for use with Integrated Pest Management systems. Organic.

Mix 1 lb per gal. Spray on using large droplets, widely scattered, or use a paint brush to flip onto plants.

IF6OZ / 6 ounce / (0.4 lb) N
per bag 4.50

IF1 / pound / (1.1 lb) N
per pound..... 9.95
5+ pounds..... 7.95

IF6OZW / 6 oz wintergreen oil / (0.4 lb) N
per bag.....5.00

IF1W / pound wintergreen oil / (1.1 lb) N
per pound 11.00
5+ pounds.....8.25

FUN FACTS: Wintergreen oil with natural methyl salicylate MeSA is an optional component in our Insect Food and the active ingredient in Predalure for organic (see page 32). It is received by beneficial insects' antennae receptors as a call for help from plants under attack by insect pests. Its use is associated with lower pest problems.

What is a HIPPO? Herbivore Induced Plant Protection Odor! To learn more google: David James MeSA Washington State Prosser.

Wildflower Seed Mixes to Attract Beneficials

Cultural practices that create beneficial habitat are essential to a successful biological control program. The key to creating a good habitat for the insects is integrating biodiversity into and around your farm or garden. Different kinds of plants attract different kinds of insects, resulting in a biological balance in the garden. Besides height and density of the stand, blends vary in content of perennials vs. annuals (in southern latitudes habitats of annuals last longer in winter cropping systems, perennials provide habitat longer in summer). Because of differences in seed size, the volume of 1 ounce of seed ranges from 2 rounded tablespoons to a rounded half cup.

Create a protective niche for natural predators and parasites by providing host insects, nectar, pollen, water sources, dew, and moist organic litter on soil surface. Consider mulching your plants to improve habitat at the soil level. Dedicate just 1% of your garden or crop area for biocontrol and you will be rewarded.

INSECTA-FLORA HABITAT PLANT SEEDS

Insecta-Flora mixes have flowers that bloom at different times throughout the year and include open flower structures that allow large and small insects to get nectar. Insecta-Flora also provides habitat for birds. Some flowers have lots of pollen, some will tolerate shade, and some will take mowing. Avoid planting mixes too heavily as the faster growing plants will overwhelm the slower growing plants resulting in lower diversity. Fall planting is best in a Mediterranean climate, giving plants time to establish in the rainy season. If planted in the spring, water to get established. In dryer areas, water several times in summer. To maintain an established habitat, if mowing is needed, mow half an area one month and the other half about a month later. Available in standard and low growing mixes.

Plant Insecta-Flora mixes 11 lb per acre OR 1 lb per 4,000 sq ft OR 1 oz per 250 sq ft OR 1 g per 9 sq ft To keep the stand for several years in a permanent bed, let the flowers set seed before mowing.

KEY TO SHIPPING CODES

P – Perishable
N – Non-Perishable
S – Shipped Separately
See page 52.

INSECTA-FLORA MIX STANDARD

Insecta-Flora Mix Standard, now with Gopher Stopper® sour clover, will provide beautiful flowers that attract, feed, and protect beneficial insects. Because it largely contains attractive flowers that re-seed themselves, it is expensive compared to many cover crop and "bug-blend" mixes. However, averaged over 4 to 5 years the cost is quite reasonable. The Standard mix has low and medium height plants (up to 3 ft tall). To add more height and diversity to the floral architecture, add some tansy phacelia and cosmos to the mixture.

Contains: Alyssum, arroyo lupine, baby's breath, bachelor's buttons, birdsfoot trefoil, blue flax, calendula, California poppy, Chinese houses, crimson clover, goldfields, Persian clover, Johnny jump-up, yarrow and Gopher Stopper® clover.

FLORASTD3 / 3 grams / (0.1 lb) N
per bag 1.75
5+ bags 1.50

FLORASTDOZ / ounce / (0.1 lb) N
per ounce 4.75

FLORASTDLB / pound / (1.2 lb) N
per pound 16.50
5+ pounds 15.50
10+ pounds..... 13.40

TIPS FOR ESTABLISHING HABITAT FROM SEED MIX

Left to Right: Baby's Breath, Crimson Clover, Bachelor's Button

Our local seedsman Paul Albright creates most of our blends. He advises to till only if soil is compacted, otherwise just roughen the surface. We've learned to sprout weed seeds and hoe before seeding. We seed small areas by hand. Large areas can be seeded by cyclone type seeder, manure spreader or grain drill. Combine the mix with fine sand or vermiculite at a compatible ratio for your seeder for even distribution of large and small seeds. Make close contact between seed and soil by compacting with a cultipacker or drag mat.

Once seed is set, mow to scatter for next year. Adding seed can establish a stronger, self-supporting growth. To prevent reseeding in an intercropping system, take down the habitat crop after bloom, before seeds set.

INSECTA-FLORA MIX LOW

Insecta-Flora Mix Low grows about one foot tall and is great for under trees, row ends, or a meadow of flowers. Along with attracting, feeding and protecting beneficials, it also serves well for nitrogen-fixing and erosion control.

Contains: African daisy, alyssum, anis, bird's foot trefoil, calendula, dwarf goldfields, English daisy, five spot (buffalo eyes), foxtail fescue (Zorro), Hykon rose clover, snow-in-summer, subterranean clover, and Johnny jump-up.

FLORALOW3 / 3 grams / (0.1 lb) N
per bag 1.75
5+ bags 1.50

FLORALOWOZ / ounce / (0.1 lb) N
per ounce 4.25
5+ ounces 2.75

FLORALOWLB/ pound / (1.2 lb) N
per pound 23.00
5+ pounds 20.70
10+ pounds..... 18.60

BENEFICIAL BLEND SEED MIX

Beneficial Blend Seed Mixture yields a wide variety of plants known to harbor beneficial insects. It can also be used to deter weeds or provide ground cover in unused areas. It is good for soil building, erosion control and has excellent drought resistance and tolerance for non-tillable, compacted, low fertility soils with high or low pH. Beneficial Blend Mix should be planted 0.25 – 0.50 inches deep in a good, fine seedbed since many flower and herb seeds are small. A well established stand will reseed and can last several years, which will add vigor to the perennial and biennial plants in the blend. Fall planting is best in a Mediterranean climate, giving plants time to establish in the rainy season.

Contains: Alfalfa (non-GMO), baby blue eyes, baby's breath, barley, berseem clover, bishop's flower, buckwheat, carrot, celery, cereal ryegrass, coriander, subclover, common vetch, crimson clover, fennel, mustard, sweet alyssum, tidy tips, white yarrow, yellow blossom sweet clover. Small legume seeds are inoculated to assure effective nitrogen-fixing nodulation.

A light planting rate of 10 lb per acre will establish 2-4 plants of each species per square foot. In orchards and vineyards, only one row of the Blend out of every 8-10 rows is needed.

BB0Z / ounce / (0.1 lb) N
per ounce 2.70
5+ ounces 1.70

BB1 / pound / (1.2 lb) N
per pound 6.90
10+ pounds..... 6.50
25+ pounds 5.50

BB50 / 50 pound / (51 lb) N S
per bag 203.00

LOW PROFILE HABITAT SEED MIX

Low Profile Habitat Seed Mix includes low growing plants and could serve for an orchard floor or erosion control. Contains a beautiful mix of cold tolerant reseeding annuals, broadleaf trefoil, and clovers. Nitro Persian clover grows densely to 2 feet with a long duration of attractive blooms. Red and crimson clover grow 18 inches high. White Dutch clover grows 6-10 inches high with a low tolerance for heat and sun. Red clover is especially attractive to beneficial insects. Broadleaf trefoil is both long-lived and tolerant of poor soils. Subclovers bury their seed heads in the soil, surviving in orchards and vineyards with drip or no irrigation. The two fescues in the mix, creeping red and Eureka hard, are shade tolerant, spread, and are low-maintenance.

Contains: Clovers (31% - white Dutch, red, crimson, Nitro Persian), subclovers (27% - Campeda, Antas, Clare), broadleaf trefoil (26%), fescues (10% - creeping red fescue, Eureka hard fescue), alyssum, bachelor's buttons (dwarf polka), baby's breath, California poppy, Chinese forget-me-not, wallflower, white yarrow. All small legume seeds are inoculated to assure effective nitrogen-fixing nodulation.

Plant 18-25 lb per acre OR 1 oz per 120 sq ft.

LOWPROOZ / ounce / (0.1 lb) N
per ounce 2.70
5+ ounces 1.70

LOWPRO1 / pound / (1.2 lb) N
per pound 6.90
10+ pounds..... 6.50
25+ pounds 5.50

LOWPRO50 / 50 pound / (51 lb) N S
per bag 203.00

DEFINITIONS OF HABITAT OR SUPPORT PLANTS:

Monitor plant – a plant that is more attractive to a pest than the crop plant. Eggplant is more attractive to whitefly than tomato or pepper so you can monitor an acre greenhouse by checking 3 eggplants spread down the aisles of the house. Bush or pole beans are more attractive to spider mite than tomato, pepper, cucumber, or strawberry. Fennel flowers attract thrips, and so on.

Trap crop – a plant or crop more attractive to pest than the commercial crop, which takes the pest damage so the crop is spared. Infested plant can be vacuumed, treated or removed.

Banker plant – a plant that attracts and hosts a pest and is used as an insectary to grow more beneficials. Quick growing cereal grasses like rye can be planted to attract aphids that later become food for aphid predators and parasites.

Monitor/trap/banker plants - beans planted in tomatoes or peppers act as a monitoring plant, and fill up with (or trap) spider mites. Predator mites, such as persimilis, are then released on the bean plants and overwhelm the spider mites. The beans then become banker plants, with predator mites moving into the crop.

Insectary plant – plants that supply pollen, nectar or shelter for beneficials and also may host pests that are food for them.

Borders, interplantings, pest break strips - insectary plants strategically placed for trapping pests and bankering beneficials.

Cover crop – a non-market succession crop with many uses including hosting beneficial insects.

INTERFLORA SEED MIX

Specially designed for interplanting in annual vegetable crops. This mixture of grasses, clovers, herbs, and flowers attract beneficial insects to help with biological control of pest insects. For row crop vegetables this can be planted in every 7th to 10th row. For bedded vegetables this can be planted every 10th to 20th bed, depending on need for support for a biological program. For established organic farms 1% of the crop area is sufficient for supporting biological control, whereas for transitional farms investing 5% of the crop area in habitat may be needed to get good pest control. Mow to six inches to clean up or use a weed whip or weed eater to reduce height as needed.

Contains: Alyssum, baby's breath, bachelor's buttons, berseem clover, buckwheat, calendula, crimson clover, phacelia, blue flax, creeping red fescue, Prima gland clover, ryegrass (dwarf perennial), subterranean clover (Nungarin and Denmark), Frontier balansa clover, Cefalu arrowleaf clover, wallflower, white yarrow.

Plant 15 lb per planted acre OR 1 oz plants 3 X 60 ft row (180 sq ft).

INTERFLOROZ / ounce / (0.1 lb) N
per ounce 2.70
5+ ounces 1.70

INTERFLOR1 / pound / (1.2 lb) N
per pound 6.60
10+ pounds..... 6.20
25+ pounds 5.80

INTERFLOR50 / 50 lb / (51 lb) N S
per bag 210.00

ALFALFA-MEDIC SEED MIX

Alfalfa hay is a habitat of all the beneficial insects serving an agricultural landscape. Along with the medics for weed smothering, this mix also traps lygus bugs near strawberries and cotton. A summer dryland green manure cover crop, the medics are done in August, and the alfalfa can be turned under in fall or early spring fixing up to 200 pounds of nitrogen per acre. In lower latitudes it can also be nursed by planting with or after winter grains, rye, oats or barley. Can be aerial seeded in the fall, drilled or broadcast at harvest yielding a 6-16 inch tall cover or self-regenerating mulch for orchard and vineyard middles and interplantings in drip irrigated row crops. Alternate mowing preserves a stable habitat for natural enemies.

Contains: *Medicago* sp. non-dormant alfalfa and *Trifolium* spp. (jester barrel medic, Santiago burr medic and snail medic).

Plant 1 lb per 1,000 square feet OR 15 lb per acre.

ALFAMEDICOZ / ounce / (0.1 lb) N
per ounce 2.60
5+ ounces 1.60

ALFAMEDIC1 / pound / (1.2 lb) N
per pound 6.30
5+ pounds..... 5.30
10+ pounds..... 4.30

ALFAMEDIC50 / 50 pound / (51 lb) N S
per bag 170.00

GOPHER STOPPER® CLOVER

Melilotus indica, or sour clover, may be added to habitat mixes or cover crops to repel gophers. Sour clover physically improves heavy soils and increases the water-holding capacities and fertility of surface strata, thus sustaining soil life. It also has high levels of coumarin anticoagulant. Sour clover is an annual, self-pollinated plant. Native to the Eastern Mediterranean region, Ethiopia, and India, it has naturalized as an annual winter legume in much of California. It grows 20 inches tall, flowers April-October, and seeds mature May-November. Biomass is up to 10,000 lb per acre, with a nitrogen content of 3.36%. Tolerates floods and salinity. Blossoms provide no nectar, and do not attract insects.

1 oz per 1,000 sq ft OR 3 lb per acre.

GOPHROZ / ounce / (0.1 lb) N
per ounce 2.90
5+ ounces 1.90

GOPHRLB / pound / (1.2 lb) N
per pound 12.00
5+ pounds 11.50
10+ pounds..... 9.30

ROAD SHOW

Low growing seed mix to plant in roads, box row, edge row, or lawn. Stands low to moderate traffic, reduces dust, helps beneficials. Cover drive roads through fields to reduce dust and erosion, as well as provide habitat for beneficial insects to aid biocontrol in neighboring fields. Can also be used as a low-water use lawn substitute. Mix should perform well in all of continental USA with sufficient rain or irrigation, except the southeast. Mowed in spring, straw will help reduce dust in summer. Road Show will reduce erosion from seasonal rain. Manage as you would sports turf - loosen soil yearly with an aerator on drive roads.

Contains: Birdsfoot trefoil, chamomile, hard fescue, Idaho fescue, Johnny-jump-up, strawberry clover, sweet alyssum, white yarrow, woolly plantain, zorro fescue.

Plant 22 lb per planted acre OR 8 oz per 100 ft of 10 ft wide road. 1 oz plants 125 sq ft and 1 lb plants 2,000 sq ft.

ROADOZ / ounce / (0.1 lb) N
per ounce 4.50
5+ ounces 2.90

ROADLB / pound / (1.2 lb) N
per pound 19.50

ROAD25 / 25 pound bag / (26 lb) N S
per bag 390.00

PERENNIAL HEDGEROW SEED SOUTH

Native mix for Southern California. Easy to grow for most areas in Southern California. Produces shrubs and small trees which attract and support beneficial insects to manage aphids, caterpillars, mites, thrips, and whitefly. Emergence is in 10-15 days, and plants will establish 120 days after emergence. A parallel strip of annual insect habitat plants can give short-term help with biological control until the shrubs grow.

Contains: Bladderpod, brewer saltbush, brittle brush, chaparral broom, Christmas berry, elderberry, flat-top buckwheat, giant wildrye, toyon, white yarrow,.

Plant 26 lb per acre OR about 5 oz for 5 X 100 ft strip. 1 oz plants 500 ft row, 1 lb plants 1,700 sq ft.

