TECHNICAL INFORMATION BULLETIN

OVERVIEW

Senstar® Insecticide is a suspo-emulsion (SE) formulation of the active ingredients pyriproxyfen and spirotetramat. Pyriproxyfen is an active ingredient developed by Valent U.S.A. LLC. *Senstar* is intended for use as an insecticidal tool targeting soft-bodied insects, including whiteflies, aphids, psyllids, mealybugs, scales and thrips. *Senstar* provides powerful activity against all life stages of target pests because it delivers control via contact and ingestion to promote faster control of all life stages.

SENSTAR TECHNICAL FEATURES

- Delivers fast translaminar movement within the foliage tissue to reach target pests that feed on the underside of leaves.
- Provides systemic activity (movement in the xylem and phloem) to control pests feeding on existing and new vegetative growth. True systemic activity will enable protection of new foliage throughout the season.
- Exhibits activity against all life stages (including eggs) of target pests.
- Controls target insects in three primary ways: contact and/or ingestion, suppressing embryogenesis within insect eggs and reduction in the percent of adult female viable eggs.
- High selectivity to harmful insect species with no hazardous effects on many beneficial insects for excellent fit in Integrated Pest Management (IPM) programs.
- Delivers a full rate of spirotetramat and an optimized dose of pyriproxyfen to enhance insect control.

MULTIPLE MODES OF ACTION

Senstar delivers both Group 7C and Group 23 insecticides in a single application*. *Senstar* controls insect pests during their whole life cycle. Also, it delivers insecticidal properties via contact and feeding actions to put in place a comprehensive management tool in each application.

- Pyriproxyfen is a juvenile hormone mimic insecticide (Group 7) that delivers insect growth regulator (IGR) features, which suppress embryogenesis within the insect eggs. In addition, the IGR type of control in *Senstar* provides inhibition of metamorphosis and adult emergence of target insects. Pyriproxyfen has no knockdown activity on adult insects, however hatching of eggs laid by treated adults will be suppressed.
- Spirotetramat belongs to the Group 23 insecticides. Spirotetramat, when sprayed as a foliar treatment, breaks down into insecticidal compounds that act as inhibitors of the critical process of lipid biosynthesis among insects that feed on the treated plants. Immature insects and female adults are particularly susceptible to this path of insecticidal activity. Spirotetramat negatively disrupts the development and molting processes of insects.

*Insecticide Resistance Action Committee (IRAC) Mode-of-Action Classification

SENSTAR LABELED CROPS

Senstar is labeled to control a diverse spectrum of sucking insects in a comprehensive list of crops.

