

**NOTE:** THE FOLLOWING INFORMATION IS OFFERED AS A GUIDE FOR PROSPECTIVE CHALLENGES TO MANAGING SEASHORE PASPALUM. ALL TURFGRASSES ARE SUBJECTED TO INSECT, DISEASE, AND WEED PRESSURES. PROPER MANAGEMENT IS THE KEY TO SUCCESS. YOU MUST CHECK ALL LABELS OF THE PESTICIDES TO BE USED ON THIS GRASS FOR LEGAL AND PROPER USE. MENTION OF A PARTICULAR PRODUCT IS NOT AN ENDORSEMENT OF THAT PRODUCT BUT REFLECTS WHAT IS KNOWN AT THE PRESENT TIME. ENVIRONMENTAL INTERACTIONS, INCLUDING SALINITY THAT IMPACT SPECIFIC SITES, MAY GIVE VARIABLE RESULTS IN THE USE OF SOME PRODUCTS.

## GENERAL INFORMATION ON SEASHORE PASPALUM AND INSECT CONTROL

Platinum TE and other seashore paspalum cultivars are no more susceptible to insect attack compared with any other warm or cool season turfgrass species. When environmental conditions favor an increase in insect populations and those insects start attacking the grass, control programs are going to be similar across the grass species and cultivars for each specific insect.

Similar to disease control programs, insecticide chemistries should be rotated across different chemistries and modes-of-action. The following charts provide some information on MOA and chemistry.

**MODES OF ACTION FOR INSECTICIDES (from C.A. Silcox & P.J. Vittum. 2008. Turf insecticide classes and modes of action. Golf Course Management. September. P.82-90.)**

<u>Group</u>	<u>Mode of action</u>	<u>Class</u>	<u>Common Name</u>	<u>Brand</u>	<u>Manufacturer</u>
1A	acetylcholinesterase inhibitor	carbamate	carbaryl	Sevin	Bayer
1B	acetylcholinesterase inhibitor	organophosphate	chlorpyrifos	Dursban	Dow AgroSciences
			acephate	Orthene	Valent
				Precise	Agrium Adv. Techn.
				Avatar®	Phoenix Env. Care
2B	GABA-gated Chloride Channel Antagonist	phenylpyrazole	trichlorfon	Dylox	Bayer
			fipronil	Choice, TopChoice, Maxforce	Bayer
3	sodium channel modulator	pyrethroid	bifenthrin	Talstar	FMC
				Menace	Nufarm
				Firebird®	Phoenix Env. Care
			cyfluthrin	Tempo	Bayer
			deltamethrin	DeltaGard	Bayer
4A	nicotinic acetylcholine receptor agonist/antagonist	neonicotinoid	lambda-cyhalothrin	Scimitar	Syngenta
			imidachloprid	Merit	Bayer
			imidachloprid	Hawk	Phoenix Env. Care
				Mallet	Nufarm
			clothianidin	Arena	Valent
			thiamethoxam	Meridian	Syngenta
			dinotefuran	Zylam	PB Gordon
				Safari®	Valent
			acetamiprid	Arvida	Atticus
5	nicotinic acetylcholine receptor agonist (allosteric)	spinosyn	spinosad	Conserve	Dow AgroSciences
				MatchPoint™	Dow AgroSciences
			(IPM approach)		
7A	juvenile hormone mimics	juvenile hormone	methoprene	Extinguish	Wellmark
7B			fenoxycarb	Award	Syngenta
7C		analogs	pyriproxyfen	Distance	Valent
11B2	microbial disruptor of insect midgut membrane	microbial	Bacillus thuringiensis	Dipel	Valent
			kurstaki		
18A	ecdysone agonist/molting disruptor	diacylhydrazine	halofenozide	Mach 2	Dow AgroSciences
			tebufenozide		
			methoxyfenozide		
			chromafenozide		
20	mitochondrial complex III electron transport inhibitor	hydramethylnon	hydramethylnon	Amdro	BASF
22	voltage-dependent sodium channel blocker	oxadiazine	indoxacarb	Advion, Provaunt	DuPont
28	ryanodine receptor modulator	anthranilic	chlorantraniliprole	Acelepryn/Ference	DuPont/Syngenta
		Diamide			

