

HUMANS

PUBLIC HEALTH INSECT CONTROL OUTDOORS AND PARASITES OF MAN¹

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PEST	PRODUCT TYPE, ACTIVE INGREDIENT & PRODUCT NAME (if specified)	METHODS AND RATE OF APPLICATION	REMARKS AND PRECAUTIONS
Repellents for mosquitoes, biting flies and gnats, chiggers, and ticks	DEET, or N, N-Diethyl-meta-toluamide (many brands and formulations)	Protect skin by applying a few drops on the palm and rub into exposed skin.	Wash hands after applying. Keep out of eyes and mouth. Higher concentrations provide longer protection, but complete coverage is required.
		Aerosol applications: hold 6 - 8 inches from skin or clothing and apply with a slow sweeping motion. Spread over skin to spread evenly. Also spray on clothing.	May damage watch crystals. Children should use 30% concentrations or less. Product should be applied by parents, apply to parent's hand and then spread onto child's skin. Approved for use on children over 2 months of age.
	Oil of Lemon Eucalyptus	Not approved for children under 3 years of age. Skin reactions have been documented.	
	Picaridin	Effective alternative to DEET.	
	Permethrin (many brands and formulations)	To be used on clothing only.	Good choice when exposed to ticks and chiggers.
ANTS, FIRE For more complete information, see the Extension publication, Managing Imported Fire Ants in Urban Areas.	Mound drenches:		Treatments tend to be more effective after soil temperatures have warmed to 60°F. The active ingredients listed may come in various formulations — be sure to use one labeled for fire ants.
	Acephate (Orthene) Bifenthrin Carbaryl (Sevin) Cyfluthrin Permethrin Spinosad	Dilute with water as instructed on the label.	Mix the proper amount into a gallon container such as a sprinkling can or gallon plastic jug with holes drilled in the screw-on cap. Mark the container POISON and use it for no other purpose or destroy after use. Pour the solution on top of and around the mound like a gentle rain. Do not otherwise disturb the mound. Use a minimum of 1-2 gallons of solution per mound. These products may not give immediate kill. Check mounds 5-7 days later and retreat if the colony has moved or new mounds are found.
	Granular products:		
	Bifenthrin Carbaryl (Sevin) Cyfluthrin Deltamethrin Gamma-Cyhalothrin Indoxacarb Imidacloprid & Beta-cyfluthrin	For treating individual mounds, measure out the recommended amount as specified by the label. Sprinkle on the top of, and around, the mound.	Mow area where mounds will be treated prior to treatment. Best results if treated area is thoroughly watered immediately after application. Treat as mounds appear. Residual control for up to 4 weeks. Use a sprinkler can or water hose to wet the mound and begin washing the insecticide into the mound. Allow 5-7 days for control.

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PEST	PRODUCT TYPE, PRODUCT NAME, % ACTIVE INGREDIENT	METHODS AND RATE OF APPLICATION	REMARKS AND PRECAUTIONS
ANTS, FIRE (cont.)	Fipronil (Over'n Out)		
	Lambda-cyhalothrin		
	Permethrin		
	Spinosad	Listed by Organic Materials Review Institute for use in organic production. Check label.	
	Dry powders:		
	Acephate	Treat mound and surrounding area,	CAUTION: wear protective gloves, avoid breathing the
	Cyfluthrin	ants track insecticide into mound	powder and contact with skin and eyes. Check area in 5-7
	Deltamethrin	causing mortality.	days and retreat new mounds.
	Permethrin		
	Bait formulations:		
Ascend (ivermectin)		Typically baits can be used at 2-5 tablespoons of bait per	
Amdro (hydramethylnon)		mound or 1-1.5 lbs. broadcast per acre. Read the label for	
Award (fenoxycarb)		rates. Baits are usually slower acting than other formulations.	
Enforcer (Abamectin B1)		They are more effective if applied during the spring or fall,	
Extinguish		and broadcast is more economical than mound treatment.	
(s-methoprene)		Apply baits when ants are actively foraging for food. Few	
Maxforce (fipronil)		baits are labeled for vegetable gardens. Check the label.	
First Strike			
(Hydromethylnon +			
(s)-Methoprene)			
Distance, Spectracide			
(pyriproxyfen)			
Justice, Eliminator			
(spinosad)			
BEDBUGS*	Bayer Advanced Home Pest Control, Cyfluthrin 0.1%	Thoroughly clean the mattress, springs, bed frame and area surrounding the bed. Lightly spray	Bedbugs are typically nocturnal, feeding at night and hiding during the day in cracks and crevices near the bed.
	Hi-Yield Garden, Pet and Livestock Insect Control. Permethrin 10%	(do not soak) bedsteads, slats, springs, baseboards and wall cracks. Allow to dry thoroughly (at least 4 hours) before use.	Bites typically occur on areas of exposed skin overnight. Treatments should target cracks and crevices on the bed and bedding, the structure of the bedroom itself and the decor (behind pictures). Good coverage is essential.
	Natural Pyrethrin Conc.		
	Diatomaceous Earth - Silicon dioxide	Fine granular product. Apply to all cracks and crevices around bed area.	
* Bedbugs are difficult to eliminate and often require professional assistance.			