HEDGESOZ / ounce / (0.1 lb) N
per ounce 4.10
5+ ounces 2.80

HEDGESLB/ pound / (1.2 lb) N
per pound 38.00
3+ pounds 32.50

PERENNIAL HEDGEROW SEED NORTH

Native mixture for Northern California. Easy to grow for most areas in Northern California. Produces shrubs and small tree foliage, like toyon shown, which attract and support beneficial insects to manage aphids, caterpillars, mites, thrips, and whitefly. Emerges in 10-15 days, and plants will establish 120 days after emergence. A parallel strip of annual insect habitat plants can give short-term help with biological control until the shrubs grow.

Contains: Acacia, ashleaf buckwheat, brittle brush, Christmas berry, deerweed, elderberry, flat-top buckwheat, fourwing saltbush, giant wildrye, lemonade berry, purple sage, toyon, white sage.

Plant at a rate of 26 lb per acre OR about 5 oz for 5 X 100 ft strip. 1 lb plants 1,700 sq ft.

HEDGENOZ/ ounce / (0.1 lb) N
per ounce 4.10
5+ ounces 2.80

HEDGENLB / pound / (1.2 lb) N
per pound 38.00
3+ pounds 32.50

FLORAL ARCHITECTURE AND A GOOD DRINK OF NECTAR:

Not all flowers are created equal when it comes to hosting beneficial insects. Joe Patt, who has PhDs in botany and entomology, looked into flower shape and access to nectar. He compared flowers with open architecture (exposed nectaries) for beneficial insect attraction to those with partially hidden and hidden nectaries. He then studied the umbels (Apiacea, the carrot family), which have open nectaries. Seed dill, var. Bouquet, was a champ at feeding the 3 mm long wasp *Edovum puttleri* as well as Pediobius. The throngs of beneficials attracted to the dill flowers helped Edovum releases control Colorado potato beetle and aided Pediobius in controlling Mexican bean beetle.

Our habitat mixes include blooms from the carrot, aster, flax, poppy, grass and clover families. You'll see plenty of white flowers in some mixes since more beneficial insects are seen on them than on blue, red and yellow flowers. Valuable beneficials abound on even very small patches and borders of habitat! Build it and they will come!

Monitor Insect Ecology

RVI offers consultation, custom rearing, and training in many aspects of insect ecology and insectary development. Field training includes collecting samples from crop and border or habitat plantings. Observations can be made about the presence of arthropod species or functional groups. The goal is to observe the ratio of pests to predator, parasite and antagonist members of the natural enemy complex and gain insights for helping the natural enemies prevail. More on our web site www.rinconvitova.com. *(Left photo: Founding entomologist Everett Dietrick field checking in organic raspberries challenged by red berry mite)*

CONSULTING AND TRAINING

Field insectary technologies. Enhancing habitat and building foodwebs.

CS100 / First hour..... 170.00

CS150 / Additional hour.....48.00

INSECT IDENTIFICATION BASIC

ID100 / each.....30.00

D-VAC RENTAL

DVAC122RENT / month / (25 lb) S
per month 100.00
DVAC24RENT / month / (65 lb) S
per month 160.00

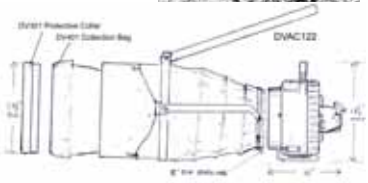
D-Vac Vacuum Insect Nets

D-Vac vacuum sampling provides a more thorough collection of tiny species and immature forms than conventional sweep net sampling methods. Tiny insects do not enter standard sweep nets because the sweeping motion causes air pressure to build at the rim, pushing them away. The vacuum insect net, on the other hand, catches a larger proportion of tiny forms, quick flying species and insects that drop or hold on tight when disturbed. This more complete sample enables more accurate assessments of the ratio of predators and parasites and often a more favorable ratio of natural enemies. Both the hand-carry and back-pack models have gas-fueled motors started by nylon rope recoil starters driving squirrel cage fans. Both come with new improved heavy duty ABS plastic collecting heads and the following standard accessories: protective collar (to hold collection bag in place), cone adapter with 1/3 sq ft opening, four collection bags and one sieve bag for making separations of large and small insects.

D-VAC MODEL 122 (HAND-CARRY)

The hand-carried D-Vac has a simple and compact design used for taking quick samples for field checking.

Echo air-cooled 2-cycle, 1 horsepower motor. Airflow capacity 280 cu ft per min at the sq ft opening of the collecting head. Weight 25 lbs.



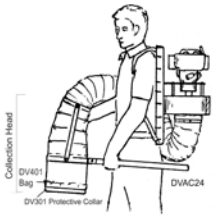
Fuel with 2-cycle oil in unleaded gasoline (8 oz per 1.25 gallon).

DVAC122 / (22 lb) S.....995.00

D-VAC MODEL 24 (BACKPACK)

The backpack D-Vac is used for heavy-duty sampling where large numbers of samples or long continuous samples are needed. It is an international scientific standard for insect sampling.

Briggs and Stratton 3 ¾ HP motor. Airflow capacity 750 cu ft per min at the sq ft opening of the collecting head. Weight 57 lbs. Included additional accessory: short 4" diameter hose adaptor.



DVAC24 / (65 lb) S.....2,800.00

NYLON ORGANDY BAG

Insect collecting net for D-Vac with an improved, more durable muslin cuff (organic cotton and hemp blend). The nylon organdy (90 mesh) bag holds all tiny forms including Trichogramma and Mymarid wasps while allowing the air to be pulled through the cloth. Replacement bags provide convenient, short-term storage of samples. Bags also available for leaf vacuums.

DVAC401 / 1 bag / (0.2 lb) N
per bag 10.00
5+ bags 9.00

MEDIUM MESH SIEVE BAG

Screen mesh (16 mesh) with muslin cuff for separating samples by size.

DVAC402 / 1 sieve bag / (0.2 lb) N
per bag 9.00

GROUND SAMPLING CYLINDER

1 sq ft screened opening for complete faunistic samples on forage crops and turf.

DVAC302 / 1 cylinder / (0.2 lb) N
per cylinder 85.00

COLLECTING CONES

1/2 sq ft, 1/3 sq ft, 1/4 sq ft openings.

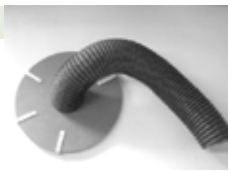
DVAC303 / ½ sq ft / (0.2 lb) N
per cone 35.00
DVAC304 / 1/3 sq ft / (0.2 lb) N
per cone 35.00
DVAC305 / ¼ sq ft / (0.2 lb) N
per cone 35.00

ADAPTER HOSE SHORT

12 inch long hose with 4 inch diameter for high suction samples.

DVAC307 / 1 adapter / (0.2 lb) N
per adapter 52.00

ADAPTER HOSE LONG



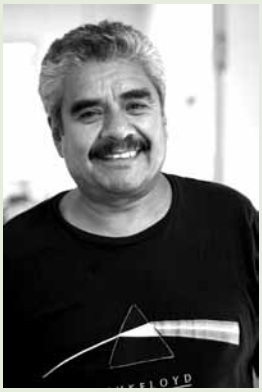
40 inch long hose with 4 inch diameter for high suction samples

DVAC306 / 1 adapter / (0.2 lb) N
per adapter 65.00

MAGNIFYING LENS (10X)

Get up close and personal with small creatures. Large field of view for scouting pests and beneficials. Has a loop for lanyard and black case.

ML100 / each / (0.1 lb) N
each 12.80



VICTOR ZARAGOZA
Fabricator and Maintenance

D-Vac Company sponsored Victor for US residency. We wanted his skills to develop D-Vac fabrication and sales. Besides that his handyman skills are in constant demand here at the farm. His oldest son Luis worked with us for a few years and his youngest Alex is fulfilling his dream to study at UC Berkeley.

Sticky Cards for Monitoring

We carry yellow sticky cards that are sticky on both sides with peel-off coverings. For monitoring, hang every 250 square feet or, to trap emerging fungus gnats, hang horizontally over pots. Yellow attracts many insects including whitefly, winged aphid, shore fly, fungus gnat, leafminer and thrips. Note counts weekly and keep records to observe trends. Blue sticky cards are also available for attracting thrips and leafminer, especially if beneficials are attracted to yellow cards. Large sticky banners also available.

YELLOW STICKY CARDS

3 X 5 inch cards

ST25-Y / bag of 25 / (0.2 lb) N
per bag 19.50
ST100-Y / box of 100 / (0.2 lb) N
per box..... 42.00
ST1000-Y / case of 1000 / (0.2 lb) N
per case..... 277.00

BLUE STICKY CARDS

4 X 7 inch card. Seabright traps fold open to expose 4 X 14 inch sticky blue surface with grid for precision monitoring of thrips and leafminer. Approximately 30 sq inch adhesive area. Punched hole and twist-tie provided to easily hang trap. Easy to handle and count insects without getting sticky. To make more attractive to thrips, add a Thrips Lure (page 32) or drop of vanilla extract.

ST5-B / pack of 5 / (0.2 lb) N
per pack 6.30
5+ packs 5.80

Cultural Practices

Small changes in farming practices can help avoid the pest flare-ups taken for granted under conventional chemical farming. The key is understanding the behavior and life cycle of the pests on your crop and of the beneficials that attack them. Often the most effective strategy does not require the purchase of products. It requires knowledge of how to integrate features of crop rotation, variety, fertility, tillage, irrigation, insect attractant, and habitat management that can make a big difference in the ratio of good bugs to bad. (*Left photo: sprinkler timing can interfere with moth flight, favors predatory mites.)*

HOPPER FINDER

Large yellow 6 in X 1,500 ft sticky banner for mass trapping of pests. Yellow attracts most pests, including winged aphid adults, whitefly, leafhopper, leafminer, thrips, gnat, fruitfly and fungus gnat. Plastic UV resistant film with water-resistant adhesive.

Hopper Finder Jr. is 6 in X 300 ft. Rollertrap is 1 ft X 300 ft.

Stretch between posts to expose a large area that attracts and traps pest insects. Pheromones, kairomones (feeding attractants) or LEDs can be added to enhance the attraction of the color. Replace when covered in bugs or debris.

STBN6Y / HF banner / (16 lb) N
- per banner 73.00
- 5+ banners 63.50
- 20+ banners 59.50

STBN6JRY / HF Jr. banner / (9 lb) N
- per banner 46.00
- 5+ banners 35.00

STBN12Y / rollertrap / (19 lb) N
- per banner 58.00
- 5+ banners 47.00
- 20+ banners 44.00

STICKY BANNER

Yellow, 530 ft x 2 in. Traps aphid, whitefly, thrips, leafminer, gnat, fruitfly, leafhopper, froghopper. For smaller spaces like greenhouses.

STBN2Y / 530 ft x 2 in / (7 lb) N
- per banner 62.00
- 5+ banners 49.00

ROLL DISPENSER

For 530 ft x 2 in banner.

STDISP-BN2 / dispenser / (2 lb) N
- per dispenser... 32.50

INSECT FINDER

Large blue 6 in X 1,500 ft sticky banner for mass trapping of pests. Blue is especially attractive to thrips and may also attract shore flies and leafminer. Thrips Lures can enhance attractivness, see page 32.

Insect Finder Jr. is 6 in X 300 ft. Rollertrap is 1 ft X 300 ft.

Stretch between posts to expose a large area that attracts and traps pest insects. Replace when covered in bugs or debris. Pheromones, kairomones (feeding attractants) or LEDs can be added to enhance the attraction of the color. Adding a few drops of vanilla flavoring can be attractive to thrips.

STBN6B / IF banner / (16 lb) N
- per banner 79.00
- 5+ banners 70.00
- 20+ banners 66.00

STBN6JRB / IF Jr. banner / (9 lb) N
- per banner 48.50
- 5+ banners 38.00

STBN12B / rollertrap / (19 lb) N
- per banner 60.00
- 5+ banners 49.00
- 20+ banners 46.00

SCARECROW

The Scarecrow is a motion-activated sprinkler to deter nuisance animals. Great to keep raccoons out of koi ponds, birds out of ripening fruit, deer away from flowers. Motion in detection area triggers 3 second blast of water out of impulse sprinkler that repels animals with sound, motion and water. Doesn't harm animals, just shoos them away. Unit stands 2 ft tall. Comes with optional bird beak/eye decals.

Aim at pond, tree, garden, or flower bed and set the sensitivity to protect the area from nuisance animals. Requires one 9-volt battery and a water hose (not included).

SCARE / each / (2.2 lb) N
- per sprinkler 88.00
- 3+ sprinklers ... 75.00

See Chase, page 32.
Fly and yellow jacket traps, page 45.

Traps and Baits

SLUG SALOON

Sturdy plastic trap protects bait from sun and rain. Draws slugs, sowbugs, and earwigs into the Saloon where they drown in the brew. Each trap comes with a one month supply of nontoxic malted grain bait. Made of tough, weather resistant polyethylene for years of service. Can be used to monitor slug population to time bait applications. Bulk packages available for farms. Call for wholesale orders.

Mix bait in the Slug Saloon. Use one trap for every 100 sq ft of infested garden area and visit the Saloon every 3-4 days to empty the tray.

SLGSLN / 1 trap / (0.6 lb) N
per trap..... 5.95
10+ traps 5.65

SLUG SALOON BULK PACK

10 Slug Saloons with 3 lb bait (6 month supply - enough for a season).

SLGSLN-B10 / 10 traps + bait / (5.3 lb) N
per box..... 59.00
10+ boxes 39.00

SNAILER

Attract destructive snails and slugs with nontoxic, food grade, people and animal safe bait in this long lasting trap. A one-way door lets them enter but not leave. Traps snails, slugs, earwigs, sowbugs. Comes with a one-month supply of bait. Can be used to monitor slug and snail population to time bait applications. Bulk package available for farms. Call for wholesale orders.

Use one per 10 sq ft for heavy infestation OR one per 400 sq ft for maintenance purposes. Replace bait every 3-4 days.

SNLR / 1 trap / (1.3 lb) N
per trap..... 8.99
10+ traps 8.79

SNAILER BULK PACK

6 Snailers with 5 lb bait (6 month supply).

SNLR-B6 / 6 traps + bait / (8.9 lb) N
per box..... 41.60
4+ boxes..... 33.00

SLUG SALOON/SNAILER BAIT REFILLS

Nontoxic malted grain bait with measuring spoon. Food grade bait releases a fermentation odor that attracts slugs better than beer. 3 oz is 3 month supply for Slug Saloon; 7 oz is 2 month supply for Snailer. Bulk 5 lb quantity fills 6 Snailer traps for 6 months, or 10 Slug Saloons to last close to a full year.

Use 1 teaspoon per trap for Slug Saloon, 3 teaspoons per trap for Snailer.

SLGBAITRF /3 ounce - Saloon / (0.3 lb) N
per box..... 4.45
10+ boxes 4.20

SNLBAITRF /7 ounce - Snailer / (0.5 lb) N
per box..... 5.80
10+ boxes 5.50

SNLBAIT5LB / 5 pound / (5.4 lb) N
per jug..... 29.50
4+ jugs..... 26.50

SLUGGO

Slug and snail bait in small pellets with iron phosphate. Low risk for kids, dogs, pets. May cause problems for chickens, which can feed on pellets. Avoid using with decollate snails, or place out of reach on raised platform or on paths where decollates don't travel. Organic, OMRI listed.