## **GENERAL INSECTICIDE CATEGORIES**

### **Botanicals**

Naturally occurring pesticides derived from plants. Pyrethrum is derived from certain cultivars of chrysanthemum flowers (mainly from Australia and Africa) and the chemicals found in pyrethrum are called 'pyrethrins.' Pyrethrins are non-residual contact insecticides that irritate insects and their nervous system, antagonistically causing them to move out of treated areas. The chemistry can alter nerve function, which causes paralysis in target insect pests, eventually resulting in death. Pyrethrins may be mixed with piperonyl butoxide or MGK-264, or synergists designed to enhance the effectiveness of the plant-based insecticide. Pyrethrins are highly toxic to fish, birds, reptiles, and amphibians, but exhibit low toxicity to mammals.

Single pesticide active ingredient components: pyrethrin 1, pyrethrin 2, cinerin1, cinerin 2, jasmolin1, jasmolin 2.

### **Synthetic Pyrethroids**

Man-made insecticide chemistry similar to natural pyrethrins but having longer residual activity (over two months), but do not agitate the insects as effectively as the natural pyrethrins. Chemistry is modified to increase stability in sunlight.

Products: allethrin stereo-isomers, Bifenthrin (Talstar/FMC), Beta-Cyfluthrin (Tempo/Bayer), Cyfluthrin, Cypermethrin, Cyphenothrin, Deltamethrin, Efenvalerate, Fenpropathrin, Tau-Fluvalinate, Lambda-Cyhalothrin (Scimitar/Syngenta), Gamma Cyhalothrin, Imiprothrin, 1RS cis-Permethrin, Permethrin, Prallethrin, Resmethrin, Sumithrin (d-phenothrin), Tefluthrin, Tetramethrin, Tralomethrin, Zeta-Cypermethrin.

### **Inorganics**

Insecticides derived from minerals and are slow in activation of activity. Boric acid (stomach poison) and Silica Gel (disrupts the waxy layer on an insect's exoskeleton, causing desiccation/dehydration) are long residual insecticides.

**Disodium Octaborate** is a derivative out of boric acid that is used to protect wood from organism and fungal degradation.

**Anthranilic Diamide:** chlorantraniliprole/cyantraniliprole (Acelepryn/Ference) (Syngenta)

**Avermectin:** Emamectin benzoate (TREE-age/Arborjet)

## Organophosphates

These insecticides have a long residual life (several weeks to months), produce quick control results, and generally act through cholinesterase inhibition (interference with the nervous system). They are moderately toxic to mammals. Trichlorfon (Dylox) Bayer; chlopyrifos (Dursban) Dow

## Carbamates

These insecticides are cholinesterase inhibitors and are moderately toxic to mammals. Carbaryl (Sevin) Bayer

## Insect Growth Regulators (IGRs)

These insecticides disrupt natural growth and development of insects by interfering with the molting process or causing sterility in the adult insects. These insecticides are usually specific to certain insect groups or types and have very low toxicity to mammals. Azadirachtin ('AzaGuard EC') prevents molting between larval, pupal, and nymphal stages while repelling 300 insect species.

Other IGRs: methoprene, hydroprene, dodecadienoates, pyriproxyfen, diflubenzuron, teflubenzuron, fenoxycarb, pyriproxyfen, buprofezin, chlorfluazuron, pymetrozine, kinoprene, allosamidin

## **Bioinsecticides**

Entomopathogenic nematodes (*Steinernem carpocapsae*) --apply in early morning or late afternoon to avoid heat or direct sunlight. Irrigate to moisten soil and thatch/sandy matt, then again immediately after application, and before spray droplets dry.

Captiva: Capsicum oleoresin extract + garlic oil + soybean oil (thrips, spider mites)

**Biorational:** azadirachtin (Azatrol) PBI Gordon; spinosad (Conserve) Dow

HETEROMASK, SCANMASK; ENTRUST™ (actinomycete bacterium *Saccharopolyspora spinosa*: fermentation by-product=spinosyns; active=spinosad).

