

ANIMALS

PETS (COMPANION ANIMALS) EXTERNAL PARASITE CONTROL

Nancy Hinkle, Extension Veterinary Entomologist

Fleas and ticks are found not only on animals, but also in the environment. While on-host treatment is important in suppressing these pests, environmental management is an essential component of flea control.

Indoors, flea control should be concentrated on areas where the pets spend the most time, such as around their bed. In addition to insecticide applications, good sanitation should be incorporated to reduce flea populations. Daily vacuuming will serve to remove flea eggs before they hatch; the vacuum cleaner bag should then be sealed in a plastic trash bag and disposed of outside in a secure trash bin, to prevent flea escape. Inclusion of an insect growth regulator along with the adulticide will assist in breaking the flea life cycle and more rapidly bringing a flea problem under control.

Outdoors, habitats should be targeted where fleas are likely to be found. Fleas cannot survive in sunlit areas, so efforts should be concentrated on shaded areas with high humidity and minimal air movement, such as around foundations, under porches and decks, and in crawl spaces. Outbuildings can also be flea sources, especially if they house feral animals or wildlife (such as opossums, raccoons, skunks, etc.). Buildings should be sealed to prevent use by wildlife and feral animals. Similarly, crawl spaces should be closed off so animals cannot gain access.

Because fleas can remain within the cocoon following development from the larva to the adult stage, protected from insecticides, flea population reduction can be a long-term process. No insecticide can effectively target fleas still in the cocoon, so there is no immediate flea suppression method. The best method of flea control is flea prevention, meaning actions should be taken early in the season to prevent fleas from developing on the hosts and to prevent wild hosts from sharing their fleas with pets.

Home remedies are rarely effective against fleas and ticks, so be suspicious of recommendations found on the Web. Boric acid does not kill adult fleas. Diatomaceous earth should not be used on dogs or cats (or any other animals). Garlic does not kill fleas. Brewer's yeast does not kill fleas. Ultrasonic devices do not kill fleas.

Pet owners should seek professional advice and assistance from veterinarians, licensed pest management professionals, and Cooperative Extension agents when dealing with flea and tick control. Always read and follow label directions in the use of any pesticide. You do not want to kill your pet in a misdirected effort to suppress fleas. Inappropriate pesticide use can damage home furnishings and plants, not to mention endangering the life and health of pets and people.

ENVIRONMENTAL FLEA AND TICK CONTROL PRODUCTS

PARASITE CONTROLLED	MATERIAL BRAND NAME	FORMULATION	SITE
Fleas, Ticks	<i>acetamiprid + bifenthrin</i> Transport Mikron	Spray	Indoor, outdoor
Fleas, ticks	<i>beta-cyfluthrin</i> BioAdvanced Home Pest	Spray	Outdoor
Fleas, Ticks	<i>bifenthrin</i> Bifen I/T	Spray	Indoor, outdoor
Fleas, Ticks	<i>bifenthrin + zeta cypermethrin</i> Ortho Home Defense	Spray	Indoor, outdoor
Fleas, Ticks	<i>deltamethrin</i> Suspend SC	Spray	Indoor, outdoor
Fleas	<i>dinotefuran</i> Alpine Water Soluble Granule	Spray	Indoor, outdoor

PARASITE CONTROLLED	MATERIAL BRAND NAME	FORMULATION	SITE
Fleas	<i>dinotefuran + prallethrin + pyriproxyfen</i> Intrepid 2F, PT Alpine Flea and Bed Bug Aerosol	Aerosol	Indoor
Fleas, Ticks	<i>esfenvalerate</i> Onslaught Insecticide, FenvaStar EcoCap	Spray	Indoor, outdoor
Fleas, Ticks	<i>esfenvalerate</i> Conquer	Spray	Outdoor
Fleas, Ticks	<i>gamma-cyhalothrin</i> Spectracide Triazicide Insect Killer	Spray	Outdoor
Fleas, Ticks	<i>imidacloprid + phenothrin</i> Bedlam Plus	Aerosol	Indoor
Fleas, Ticks	<i>imidacloprid + beta-cyfluthrin</i> BioAdvanced Home Pest Bed Bug & Flea Killer	Spray	Indoor
Fleas, Ticks	<i>lambda-cyhalothrin + pyriproxyfen</i> Black Flag Flea and Tick Spray	Spray	Indoor
Fleas	<i>methoprene</i> Precor 2000 Plus Premise Spray	Spray	Indoor
Fleas, Ticks	<i>permethrin</i> Tengard SFR Permethrin	Spray	Indoor, outdoor
Fleas	<i>pyriproxyfen</i> NyGuard Plus, Tekko Pro, Archer IGR	Spray	Indoor
Fleas	<i>tetramethrin + pyrethrins + methoprene</i> Raid Flea Carpet and Room	Spray	Indoor
Fleas, Ticks	<i>thiamethoxam + lambda-cyhalothrin</i> DemandDuo	Spray	Indoor, Outdoor