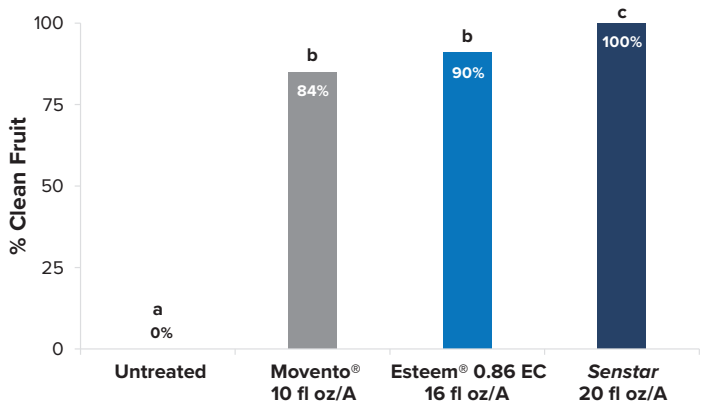
	Aphids	Whiteflies	Mealybugs	Scales	Thrips	Psyllids	Other	Rate (fl oz/A)
Annual Crops								
Brassica (Cole) Leafy Vegetables	X	X			larvae*		Swedge midge, diamondback moth*	6–10
Bulb Vegetables†					larvae		Western flower thrips*	10
Carrots (not for use in CA)	X	X						10
Fruiting Vegetables (not for use in CA)	X	X				X	Leafminers*, Western flower thrips (larvae)*	8–10
Leafy Vegetables (except brassica vegetables)	X	X					Diamondback moth*, leafminers*, Western flower thrips (larvae)	8–10
Legume Vegetables (excluding Soybeans) (not for use in CA)	X	X					Leafminers*, melon thrips (larvae)*, Western flower thrips	8–10
Sugar Beets (not for use in CA)	X	X					Root maggot*	9–18
Tuberous & Corm Vegetables (not for use in CA)	X					X	Western flower thrips (larvae)*	8–10
Watercress (not for use in CA)	X	X					Sharpshooters	8–24
Permanent Crops								
Artichokes (Globe) (not for use in CA)	X	X					Plum moth	10–16
Bananas & Plantains (FL, HI, Puerto Rico only)	X	X						20–32
Bushberries & Low-Growing Berries (not for use in CA)	X			lecanium*	larvae		Gall midge, tipworm, maggot*, fruitworm*, leafhoppers*	16–20
Citrus	X	X	X	X[1]	X	X	Black fly, leafminer,	16–20
Grapes (not for use in CA)		X	X				Tumid gallmaker, phylloxera, lecanium scale*	12–16
Pineapple (not for use in CA and NY)			X	X				20
Pome Fruit	X	X	X	X		X	Gall & leaf midge*, codling moth*, leafminer*, leafhopper*	12–18
Stone Fruit	X	X	X	X[2]			Fruitfly*, oriental fruit moth*, spotted wing drosophila*	12–18
Trees Nuts	X	X	X	X[3]			Phylloxera	12–18
Tropical Fruit (not for use in CA)	X	X	X	X	X			16–20

†Not all subgroup crops will be labeled in California
*Suppression only

[1]Citricola scale suppression only
[2]Black scale suppression only
[3]Black, brown, Italian, olive and lecanium scale suppression only

SENSTAR EFFICACY

California Red Scale—Citrus (Oranges)

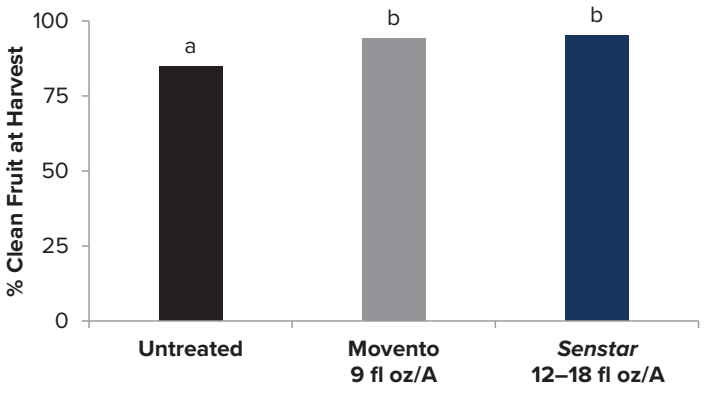


Senstar applied at the first generation red scale crawler stage delivers cleaner fruit compared to *Esteem* 0.86 EC Insect Growth Regulator or Movento.

Means followed by the same letters are not significantly different (P≤0.10).

Source: Sawtooth Ag

San Jose Scale—Pome Fruit

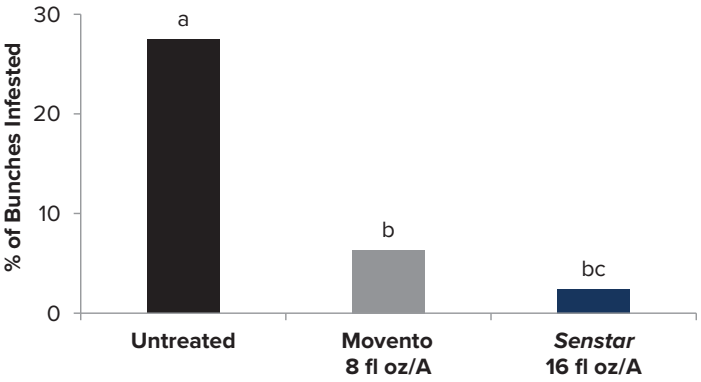


Senstar can protect fruit from scale's presence on the fruit and/or the damage caused by feeding.