Grandevo PTO (Engage Agro USA): *Achromocil* (*Chronobacterium substageae*): active on chinch bugs, sod webworm, cutworms, and white grubs.

BotaniGard mycoinsecticide: *Beauveria bassiana* strain GHA. Whiteflies, mealybugs, aphids, thrips, weevils. Safe on beneficial insects. Spores adhere to insect's cuticle, germinate, and produce enzymes that attack and dissolve the cuticle, where it penetrates the skin and grows into the insect's body.

Source:

<http://www.epa.gov/oppsrrd1/reevaluation/pyrethroids-pyrethrin.html>

From: D. Shetlar. March 2012. Grubs, Billbugs, and Chinch Bugs. Turf A20-A24.

Cholinesterase inhibitors: organophosphates and carbamates

Insect Growth Regulators (IGRs): narrow spectra of controlling pests

Neonicotinoids: block nicotinic receptors of nerves, systemic action. Merit (imidacloprid). Should be used as a preventative and not a curative treatment on young insects. Meridian (thiamethoxam), Arena (clothianidin), Zylam/Safari (dinotefuran). Arvida (acetamiprid).

Pyrethroids: curative treatment.

Long term residual for grubs, billbugs, and chinch bugs: Acelepryn (chloranthraniliprole) and Arena (clothianidin)

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ADULTICIDES; chlorpyrifos, pyrethroids, indoxacarb (PROVAUNT)

SYSTEMIC LARVICIDE: chlorotranipole (ACELEPRYN); cyanthraniliprole (FERENCE)

LARVICIDES: indoxacarb (PROVAUNT), spinosad A & D (CONSERVE); trichlorfon (DYLOX)

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Similar to fungicides, insecticide efficacy can be potentially negatively impacted by water quality in the spray tanks.

WATER QUALITY INTERACTIONS WITH EFFICACY OF SELECTED INSECTICIDES					
Insecticide	Water Quality				
	Acidic (pH<6)	Alkaline (pH>8)	Muddy	Hard	Saline
Acephate	ok	dnu	ok		
Bifenthrin	ok	ok	dnu		
Carbaryl	ok	dnu	nr		
Chlorpyrifos	ok	dnu	dnu		
Clothianidin	ok	ok	ok		
Fipronil	ok	ok	nr		
Imidacloprid	ok	tfc	ok		
Indoxacarb	ok	dnu	tfc		
λ-cyhalothrin	ok	dnu	dnu		
Spinosad	ok	tfc	tfc		
Thiamethoxam	ok	tfc	ok		
Trichlorfon	ok	dnu	ok		

dnu= do not use; tfc=test for compatibility; nr=not recommended  
 Source: D.Park and J-H. 'J.C.'Chong. 2010. Carrier water quality and pesticide stability. Golf Course Industry 22(11):37-39.

The chart below summarizes the possible seasonal occurrence of disease and insect attacks on turfgrass ecosystems.

<b>TURFGRASS PEST DIAGNOSIS POSSIBILITIES BY SEASON</b>		
<b><u>Spring—cool weather (45-60° F)</u></b>	<b><u>Late Spring, early summer, early fall—warm weather (60-75° F)</u></b>	<b><u>Summer—hot weather (over 75° F)</u></b>
Fairy ring	Dollar spot	Pythium blight
Patch diseases	Pythium blight	Pythium root dysfunction
Powdery mildew	Pythium root dysfunction	Dollar spot
Helminthosporium complex	Patch diseases	False dollar spot
Ascochyta leaf spot	Take-all/Decline/ETRI	Fusarium blight
Anthrachnose leaf spot	Necrotic Ring Spot	Patch diseases
Necrotic Ring Spot	Slime molds	Fairy ring
	Helminthosporium complex	Take-all/Decline/ETRI
	Billbugs	Helminthosporium complex
	Ascochyta leaf spot	Curvularia fading out
	Anthrachnose leaf spot	Worm complex, including grubs
	Nematodes	Billbugs
		Slime molds
		Algae/Moss
		Nematodes
		Ground Pearls