PET BIRDS

PARASITE CONTROLLED	MATERIAL BRAND NAME	FORMULATION	SITE
Mites, Lice, Fleas	<i>pyrethrins + piperonyl butoxide</i> (Many Available)	Aerosol	Indoor

FLEA CONTROL PRODUCTS

Nancy Hinkle, Extension Veterinary Entomologist

Adult fleas spend their entire lives on their host(s) or people. As they are laid, flea eggs fall off the animal and collect in the environment (carpet or dirt). Flea larvae emerge from eggs within a couple of days and crawl around, eating their parents' feces. In about two weeks, the larva has completed its development and is ready to spin a cocoon within which it will change into an adult. Once this metamorphosis has taken place, the adult flea remains within the cocoon until it is stimulated to emerge. If a host is not present, an unemerged flea can remain within its cocoon for months, allowing a flea infestation to persist for long periods without an

animal around. Cues that signal a nearby host include movement, heat, and carbon dioxide (exhaled by all mammals). Upon detecting one of these stimuli, the flea bursts from the cocoon and hops toward the host. It repeatedly flings itself against the host until its claws catch. To avoid being groomed off or knocked loose, the flea burrows into the host's coat. Adult fleas must suck blood once an hour, so they never leave the host. Once on the host, fleas live for two or three weeks.

Fleas can live on wild animals such as opossums, raccoons, foxes, skunks, etc., so it is important to discour-

FLEA CONTROL PRODUCTS

age wild animals from visiting your yard and sharing their fleas. Do not leave pet food outside at night, and seal garbage cans to prevent attracting wildlife. Cover the openings to crawl spaces with screens, and do not allow wild animals to den under the house, in the attic, or in outbuildings.

Because flea eggs, larvae, and pupae are dispersed in the environment, they are very difficult to control. Daily vacuuming helps suppress fleas indoors. The most efficient flea control method is to treat the host (dog or

cat) and kill adult fleas before they can reproduce. Pets should be treated early in the spring, before fleas become a problem, to prevent large populations becoming established in the environment. Over-the-counter products, while less expensive, do not contain the same ingredients as those obtained through veterinarians that may be more effective. Numerous counterfeit products are being marketed on the Web; don't endanger your pet's health by risking use of products with unknown ingredients. Always read and follow label directions. Pesticides can sicken or kill pets and people if used incorrectly.

HOST-APPLIED FLEA PRODUCTS

PARASITE CONTROLLED	MATERIAL BRAND NAME	FORMULATION	TREATMENT INTERVAL	PET
Fleas, ticks	<i>afloxolaner</i> NexGard	chewable	once/month	dogs
Ticks	<i>amitraz</i> Preventic Tick Collar	collar	once/3 months	dogs
Fleas, ticks, lice	<i>cyphenothrin + fipronil</i> Sentry FiproGuard Max for Dogs	topical	once/month	dogs
Fleas, ticks	<i>deltamethrin</i> Scalibor	collar	once/6 months	dogs
Fleas, ticks	<i>deltamethrin</i> Activyl Band	collar	once/6 months	dogs
Fleas	<i>dinotefuran + pyriproxyfen</i> Vectra	topical	once/month	cats
Fleas, ticks	<i>dinotefuran + pyriproxyfen + permethrin</i> Vectra 3D	topical	once/month	dogs
Fleas, ticks	<i>etofenprox</i> Sergeant's Silver Squeeze-On for Cats & Kittens	topical	once/month	cats
Fleas, ticks	<i>etofenprox + fipronil</i> Sentry FiproGuard Max for Cats	topical	once/month	cats
Fleas, ticks	<i>etofenprox + methoprene</i> Petcor 2 Flea & Tick Spray	spray	twice/month	dogs
Fleas, ticks	<i>etofenprox + methoprene</i> Petcor 2 Flea & Tick Spray, Zodiac Spot On Plus Flea Control	spray	once/month	cats
Fleas, ticks	<i>etofenprox + pyriproxyfen</i> Sergeant's Gold Squeeze-On for Cats & Kittens, Sentry Purrscriptions Plus	topical	once/month	cats
Fleas, ticks	<i>etofenprox + pyriproxyfen</i> Sergeant's Evolve 11 Flea & Tick Squeeze-On for Dogs	topical	once/month	dogs
Fleas, ticks	<i>etofenprox + pyriproxyfen + methoprene</i> Hartz UltraGuard Pro	topical	once/month	dogs, cats