¹ Be certain that the insecticide that you purchase is labeled for the site desired.

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PEST	PRODUCT TYPE, PRODUCT NAME, % ACTIVE INGREDIENT	METHODS AND RATE OF APPLICATION	REMARKS AND PRECAUTIONS
<p>BEEES, WASPS, HORNETS, AND YELLOW JACKETS</p>	<p>Aerosol: Variety of Jet Sprays available</p>	<p>Apply in evening when insects are at rest. With wind at back, aim at nest opening in trees, bushes, under eaves or in ground cracks and crevices. Thoroughly treat nest. Retreatment may be necessary. If possible, destroy nest, or seal nest opening.</p>	<p>Nuisance honey bee nests can often be removed by bee removal experts. Contact Extension Specialist for more information.</p> <p>Some aerosols produce a jet stream up to 20 -25 feet for the safety to the operator and the ability to reach nests high off the ground. Apply in the evening.</p> <p>Make sure a clear and accessible escape route is planned and available prior to initiating spraying.</p>
	<p>Variety of other products labeled for these pests. However, knockdown could be delayed resulting in increased hazard for the applicator.</p>		<p>Make sure a clear and accessible escape route is planned and available prior to initiating spraying, even more important with non-aerosol products.</p>
<p>EYE GNATS</p>	<p>Fogger: Cutter Bug Free Backyard Outdoor Fogger, Tetramethrin 0.2% and Permethrin 0.05% Enforcer Mosquito Killer Indoor-Outdoor Fogger, Tetramethrin 0.2% and Sumithrin 0.2%</p>		<p>Air movement from electric fans will give protection in a limited area. Commercial repellents are not very satisfactory. However, devices like the ThermoCell Mosquito Repellent or the Off Power Pad Lamp, may provide localized relief.</p> <p>No suitable control for households.</p> <p>Fogging and space sprays give temporary relief to limited area (patio, porch, etc.). Mosquito adulticides will provide temporary relief.</p>
	<p>Ready to Use: Black Flag Fogging Insecticide, Resmethrin 0.2%</p>	<p>Fogging insecticides formulated for electric, and propane gas powered thermo-foggers to be used undiluted (hand held models for homeowners from Sears, Act Hardware, Lowes, Home Depot and probably others). Spray down wind to allow spray to drift through area to be treated.</p>	<p>Read label instructions carefully. Wear proper protective equipment.</p>
	<p>FLEAS (outside treatment only)</p>	<p>Any Concentrate, Dust, Granular or Ready to Use Hose End Product containing Beta- cyfluthrin, Bifenthrin, Carbaryl, Cyfluthrin, Cypermethrin, Deltamethrin, Esfenvalerate, Gamma-cyhalothrin, Imidacloprid & Beta-cyfluthrin, Lambda-Cyhalothrin, Malathion, Permethrin or Tralomethrin</p>	<p>Trim vegetation and grass to reduce harborage (hiding sites) and increase contact with pests.</p>
<p>Martin's IG Regulator Concentrate w/Nylar, Pyridine 1.3%</p>			<p>Insect growth regulator, best if used in conjunction with an adulticide. If used with an adulticide, necessity of follow-up treatment reduced.</p>