Use 1 lb per 1000 sq ft. Delay watering after treatment. Repeat every 2 weeks until slugs and snails decline.

SLUGGO2.5 / 2.5 pound / (2.9 lb) N
per bag 21.50

SLUGGO25 / 25 pound / (26 lb) N S
per bag 74.00

SLUGGO50 / 50 pound / (52 lb) N S
per bag 125.00

BEETLE HARBOR

Strip of corrugated paper to wrap around trees to provide harborage for beetles and other insects. Insects are attracted to small spaces to hide during the daytime or to pupate. Used for monitoring, insect collecting or mass trapping. Works well for mass trapping eucalyptus tortoise beetle. 4 in X 150 ft with 3/8 in flutes.

Secure one end with box tape. Wrap around tree and secure other end with box tape. Leave on tree for several days. Remove from tree and tap or poke out insects.

HARBOR / 1 roll / (1.0 lb) N
per roll 13.50
30+ rolls..... 12.00
60+ rolls..... 9.80

Kairomones and Lures

Kairomones are feeding attractants that draw pests to plants and predators to pests. Methyl salicylate (MeSA) is a volatile pheromone released by plants damaged by plant feeding insects. Many beneficials respond to this distress signal and are attracted to plants releasing MeSA. MeSA kairomone lures can bring in beneficials before pests start causing damage. In one study, treatment with MeSA reduced mite levels from an average of over 20 mites per leaf to below economic injury levels. Other studies showed decreases in grape leafhopper populations and pesticide treatments reduced to less than half.

Predalure is a new product with feeding attractant for beneficials that can be placed near the plants to be protected.

PREDALURE

Methyl salicylate (MeSA) kairomone lure. Specifically attracts beneficial predatory insects: green lacewing, lady beetles and various syrphids (flower or hover flies). Attract and keep predatory beneficial insects in your crop - reduce need for beneficial releases or insecticides. Encapsulated in a controlled release packet, the proprietary membrane releases the attractant for 30 or 90 days. Available either with synthetic MeSA (code PRED) or natural MeSA from wintergreen oil for organic (code PREDO).

Place 1 per tree or every 300 sq feet OR 2 to 3 per acre at crop height, equidistant from each other or in "hot spots" where control is needed. Lasts 30 or 90 days.

PRED30D-10 / pack of 10, 30 day, synthetic MeSA / (0.3 lb) N
per pack 39.00

PRED90D-10 / pack of 10, 90 day, synthetic MeSA / (0.5 lb) N
per pack 40.50

PREDO30D-10 / pack of 10, 30 day, wintergreen / (0.3 lb) N
per pack 42.80

PREDO90D-10 / pack of 10, 90 day, wintergreen / (0.5 lb) N
per pack 52.00

Discount for packs of 25.

CIDETRAK D

Cucurbitacin from powdered buffalo gourd root attracts cucumber beetle or corn rootworm, *Diabrotica* spp.

Mix 3.1 ounce with 1 ounce Entrust (spinosad) in 10 gal water per acre, spray large drops widely scattered.

CIDETRAKD / 4 pound / (4.2 lb) N
per bag.....149.00

CIDETRAKD.5 / 0.5 pound / (0.6 lb) N
per bag.....25.00

THRIPS LURES

Kairomone to multiply the effectiveness of blue sticky traps. Attracts Western flower thrips and other thrips species.

Use with sticky traps. Place 1 lure every 5-25 ft. Lures should be placed upwind from the infestation so the scent is carried to the thrips. Replace monthly.

THRIPSLURE / pack of 10 / (0.1 lb) N
per pack 46.50
5+ packs 34.50
10+ packs..... 29.30

THRIPLINE

Lure with mating pheromone for Western flower thrips (*Frankliniella occidentalis*). Attracts both males and females.

Use with sticky traps. Apply lure directly to sticky surface of trap. Hang traps 12-16 inches above crop, 30 ft apart, 40 traps per acre. Replace every 3-4 weeks, or sooner if trap becomes covered with pests or debris.

THRIPLINE / pack of 10 / (0.2 lb) N
per pack 50.00
5+ packs 38.00
10+ packs..... 35.40

THRIPLINE KIT

Mating pheromone lures with 4 X 10 inch Takitrap dry sticky traps. Takitraps are double sided with 4 removable panels for a month of trapping. Dry glue leaves no residue on fingers.

THRIPSKIT / 10 traps & 10 lures / (0.5 lb) N
per kit 55.00
5+ kits 43.40
10+ kits 40.80

CHASE

Mole, gopher, vole, armadillo repellent with castor oil. Penetrates soil quickly and deeply. Moles don't like the taste, smell or feel of castor oil. They become distressed and leave. Repels for up to 60 days.

Granular - scatter 1 lb per 1,000 sq ft.
Liquid - mix 1 ounce per gal water and spray to cover 312 sq ft. Water in after application.

CHASE6 / 6 pound / (6.2 lb) N
per bag.....40.00

CHASE1/ gallon / (9 lb) N
per bottle.....76.00

Food for Soil Foodwebs

Good soil fertility can prevent pests and diseases. Young explains in Quality First (see page 49) how Albrecht's essays about mineral balancing apply to vineyard and orchard production. Soil nutrition, while essential, is outside of our focus; however, if you are in transition from conventional chemical to biologically active soil, our Microbe Nutrients can accelerate the process. Along with our inoculants (see page 34), we offer a few other select products that may also contribute to soil systems that suppress pests or diseases.

MICROBE NUTRIENTS

Dry food for bacteria and fungi. Good to use with Defensor, Rhizoboost, or other inoculants. When bacteria have plenty of the basic food needed to actively multiply they produce slime, which helps them stick to plant leaves or roots. Microbe Nutrients help microbial inoculants to fill their valuable roles in the soil food web, establishing protective slime zones that suppress pathogens and exuding nutrients that help plants grow better. Organic. Contains dextrose (glucose), brewers yeast, and humic acid.

Mix with water and inoculant to feed bacteria or fungi just before applying. For 1 qt inoculant, use 2 lb or more Microbe Nutrients. For 1 gal, use 8 lb.

NUTRIENT2 / 2 pound / (2.1 lb) N
- per bag 12.00
- 5+ bags 9.00
- 10+ bags 7.50

NUTRIENT8 / 8 pound / (8.2 lb) N
- per bag 25.00
- 5+ bags 18.20

NUTRIENT40 / 40 pound / (40.2 lb) N
- per bag 79.00
- 5+ bags 69.00

YUCCA AG-AIDE 50™

Liquid 50% cold extract of *Yucca schidigera* containing steroid saponins. Use as wetting agent, soil penetrant, root stimulant, fungal food or in compost tea. OMRI listed.

For half acre foliar application use 1 lb per 100 gal water.

YUCCAQT / quart / (3 lb) N
- per quart 30.00
- 6+ quarts 20.00

YUCCAG / gallon / (10 lb) N
- per gallon 72.00
- 4+ gallons 63.00

YUCCA5G / 5 gallon/ (52 lb) N S
- per pail 290.00
- 5+ pails 261.00
- 10+ pails 247.00

BUG BITS [NEW]

Source of chitin. Food for chitin-digesting fungi or bacteria (like those in Rhizoboost). Feeds the microbes that help suppress plant feeding nematodes and insects on roots such as aphid, phylloxera, mealybug. Contains dried insects and insect parts.

BUGBITS10 / 10 pound / (10.2 lb) N
- per bag 18.00
- 5+ bags 16.00
- 10+ bags 14.00

FOSPHITE®

SAR (systemic acquired resistance) activator. For control of *Phytophthora*, *Pythium* and downy mildew on food crops, turf and ornamentals and *Phytophthora* in conifers. Potassium phosphite, a systemic fungicide, stimulates a plant's immune system to fight disease, especially water molds like *Phytophthora*. (Tree trunk injection approved in all states except California.)

Foliar: 1-2 qt per acre OR 2-4 tsp per gal. Drench: 1-2 qt per 100 gal OR 2-4 tsp per gal.

FOSPHITEQT/ quart / (3.4 lb) N
- per quart 16.00

FOSPHITE / gallon / (13.6 lb) N
- per gallon 54.00
- case of 4 gal 208.00

SILO-TEC 0-0-3

Soluble silicon fertilizer helps build plant cell walls to better withstand attack by disease causing organisms. Increases drought and heat tolerance by reducing transpiration water loss. Enhances structural strength. Proven to suppress gray leaf spot in St. Augustine grass and brown patch in Zoysia grass.

For foliar spray, use 2-4 tsp per gal water (4 pints per 100 gal). Tank mix compatible with many other fertilizers or inoculants.

SILICAQT / quart / (3.4 lb) N
- per quart 25.00
- 5+ quarts 12.00

SILICA2.5G / 2.5 jug / (13.6 lb) N S
- per jug 68.00
- 4+ jugs 55.00

HUMIC ACID

Fungal food. Good addition to compost tea. Biostimulant promotes fast development of absorbing roots. Good sticker/UV protection for foliar applications. Contains 12% liquid humic acid.

For 1 acre foliar application use 1 quart per 50-100 gal water OR 1 oz per 1,000 sq ft in 10 –20 gal water. For soil application use 2-3 quart per acre OR 2-3 oz per 1,000 sq ft.

HUMICG/ gallon / (9.4 lb) N
- per gallon 26.00
- 4+ gallons 17.00
- 8+ gallons 14.00

HUMIC2.5/ 2.5 gallon / (28 lb) N
- per jug 46.00
- 2+ jugs 35.00
- 4+ jugs 25.00

Soil Inoculants

In an acre of healthy soil there are six tons of microbes digesting wastes, protecting roots, sequestering carbon dioxide and opening up soil structure. Bio-Cat Microbials produces two of our low-cost inoculants: Rhizoboost to kickstart restoration of soil food webs, and Defensor to tip the balance towards beneficial organisms. Apply with our Microbe Nutrients to fuel the bacteria at the start of the food chain.

RHIZOBOOST

Rhizoboost is a liquid microbial soil inoculant that enhances biodiversity and discourages growth of undesirable microorganisms in the soil. The bacteria are naturally occurring (non GMO) and have been selected for their high degree of competitiveness. Field trials over the last 13 years demonstrate higher yields, lower disease and improved soil structure compared to untreated control plots. Contains *Bacillus licheniformis*, *B. chitinosporus*, and two strains of *B. laterosporus*. Spore count of 1 trillion CFU/gal. Nontoxic to people, animals, plants. No REI.

Use 1 qt per acre with 2 lb Microbe Nutrients on a 2 week cycle. If using with Defensor or inoculants, alternate every 2 weeks. Do not apply simultaneously with other inoculants.

RHIZOBST4OZ / 4 ounce / (0.6 lb) N
per bottle..... 3.80

RHIZOBSTQT / quart / (2.3 lb) N
per quart 18.50
6+ quarts..... 13.50
12+ quarts..... 11.00

RHIZOBSTG / gallon / (9.4 lb) N
per gallon 39.00
5+ gallons 34.00
25+ gallons..... 29.50

RHIZOBSTDR / 55 gallon / (465 lb) N S
per drum..... 1,580.00

DEFENSOR

Defensor is a microbial soil inoculant that contains bacteria that compete with fungal diseases and other pathogenic microorganisms. The two *Bacillus* strains used in Defensor are naturally occurring (non GMO) and have been selected for their high degree of microbial competitiveness. *B. subtilis* produces bacillibactin, an enzyme that destroys certain soil pests. The bacteria also boost a plant's immune system by stimulating systemic acquired resistance (SAR). Field trials over the last 10 years show increases in plant health, vigor, yield, resistance to stress, pests and disease in fungus-infested soils treated with Defensor compared to untreated control plots. Contains *Bacillus subtilis* and *B. cereus*, 1 trillion CFU/gal. Nontoxic to people, animals, plants. No REI.

Use 1 qt per acre with 2 lb Microbe Nutrients on a 2 week cycle. If using with Rhizoboost or other inoculants, alternate every 2 weeks. Do not apply simultaneously with other inoculants.

DEFENSOR4OZ / 4 ounce / (0.6 lb) N
per bottle..... 3.80

DEFENSEORQT / quart / (2.3 lb) N
per quart 18.50
6+ quarts..... 13.50
12+ quarts..... 11.00

DEFENSEORG / gallon / (9.4 lb) N
per gallon 39.00
5+ gallons 34.00
25+ gallons..... 29.50

DEFENSORDR / 55 gallon / (465 lb) N S
per drum..... 1,580.00

BIOZOME

Mix of primitive Archaea microorganisms that digest petroleum and petrochemicals. Cleans up soils contaminated with petroleum or pesticides including DDT, chlordane, PCB's, and dioxins. The organisms in Biozome also unlock soil nutrients to improve plant growth, reduce transplant shock, and increase disease resistance and crop yield.

1 oz per 30 sq ft OR 1 tsp in planting hole.

BIOZOME2 / 2 pound / (2.6 lb) N
per jar 32.00
5+ jars 22.00

BIOZOME25 / 25 pound / (26 lb) N S
per bag 169.00
3+ bags 152.00

MYCOSTOP

Streptomyces griseoviridis (Actinomycete) biofungicide. Controls or suppresses many root rot and wilt pathogenic fungi, including *Pythium*, *Fusarium*, *Alternaria*, *Phomopsis*, *Rhizoctonia*, *Phytophthora*, and *Botrytis*. Helps boost a plant's immune system against above- ground diseases, such as powdery mildew. Enhances root growth and crop yield. Safe to apply. 100 million CFU/g. Refrigerated shelf life 1 year. Acceptable for hydroponic and small orifice emitters. For seed treatment and other dry uses see Mycostop Mix. OMRI listed.

Mix 1 g in 10.5 qt water for a 0.01% solution and drench 5-26 gal per per 1,000 sq ft.

MYCO2 / 2 gram / (0.1 lb) S
per packet..... 18.90
5+ packets..... 13.40
20+ packets..... 12.40

MYCO5 / 5 gram / (0.1 lb) S
per packet..... 38.00
5+ packets..... 34.50
10+ packets..... 32.50

MYCO25 / 25 gram / (0.1 lb) S
per packet..... 148.00
5+ packets..... 139.50
10+ packets..... 136.00

MYCOSTOP MIX

Streptomyces griseoviridis biofungicide. Best for seed treatment and soil incorporation. Can also use as drench and cutting dip. 1 billion CFU/gram. Refrigerated shelf life 1 year. Will slowly plug 150-200 mesh screens. OMRI listed.

To treat seeds, use 0.4-2.3 g per lb seed OR 2-5 oz per 100 lb seed OR for soil incorporation use 0.85-4 g per cu yd. For drench or cutting dip, mix 1 g in 10.5 qt water for a 0.01% solution and drench 5-26 gal per per 1,000 sq ft.

MYCOMIX / 25 gram / (0.1 lb) S
per packet..... 136.00
5+ packets..... 116.00

ACTINO-IRON

Streptomyces lydicus (Actinomycete) soil amendment with chelated iron and humates. this product protects and mobilizes nutrients, especially iron. Foods that enhance microbe action are: yucca, lignin, kelp, and orange oil.

Use 1 lb to 3 cu ft soil (30 qt) OR place 1-3 tsp in planting hole.

ACTINO1 / pound / (1.1 lb) N
per pound..... 13.50
5+ pounds..... 8.50

ACTINO50 / 50 pound / (51 lb) N S
per bag 124.00

MICRO108

Streptomyces lydicus soil inoculant. Soluble form of Actino-Iron microbe.