PARASITE CONTROLLED	MATERIAL BRAND NAME	FORMULATION	TREATMENT INTERVAL	PET
Fleas, ticks, lice	<i>fipronil</i> ShieldTec for Cats	topical	once/month	cats
Fleas, ticks, lice	<i>fipronil</i> Pronyl OTC for Cats	topical	once/month	cats
Fleas, ticks, lice, mites	<i>fipronil + cyphenothrin + methoprene</i> Frontline Tritak for Dogs	topical	once/month	dogs
Fleas, ticks, lice	<i>fipronil + etofenprox + methoprene</i> Frontline Tritak for Cats	topical	once/month	cats
Fleas, ticks, lice	<i>fipronil + methoprene</i> Frontline Plus for Cats	topical	once/month	cats
Fleas, ticks, lice	<i>fipronil + methoprene</i> PetArmor Plus	topical	once/month	dogs
Fleas, ticks, lice	<i>fipronil + methoprene</i> Pronyl OTC Plus for Dogs	topical	once/month	dogs
Fleas, ticks, lice	<i>fipronil + pyriproxyfen</i> EffiPro Plus for dogs	topical	once/month	dogs
Fleas, ticks, lice	<i>fipronil + pyriproxyfen</i> EffiPro Plus for cats	topical	once/month	cats
Fleas, ticks, lice	<i>fipronil + permethrin + pyriproxyfen</i> EffiTix Plus for dogs	topical	once/month	dogs
Fleas, ticks	<i>flumethrin + imidacloprid</i> Seresto Flea & Tick Collar for Cats	collar	once/8 months	cats
Fleas, ticks, lice	<i>flumethrin + imidacloprid</i> Seresto Flea & Tick Collar for Dogs	collar	once/8 months	dogs
Fleas, ticks	<i>fluralaner</i> Bravecto Topical for Cats	topical	once/3 months	cats
Fleas	<i>fluralaner + moxidectin</i> Bravecto Plus	topical	once/2 months	cats
Fleas, ticks	<i>fluralaner</i> Bravecto Topical for Dogs	topical	once/3 months	dogs
Fleas, ticks	<i>fluralaner</i> Bravecto Chewable for Dogs	chewable	once/3 months	dogs
Fleas, lice	<i>imidacloprid + pyriproxyfen</i> Advantage II for Dogs, PetArmor Advanced 2	topical	once/month	dogs
Fleas	<i>imidacloprid + pyriproxyfen</i> Advantage II for Cats	topical	once/month	cats
Fleas, ear mites	<i>imidacloprid + moxidectin</i> Advantage Multi	topical	once/month	cats, ferrets
Fleas, mange mites	<i>imidacloprid + moxidectin</i> Advantage Multi	topical	once/month	dogs
Fleas	<i>imidacloprid + permethrin + pyriproxyfen</i> Advecta II for Dogs	topical	once/month	dogs
Fleas	<i>imidacloprid + pyriproxyfen</i> Advecta II for Cats	topical	once/month	cats