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PEST	PRODUCT TYPE, PRODUCT NAME, % ACTIVE INGREDIENT	METHODS AND RATE OF APPLICATION	REMARKS AND PRECAUTIONS
HOUSE FLIES, BLOW FLIES, STABLE FLIES, DEER FLIES, BLACK FLIES, AND GNATS (outside treatment only)	Aerosol Foggers: Various products available.	Use only under calm conditions in protected areas.	Can provide temporary relief in areas with limited air movement.
	Bait Granules: Methomyl Fly Baits – several products	Primarily for Houses Flies. 1/4 lb. (4 oz.)/500 sq. ft. (Scatter daily, or as needed for quick knockdown.	Avoid placing bait where children, pets or other animals will be exposed.
	Concentrates and Ready To Use Products containing Beta-cyflutrin, Bifenthrin, Cyfluthrin, Cypermethrin, Deltamethrin, Esfenvalerate, Lambda- cyhalothrin, Permethrin		Most efficient control technique is to eliminate larval habitats if possible. Residual products, spray around house foundations, outside of buildings on resting areas, garbage cans, under porches, along fences and shrubbery, border vegetation and other areas flies congregate.
	Malathion		May do a poor job with house flies due to resistance.
	Black Flag Fogging Insecticide, Resmethrin 0.2%	To be used undiluted.	Ideal for use in electric, propane or gas powered foggers available through home improvement and hardware stores.
	Cygon 2E Dimethoate 23.4%	1 pint/3 gals. of water. Spray exposed surfaces such as walls, fences and refuse containers.	Do not contaminate water or food intended for human or animal use. Available through farm supply stores.
	Dibrom, Naled	Can be applied as a thermal fog or ULV non-thermal ground application, or aerial application.	Very corrosive to equipment. Available through mosquito control distributors.
	Traps and Pest Strips:		Suspend in area where flies are active, away from concentrations of human activity.
	No Pest Strip, Dichlorvos 18.6%	Treats 900-1200 cu. ft. area	Not for use in food handling areas. Lasts up to 4 months.
	Quick Strike Fly Abatement Strip, Nithiazine 1%		Traps should not be placed in direct association with areas of human activity. By design, the traps draw flies to them.
Variety of sticky traps and funnel/jug traps			

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<p>LICE – HEAD, BODY AND CRAB</p> <p>For more information see extension publication 851.</p>	<p>Various products available as shampoos, cream rinse, mousse, gels or lotions. Products typically contain either Permethrin or Pyrethrins.</p>	<p>Follow label directions!</p> <p>Inspect head after 7 days, despite label claims, shampoos usually do not kill all eggs present. If live lice or eggs less than 1/4 of an inch from the scalp are seen, a second treatment should be given.</p> <p>Read the label carefully for additional precautions.</p>	<p>Combing with a fine-toothed comb is considered a highly effective technique for eliminating head lice populations.</p> <p>Head lice live on the scalp and lay small white eggs (nits) on individual hair shafts close to the scalp. Nits are most easily found on the nape of the neck or behind the ears.</p> <p>All personal headgear, scarves, coats and bed linen should be disinfected by machine washing in hot water and drying using the hot cycle of the dryer for at least 20 minutes. Personal combs and brushes should be disinfected by soaking in hot water (above 130°F) for 5 to 10 minutes.</p> <p>Vacuuming lounging areas to pickup hairs and lice is helpful. However, head lice can not live off a human host for more than 24 hours.</p>
	<p>Kwell Shampoo, Lindane 1% also available as a lotion and cream — all by physician's prescription only.</p>	<p>Apply sufficient quantity of shampoo to thoroughly wet the hair, thoroughly work into hair and allow to remain for 4 minutes. Add small quantities of water until a good lather forms, rinse thoroughly.</p> <p>The lotion and cream formulations are left in place for 8-12 hours. Read the label carefully.</p>	<p>Avoid contact of shampoo with eyes or other mucous surfaces.</p>
<p>MIDGE LARVAE (Chironomidae)</p>	<p>Granular: Abate 1G or 2 G, Temephos, 1 or 2%</p>	<p>5-10 lbs./acre in standing water. 10-20 lbs./acre in tidal water, marshes and water high in organic content.</p>	<p>Shrimp and crabs may be killed at these rates.</p>
	<p>Provect 1G 1% Temephos</p>	<p>5-20 lbs /acre</p>	<p>Non-target concerns.</p>
	<p>Liquid: Strike, Methoprene 20%</p>	<p>Standing water – 10 lbs./acre for initial dose, supplemental dose for 5- 7.5 lbs./acre required every 21 days.</p> <p>Waste-water treatment sites – 5 ozs. per million gallons of flow for 14 days. Maintenance rate of 2.5-3 ozs. per million gallons will prevent reinfestation.</p>	<p>Will suppress mosquitoes in standing water and filter flies in water treatment sites.</p>