6 oz per 100 gal water. Use 1 gal per cu ft soil or 16-6 inch pots.

MICRO108 / 18 ounce / (1.2 lb) N S
per jar 138.00
5+ jars 123.00

ROOTSHIELD WP

Biological fungicide protects plants from pathogenic root fungi including *Rhizoctonia*, *Fusarium*, *Pythium* and *Sclerotinia*. Blocks and attacks pathogens by "eating" them, ensuring good plant growth. Preventive biofungicide - apply to "clean" plants. Promotes a healthy root system and helps you grow healthier, earlier maturing plants. *Trichoderma harzianum* biological fungicide in wettable powder for drench application.

1-2 Tbs per 5 gal water OR 4.5 oz per 100 gal. 100 gals treats 800 sq ft with pots less than 4 inches deep, or 400 sq feet with deeper pots. One lb treats 6,400 6-inch pots.

ROOTSHWP3 / 3 pound / (3.3 lb) N S
per bag 559.00

ROOTSHIELD GRANULES

Apply to seeds, planting mix, cuttings or growing roots before fungal diseases strike. Contains *Trichoderma harzianum* strain T-22, 10^7 CFU/gram. Granular for soil incorporation. EPA registered.

Mix 1-1.5 lb per cu yd soil OR for incorporating in furrows, use 5-10 lb per acre. For infected plants, treat infection first, then apply RootShield.

ROOTSH40 / 40 pound / (41 lb) N S
per bag 315.00

PLANTSHIELD

Similar to RootShield, but formulated for use as a foliar spray or drench. Protects plants from fungal disease including *Botrytis* (grey mold), powdery mildew and downy mildew. Contains *Trichoderma harzianum* strain T-22, 10^7 CFU/gram.

Use 3-5 oz per 100 gal water per acre as a drench. For a foliar spray, mix 0.25-1 oz per gal water and apply every 1-2 weeks.

PLANTSH3 / 3 pound / (3.3 lb) N S
per bag 179.00
6+ bags 169.00

PLANTSH30 / 30 pound / (31 lb) N S
per bag 1,530.00

ROOTMATE

Beneficial fungus helps crowd out pathogenic microorganisms, increases soil's nutrient availability, and reduces plant stress. Helps healthy plants mature faster. *Trichoderma virens* strain G-41 is patented to control *Phytophthora* fungal diseases, and research shows promise controlling *Rhizoctonia*, *Pythium* and other causes of root rot and damping off.

Use 3-5 oz per 100 gal water OR ½ tsp per gal water. Drench root zone. Reapply every 10-12 weeks for best results.

ROOTMATE3 / 3 pound / (3.3 lb) N S
per bag 158.00
6+ bags 148.00

POND KLEEN

Reduce algae, scum, sludge and foul odors in ponds with bacteria that biodegrade waste. Use in fishponds, fountains, water works, retention ponds or tail water ponds. Dilute version for home use (POND2 and POND10) or original 10X industrial formula.

1 lb per 100K gal OR 3 lb per acre-ft. Apply monthly. Use 2-3 times recommended amount for faster results. For small koi ponds and fountains use 1 tsp every 2 weeks.

POND2LB / 2 pound / (2.3 lb) N
per jar 13.00

POND10LB / 10 pound / (11 lb) N
per bag 49.00

POND10X2 / 2 pound / (2.3 lb) N S
per bag 48.00

POND10X25 / 25 pound / (26 lb) N S
per bag 295.00

POND10X50 / 50 pound / (51 lb) N S
per bag 545.00

See also:
Don't forget to feed your microbes! See page 33.
Elaine Ingham's seminar on CD and Compost Tea Manual, page 49.

PROMOT® MZM

Seedling inoculant with *Trichoderma harzianum* and *T. koningii* fungi antagonizes plant root pathogens such as *Pythium*, *Rhizoctonia*, *Fusarium* and *Phytophthora*. Also contains manganese, magnesium and zinc along with enzymes and natural growth factors. May increase growth and root health of existing plants as well as increase flowering and reduce growing time. OMRI listed.

1-2 qt per acre. Water on seeds at planting, apply as a side dress with liquid fertilizer or inject into irrigation water for existing plantings. For transplants, use 1.5 oz per gal for root dip.

PROMOG / gallon / (11 lb) S
per gallon 86.00

PROMO2.5 / 2.5 gallon / (28 lb) S
per jug..... 185.00
2+ jugs..... 179.00

PROMOD / 55 gallon / (465 lb) N S
per drum..... 3,550.00

SOILGARD 12G

Granular microbial fungicide. Naturally occurring soil fungus inhibits damping off and root rot causing fungi such as *Rhizoctonia, Pythium, Fusarium, Sclerotinia* and *Sclerotium.* Contains *Gliocladium virens* strain GL-21, $1x10^6$ CFU/g. OMRI listed.

Mix 1 lb per cu yd soil. Can also be mixed with water to apply as a drench in ratio of up to 1 lb SoilGard to 2 gal water. For root dip use 1-2 lbs per gal water. Best if used as a preventative.

SOILGD / 7.5 pound / (8 lb) S
per bag 98.00
4+ bags 94.00

MEETS STANDARDS FOR ORGANIC

Some product descriptions state "NOP Organic," others "Organic, OMRI listed." The Organic Materials Review Institute (OMRI) reviews products for use in organic production. Producers can also self certify that their products are made from natural ingredients and meet USDA NOP organic standards. For more about NOP, refer to the National Organic Program at www.ams.USDA.gov. OMRI listing is subject to change. For more, see omri.org.

Products with OMRI listing: Actino-Iron, Cease, Cedar Gard, Cyd-X, DE Fossil Shell Flour, Dipel DF, Endomycorrhizae, Endo/Ecto Mycorrhizae, Endo/Ecto Micronized, Entrust, Garlic Barrier, Gnatrol WDG, Micro 108, Mildew Cure, Monterey Garden Insect Spray, Mycostop, Mycostop Mix, Mycotrol O, NuFilm P, Orange Guard, Pest Out, PlantShield, Promot MZM, Rootshield Granules, Rootshield WP, Semaspore, Serenade Max, Sluggo, Soilgard 12G, VectoBac, VectoLex, Yucca Ag-Aide 50

Products that meet NOP Organic standards: balEnce, Biozome, Bug Bits, Defensor, Humic Acid, Insect Food, Microbe Nutrients, neem oil, orange oil, Slug Bait for Slug Saloon and Snailer, Rhizoboost

Mycorrhizal Fungi To Re-Establish the Soil Food Web

Supplementing your soil with mycorrhizal inoculants will promote a healthy root system, help plants survive environmental extremes such as drought, salt, transplant, reduce disease and mobilize nutrients. A healthy plant resists pests and disease.

Mycorrhizal fungi naturally colonize the roots of over 90% of the world's plant species. Most of these plants form associations with endomycorrhizae, which enter the plant's root cells, while some partner with ectomycorrhizae, which grow between and around root cells. Plants secrete sugars to support the mycorrhizae, the fungi then increase the surface area of the roots by thousands of times, giving the plant access to more water and nutrients. Fungi also release chemicals that unlock minerals in the soil and produce antibiotics making it hard for disease to enter the plant.

Overall soil structure improves when there is a healthy population of mycorrhizae, becoming more porous and holding water better. Chemicals commonly used in farming, such as fertilizers, pesticides, and fungicides, as well as intensive cultivation and erosion, can damage the mycorrhizae that normally inhabit soil.

RVI offers endo, and endo-ecto products in dry granular form. These don't mix well with water, but can be suspended in a slurry for a root dip. Our ecto and micronized endo-ecto can be suspended for drip or drench application. The tablets are handy for pots and planting holes.

Endomycorrhizae help all plants that originated in the temperate and suptropic areas including apples, corn, tomatoes, and wheat. Plants not helped are: heath, pine, oak, birch, sedge, rush, orchid, protea, mustard (crucifers), carnation, beet (chenopods), cabbage, eucalyptus.

Ectomycorrhizae help most of the plants not helped by endomycorrhizae, including pine and oaks.

ENDO/ECTO PLUS MYCORRHIZAL INOCULANT

Four species of endomycorrhizae, 5 ectomycorrhizae species, beneficial Trichoderma fungus spores and biostimulants. Contains *Glomus intraradices, G. mosseae, G. aggregatum, G. etunicatum* (endomycorrhizae - 20,000 propagules/lb), *Rhizopogon villosullus, R. luteolus, R. amylopogon, R. fulvigleba, Pisolithus tinctorius, Scleroderma cepa, S. citrinum* (ectomycorrhizae - 110 million propagules/lb), *Trichoderma koningii, T. harzianum* (trichoderma fungus - 150 million CFU/lb), kelp, fulvic acid, humic acid, vitamins, amino acids.

Use 1 Tbs on 1 gal transplants, 1/4-1/2 tsp on small plants and cuttings, dust on seeds, bury 1-2 oz in holes around established plants, mix with organic fertilizer to vertical mulch trees.

MAENEC+# / pound / (1.3 lb) N
per pound..... 32.00
5+ pounds..... 17.60
10+ pounds..... 14.90
20+ pounds 13.50
40+ pounds 12.00
120+ pounds... 10.50

ENDO/ECTO MICRONIZED

Fine powder can pass through # 50 screen, for drench or drip application. Helps most plants. Contains 11 species: *Glomus intraradices, G. mosseae, G. aggregatum, G. etunicatum* (endomycorrhizae - 100,000 propagules/lb), *Rhizopogon villosullus, R. luteolus, R. amylopogon, R. fulvigleba, Pisolithus tinctorius, Scleroderma cepa, S. citrinum* (ectomycorrhizae - 110 million propagules/lb).

Use 10 lb per acre OR 0.25-0.75 lb per cu yd OR 0.25 tsp to 0.5 oz per cutting or transplant.

MAENECMIC / pound / (1.2 lb) N

per pound..... 36.00	10+ pounds..... 19.00
2+ pounds..... 28.00	40+ pounds 17.20
5+ pounds..... 21.00	

ENDOMYCORRHIZAL INOCULANT

4 species of endomycorrhizal fungi (VAM): *Glomus intraradices, G. mosseae, G. aggregatum, G. etunicatum* (60,000 propagules/lb).

Use 2 lb per acre OR 1-2 lb per cu yd OR for restoration work, use 20-60 lb per acre.

MAENDO# / pound / (1.2 lb) N

per pound..... 25.00
5+ pounds..... 16.00
10+ pounds..... 12.00

ECTOMYCORRHIZAL INOCULANT

Ectomycorrhizal fungi: *Pisolithus tinctorius* and 3 *Rhyzopogon* spp. Benefits kinickinick, fir, pine, birch, hemlock, poplar, Douglas fir, larch, spruce, eucalyptus, oak and walnut. 1 billion spores/g.

Use 1 tsp per 5 seedlings, 2 tsp per 5 trees 2-4 ft tall, 4 tsp per 5 trees 4+ ft tall. Mix with water and spray on root balls of transplants or over root zone on established plants. To use as root dip for seedlings, mix 1 tsp per pint water.

MAECTOPOWG / gram / (0.1 lb) N

per gram..... 6.00	100+ grams..... 1.65
5+ grams..... 5.40	1K+ grams..... 1.29
10+ grams..... 3.90	5K+ grams..... 1.26

PLANT SUCCESS TABLETS

Fifteen species of endo- and ectomycorrhizae in easy to use tablets, just drop tab in pot or in hole next to established plant.

Use 1 tab per seed or 2 inch pots, 2 tab for up to 1 gal, 4 tab for 3 gal, 8 tab for 5 gal OR use 10 tablets per inch of stem width.

MAENECTAB / 100 tabs / (.5 lb) N

per bag 25.00
5+ bags 18.00
10+ bags..... 14.00
100+ bags..... 12.00

MAENECTABK / 1,000 tabs / (4 lb) N

per tub 150.00
5+ tubs 131.00
10+ tubs..... 129.00
100+ tubs 125.00

ALIA TSANG
Biocontrol and Marketing Intern

When Alia applied for our post-graduate internship, we signed her up resume unseen despite already having an intern. A keenly intelligent botanist who also plays full contact roller derby and plans to WWOOF, Alia began weeding, now does quality control and editing for our soon to be launched website.

BRIDGET DAUGHTERS
Post-Graduate Intern

This year's post-graduate intern, Bridget Daughters, comes with training in ag entomology and biocontrol in production greenhouses. Since beneficials were the most fascinating thing she studied at Cal Poly SLO, she is now exploring the field of biocontrol through the varied practical learning opportunities that come our way.

FUN FACTS: FUNGUS EATING MITES AND INSECTS

Just below the surface of lively soil, where carbon and nitrogen fuel the biosystem, fungal hyphae grow. Both endo and ectomycorrhizae provide food for microscopic members of the soil foodweb, e.g., collembola, cryptostigmatid and faster growing mites, as well as bacteria feeding nematodes and flagellates.

There are also omnivorous and predaceous nematodes and amebae filling in all trophic levels of the soil foodweb, eating CO_2 and pooping out ammonia and naturally fertilizing nearby plants. As Elaine Ingham explains, these active soils provide fungal food for the insect foodweb that starts at the soil interface and, incidentally, also help reduce the threat of global warming.

Meanwhile above ground, mites and insects are busy on leaf surfaces also consuming fungi and algae. For example, tiny Tydeid mites significantly reduce powdery mildew in grapes. The ashy gray ladybug Psyllobora (see left) feeds mainly on fungi. This 1/16 inch long lady beetle helps control powdery mildew, smut and other diseases.

Psyllobora, Tydeids, and other fungus-eating insects and mites are negatively affected by applications of oil, even stylet oil, sulfur, and of course, chemical fungicides. Alternatively, compost tea, *Bacillus subtilis* and bicarbonate slow down pathogenic fungi while doing no harm to the soil foodweb. *(Above drawing: Psyllobora viginti-maculata* in Insects of Western North America, E. O. Essig, 1926, p. 417.)

Botanical Materials For Biologically-Based IPM

Nature abounds in botanical compounds that kill or repel pests. Nature also has no problem as far as environmental impacts from botanical pesticides--they are harmless to earth, air and water. They do their pest control function and then become food for the microbes on the plant surface and in the soil. Raw materials for pesticides are being pulled off the kitchen shelf and formulated for convenient use for farms and gardens, and do-it-yourself recipes can be found on the internet. We can pretend the storeroom is a spa near where we keep the Phydura. Passing the shelf near the Armorex, coworkers ask if we ordered out Italian.

PEST OUT (FORMERLY GC MITE)

Botanical miticide for control of various mites and insects, including thrips and aphids, on many types of crops such as melon, squash, tomato, grape, cucumber, tree crops and flowers. One application of Pest Out can control mites for 3-4 weeks. Contains oil of cottonseed, clove and garlic. Low risk to humans and animals. Organic, OMRI listed. EPA exempt.

Use 1% solution (1.5 oz per gal) foliar every 7 or more days.

PESTOUT1 / gallon / (11 lb) N
per gallon 69.00

PESTOUT2.5 / 2.5 gallon / (28 lb) N S
per jug..... 129.00

MILDEW CURE (FORMERLY GC3)

Organic fungicide controls powdery mildew on many crops such as melon, squash, tomato, cucumber, grape, tree crops and flowers. Safe, effective, long lasting and offers little chance for disease resistance build-up. Derived from garlic extracts and other essential oils. Low risk to humans and animals. Organic, OMRI listed, EPA exempt.