FLEA CONTROL PRODUCTS

PARASITE CONTROLLED	MATERIAL BRAND NAME	FORMULATION	TREATMENT INTERVAL	PET
Fleas	<i>indoxacarb</i> Activyl for Dogs	topical	once/month	dogs
Fleas	<i>indoxacarb</i> Activyl for Cats	topical	once/month	cats
Fleas, ticks	<i>lotilaner</i> Credelio	chewable	once/month	dogs
Fleas	<i>lufenuron</i> Sentinel Spectrum	chewable	once/month	dogs
Fleas	<i>lufenuron</i> Sentinel Flavor Tabs	chewable	once/month	dogs
Fleas	<i>nitfenpyram</i> Capstar	tablets	once/day	dogs, cats
Fleas, ticks, lice	<i>permethrin + pyriproxyfen</i> ShieldTec Plus for Dogs	topical	once/month	dogs
Fleas	<i>pyrethrins + methoprene</i> Zoecon Petcor Flea Spray, Zodiac Fleatrol, VetKem Ovitrol	topical spray	once/week	dogs, cats
Fleas, ticks	<i>sarolaner</i> Simparica	chewable	once/month	dogs
Fleas, ticks	<i>sarolaner + moxidectin</i> Simparica Trio	chewable	once/month	dogs
Fleas, ticks, mites	<i>selamectin</i> Revolution	topical	once/month	dogs, cats
Fleas, ticks, mites	<i>selamectin</i> Senegey for Dogs and Cats	topical	once/month	dogs, cats
Fleas, ticks, ear mites	<i>selamectin + sarolaner</i> Revolution Plus	topical	once/month	cats
Fleas	<i>spinetoram</i> Cheristin for Cats	topical	once/month	cats
Fleas	<i>spinosad</i> Comfortis	chewable	once/month	cats
Fleas	<i>spinosad</i> Trifexis	chewable	once/month	dogs
Fleas, ticks	<i>tetrachlorvinphos + methoprene</i> Hartz UltraGuard Pro Flea & Tick Treatment for Dogs	topical	once/week	dogs
Fleas, ticks	<i>tetrachlorvinphos + methoprene</i> Hartz UltraGuard Plus Flea & Tick Spray for Cats	spray	once/week	cats

HONEY BEE DISEASE AND PEST CONTROL

Keith S. Delaplane, Extension Entomologist

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
American foulbrood (AFB)	Effective Jan. 1, 2017, the antibiotics <i>oxytetracycline</i> (Terramycin), <i>tylosin</i> (Tylan) and <i>lincomycin</i> (Lincomix) are available for treating symptoms of AFB, but only under a Veterinary Feed Directive (VFD) prescribed by a licensed veterinarian.	Allowable rates and dosages are by veterinary prescription or by written Veterinary Feed Directive (VFD) instructions obtained from a licensed veterinarian.	Antibiotics are not effective against this disease and serve only to mask symptoms. If symptoms are restricted to one comb, it may be possible to eliminate the disease by removing, burning, and burying the affected comb and requeening the colony with stock genetically selected for AFB-resistant hygienic behavior. If symptoms recur (very probable), then the colony must be burned. Kill the colony by wrapping it completely in a large plastic trash sack and allowing it to suffocate in the heat of the day. Dig a pit and burn all bees, combs, and frames. Bottom boards, supers, and lids can be salvaged by scorching their interiors with a torch. As a general practice, do not feed bees honey from unknown sources and exercise caution when purchasing used equipment. The disease is highly communicable by contact, whether by contaminated food, equipment, or drifting bees.
European foulbrood (EFB)	Same as for American foulbrood.	Same as for American foulbrood.	These drugs are for preventing and treating disease. Treat in February and September and never within 4 weeks of a marketable nectar flow. Help infected colonies by adding unsealed brood and feeding 1:1 sugar syrup. Use hygienic-selected bee stick.
Chalkbrood	None		Keep hives well-ventilated. Prop lid slightly to exhaust warm, damp air. Lean hive forward to drain rain water from interior. Use bee stock selected for hygienic behavior.
Nosema	<i>fumidil-B</i>	Product is expected to be released October 2019. Please read product label for mixing and application instructions.	Feed medicated syrup in spring and fall and never immediately before a marketable nectar flow. Keep hives well-ventilated. Prop lid slightly to exhaust warm, damp air. Lean hive forward to drain rain water from interior.
Small hive beetles	For treatment inside colonies: Adult beetles can be trapped and drowned in vegetable oil with any of the numerous in-hive adult beetle traps available by bee suppliers. Some beekeepers report success at trapping adults with sheets of micro-fiber cloth laid on top of brood combs. These cloths are widely used in the automobile detailing industry. Beetles—and a small number of bees—get entangled and die in the fibers. In-hive trapping should be done in conjunction with soil nematodes to optimize beetle control.		
	<i>permethrin</i> GardStar 40% EC	For treatment outside colonies: Mix 5 millimeters GardStar concentrate with 1 gallon water. Thoroughly wet ground in an area 18–24 inches wide in front of each hive (1 gal/6 hives).	Product is designed to kill immature beetles when they leave hive in order to pupate in the soil. Product is highly toxic to bees. Avoid direct spray onto hive surfaces. Apply in late evening after bees become inactive. For pre-placement cleanup of new apiary site, apply thoroughly to ground surface 24–48 hours prior to hive placement.
	<i>Heterohabditis indica</i> predatory soil nematodes (Southeastern Insectaries, Perry, GA)	For treatment outside colonies: Mix 1 million infective juveniles in 2 gallons water per colony. Strain out gelatin globules and trickle solution on ground in front of hive. Treat ground under hive if screen bottoms are used.	Management: Predatory nematodes have been shown to effectively kill SHB pupae in soil in front of hives.