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PEST	PRODUCT TYPE, PRODUCT NAME, % ACTIVE INGREDIENT	METHODS AND RATE OF APPLICATION	REMARKS AND PRECAUTIONS
MIDGE LARVAE (Chironomidae) (cont.)	Agnique, Monomolecular Surface Film, 100%	Fresh water – ponds and lakes, 0.5 gallons/acre. Polluted waters – sewage lagoons and percolation ponds 0.5-1.0 gallons/acre.	Persistence – 5-22 days depending on conditions. 10-14 days most likely. Indicator oil provided to monitor presence of film.
	Vectobac 12AS, <i>Bacillus thuringiensis</i> var. <i>israelensis</i> (Bti) 1200 ITU's	Standing waters less than 6 feet deep, 1 gallon/acre every 14 days. Waste water treatment sites – 20 mg/liter a.i. (1.67 ml) per liter of waste water. Treat for 30 minutes, repeat applications as needed after 2-4 weeks.	Not effective against all midge species, members of the subfamilies Chironomini and Tanytarsini are generally susceptible. Will suppress mosquitoes in standing water and filter flies in water treatment sites.
	Pellet: Bactimos PT, 2-3%, <i>Bacillus thuringiensis</i> subsp. <i>israelensis</i>	18.0 - 26.0 lbs./acre	Target areas where larvae are developing.
MITES, CHIGGERS			See repellents. Keep grass cut short and open to the sun to help reduce chiggers. Permethrin repellent of choice for chiggers. Permethrin is for treating clothing only. Vegetation should not touch legs on walking trails.
	Variety of products available in either concentrate, granule or ready to use formulations Products containing Beta-cyfluthrin, Bifenthrin, Carbaryl, Cyfluthrin, Deltamethrin, Gamma-cyhalothrin, Imidacloprid & Beta-cyfluthrin, Lambda-cyhalothrin, Permethrin or Tralomethrin will all be effective if applied according to label.	Mow grass and trim vegetation prior to insecticide application.	Water lightly, immediately after granule applications.
	Yellow Jacket Wettable Dusting Sulfur, Sulfur 100%	2 lbs./1000 sq. ft.	Apply with enough water for thorough coverage. Treat at weekly intervals and a day or two before protection is desired.
MITES clover mites (outside use only)	Variety of products available in concentrate granular and ready to use formulations. Products containing any of the following active ingredients (Bifenthrin, Cyfluthrin, Deltamethrin, Gamma-cyhalothrin, Imidacloprid & Beta-cyfluthrin, Lambda-cyhalothrin, Malathion, Permethrin, Pyrethrin, and Tralomethrin) will work effectively if used properly.	Spray lower foundation of house as well as ground, lawn and plants in an area 10ft. wide around the perimeter of home. Water lightly, immediately after granule applications.	Keeping the turf from 12-48 inches from the side of the building will help create a barrier for clover mites