Mix 1-3 oz per gal. Try 1 oz first, higher concentrations increase chance of burning. Controls powdery mildew for 7-10 days with a 1% foliar spray solution.

GC3 / gallon / (11 lb) N
per gallon 62.00

FUNGASTOP

Broad spectrum antifungal and antibacterial. Citric acid and mint oil inhibit pathogenic fungi and bacteria. Pathogens controlled include *Alternaria, Botrytis, Erwinia, Phytophthora, Pseudomonas, Sclerotinia* and *Xanthomonas.* No Pesticide ID required.

Use 16-32 oz per acre every 7-15 days. For seed treatment, dilute 16 oz in 100-200 gal water and soak seeds 2-24 hours before planting.

FUNSTOPQ / quart / (3 lb) N
per quart 48.00

FUNSTOP1 / gallon / (11 lb) N S
per gallon 118.00

FUNSTOP5 / 5 gallon / (55 lb) N S
per jug..... 545.00

NEEM OIL

100% pure cold-pressed neem seed (*Azadiracta indica)* oil that makes a great plant wash. Contains azadirachtin and other phytochemicals that act as natural insect growth regulators and anti-feedants.

Dilute 1 part oil to 40 parts water with 1% soap or detergent (3 oz per gal water with 1 oz soap or 2 tsp per pint water with 1 tsp soap) for a plant wash. Spray once a week, 2-3 times.

NEEMHP / half pint / (0.8 lb) N
per bottle..... 22.00
5+ bottles..... 16.20

NEEMQ / quart / (3 lb) N
per quart 39.50

NEEMG / gallon / (12 lb) N
per gallon 109.00

HOT PEPPER WAX

Capsaicin-based spray kills insects by raising their body temperature, yet is harmless to plants and warm-blooded animals. Wax component of Hot Pepper Wax suffocates insects. Surviving pests find it hard to feed on the wax covered leaves and the insect repelling scent drives them away from treated plants. Repels chewing and sucking insects including aphid, whitefly, spider mite, thrips, leafhopper and scale, as well as grazing and browsing animals such as rabbits and deer. Contains capsaicin, food-grade wax, kelp, eucalyptus oil, and herb-based insect repellent scents. CA Pesticide Operator # required for commercial agricultural use.

Mix 2-8 oz per gallon water. Spray on plants every 3 weeks.

HPWP / pint / (1.8 lb) / N
per pint 15.50

HPWQ / quart / (3 lb) / N
per quart 21.50

HPWG / gallon / (12 lb) / N
per gallon 60.00

ORANGE GUARD

Orange oil insecticide. Destroys the waxy coating of the insect respiratory system, causing suffocation to a wide range of insects. The citrus fragrance also works to repel insects, especially on absorbent surfaces that can be saturated. Dilute and use as a foliar spray, use full strength as a contact insecticide and as a general insect repellent. Kills and repels insects such as ant, cockroach, flea and silverfish. Safe to use around pets and children. Biodegradable and water soluble. OMRI listed. EPA registered. Contains 5.8% d-limonene.

Use full strength for most applications. For plant spray, dilute 1:4 to 1:6 with water.

ORANGDQ / quart spray bottle / (3 lb) N
per bottle..... 12.50

ORANGDG / gallon / (11 lb) N
per gallon 28.00

SPRAYAT / sprayer for gal jug / (0.2 lb) N
per sprayer..... 5.00

ORANGE OIL

100% cold-pressed, food grade oil extracted from orange peel. Pleasant citrus fragrance for use in plant wash recipes and as a degreaser and gunk remover (for sticky traps). Contains approximately 90% *d*-limonene.

Use 10% concentration on hard surfaces. Dilute 1:40 to 1:60 (2-3 oz per gal) in water with some soap for plant wash. Test to make sure it doesn't burn leaves. For drenching ant hills use 4-6 oz per gal with 2 oz soap.

ORANOILQ / quart / (3 lb) N
per quart 19.80

ORANOILG / gallon / (12 lb) N
per gallon 39.00
5+ gallons 19.50

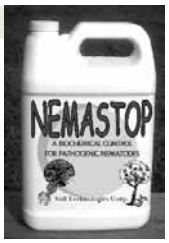
CEDAR GARD

Cedar-based insect controlling and repelling concentrate that significantly reduces caterpillar, mosquito, roach, possibly cucumber beetle, aphid and other pests. Pleasant cedar scent interferes with pest pheromone receptors, driving them away as well as disrupting mating and feeding. Safe for beneficials. Also controls mildew. OMRI listed. Biodegradable.

Spray 2% or lower solution on plants. For a 1.5% solution, use 2 oz per gal water. Dilute 1 qt per acre for field crops OR 1 pt per acre for greenhouse use. For turf, use 1 pt per 500-1,000 sq ft. Can also be used as a drench for ant mounds.

CEDG / gallon / (11 lb) N S
per gallon 83.00
5+ gallons 73.00

NEMASTOP



Plant fatty acid based extract inhibits plant feeding nematodes and prevents secondary fungal infections. Stimulates beneficial predatory nematodes to help control root knot nematodes and other soil-dwelling pests. In trials on okra, Nemastop reduced root knot nematode population to below detectable levels. Also improves a plant's ability to withstand pathogens and environmental stresses. Non-phytotoxic. Environmentally friendly. Derived from *Quercus falcata, Opuntia lindheimeri, Rhus aromatica,* and *Rhizophoria mangle.* Not yet registered in CA.

Use 26 oz per acre for vegetables every 60 days or up to 6 times per year OR 87 oz per acre for turf every 30 days or up to 10 times per year.

NESTOP1 / gallon / (11 lb) N S
per gallon.....165.00

NESTOP5 / 5 gallon / (55 lb) / N S
per jug 689.00

NESTOP15 / 15 gallon / (165 lb) N S
per jug 1,980.00

ARMOREX

Broad spectrum soil treatment controls root knot and other pathogenic nematodes, soil borne fungi such as *Pythium, Rhizoctonia* and *Phytophthora,* soil-dwelling insects such as wireworms, grubs and garden symphylan, and selected weeds, including quackgrass, broomrape, bermudagrass. Contains rosemary oil, garlic, eugenol, white pepper and sesame oil.

Use 11.3 oz per 1000 sq ft OR for turfgrass, 5.6 oz per 1000 sq ft.

ARMOREXQT / quart / (2.4 lb) N
per quart 54.00

ARMOREX5 / 5 gallon / (55 lb) N S
per jug..... 689.00

ARMOREX15 / 15 gallon / (150 lb) N S
per jug..... 1,980.00

NU FILM 17 & NU FILM P

Sticker, extender, spreader and UV-shield. Natural polymer from pine resin that cross links in sunlight, forms a net that holds microbes and botanicals on leaf surface. Nu Film P is an excellent sticker. Nu Film 17 extends longer. Nu Film P is OMRI listed. CA Pesticide Operator # required for commercial agricultural use.

Nu Film 17: Use 1 pt per acre with soft pesticides, microbials, or other foliar sprays. Do not apply within 30 days of harvest.
Nu Film P: Use 4-6 oz per acre with soft pesticides, microbials, other foliar sprays.

NUFILM17 / gallon / (11 lb) N S
per gallon 58.50
4+ gallons 50.80

NUFILMP / gallon / (11 lb) N S
per gallon 53.30
4+ gallons 45.60

MOSQUITO BARRIER & GARLIC BARRIER

Garlic Barrier is a very strong liquid garlic extract (from super potent garlic) that can be sprayed on farm and garden plants to keep insects off. Mosquito Barrier is labeled to repel mosquitoes from your home, making it more comfortable and reducing risk from mosquito-borne diseases. They both repel tick, flea, gnat, fire ant and black fly. The huge list of insects that it works on is available on our website. Garlic repels birds from ripening fruit. It imparts no garlic taste on any crops or plants that are sprayed. The odor of garlic disappears in about 30 minutes. Garlic Barrier comes in 2 strengths: 1X (quart size) and 10X (gallon sizes). Mosquito Barrier just comes in 10X strength. OMRI listed.

Mosquito 10X: 4 oz per gal on 3,000 sq ft every 3 weeks.
Garlic 10X: 1 gal per 100 gal on 10 – 12 acre every 2 weeks as needed.
Garlic 1X: mix 1:10 (3 oz per qt water).

MOSBARQ / quart/ (3 lb) N
per quart 22.50

MOSBARG / gallon / (11 lb) N
per gallon 85.00

MOSBARCS / 4 gallon case / (49 lb) N S
per case..... 268.00

GARBARQ / quart/ (3 lb) N
per quart 13.50

GARBARG / gallon / (11 lb) N
per gallon 85.00

GARBARCS / 4 gallon case / (49 lb) N S
per case..... 268.00

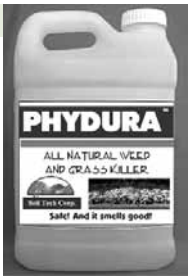
HOT SAUCE ANIMAL REPELLENT

Hot pepper extract (2.5% capsaicin) repels insects, deer, elk, rabbit, meadow vole, pine vole and squirrel.

6-8 oz per 100 gal water OR 1 Tbs per 6 gal. Can mix with NuFilm to keep on plant longer.

HOTS / half gallon / (6 lb) N S
per bottle..... 129.00

PHYDURA



Natural contact herbicide containing clove oil, vinegar and soybean oil. Broad spectrum herbicide, targets a wide variety of grass and broadleaf weeds including crabgrass, mustard, dandelion, castor bean, poison ivy, algae and moss. Kills weeds in less than 24 hours. Safe to use around trees, shrubs, and bodies of water. Pleasant odor dissipates rapidly after application.

Dilute 1 gal with 2-3 gal water. Spray on weeds to cover, during brightest part of day. On cloudy days, use stronger dilution (2:1).

PHYDURAQ / quart / (2.4 lb) N
per quart 25.00

PHYDURAG / gallon / (12 lb) N
per gallon 64.00

PHYDURA2.5 / 2.5 gallon /(28 lb) N S
per jug..... 119.00

Pathogens & Antagonists

NOSEMA

Bran bait with *Nosema locustae* grasshopper pathogen. Spores kill younger grasshoppers and cripple older ones. Works best on 3rd instar nymph (0.5 inch size). The disease is passed on when infected females lay eggs and when healthy grasshoppers cannibalize dead or sick grasshoppers. *Nosema locustae* is a protozoan parasite and is host specific to grasshoppers. Will not harm beneficial insects, humans, pets, or wildlife.

1 lb per acre OR 12 flakes per sq ft.

NOSEMA1 / pound / (1.2 lb) N
per pound..... 27.00

NOSEMA5 / 5 pound / (5.2 lb) N S
per bag 59.00
5+ bags 43.00

NOSEMA50 / 50 pound / (51 lb) S
per bag 140.00
2+ bags 130.00

MYCOTROL O

Beauveria bassiana spores in liquid. Fungal insect pathogen controls whitefly, aphid, thrips, plant bug, psyllid, mealybug, scarab beetle, weevil, grasshopper and borer. Controls even pesticide resistant pests. Safe for many beneficials. Organic, OMRI listed.

Use ½ to 2 qt per 100 gal every 3-7 days.

MYCTROQT / quart / (3 lb) N
per quart 72.00

MYCTRO1 / gallon / (11 lb) S
per gallon 210.00
4+ gallons 195.00

BOTANIGARD 22WP

Beauveria bassiana spores in dry granules. Same pathogen as Mycotrol O. Targets many soft-bodied sucking insects.

Use ½ to 2 lb per 100 gal.

BOTGD1 / pound / (1.2 lb) N
per pound..... 88.00

DIATOMACEOUS EARTH (DE)

Perma-Guard food grade (low risk for inhalation) is the fossilized remains of microscopic shells created by one-celled plants called diatoms. Mother Nature's eco-friendly naturally organic material.

Check online for recipes and all the different ways to use diatomaceous earth!

DIATOM.5 / 0.5 pound / (0.7 lb) N
per can..... 5.00

MOSQUITO DUNKS

Floating donut-shaped dunks with *Bacillus thuringiensis* israelensis (Bti) mosquito and fly pathogen. Controls mosquito larvae.

1 dunk per 100 sq ft of water surface per month.

DUNKS6 / 6 donuts / (0.3 lb) N
per pack 23.00

DUNKS20 / 20 donuts / (0.9 lb) N
per pack 35.00
5 packs..... 30.00
50 packs 23.00

VECTOBAC 12AS or G & VECTOLEX CG

VectoBac with *Bacillus thuringiensis* israelensis (Bti) and VectoLex with *Bacillus sphaericus* (Bs) are biological larvicides for mosquitoes, black flies and other pests in soil and water. All species of Culex are susceptible to Bs. Vulnerability of other species varies. Ground or aerial application of liquid or granules possible. Vectobac AS is liquid and Vectobac G is granular. Vectolex is coarse granular. CA Pesticide Operator # required for commercial agricultural use.

VectoBac (Bti): 0.5 to 25 mg per qt liquid OR 2.5 to 10 lbs granular as needed for fast-acting (not extended) control.
VectoLex (Bs): One application of 5 to 20 lbs per acre offers extended control.

VECTOBAC12AS / 5 gallon / (54 LB) N S
per container.....69.00

VECTOBACG / 50 pound / (51 lb) N S
per bag 159.00

VECTOLEX / 50 pound / (51 lb) N S
per bag 349.00

GNATROL WDG

Bti biological larvicide. New wettable granule formulation. Control fungus gnat larvae with ease and accuracy of application on ornamentals, all bulb crops, bedding plants and vegetable sets. Attacks larval stage of fungus gnats, which feed on plant roots. Organic, OMRI listed. CA Pesticide Operator # required for commercial agricultural use.

Use 3.2 to 6.4 oz per 100 gal (¼ tsp per gal) water for light infestation or 13 to 26 oz per 100 gal (1/2 tsp per gal) water for heavy infestation. Apply to soil as spray or drench.

GNATWDG / 16 pound / (17 lb) N S
per pail..... 375.00
3+ pail 356.00

CYD-X

Cydia pomonella granulovirus (CpGV), codling moth pathogen. Host specific to codling moth. Larvae ingest virus and stop feeding, then die within 3-7 days. Organic, OMRI listed.

Use 1-6 oz per acre.

CYDX / quart / (3 lb) N S
per quart 368.00

DIPEL DF

Bt kurstaki caterpillar pathogen. Targets moth larvae, including caterpillar, leafroller, webworm, armyworm and looper. Larvae stop feeding within the hour and die within 3 days. Organic, OMRI listed. CA Pesticide Operator # required for commercial agricultural use.

Use ½ - 2 lb per acre OR 1-4 tsp per gal OR ½-2 lb per 100 gal.

DIPELDF / pound / (1.2 lb) N
per bag 28.00

DIPELDF5 / 5 pound / (5.2 lb) S
per bag 95.00
3+ bags 81.50

ENTRUST

80% spinosad, fermentation product from *Saccharopolyspora spinosa* soil bacteria. For leaf-feeding insects such as caterpillar, leaf-feeding beetle, asparagus beetle, armyworm, leafminer, thrips, borer, psyllid, sawfly, fly, wasp, and ant. Works on contact, most effective when ingested. Not effective for sucking insects or mites. Low toxicity to mammals and birds. Organic, OMRI listed. CA Pesticide Operator # required for commercial agricultural use.

Use 0.5 to 3 oz per acre.