HONEY BEE DISEASE AND PEST CONTROL

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
Tracheal mites This mite is now rarely seen in Georgia and treatments are not recommended.	menthol	one 1.8 oz packet per colony	Do not use on hives containing marketable honey. Enclose 1.8 oz menthol in a 7-inch square plastic (or other porous) screen packet. Treat colonies in fall and early spring and only when daytime highs range from 60–90°F. If daytime high is > 80°F, place packet on bottom board. If daytime high is 60–79°F, place packet on top bars. Replace menthol as needed. Remove all menthol 10–12 weeks after first treatment and at least 1 month before nectar flows. Vegetable oil in the medicated extender patty described below helps control AFB, EFB and tracheal mites.
	oil patties	Mix patties with 2 parts sugar and 1 part vegetable cooking shortening. Each patty should be 0.5 lb.	Place oil patty on top bars of brood frames. Treatments applied February through April are most effective.
Varroa mites	Population growth of mites can be limited by use of genetically-selected mite resistant stock, screened bottom boards, and spring- time drone brood trapping. For the latter, a drawn comb of drone cells is inserted in the hive in early spring. Bees fill it with drone pupae, and once the brood is capped, the beekeeper removes the frame, freezes it (killing mites along with the brood), then returns it to the hive so the bees can eat the brood and recover some of their nutrient investment. Because mites significantly prefer drone brood, a large fraction of the mite population will be removed and killed with this procedure. Any of the mite treatments below will be more effective at times of year when brood area is naturally low. It is especially important to treat in late summer/early autumn in order to protect the bees destined to form the overwintering cluster.		
	<i>fluvalinate</i> Apistan This product is now widely ineffective due to evolved mite resistance.	1 strip for each 5 combs of bees in each brood chamber	Do not use on hives containing marketable honey. Hang one strip between frames 3 and 4, and another strip between frames 7 and 8. Leave strips in hive for 42–56 days. Apistan treatments are usually most effective when used in early fall.
	<i>coumaphos</i> CheckMite+ Strip This product is now widely ineffective due to evolved mite resistance.	1 strip for each 5 combs of bees in each brood chamber	Remove honey supers before application of CheckMite+Strips and do not replace until 14 days after the strips are removed. Hang the strips within two combs of the edge of the bee cluster. If two deep supers are used for the brood nest, hang CheckMite+ Strips in alternate corners of the cluster, in the top and bottom super. Treat all infested colonies within yard. The treatment is most effective when brood rearing is lowest. Do not treat when surplus honey is being produced. Leave the strips in the hive for at least 42 days (six weeks), but do not leave strips in hive for more than 45 days. Do not treat more than twice a year for varroa mites.
	<i>thymol</i> Apiguard	1 tray per colony, repeated after 2 weeks	Open the hive. Peel back the foil lid of the Apiguard tray leaving one corner of the lid attached to the tray. Place the open tray centrally on top of the brood frames, gel side up. Ensure that there is a free space of at least 0.5-inch between the top of the tray and the hive cover board, for example, by placing an empty super on top of the brood box. Close the hive. After two weeks replace the first tray with a new one, according to the same instruction. Leave the product in the colony until the tray is empty. Remove the product when installing the supers on the colony. The efficacy of Apiguard is maximized if the product is used in late summer after the honey harvest (when the amount of the brood present is diminishing). However, in the case of severe infestations, Apiguard can also be used during springtime, when temperatures are above 60° F. Efficacy will vary between colonies due to the nature of the application. Therefore, Apiguard should be used as one treatment among others within an Integrated Pest Management program, and mite fall regularly monitored. If further significant mite fall is observed during the following winter or spring, use an additional secondary winter or spring treatment for varroa.