Means followed by the same letters are not significantly different (P<0.10).

Source: D. Biddinger, Penn State; Biglerville, PA

Vine Mealybugs—Table Grapes

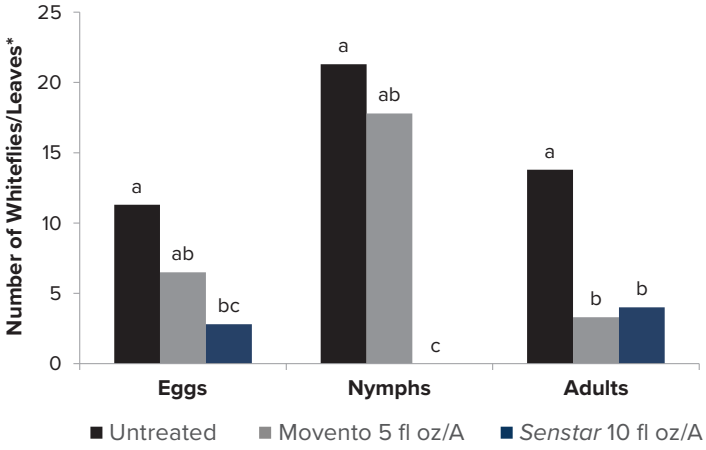


Senstar can deliver better protection on grape bunches due to its two modes of action targeting all life stages of the pest.

Means followed by the same letters are not significantly different (P<0.10).

Source: Summary of four trials conducted in California by multiple research scientists and outfits

Whiteflies—Tomatoes



Senstar can deliver faster control of eggs and nymphs of whiteflies compared to currently available product.

* Adult (10 leaves/plant evaluated); eggs and nymphs (5 leaves/plant). Ratings taken 7 days after application.

Means followed by the same letters are not significantly different (P<0.10).

Source: St. Lucie County, FL; Better Crops, LLC

RESISTANCE MANAGEMENT GUIDELINES

Senstar contains both Group 7C/pyriproxyfen and Group 23/spirotetramat insecticides. Any insect population may contain individuals naturally resistant to *Senstar* and other Group 7C or Group 23 or insecticides. Resistant individuals may dominate the insect population if these insecticides are used repeatedly in the same fields without following IPM guidelines including rotating other classes of chemistry. Appropriate resistance management strategies should be followed.

To delay insecticide resistance, take the following steps:

- Rotate the use of *Senstar* and/or other Group 7C and Group 23 insecticides within a growing season with different groups of classes of chemistries to minimize the risk of onset of resistance.
- Use tank mixtures with insecticides from a different group that are equally effective on the target pest when such use is permitted. Do not rely on the same mixture repeatedly for the same pest population. Consider any known cross-resistance issue (for the targeted pests) between the individual components of the mixture.
- Adopt an IPM program for insecticide use that includes scouting, uses historical information related to pesticide use, crop rotation, record keeping, and which considers cultural, biological and other chemical control practices.
- Monitor after application for unexpected target pest survival. If the level of survival suggests the presence of resistance, consult with your local extension specialist or certified crop advisor.
- Contact your local extension specialist or certified crop advisors for any additional pesticide resistance management and/or IPM recommendations for the specific site and pest problems in your area.
- For further information or to report suspected resistance contact Valent at 800-6-VALENT (682-5368).

INTEGRATED PEST MANAGEMENT

IPM is an approach that combines various tools and methods including chemical and biological products, natural pest enemies and cultural methods such as sanitation, crop rotation and resistant crop varieties to manage pests at an economically acceptable level. *Senstar* is highly suited for use in IPM programs because it shows high selectivity to harmful insect species with no hazardous effects on many beneficial insects. Insect predators or parasites which are unaffected by *Senstar* include: *Orius sauteri* (thrips predator), *Anthocoris melanocerus* (pear psylla predator), *Aphytis holoxanthus* (California red scale parasite), *Encarsia pergandiella* (whitefly parasite) and *Chrysopa carnea* (green lacewing, a general predator). In addition, *Senstar* has shown minimal impact to pollinators.