ENTRUST / pound / (1.2 lb) N
per pound..... 579.00
5+ pounds..... 563.00

MONTEREY GARDEN INSECT SPRAY

0.5% spinosad spray. For caterpillar, leaf-feeding beetle, leafminer, thrips, fly, wasp, psyllid, and more. Organic, OMRI listed.

Use 2 oz per gal. Mix with neem oil for citrus leaf miner.

INSECTSPR / pint / (1.8 lb) N
per pint 16.50
6+ pints 15.00

INSECTSPRQ / quart / (3 lb) N
per quart 39.00
6+ quarts..... 25.00

INSECTPRG / gallon / (11 lb) N S
per gallon 91.00
4+ gallons 71.50
12+ gallons..... 67.50

SERENADE MAX

Broad spectrum preventive for many fungal and bacterial plant diseases including fire blight, powdery mildew, gray mold, downy mildew, blights, scabs and leaf spots. Contains *Bacillus subtilis* strain QST 713, 5 X 10^9 CFU/g. CA Pesticide Operator # required for commercial agricultural use.

Use 4-10 lb per acre, every 7 - 10 days.

SEREMAX / 12 pound / (12.6 lb) N

per bag 185.00
4+ bags 174.00

CEASE

Bacillus subtilis biofungicide formulated for use on seedlings, ornamentals, trees, shrubs and greenhouse vegetables. Contains *Bacillus subtilis* strain QST 713, 1 X 10^9 CFU/g.

Dilute 1:50 to 1:100 for soil drench. For foliar use, spray 2-8 qt in 100 gal water per acre. Can also be used as a post harvest dip for cut flowers.

CEASE / gallon / (11 lb) N

per gallon 83.00

CEASECS / 4 gallon per case / (44 lb) S

per case..... 240.00
3+ cases..... 222.00

TO GROWER CUSTOMERS IN CALIFORNIA

Some product descriptions state: "CA Pesticide Operartor # required for commercial agricultural use". CalEPA requires these only be sold to growers with a Restricted Use Permit from their County Ag Commissioner. CA homeowners don't need a permit to use these products at home: Dipel DF, Entrust, Gnatrol WDG, Hot Pepper Wax, Nu Film 17, Nu Film P, Serenade Max, Sluggo, Vectobac, Vectolex.

Fly Control

Successful Three-Pronged Fly Control Strategy

Start regular releases of parasitic wasps when flies appear in spring so colonies can reproduce and build up on the first generations of flies. Regular fly parasite releases during the warm months combined with trapping of adult flies and minimizing fly breeding habitat constitute an effective, economical fly control program. Good, early fly control is easier than attacking a population that has grown out of control. Durable release stations now available to protect fly parasites (see page 44). *(Right photos from top to bottom: Top: releasing fly parasites by placing a pinch in the release station. Middle: The Sagebrush S3 bucket trap is our most popular for commercial facilities. Bottom: Daily removal to manure pits where parasites are released.)*

1) Regular Fly Parasite Releases

Minute parasitic wasps inside the resting stage of flies (1 – 10 per pupa). Minimum 75% parasitism and no live flies. Approximately 50% wood shavings by volume. Fly parasite mixture contains *Muscidifurax zaraptor, M. raptorellus* and *Spalangia cameroni*, wasps that lay eggs in fly pupae.

Few fly parasites survive the winter, so parasite releases are made early each spring at the first sign of emerging or immigrating adults to decrease fly breeding. Use plastic mesh release stations to protect fly parasites while they emerge. In areas with long fly seasons continue releases through warm weather. Releases end with the first hard frost.

Two other beneficial insects can be released, especially in poultry and hog operations: Hister Beetles (*Carcinops pumilio*) that eat fly eggs, and Ophyra or dump fly (*Hydrotaea aenescens*) that lives in manure sludge and preys on house fly larvae.

2) Trapping Adult Flies

Rincon-Vitova sells a variety of fly traps. Place traps in areas where the temperature is close to 70° F in shade when weather is hot, in sun when cold. Set up at least one baited trap inside each barn or shady area where you see high numbers of adult flies. Replace bait frequently and use sticky traps in barns and sheds. In humid areas and in wet manure accumulations, especially where manure is washed into pits, use parasites and toxic bait for good fly management (see new balEnce natural fungal pesticide bait on page 45). Fly parasites do not attack many biting flies. Biting flies can be caught on sticky traps (page 46) and traps that visually simulate the side of a cow and physically trap the fly (see NZI trap, page 47).

3) Control of Fly Breeding Sites

Good sanitation practices eliminate conditions favorable to fly breeding and limit fly problems. Frequent manure removal reduces the breeding sites. Keep areas around watering and feed troughs clean and dry. See our Fly Control Bulletin on our website.

Evaluating Parasite Effectiveness

MONITOR NUMBER OF ADULT FLIES

A reduction in the number of adult flies is the best measure of success. Baited jug traps and index cards offer two standardized methods. See our website for more information about monitoring techniques.

Beneficials for Fly Control

FLY PARASITES

Rincon-Vitova Insectaries produces a quality mixture of species of parasitic wasps developing inside fly pupae. These tiny wasps use biological radar to seek out maggots transforming into pupae, but don't bother people or animals. They are shipped in breathable paper bags with wood shavings to cushion them in transit and absorb moisture.

Mix of *Muscidifurax raptorellus, M. zaraptor* and *Spalangia cameroni* parasitic wasps. Targets filth breeding flies (housefly, stable fly, lesser housefly).

FP5 / 5,000 pupae / (0.03 lb) P	
per bag	12.00
5+ bags	9.40
10+ bags	8.40
FP10 / 10,000 pupae / (0.04 lb) P	
per bag	16.50
5+ bags	12.90
10+ bags	10.60
20+ bags	10.20
40+ bags	9.80

FP20 / 20,000 pupae / (0.5 lb) P	
per bag	30.00
5+ bags	24.20
10+ bags	19.00
20+ bags	18.00
FP50 / 50,000 pupae / (1.0 lb) P	
per bag	52.80
5+ bags	46.00
10+ bags	43.00
20+ bags	41.10
40+ bags	40.60

FLY PARASITE SCHEDULES

Arrange for shipments every 1, 2, 3 or more weeks through the fly season. Feel free to adjust number of units and shipping dates as needed.

Discounts for prearranged schedules: 1% for each additional shipment, up to 12 shipments.

JOEL GROSSMAN
Director of News and Publications

A UC Berkeley Master in Biocontrol under Robert van den Bosch, Joel worked for Deke in the 1970's and again in the 1990's. With Deke, he co-wrote the NaturFarm report. He writes ESA Highlights for IPM Practitioner and is now blogging about more entomological and biocontrol research news at biocontrolbeat.com.

STEVE CHAPMAN
Fly Control Sales

Steve could be in the Guinness Book for how long he's made a living selling biological fly control. He learned in the '70's in a business modeled after ours, and soon found a home with us. Steve has taught hundreds how to make fly parasites work, especially around race horses and cattle.

ESTIMATING NUMBER OF FLY PARASITES TO ORDER

An FP10 unit contains a minimum of 10,000 fly pupae from which a minimum 20,000 adult parasites will emerge. Factors affecting recommended release rate: numbers of flies, amount and wetness of manure or other organic matter for fly breeding, temperature, humidity, naturally-occurring beneficial controls, incoming migrations and use of bait traps. A baseline rule of thumb is to use 500 to 1,000 parasites per large animal per month and two parasites per small animal per month. Double or triple up when fly problems are severe and cut back when the parasites are well-established and weather is cooler and drier.

Minimum maintenance release rates and schedules for typical fly season programs (1 unit = 1 FP10):

Area	Rate	Frequency	Amount Suggested
Stables	100 parasites/horse	every 2-4 weeks	1-4 unit/mo for up to 30 horses
Feedlots	250 parasites/head	every 1-2 weeks	7-10 units/wk for 1,000 head
Dairies	200 parasites/cow, 1,000/calf	weekly	5-7 units/wk for 100 cows
Poultry breeders	6 parasites/bird	weekly	5 units/wk for 10,000 breeders
Poultry layers	4 parasites/bird	weekly	1 unit/wk for 10,000 layers
Compost	500-1,500 parasites/cu yd	monthly	5-15 units/mo for 100 cu yd

FLY PARASITE RELEASE STATION

Polypropylene plastic mesh cylinder. Safely holds fly parasites for slow release. Protects from predators, birds, and being trampled under foot for the 2-3 weeks parasites are emerging. Helps you get the most from your fly parasites. Comes with wire bail for hanging and includes a plastic tie for strapping onto a post. Holds approximately 1 quart.

Place around fly breeding sites (near fly maggots) every 100 ft or so (5-10 per acre). Place a pinch of fly parasites into each cylinder from each periodic shipment. When full, empty and start over.

FPRS / set of 5 / (2.0 lb) P

per set..... 18.00
5+ sets..... 11.75
10+ sets 9.50

HISTER BEETLE

Carcinops pumilio, small black adult beetle. Targets fly eggs and small fly larvae. Establishes in manure pits in poultry houses. *C. pumilio* is the most common hister beetle found in northeastern poultry. Adult and immature hister beetles live in surface layers of manure and forage for fly and mite prey. Hister larvae are also predaceous and highly aggressive. Since hister beetles attack the early fly stages, your biological control program should also include fly parasites to attack the flies that make it to the pupal stage.

10,000 per pit to colonize

HISTER1 / 10,000 beetles / (1 lb) P S

per unit 675.00

HISTER HOUSE

Hister beetle traps. Set on manure piles to collect beetles from manure accumulations prior to clean-out. Store the beetles until a new manure pile has started to accumulate. Beetles will not be harmed by two weeks of storage at 50° F. Mortality will be obvious at 10 weeks. Can trap 200 to 600 or more beetles per trap.

100–300 per manure pit (yields 20,000 to 180,000 or more beetles for transfer).

HISTERH / 100 traps / (20 lb) N S

per set..... 189.00
5+ sets..... 179.00

OPHYRA DUMP FLY

Hydrotaea aenescens predatory fly pupae. Targets fly larvae in wet manure away from light (houseflies, etc). Adult flies don't bother animals. Ophyra prefers very moist manure away from the light. Larvae are predators and will kill the larvae of many other fly species. Ophyra has been used successfully in poultry and swine houses. The larvae seem to prefer manures that are comparatively low in fibrous materials, and do not develop well in manures from cattle, horses, sheep, or goats. Black dump fly adults seem to prefer dark locations and stay close to the ground. In swine houses and high-rise poultry houses, adult black dump flies tend to stay in the manure pits.

10,000 pupae per 1,000 sq ft manure.

OPHYRA / 10,000 pupae /(2.3 lb) P S

per tub 43.00
5+ tubs 23.00

NEMATODES

Steinernema feltiae beneficial parasitic nematode. Targets filth breeding flies in maggot and pupal stage. Needs moisture and media temp over 55° F.

See Nematode section page 11.

Fly Traps and Lures

Fly populations grow fast. Reducing the number of adult flies by trapping with fly lures is critical to slowing down fly reproduction. Reducing adult fly numbers allows the fly parasites to keep pace with the number of fly pupae they find. Trapping also helps deal with flies migrating from neighboring areas.

FINAL FLIGHT FLY TRAP

For houseflies and other filth breeding flies - our most popular trap. Reusable wide mouth plastic quart jar with durable, screw-on top. Comes with a lure packet and holds 5,000 dead flies. The jar and top are easy to empty and clean (every 1-2 weeks). Fly traps like this with smelly bait are best placed outdoors in an area with good light, not too windy, at a height of 2-5 feet off the ground where the powerful attractant and odor attracts flies. Made by Troy Bio-Sciences.

FTRAP-FF / trap and 1 lure / (0.7 lb) N

per unit 8.95
12+ units..... 7.95

FINAL FLIGHT FLY LURE

For houseflies and other filth breeding flies. Lure packets contain strong smelling sex attractants and feeding stimulants that draw both male and female flies into the trap. Designed for use in quart sized traps such as Final Flight Fly Traps by Troy Biosciences.

Use 1 packet for each quart-sized trap. Add water and agitate. Replace every 1-2 weeks.

FTLUR3-FF / 3 lures / (0.2 lb) N
per pack 8.35
6+ packs 7.95
12+ packs..... 5.95

SAGEBRUSH H1 AND S3 TRAPS

Metal outdoor "solar-powered," screen cone design. Bait recipes included. Catches flies or yellow jackets (depending on bait). Fly bait: molasses 1:3 with water or use fly attractants. Yellow jacket bait: meat scraps. *(Top Photo: S3, Bottom: H1)*

FTH1 / hanging trap, 6" dia, 10" h / (2.2 lb) N
per trap..... 42.21
4+ traps..... 26.80

FTS3 / standing trap, 12.75" dia 10" h / (8.4 lb) N S
per trap..... 46.60
4+ traps 31.40
8+ traps..... 28.20

SAGEBRUSH JUMBO

Industrial Size: fits over 55 gallon drum. Catches 4 million flies. For large facilities (dairies, food processors, packing houses).

FTS5 / drum trap, 24" dia 16" h / (47.5 lb) N S
per trap..... 142.00
4+ traps..... 125.00

SAGEBRUSH EXCLUSION

With exclusion screen. Fits over 5-gallon bucket of bait. Screen keeps flies out of bait preventing maggots in the bait.

FTE2 / standing trap, 13" dia 13" h / (12.1 lb) N S
per trap..... 52.00
4+ traps..... 36.40
8+ traps..... 33.15

FARNAM FLY ATTRACTANT

Another good fly lure with strong-smelling sex attractants and feeding stimulants. It can be used in any fly trap including Sagebrush metal fly traps and homemade traps. Potent and fast acting, just add water.

FLYATT / 4 oz / (0.3 lb) N
per bottle..... 12.00

JUMBO BAG FLY TRAP

Traps house, false stable, blow, blue bottle, green bottle, flesh, face flies, etc. Use where you need fast, short-term control. Not our first choice because they are disposable and not biodegradable, but useful for fast, short-term, high-capacity control in bad situations when frequent trap cleaning and bait mixing are impractical. Holds over 40K flies.

Add water and hang. Disposable – no touching the bait or flies. Super-charged lure lasts up to 6 months.

FTJB / 1 trap / (0.3 lb) N
per trap..... 8.75
10+ traps 6.45

FTJB45 / 45 traps / (14.0 lb) N S
per box..... 172.00

RESCUE YELLOW JACKET TRAP

Lures wasps into trap where they dry up. Lasts several seasons. Reusable. Proven cone design with pheromone bait that attracts over a dozen species of biting wasps. Start early in spring to catch young queens. Replacement lures also available.

YJTR / 1 trap / (8.2 lb) N
per trap..... 18.90
6+ traps..... 14.80
12+ traps 12.60

YJTA / 10 lures / (0.1 lb) N
per pack 18.60
10+ packs..... 12.50

BALENCE™ FLY SPRAY

Suspension of the spores (conidia) of *Beauveria bassiana*, an insect-eating fungus. Fog around animal rearing areas and spray into chicken house manure pits. Compatible with fly parasites. Safe for humans, animals and beneficial insects. Acceptable in an organic program and approved by US EPA. Economical.

15 oz bottle treats up to 50,000 sq ft.

