

TIMELY INFORMATION

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NEW GENERATION INSECTICIDES FOR VEGETABLE PRODUCERS

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As a result of the Food Quality Protection Act (1996) that enforced a tolerance reassessment program for pesticides, several conventional insecticides underwent scrutiny for re-registration and/or voluntary cancellation (removal from sale). Today, several new insecticides with unique modes of action have been registered by the Environmental Protection Agency (EPA) to replace the older chemistries. This article provides a short review of some of the new generation insecticides that have been approved for use in vegetable crops in recent years. It is important for vegetable producers to learn the use of new chemistries and this article is a step in that direction. Application rates of listed insecticides and use restrictions are described in the 2009 Vegetable Crop Handbook for Southeastern U.S. and have not been duplicated in this article. The pesticide classification system developed by the Insecticide Resistance Action Committee (IRAC, www.irac-online.org) has been used to indicate the insecticide group.

Low toxicity products: In the table below, please note the availability of new low-toxicity insecticides for vegetable insect management, e.g., Coragen with oral toxicity of >5,000 mg/kg (in rats). A few older chemistries have been mentioned to highlight their uniqueness and availability. Also, take note of the new selective feeding inhibitors available for vegetable producers, e.g., Synapse and Coragen for lepidopteran pests and Fulfill for homopteran pests. Some new generation formulations of insect growth regulators (insect hormone mimics) that are highly selective to lepidopteran pests have become popular in the past three to four years; these products are excellent partners in IPM programs. Vegetable producers should contact their pesticide dealers regarding early availability of safe insecticides.

Non-target effects: It is interesting to point out that old insecticide chemistries (especially organophosphates and carbamates) attacked the general organ systems of insects. Remember that insects and humans have similar tissue, reproductive, enzyme, and nervous systems. This commonality made old insecticides highly toxic to non-target organisms including humans; interestingly, the new chemistries listed herein are more tissue-specific, highly-branched long-chain molecules that are activated in unique ways inside the target cells of insects resulting in reduced threat to other organisms. Vegetable producers across the state should be aware about the efficacy and environmental impact of insecticides before use in order to promote sustainable agriculture. Use scouting techniques/economic threshold posted on new vegetable entomology website (<https://sites.aces.edu/group/commhort/vegetable/default.aspx>) for more guidance.

IRAC Group	Trade name	Products	Manufacturer	Mode of action	Uniqueness of product
5 (spinosyns)	Spinosad	SpinTor 2SC	Dow AgroSciences	Nicotinic acetylcholine receptor	<ul style="list-style-type: none"> This insecticide has been replaced in the 2009 Vegetable Crop Handbook by spinetoram (see below).
	Spinetoram	Radiant 1SC	Dow AgroSciences	Nicotinic acetylcholine receptor allosteric activator	<ul style="list-style-type: none"> Closely related to spinosad and so is a microbial derivative. Spinetoram has activity against a wide range of chewing (loopers, leafminers, armyworms) and sucking (thrips) insect pests. Short (1 to 3 d) pre-harvest interval Crops: many leafy vegetables, potatoes, peanut, root vegetables, etc.
23 (Tetramic acid derivatives)	Spirotetramat	Movento 2SC	Bayer CropScience	Inhibitor of Acetyl Coenzyme A carboxylase (enzyme)	<ul style="list-style-type: none"> This product interferes with lipid biosynthesis. Product translocates upward & downward within plants (2-way systemic insecticide) Movento can be applied as chemigation in addition to foliar spray. Target insects: aphids, scale insects, mealybugs, whiteflies, thrips, psyllids (sucking pests)
23 (Tetramic acid derivatives)	Spiromesifen	Oberon 2SC	Bayer CropScience	Inhibitor of Acetyl Coenzyme A carboxylase (enzyme)	<ul style="list-style-type: none"> This product interferes with lipid biosynthesis. Registered in about 13 states including Alabama as a miticide and insecticide. Has excellent activity against whiteflies (3 species) and spider mites. Applications should be directed at the immature stages, including the unique “pupal” stage of whiteflies.
28 (diamides)	Flubendiamide	Synapse 24WG	Bayer CropScience	Ryanodine receptor modulator	<ul style="list-style-type: none"> Rapid feeding inhibitor, acts as stomach poison. Apply early when caterpillars are small. This product has ground water advisory. Can be applied as foliar spray and chemigation. Target insects: armyworms, diamondback moth, tomato fruitworm (many

					cucurbitaceous & solanaceous vegetable pests)
28 (diamides)	Rynaxypyr	Coragen 1.67SC	DuPont	Ryanodine receptor modulator	<ul style="list-style-type: none"> • Causes rapid feeding cessation by upsetting Ca²⁺ balance in muscles • Excellent long-lasting control of lepidopteran insects like corn earworm, corn borer, loopers, imported cabbageworm, diamondback moth, etc. • Has ovicidal and ovi-larvicidal (i.e., young larvae die as they emerge) action • Coragen is toxic to aquatic organisms. • Coragen is safe to parasitoids, predators, and pollinators.
9B	Pymetrozine	Fulfill 50WDG	Syngenta	Selective homopteran feeding blockers.	<ul style="list-style-type: none"> • Fulfill is an aphicide that interferes with insect feeding in a selective manner. It is a stomach poison with limited contact action. • Over 19 different aphid species can be targeted in row crops and vegetables. • Can be applied with ground applicators as well as chemigation (in potatoes) at very low application rates. • Provides suppression of whiteflies.
18 (diacyl hydrazines)	Methoxyfenozide	Intrepid 2F (available since 2007)	Dow AgroSciences	Ecdysone receptor agonist	<ul style="list-style-type: none"> • Intrepid is a new generation of insect growth regulator (IGR) products. It mimics the action of molting hormone in caterpillars. • Product has to be ingested and then it triggers untimely molting/ • Provides excellent control of many lepidopteran insects like armyworms (beet, yellowstriped, fall), loopers, and corn earworm. Provides suppression of cutworms and pinworms. • Lower application rate can be used for early instars.
15 (benzoylureas)	Novaluron	Rimon 10 EC (greenhouse insect control)	MANA	Chitin synthesis inhibitor	<ul style="list-style-type: none"> • One of the older generation of IGRs, Rimon has primarily stomach action. • Very good thrips, whitefly,

					<p>and leafminer management in greenhouses.</p> <ul style="list-style-type: none"> • Since target insects continue to develop and feed for few days after ingestion, it is important to apply it timely and compensate for its slow action.
6 (avermectins)	Emamectin benzoate	Proclaim 5WDG	Syngenta	Chloride channel activator	<ul style="list-style-type: none"> • This insecticide is the new version of a popular old chemistry – avermectins, a product of microbial fermentation. • Controls only lepidopteran pests, e.g., beet armyworm, diamondback moth, cabbage looper, leafminers, etc. Applications should be made in the early stages of caterpillars. • Product has contact and stomach activities. • Proclaim is highly toxic to fish, mammals, and aquatic organisms. • Has some use restrictions on cucurbits and brassicas.

New vegetable entomology portal for Alabama crop producers:

<https://sites.aces.edu/group/commhort/vegetable/default.aspx>

For assistance related to insecticide mode of action and insect activity please contact Ayanava Majumdar, Extension Entomologist, cell phone: 251-331-8416, linc# 7*333, e-mail: azm0024@auburn.edu.