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
<p>Varroa mites (continued)</p>	<p><i>oxalic acid</i></p>	<ol style="list-style-type: none"> <li data-bbox="570 268 880 724"> <p>1. Solution method: Dissolve 35 g of Oxalic Acid Dihydrate in 1 liter of 1:1 sugar: water (weight:volume). Smoke bees down from the top bars. With a syringe or an applicator, trickle 5 ml of this solution directly onto the bees in each occupied bee space in each brood box. The maximum dose is 50 ml per colony whether bees are in nucs, single, or multiple brood chambers. Under certain unfavorable conditions (e.g., weak colonies, unfavorable overwintering conditions), this application method may cause some bee mortality or overwintering bee loss.</p> <li data-bbox="570 730 880 1081"> <p>2. Vaporizer method: Apply only to outdoor colonies with a restricted lower hive entrance. Seal all upper hive entrances and cracks with tape to avoid escape of Oxalic Acid vapor. Smoke bees up from the bottom board. Place 1.0 g Oxalic Acid Dihydrate powder into vaporizer. Follow the vaporizer manufacturer's directions for use. Insert the vaporizer apparatus through the bottom entrance. Apply heat until all Oxalic Acid has sublimated.</p> <li data-bbox="570 1087 880 1753"> <p>3. Spraying package bees: Ensure bees are clustered before applying oxalic acid (for example, store in cool dark location 24 hours before application). Spray broodless package bees with a 1:1 sugar:water solution at least 2 hours before spraying with oxalic acid. This allows bees to fill honey stomachs with sugar water reducing ingestion of oxalic acid. Mix a 2.8% oxalic acid solution by dissolving 35 g of Oxalic Acid Dihydrate in 1 liter of 1:1 sugar: water (weight:volume). Evenly apply 3.0 mL of 2.8% oxalic acid solution per 1,000 bees using a pump sprayer or battery powered sprayer (for example, a typical 2 lb package contains approximately 7,000 bees which requires 21 mL of solution). Apply solution evenly on both sides of the package. Store bees in a cool darkened room for 72 hours before hiving.</p> 	<p>Product is extremely hazardous. Observe all labeled instructions for protective clothing and handling practices.</p>

HONEY BEE DISEASE AND PEST CONTROL

PEST	MATERIAL AND FORMULATION	RATE	REMARKS AND PRECAUTIONS
Varroa mites (continued)	<i>thymol</i> ApiLife VAR	1 treatment consists of 3 wafers over 26–32 days	<p>Applications can be made in any season (spring, summer, fall, winter) in which all applicable restrictions, precautions and directions for use can be followed. Do not use when surplus honey supers are in place. Use when average daily temperatures are between 59–69°F. Do not use ApiLife VAR at temperatures above 90°F.</p> <p>Two treatments per year may be made. A treatment (3 tablets) consists of the following:</p> <p>Take one tablet and break into four equal pieces. Place pieces on the top corners of the hive body. Avoid placing pieces directly above the brood nest. After 7–10 days, replace with a fresh tablet broken in to pieces as above. Repeat procedure again 7–10 days later and leave last tablet for 12 days. After 12 days, remove residuals from the colony.</p> <p>To prevent the bees from gnawing the tablet either enclose each piece of tablet in an envelope of screen wire (8 mesh/ inch) or place the uncovered pieces above a sheet of metal screen that prevents bees from contacting it.</p> <p>Remove ApiLife VAR tablets from hive at least 1 month (30 days) prior to harvesting the honey.</p>
	<i>formic acid</i> Mite-Away Quick Strips		<p>Optimal treatment season is spring or fall corresponding to optimal temperature windows described below. Outside daytime temperature highs should be between 50–92°F. Temperatures >95°F during the first three days of treatment can cause excessive brood mortality and absconding. Remove strips from pouch. For hives with single brood chambers lay two strips across the top bars of the frames of the brood chambers, staggering them so they lay flat and across the full width of the hive body, with approximately 2 inches between strips and 4 inches between the ends of the brood chamber and the outer edges of the strips. For hives with two brood chambers place the strips as described above on the frame top bars of the lower hive body, so the strips are in-between the brood chambers. Put on honey supers if a honey flow is anticipated. The active ingredient dissipates after 3 days; however, do not disturb the colony for 7 days to allow it to recover from manipulation. Spent strips need not be removed after use.</p>
Wax moths	<i>paradichlorobenzene</i> PDB moth crystals	Stack stored supers, cover stack and make air-tight with newspaper or duct tape. At intervals equal to the height of 5 deep supers or 10 shallow supers, insert 6 tablespoons of PDB. Put crystals on a small piece of cardboard placed on top bars of frames. Replace crystals as they evaporate. Air-out supers before using on live bee hives.	Wax moths are secondary scavengers. Wax moths in living colonies indicate an underlying problem. Check for queenlessness, disease, or mites. Protect stored combs by: (1) storing them on top of strong colonies, (2) freezing combs and supers, then stacking them and taping shut all cracks to exclude moths, (3) stacking combs so they are constantly exposed to air and daylight, (4) operating an electronic “bug zapper” in the super storage room to kill adult moths, (5) using PDB crystals.