BALENCE / 15 ounce / (1.0 lb) N
per bottle..... 98.00
10+ bottles 92.00

BALENCE™ BIOLOGICAL FLY BAIT

A new fly scatter bait that utilizes *Beauveria bassiana* — a natural fly pathogen. Use in a balEnce™ bait station or on trays hung where flies are congregating. Flies are attracted to the smell and taste of balEnce™ and pick up the fungus conidia (spores) while feeding on the bait. Once the conidia contact the fly, they germinate, grow in the fly and kill it. Use in combination with other biocontrol strategies to get excellent fly control. Will not harm beneficial insects, including beetles, mites or parasitoid wasps.

Install one balEnce™ station for every 200-250 square feet of fly breeding area. Refill twice a week for normal fly levels and more frequently for high fly infestation. Fly levels decrease over 2-4 weeks.

BALBAIT7 / 7 pound / (8 lb) N S
per pail..... 82.75

BALBAIT40 / 40 pound / (41 lb) N S
per pail..... 325.00

BALENCE™ BIOLOGICAL FLY BAIT STATION

Install one balEnce™ station for every 200 -250 square feet of fly breeding area. These stations are completely recyclable.

BALBAITSTN / 1 station / (0.5 lb) N S
per station..... 15.00
10+ stations 10.00

NO-GAG ME FLY LURE

Effective bait made of food grade materials. Mix with water in a bait tray or jug-style trap to attract flies, but not repel people. Mild odor until fermentation occurs (2 weeks).

Clean and refill traps every 10-14 days.

FLYLURE3-NO / 3 lures / (0.2 lb) N
per bag 7.95

FLYLURE10-NO / 10 lures / (0.7 lb) N
per bag 28.95
4+ bags 19.95

AEROXON FLY CATCHER

Sticky fly paper strip that hangs from ceiling like grandma used. Vertical hanging fly trap. No insecticides, odorless, non-toxic, compostable. Uses special glue to attract and trap flies. Proven, eco-friendly way of controlling flies in homes, farms, stables, restaurants.

FLYTAPE /1 strip / (0.1 lb) N
per strip 1.00

FLYTAPE100 / 100 strips / (2 lb) N
per box..... 50.00

AEROXON BARN AND STABLE FLY CATCHER

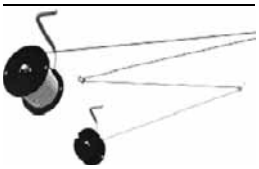
Large, horizontal hanging paper fly trap with high contrast stripes to attract flies – flies like edges. No insecticides, odorless. Ideal for barns, stables, kennels. Large 9.3 sq ft trapping area traps 10,000 flies. Contains 2 Barn & Stable Fly Catcher strips (8" x 14') plus hanging rope.

FLYCATCHB / 2 pack / (0.7 lb) N
per pack 15.50

STICKY FLY RIBBON

White web 1000 ft x 1/8 inch. Traps up to 40,000 flies. For house fly, stable fly, lesser house fly, horse fly, deer fly, other biting flies. Dispenser also available.

Stretch under ceiling in barns and animal sheds. Flies rest on the ribbon and are trapped.



STRIBBON / 1 ribbon / (0.7 lb) N S
per ribbon..... 42.00
5+ ribbons..... 30.00
10+ ribbons 27.50

STDISP-RIB / dispenser / (2 lb) N S
per dispenser... 41.50
5+ dispensers.. 30.00

Handling charge $5.00

FACE FLY AND BITING FLY TRAP

Alsynite (fiberglass) cylinder (12 inch high X 8 inch diameter) on a stake, covered with a disposable sticky white (for face flies) or clear (for biting flies) sleeve. Face flies think it is a face to attack. Also attracts other biting flies such as stable flies. Available in white (STFF) or clear (STBF).

Fasten to a fence post at a 45° angle.

STFF / 1 trap / (2.5 lb) N
per trap..... 24.00
5+ traps..... 18.60

STBF / 1 trap / (2.5 lb) N
per trap..... 25.30
5+ traps..... 20.00

FACE/BITING FLY TRAP REPLACEMENT STICKY SLEEVES

Sticky sleeves 12 X 28 inch, clear for biting fly, white for face fly. Available in white or clear.

STRS10-W or STRS10-C / 10 sleeves /(0.2 lb) N
per box..... 26.00
5+ boxes..... 21.00

NZI BITING FLY TRAP

Nzi is a simple, safe cloth trap for capturing biting flies (horse flies, deer flies, stable flies). Superior design for trapping larger numbers and more types of biting flies. Flies are attracted to the color and shape of the trap. 6 ft wide, 4 ft tall. 3 poles required (not included). Use 1 per 20 acre pasture.

PTNZI / each / (10 lb) N

per trap..... 145.00

Houseflies

AS POLLINATORS

Pollination is now a limiting factor for fruit and vegetable production in some areas. We supply for cage and enclosed pollination. The flies are left in the cages where they pollinate flowers then die in a few days – there is no chance for them to carry pollen to other plants.

AS FOOD FOR REPTILES AND AMPHIBIANS

We can ship flies ready to emerge from pupae. A small amount of fly pupae can yield live flies for several days for lizards, birds, and other pet or zoo animals.

FLY ADULTS

Musca domestica., common housefly. Units of 1,000 and 5,000.

FLYADULT / 1,000 flies / (3.4 lb) P S

per bag 33.00

5+ bags 10.00

FLYADULT5 / 5,000 flies / (3.4 lb) P S

per bag 45.00

5+ bags 32.00

FLY LARVAE

Musca domestica maggots. Units of 5,000, 30,000, or 120,000. Ask about discounts.

FLYMAG5 / 5,000 larvae / (0.3 lb) P S

per tub 24.00

FLY PUPAE

Musca domestica pupae for pollination. We train animal handlers to manage pupae to produce flies for movie and TV filming.

FLYPUP5 / 5,000 pupae / (0.8 lb) P S

per bag 19.00

3+ bags 14.50

FLYPUP10 / 10,000 pupae / (0.8 lb) P S

per bag 37.50

3+ bags 19.60

INQUIRE ABOUT PRICE BREAKS FOR REGULARLY SCHEDULED SHIPMENTS.

Bumblebees

Bumblebees can be used to pollinate a wide variety of fruit, vegetable and seed crops. We offer *Bombus impatiens* in a variety of hive sizes for use east of the Rocky Mountains. Call for details to set up a program.

BUMBLEBEE FIELD NEST BOX

Sturdy 2 chamber plywood box 15 X 8 X 6.5 inch with upholstery cotton nesting material, for cavity or ground nesting bumblebees. Comes with ¾ X 8 inch PVC pipe - place soil over pipe to simulate mouse hole. Place nest box in field to house bumblebees, does not come with bees. Made of recycled plywood. Plans available.

BEENEST / each / (7 lb) N S

each 28.00

Mantids

MANTID EGG CASES

Praying mantis, general insect predator. Specify the larger Chinese mantid (*Tenodera aridifolia sinensis* - MANTSINE) or the smaller European mantid (*Mantis religiosa* - MANTEURO). Egg case with 50-250 eggs. Only avail Feb-June. Targets a variety of insects, including beneficial insects. Also great for hobby and educational use.

3 egg cases per 5,000 sq ft OR 1-100 cases per acre. Tie on bush above ground and hatch at 70-90° F, 40-95% RH.

MANTSINE or MANTEURO / egg case / (0.1 lb) P

per case..... 3.95

20+ cases 3.40

50+ cases 2.80

Flea Control

After a blood meal, adult fleas drop to the ground to lay eggs. To treat immature stages in lawn or soil, use Sc nematodes. Indoors, powders containing boric acid or diatomaceous earth can be sprinkled on carpets to kill the nymph stage. On dogs and cats, shampoo with Bug Arrest and/or neem oil into wet fur to remove adults. Flea treatments are vital every two weeks to break the flea life-cycle. Ask about our Flea Traps to trap fleas indoors.

BUG ARREST

Mixture of natural digestive enzymes and botanical soap. Disables insects and mites on pets, plants, and around the home by destroying their exoskeleton. Controls lice, flea, ear mite, skin mite and mange on animals; dust mite, ant, roach and fly around the home.

Spray on animal, massage in, brush, rinse. For insects on plants mix 1 oz per 16 oz water.

ARREST / quart / (2.3 lb) N
per quart 18.00

ARRESTG / gallon / (9 lb) N
per gallon 49.95

BRYCE YUKIO ADOLPHSON

Visual Journalism Student

Bryce and Jan met through the Baha'i Faith. She welcomed him to photograph the farm for class assignments, and apply his design, media and teamwork skills to present bugfarmers in action. Raised on a raisin farm, he's at ease with our customers. Bryce also does volunteer web design, visual reports and fieldwork for the Mama Hope project in Africa (mamahope.blogspot.com).

Cockroach Control

For institutions, parasites are available that attack the egg stage of a number of cockroaches (but not the German roach). These are released periodically to keep the roaches suppressed. For use with parasites, borate based baits work well combined with sticky traps or baited jar traps. For a full IPM program see the video of the 2001 workshop.

ANASTATUS COCKROACH PARASITE

Anastatus tenuipes parasitic wasp. Targets brownbanded cockroach. Sold as part of a program with PNE, Inc., call for details.

ANAS / 100 wasps / (0.5 lb) S
per unit 34.00
5+ units 18.00
10+ units..... 13.00

APROSTOCETUS COCKROACH PARASITE

Aprostocetus hagenowii parasitic wasp. Targets a variety of cockroaches: American, smokybrown, Australian, brown, Oriental, harlequin, Florida, Turkestan, *E. biolleyi.* Sold as part of a program in cooperation with PNE, Inc.

APROS / 1,000 wasps / (0.5 lb) S
per unit 87.00
5+ units 75.00
10+ units..... 72.00

COMPERIA COCKROACH PARASITE

Comperia merceti parasitic wasp. Targets brownbanded cockroach. Sold as part of a program in cooperation with PNE, Inc.

Prices variable, please call for details.

COCKROACH BIOCONTROL WORKSHOP VIDEO & MANUAL – SEE PAGE 49

AGRISENSE LO-LINE TRAP

Paperboard trap with sticky area and feeding attractant pellet. Folds to tent. Economical - $1.06/trap. Use to monitor and remove cockroaches, silverfish, and other bugs. Can hold 90 American or 200 German roaches.

LOLINE10 / 10 traps / (0.8 lb) S
per pack 15.40

LOLINE / 200 traps / (16 lb) S
per case..... 212.00

See also:
Boric Acid, page 4.
Niban, page 4.
Diatomaceous Earth, page 37.

BENEFICIAL INSECT PHOTOS
Captioned and laminated 8 X 10" color photos. Some show multiple life stages. Request or download order list of over 40 selections.

PHOTO / 1 photo / (0.1 lb) N

per photo..... 12.50

RINCON-VITOVA – APPLIED BIO-NOMICS SLIDE SET
Call for information.

WORLD'S BEST BUG VIEWER


2X+2X magnification. 6 oz clear plastic cup with two lenses and screw on lid. One flips over the other for total 4X magnification. A great hit with children from 3 to 8 years old – fun for adults, too!

BV1 / each / (1.2 lb) N

each 4.95
10+..... 4.60
20+..... 3.75
50+..... 3.10

CD's, Tapes and Harder to Find Books

RVI ON CD-ROM
All our bulletins and more.

CDRVI / each / (0.1 lb) N

each 5.00

APPLIED BIO-NOMICS BIOLOGICAL TECHNICAL MANUAL
The manual we use contains information on using more than 25 beneficials, primarily focusing on control of two-spotted spider mite, whitefly, western flower thrips, fungus gnat, aphids, and scale in greenhouses and interiorscapes.

ABNMAN / each / (2.5 lb) N

each 26.00

COMPOST TEA MANUAL


By Dr. Elaine Ingham. For large and small scale compost tea brewing. Recipes for brews with different bacteria to fungi ratios.

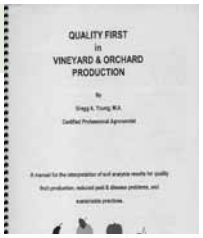
COMPMAN / each / (1.5 lb) N

each 30.00

ELAINE IN SANTA PAULA, 1996
First educational event of the Dietrick Institute for Applied Insect Ecology, Elaine held an audience of over 90 in rapt attention for a 4-hour presentation about soil ecology on farms. Records an historic event shaping the understanding about life in the root zone for many in our agricultural area.

CDINGHAM / audio CD / (0.1 lb) N

each 10.00

QUALITY FIRST IN VINEYARD AND ORCHARD PRODUCTION


By Gregg Young. Scientifically proven proactive program starts with soil.

BOOKYOUNG / each / (0.8 lb) N S

each 35.00

COCKROACH BIOCONTROL WORKSHOP


VHS set and manual. The latest, best information on setting up a biocontrol program for cockroaches with appropriate IPM methods. Directed towards companies or institutions.

8 hr video, 4 VHS tapes. Workshop held 3-1-01. Call for details.

VHSROACH / each / (1.8 lb) N

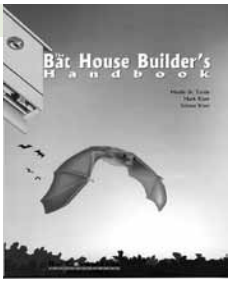
each 36.00

OWL HOUSE PLANS


Plans and instructions for building a nesting box for owls. Houses barn owls (*Tyto alba*). Field tested designs, great for gopher control. An owl family can eat 3,000 rodents a year. (In CA 70% of these are gophers.)

OWLPLAN / each / (0.2 lb) N

each 3.75

BAT HOUSE BUILDER MANUAL


Tuttle, and Hensley, 2004. Build home for insectivorous bats that devour mosquitoes, moths, other night flying insects. 3 sets of plans and details for building, mounting, and attracting bats – finished houses fit dozens to hundreds of bats.

BATMAN / each / (0.3 lb) N

each 6.40

ORGANIC GARDEN SIGN


"Organic Garden Please Do Not Spray," 12 X 12 inch heavy weight aluminum. Weather resistant. 1 5/8 inch tall black letters on yellow.

SIGNO-G / each / (1 lb) N

each 19.00

Index

How to Figure Freight Cost

A complicated order may include perishable items needing quick freight, non-perishable items that can go by Ground service or items that must be shipped from a different facility—the items can't always go in one box. The codes used throughout the catalog after the shipping weight are P for perishable, N for non-perishable and S for ships separately (defined below).

Here is a way to determine how many boxes and the shipping weight for each box using the item shipping weight and shipping codes found next to each item code. To get the freight charge, find the shipping weight and type of service required by the item (overnight, 2-day, etc.) in the table on the next page.

DETERMINE SHIPPING WEIGHTS OF PERISHABLE ITEMS (SHIPPING CODE P)

Consider all items on the order with a shipping code P (perishable) together. Multiply the shipping weight of each item by the quantity ordered. Add the weights together and use the next higher whole pound. Finally, add a packaging weight (may include foam box, cool packs, empty space for required air circulation, see below). This gives you your final shipping weight for a box of perishable items.

- If the shipping weight total is less than 1 pound, add nothing
- If it is 2-3 pounds, add 2 pounds for box weight.
- If it is 4-5 pounds, add 3 pounds for box weight.
- If it is 6-10 pounds, don't add, just use 9 pounds as the shipping weight.
- If it is more than 10 pounds, call customer service.