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PEST	PRODUCT TYPE, PRODUCT NAME, % ACTIVE INGREDIENT	METHODS AND RATE OF APPLICATION	REMARKS AND PRECAUTIONS
MITES Human itch mite (scabies)	Lotions or Creams: Ellimite, Permethrin (Physician's prescription only) Kwell lotion or cream, Lindane 1% Physician's prescription only.	A physician should be consulted for diagnosis and treatment. The lotion or the cream is applied to dry skin in a thin layer and rubbed in thoroughly. Usually one ounce is sufficient for an adult. A total body application should be made from the neck down. The lotion or cream is left on for 8-12 hours then removed by thorough washing.	Scabies rarely affects the head of children or adults but may occur in infants. One application is usually curative. Read the label carefully. Some itching may continue several weeks after a successful treatment due to dead mites and tunnels still in the skin.
MITES rodent mites, bird mites	Few products specifically labeled for these pests. Products labeled for perimeter pests would be effective. Mites are not typically hard to control off their host.	Treat in cracks and crevices, attics, between walls, or other dry inconspicuous areas harboring mites.	Various mites that feed on rodents or birds will readily attack man, especially when the normal host is not available (dead, migrated, etc.) or large populations develop. Biting can cause severe itching and discomfort. Remove the nest if possible and exclude hosts.
STRAW ITCH MITES	Pyrethrins (various formulations)	In a kitchen, spray infested area after removing food.	Mites are parasitic on the larva of grain and cereal insects. Mites readily bite man when in contact with infested hay, straw, or stored grain or flour. Can cause intense itching, and fever. Remove infested materials. To prevent, keep products dry. For a residue in a food handling area, select one of the insecticides labeled for spraying of cockroaches. Apply to infested area following label instructions.
MOSQUITOES homeowner larval stage	Agnique MMF	0.2 - 1.0 gal/acre	Effective against larvae and pupae. Can be used in pet waters.
	Vectolex (<i>Bacillus sphaericus</i>)	5 - 20 lbs./acre	Very effective against the <i>Culex</i> species. Some residual control, reapply as needed after 2 - 4 weeks.
	Water Soluble Pouch available	1 pouch/50 sq. ft.	
	<i>Bacillus thuringiensis</i> , subsp. <i>israelensis</i> (Bti) – Mosquito Dunks – Briquets	1/100 Sq. Ft.	Very safe and effective. Retreat as needed.
	Bti (various formulations)	Varies by formulation	Treatments need to be repeated every 7-12 days.
	Altosid Briquets (methoprene)	1/100 sq. ft.	30 day residual.

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MOSQUITOES homeowner larval stage (cont.)	Pre-Strike Granules (methoprene)	1 lb./800sq. ft.	21 day residual – available in pet stores. Can be use in pet waters.
	Temephos (several formuatiions)		Good choice for treating used tires.
MOSQUITOES homeowner adult mosquitoes (out- side treatment only)	Aerosol Foggers: Variety of products available.	Spray areas infested with mosquitoes with a slow sweeping motion while moving away from treated area. Spray when air is still. Repeat if necessary.	For temporary relief over limited areas.
	Surface Residuals: Variety of products available. Products contain Bifenthrin, Carbaryl, Cyfluthrin, Cypermethrin, Deltamethrin, Gamma- cyhalothrin, Imidacloprid & Beta-cyfluthrin, Lambda-cyhalothrin, Malathion, Permethrin, Tralomethrin are all effective if used properly.	Wet surfaces uniformly, carefully treat vegetation, trying to coat bottom surfaces of leaves on shrubbery.	
	Black Flag Fogging Insecticide, Resmethrin 0.2%	For use in electric, propane, or gas powered thermal fogger (available from Sears, Ace Hardware, Lowes, Home Depot, and probably others).	Follow manufactures and label directions carefully. For temporary relief over limited areas.
	TRAPS: Several types of insect traps are sold for mosquito control. These would include the Mosquito Magnet, Flowtron Power Trap, The Dragon-Fly and traditional “bug-zappers” as well as others. While all of these traps will usually catch and kill mosquitoes, it is important to carefully read the operating instructions to be certain that the trap you plan to purchase has been shown to be effective against the species of mosquito that you have present.		
	CANDLES, LAMPS & TORCHES: Typically these devices contain citronella or allethrin. These devices can be effective in repelling mosquitoes in enclosed areas or under still conditions. Moderate air movement will significantly reduce effectiveness.		
MOTH FLIES (larval stage)	Concentrate – EC: Strike, Methoprene	Wastewater treatment sites – 5 ozs. per million gallons of flow for 14 days. Maintenance rate of 2.5 - 3.0 ozs. per million gallons of flow will prevent reinfestation.	Metering pumps are the most efficient and accurate application method. Will also suppress midge larvae.
	Biological Control Agent: Vectobac 12AS, <i>Bacillus thuringiensis</i> var. <i>isrealensis</i> (Bti)	Wastewater treatment sites – 10 - 20 mg/liter a.i. (0.833-1.67 ml) per liter of wastewater. Treat for 30 minutes, repeat applications as needed after 2 - 4 weeks.	Does not damage the zoogloea in wastewater, filters and adds no chemicals to the discharges of receiving rivers and streams.
MOTH FLIES filter flies in sewage treatment plants	ULV Concentrate: Most mosquito adulticides are also labeled for “nuisance flies” and would be effective for short term suppression of a pest population. Follow label instructions.		
	Perimeter Treatments Concentrate – EC: Permethrin , bifenthrin, deltamethrin		Various formulations are available as a perimeter or barrier treatment.

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PERIMETER PESTS: Centipedes, Millipedes, Scorpions, Spiders (outside treatment only) (cont.)		To prevent pests from entering building, spray a 5 ft. band of soil around the house next to the foundation to a height of 2 - 3 ft. Thoroughly spray any piles of firewood, debris and other outside areas where they are found.	Removing piles of wood and trash close to inhabited areas will reduce harborage areas. Removing mulch at least 3 ft. from sides of buildings will reduce millipede breeding. Do not burn sprayed firewood within 2 weeks following treatment.
	A variety of products available in either concentrate, granular or ready to use formulations.		
	Any product with one of the following active ingredients (Bifenthrin, Carbaryl, Cyfluthrin, Cypermethrin, Deltamethrin, Esfenvalerate, Gamma-cyhalothrin, Imidacloprid, Lambda-cyhalothrin or Permethrin) will be effective if used according to the label.		
TICKS – brown dog and spot treatments outside	Concentrate – EC: Any product containing Bifenthrin, Carbaryl, Cyfluthrin, Cypermethrin, Esfenvalerate, Permethrin, Tralomethrin Dusts: 5 or 10% Carbaryl (several products available)	Carbaryl or Permethrin suggested for Brown Dog Tick Treatments 2 - 4 lbs/1000 sq. ft.	Tick control is best conducted as part of a comprehensive program, where the animals involved, their bedding and indoor and outdoor areas that they use are all treated. Standard residual treatment would involve thoroughly spraying window frames, door sills, porch and patio walls, foundations, cracks and crevices. Spray 5 ft. band around the house, 2 - 3 ft. up wall. Best applied after rain and with no rain or irrigation for 48 hours post-treatment.
	Granules: Any products containing Bifenthrin, Imidacloprid & Beta-cyfluthrin, Deltamethrin, Gamma-cyhalothrin, Lambda-cyhalothrin, Permethrin Ready to use/hose end: Any products containing Bifenthrin, Cyfluthrin, Deltamethrin, Lambda-cyhalothrin, Permethrin or Tralomethrin		Perimeter treatment to building surfaces and ground treatment.

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<p>TICKS – area-wide treatment: campgrounds, picnic areas, footpaths, recreational parks, backyards and other outside</p>			<p>Large scale tick control is a difficult task. It is important to keep vegetation mowed and trails cleared where the majority of human activity occurs. By eliminating the majority of vegetation that will contact hiker's legs a large percentage of tick contacts can be eliminated. Walking trails should be cut as low as possible.</p>
	<p>Granular:</p> <p>Basic Solutions Lawn and Garden Insect Killer, 0.1% Bifenthrin</p> <p>Bayer Advanced Multi-Insect Killer 0.1% Cyfluthrin</p> <p>Bayer Advanced Lawn, Complete Insect Killer for Soil & Turf, 0.15% Imidacloprid & 0.05% Beta-cyfluthrin</p> <p>Spectracide Triazicide Soil & Turf Insect Killer Granules, 0.04% Lambda-cyhalothrin</p> <p>Spectracide Bug Stop Insect Control Granules, 0.25% Permethrin</p>	<p>1.2 lbs./500 sq. ft.</p> <p>2 - 3 lbs./1000 sq. ft.</p> <p>2 - 3 lbs./1000 sq. ft.</p>	<p>Granular formulations usually work best if lightly watered after application.</p>
	<p>Concentrate EC:</p> <p>Esfenvalerate, Permethrin, various products</p>		<p>Uniform coverage important.</p>
	<p>Concentrate WP:</p> <p>Rabon 50WP</p>	<p>2 lb. formulation/25 gals. to treat about one acre.</p>	<p>Most readily available through poultry supply dealers. This is the chemical of choice.</p>