DETERMINE SHIPPING WEIGHTS OF NON-PERISHABLE ITEMS (SHIPPING CODE N)

Consider all items on the order with a shipping code N (non-perishable) together. This means they are combinable with other non-perishable items for UPS ground shipments with 1 – 5 days transit. Multiply the shipping weight of each of those items by the quantity ordered. Add the weights together and use the next higher whole pound. This gives you your final shipping weight for a box of non-perishable items. If the total is greater than 50 pounds it must be split into boxes of less than 50 pounds each. You can use a more expensive service if you need your order shipped faster than Ground.
You don't have to ship perishable and non-perishable items in separate boxes. If your order is a mix, they may still be combinable. Compare the cost of one perishable box shipped by Next Day or 2 Day plus one non-perishable box shipped by Ground to the cost of a single, heavier box shipped by Next Day or 2 Day.

DETERMINE NUMBER OF BOXES AND SHIPPING WEIGHT FOR ITEMS THAT MUST BE SHIPPED SEPARATELY (SHIPPING CODE S)

Consider each item on the order with S shipping codes as a separate box. Sometimes items with S codes can be combined, but usually not. Follow the directions above regarding calculating shipping weight for either perishable or non-perishable items.

KEY TO SHIPPING CODES

P = Perishable | N = Non-Perishable | S = Ships Separately

CHOOSE TYPE OF SERVICE AND FIND YOUR ZIP CODE AND ZONE IN THE CHART

UPS (United Parcel Service) provides excellent service and value. Choose among the following services:

- UPS Next Day Air: Best for all insects in adult stage, all mites and predatory nematodes
- UPS Next Day Air Saver: Used for same contents as Next Day Air, but may be delivered as late as 7 pm
- UPS 2 Day AM: Fine for low value perishable orders in cool weather as well as insects in egg and pupal stages
- UPS 2 Day: Used for same contents as 2 Day AM, but may be delivered as late as 7 pm
- UPS 3 Day Select: Most cost-effective for fly parasites for zones 4-8
- UPS Ground: Used for temperature stable products

Perishable insects, mites and nematodes require Next Day or 2 Day AM Air service. Ground service may be acceptable if you are in zone 2. (Ground service is not reliable enough for high value perishable shipments.)

Choose 2 Day or 3 Day service for some insects in egg or pupal stage when the weather is neither extremely hot nor freezing cold. You may also choose Ground if you are in zone 2 or 3 and willing to accept consequences of slightly less reliable Ground service. You must be prepared for the insects to possibly be emerging from egg or pupa on or near the delivery date. If insects in egg or pupal stage are combined with more perishable items, choose Next Day or 2 Day AM.

DETERMINE COMMERCIAL OR RESIDENTIAL ADDRESS

Add $2.00 residential address charge unless you are open for business M-F 8-5 with someone present to sign for delivery.

MORE ABOUT HOW WE SHIP

- Perishable items are shipped Monday, Tuesday and Wednesday to assure arrival before the weekend.
- UPS Next Day, 2 Day or 3 Day Air are used depending on weather and how perishable the items are.
- UPS is our preferred shipper and is less expensive. FedEx published rates are used if you prefer FedEx.
- US Postal Service is risky: they have unpredictable transit times and tracking. We add $4 handling charge and no guarantee.
- Handling charges from $2-$6 are noted and added to invoice for products shipped from selected facilities.
- Freight charge is based on number of boxes, shipping weights, zone, and type of service.
- E-mail confirmation with tracking number and proof of delivery available for boxes originating in Ventura, CA.
- We can ship on a third party account.
- Our packaging is simple and as biodegradable or recycled as possible. We try to reuse packing materials as much as possible, don't be surprised if foam boxes look used. We encourage local reuse of packaging since shipping packaging back to us probably uses more energy than it saves.

Find Shipping Zone

USE FIRST 3 DIGITS OF YOUR ZIP CODE

Originating from Ventura, California

Destination ZIP CODE	ZONE	Destination ZIP CODE	ZONE
004 – 005	8	648 – 649	6
010 – 089	8	650 – 658	7
100 – 199	8	660 – 693	6
200 – 299	8	700 – 726	7
300 – 399	8	727	6
341-353	8	728 – 729	7
354	7	730 – 748	6
355 – 364	8	749	7
365 – 366	7	750 – 754	6
367 – 368	8	755 – 756	7
369	7	757 – 758	6
370 – 374	8	759	7
375	7	760 – 769	6
376 – 379	8	770 – 777	7
380 – 384	7	778 – 789	6
385	8	790 – 791	5
386 – 397	7	792	6
398 – 418	8	793 – 794	5
420	7	795 – 796	6
421 – 422	8	797 – 838	5
423 – 424	7	840 – 841	4
425 – 462	8	842 – 844	5
463 – 464	7	845 – 853	4
465 – 474	8	854	3
475 – 478	7	855 – 863	4
479 – 497	8	864	3
498 – 509	7	865	4
510 – 512	6	870 – 872	5
513 – 514	7	873	4
515 – 516	6	874 – 885	5
520 – 567	7	889 – 892	3
570 – 577	6	893 – 898	4
580 – 583	7	900 – 921	2
584 – 588	6	922	3
590 – 591	5	923 – 935	2
592 – 593	6	936 – 941	3
594	5	942	4
595	6	943 – 953	3
596 – 599	5	954 – 961	4
600 – 639	7	970 – 974	5
640 – 645	6	975 – 976	4
646 – 647	7	977 – 994	5

Find Freight Charges by Weight, Type of Service & Zone

ZONE	2	3	4	5	6	7	8
NEXT DAY							
2 LBS	18.40	25.90	32.90	35.80	39.70	41.20	42.85
3 LBS	20.75	27.30	36.40	39.70	44.05	45.25	46.85
4 LBS	22.35	28.60	39.45	43.45	48.05	49.30	57.25
6 LBS	24.60	31.45	46.65	51.25	56.40	57.15	59.60
10 LBS	26.80	36.30	58.70	65.55	72.50	74.25	76.40
Nxt Day Saver*	Next Day minus 14%		Next Day minus 10% for Zones 3 to 8				
SECOND DAY							
2 LBS	9.80	10.10	10.50	12.15	15.45	16.85	17.55
3 LBS	9.85	10.40	11.10	13.35	17.75	19.50	20.15
4 LBS	10.15	10.75	12.00	15.55	20.50	22.20	22.90
6 LBS	10.92	11.55	14.20	18.80	24.45	27.45	28.55
10 LBS	13.05	15.30	19.10	25.60	36.60	39.95	41.05
2 Day AM*	2 Day plus 14%		2 Day plus 10% for Zones 3 to 8				
3 Day Select	Ground plus 25% for Zones 2-3						
Ground plus 60% for Zones 4-6			Ground plus 140% for Zones 7-8				
GROUND SERVICE							
2 LBS	4.75	5.05	5.50	5.61	6.01	6.16	6.45
4 LBS	4.93	5.48	6.06	6.37	6.77	6.99	7.62
6 LBS	5.33	5.74	6.46	6.82	7.21	7.57	8.29
10 LBS	6.20	6.33	7.02	7.54	8.19	9.20	10.38
15 LBS	7.11	7.52	7.72	8.44	10.38	12.48	14.35
20 LBS	7.68	8.68	8.97	10.30	12.93	15.53	18.17
25 LBS	8.62	10.01	10.51	12.28	15.63	18.63	22.16
30 LBS	9.68	11.22	12.13	14.27	18.44	21.71	26.23
35 LBS	10.26	12.23	13.45	15.93	20.63	24.24	29.52
40 LBS	11.82	14.57	16.47	19.87	25.33	30.26	35.43
50 LBS	12.46	15.56	17.73	21.63	27.15	33.27	38.33
60 LBS	13.75	17.14	19.91	24.51	30.31	36.50	43.33

* Next Day Saver and 2 Day AM are limited to major metropolitan area zip codes

MY ORDER LOG (KEEP TRACK OF WHAT YOU ORDERED FOR FUTURE REFERENCE)

Date Ordered	Ship Date	Items Ordered	P,N,S	Price Quotes and Notes

How to Order, Policies and Fine Print

CUSTOMER SERVICE

Monday – Friday
8:00 AM-4:30 PM PST
[Oct-Feb hours 9:00 AM-4:00 PM]
800-248-BUGS (2847)
805-643-5407

FAX Order Line: 805-643-6267

EMAIL: orderdesk@rinconvitova.com

Website: www.rinconvitova.com
Secure on-line ordering in our near future.

Call if you do not get confirmation of voicemail, FAX or email orders or inquiries within 4 business hours.

SALES POLICY

- Availability and prices subject to change without notice.
- Minimum order $25 or $4 handling charge will be applied.
- Payment accepted: VISA, MasterCard, American Express, personal check, Net 15 with approved credit, purchase orders from corporations and institutions.
- No back order of out of stock items billed or shipped without prior arrangement. Additional shipping charge to ship out of stock items when they become available applied. Migratory habits and weather affect availability of ladybugs.
- CA sales tax 8.25% applied to California customers.

MAILINGS

Our mailing list is made up of people who call us or attend conferences that we attend, or are members of like-minded organizations that support biological pest control. We send a catalog or other updates annually. Our e-newsletter Biocontrol Beat is sent quarterly and our Fly Control Buzz sent once or twice a year. Permission is required to be included and there are multiple ways to opt out.
If you would like to receive a catalog or if you don't want our mail, please call, fax or e-mail.

PLANNING AHEAD

Advance orders or a schedule of shipments is often most effective for pest control programs and more likely to assure availability. An advance order can have a tentative quantity and ship date. Both can be adjusted when the ship date gets closer. For large quantities, six weeks advance notice helps. Plan for the arrival of shipment. Leave a signed note for the driver if you might be temporarily unavailable to answer the door. Because of perishability, we accept no responsibility if there is nobody to receive your delivery.

FINE PRINT

Success cannot be assured when using beneficial organisms and natural products. Rincon-Vitova makes no warranties or guarantees as to results. The purchaser and/or user waives and releases Rincon-Vitova Insectaries, Inc. and its employees and agents from all injuries, damages, and liabilities arising, if any, because of the use of these products or their handling.

KNOWLEDGEABLE, FRIENDLY PEOPLE ANSWER OUR PHONE

We would not be here if we did not dearly want you to be successful with biological pest control. There is a learning curve that sometimes needs consultation. Call for advice on how to best use our beneficials. There is also information on our website and blog (www.bugfarm.us).

GRAPHIC CREDITS

- Allison Mia Starcher drew the cover.
- Max Badgley photos: Aphytis, page 19; fly parasites, page 43; Goniozus, page 10; ladybug, page 7; Leptomastix, page 14; mealybug larva, page 14; Orius, page 21; T. pretiosum, page 9; snails, page 20.
- Anagyrus photo courtesy of www.Bio-Bee.com.
- Ophyra photo source unknown.
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We Appreciate Your Business
Because It Helps Our Mission
Promoting Safe & Natural
Biological Control by
Natural Enemies

GUARANTEE, CLAIMS AND RETURNS POLICY

- Organisms are guaranteed live and in good condition on arrival.
- Claims regarding late delivery must be received within 4 hours after expected arrival deadline.
- Claims regarding quality of perishable items (P) must be made no later than the end of the next business day.
- Claims regarding missing items or non-perishable items (N) that are defective, damaged, or do not meet your expectations must be reported within 5 days.
- Returns must be pre-authorized and in resalable condition. We charge 15% restock fee and freight out and back.
- Inspect your order immediately. Read instructions for care on the container and/or product information sheet. Further instructions and information is available on our website.
- Hold perishable items as directed until you release them. Insects and mites while being held in their packaging need some air circulation. It is ideal to transfer contents to a larger insulated box with ice packs wrapped well with something insulating (i.e., towel, layers of newspaper). Avoid covering air holes in containers. Do not put containers of insects in a plastic bag. Original packaging or paper bags are best for temporary holding. Do not refrigerate unless directions allow it.
- No credit for delayed claims.

Rich has been our congenial UPS driver for 20 years.

Order Form

PO Box 1555, Ventura, CA 93002-1555

Call to order Monday - Friday, 8-5 PST
800-248-BUGS (2847) or 805-643-5407

Email or fax orders anytime:
FAX: 805-643-6267
EMAIL: orderdesk@rinconvitova.com

Customer Name:	Daytime Phone (required):
Address:	Fax number:
	Email address:
Billing address:	Payment method: ❑ Personal Check ❑ MC ❑ Visa ❑ AmEx
	Credit Card #: Exp. date:

Credit Card Billing address (if different from above):

Product Code	Product Name	Quantity	Wt	Ship Code (S, P, N)	Unit Price	Total Price

Notes/Special Instructions

_____

_____

_____

_____

_____

_____

Box weight total: _____

Add packaging weight for code P items: _____

Total Shipping Weight _____

Repeat if S code indicates more than one box. Call for help if needed to determine number of boxes.

Shipping rate estimator available at rinconvitova.com

SUBTOTAL _____

ADD SHIPPING AND HANDLING _____

CA RESIDENTS ADD 8.25% SALES TAX _____

GRAND TOTAL _____

RINCON-VITOVA
INSECTARIES, INC.
PO Box 1555 | Ventura, CA 93002-1555

PRESORTED STANDARD
U.S. POSTAGE PAID
SAN DIEGO, CA
PERMIT NO. 2858

GREEN BIZ AT BUGFARM

Jan Dietrick, MPH and Ron Whitehurst, PCA Rincon-Vitova's Owner-Managers

ALL IN THE FAMILY

Ron was a follower of Jan's dad since 1981. They ran into each other at conferences like Eco-Farm at Asilomar; the first Eco-Farm conference Jan attended, where she, too, made friends with Ron. Deke said it was hard to get a job in biological control. Marrying his daughter might be a way– that happened in 1997. They live at the bugfarm and dine on foodscape plants (like the edible mums in the background). Jan tutors Baha'i study circles and their meditation hall is open daily for TM sidhis.

Jose and Javier dumping fly production media for recycling in gardens—hedgerow of cacti, grapes, and bananas gets gray water drip.

RECYCLING BUGFARM STYLE

We separate waste, control weeds with used cardboard mulch, reuse packaging we receive as much as we can, and buy/salvage quite a lot of recycled goods. We're renovating a farmhouse to offer a room for summer interns. It uses some Sthapatya Veda design. Interns can pick from a small fleet of salvaged bicycles to ride the bike trail next to the bugfarm south to town and beach or north to Ojai and mountains. There are great Farmers' Markets in both directions.

Josh Fraka, Insectary Technician and Carpenter working on installation of our solar hot water storage tank.

JOSH OF ALL TRADES

Josh harvests insects on Sundays. The rest of the week he is working on renovations and the new hydronic heating system. He got interested in organic gardening from a high school teacher. The hydronic heating plant he is buidling is designed to heat 7,500 sq ft, saving 8,000 therms of natural gas worth $9,000 annually. The system pays for itself in 7 years. Our renovations include development of passive HVAC, daylighting, 12 volt LED/plugs, and solar ovens. When we can't get recycled, we use as much FSC certified materials as we can.

WATTS happening? Our Sunny Boy inverters send 5,000 kW to the grid on sunny days.

Jan doing a sun dance over the solar collector panels.

PRACTICING WHAT WE PREACH

We don't want to contribute to global warming, so we're turning sunshine into electricity, hot water for heating, eliminating over 55 tons of CO_2 per year. For green fun, we foodscape. Our landscaping yields fruits, vegetables and leafy greens. Biodegradable cleaners protect gray water that waters tree roots and beneficial habitat demonstration gardens. Waste products from rearing flies are composted for local gardeners. Half of our coworkers receive incentives for biking, bussing and/or carpooling instead of driving a car to work.