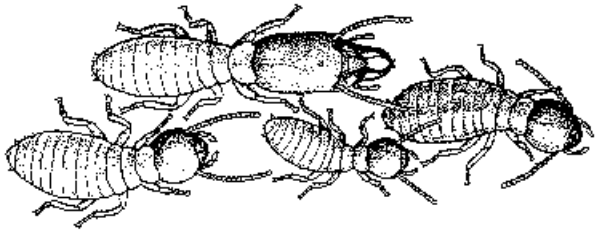

Chapter 6

Conventional Termiticide Treatments

The chemical treatment of soil around and under foundations of buildings to protect them from termite attack is the conventional approach that has been in common use for at least 50 years. The treatment results in a *chemical barrier* that repels or kills termites as they tunnel into or near the treated area. The ability of the barrier to withstand the efforts by termites to enter the structure is influenced by several factors that are discussed in the next section.

Factors Affecting Termiticide Application

The soil type and its moisture content affect the penetration and stickiness of liquid termiticides. If the soil is excessively wet, there is a chance of termiticide runoff and a chance that the chemical will not penetrate into and/or stick to the soil. In frozen or excessively dry soil, termiticides are repelled and puddling occurs, resulting in poor distribution of the termiticide. All liquid termiticide labels prohibit applications to be made into water-saturated or frozen soil.

Mechanical disturbance of treated soil breaks the continuity of the termiticide barrier and increases the possibility of termites crossing the barrier. When the soil under a slab is treated, the termiticide penetrates less than 2 inches, with the majority of the termiticide being found in the top 3/4 of an inch. Therefore, very little disturbance of the treated soil can be tolerated. A slab-foundation site freshly treated during construction, for example, should be protected from rain and evaporation, unless the concrete is to be poured the same day. Treatment of the outside of foundation walls during construction should be done after all grading and other soil disturbances have been completed to avoid disrupting the continuous barrier.

Liquid termiticides are not easily moved or disturbed once dry in the soil. Since they don't dissolve in water, movement from the soil is not a problem. However, there is a slight risk of contaminating a well or other water supply if liquid termiticides are applied to adjacent soil that either contains layers of gravel or tends to crack severely during periods of drought. In these situations, the soil should not be treated by trenching and rodding. Instead, it should be treated using the treated backfill method.

Methods of Application

The objective of applying a termiticide to soil is to provide an unbroken chemical barrier between the wood in the structure and termite colonies in the soil. Thus, the termiticide must be applied thoroughly and uniformly to block all routes of termite entry. Treatment must be done around all pipes, utility conduits, foundations, and footings that contact the soil. Application procedures will depend on the soil type, grading, water table, presence of drainage tile, and the location of any wells in the area. The design of the structure, location of the colony, severity of infestation, and the termites' behavior must also be considered. The overall principle in conventional termiticide barrier termite control is to make it impossible for termites to move between their colony in the ground and the wood in the structure. If a portion of a structure remains unprotected, termites may gain entrance into the building.

Three common methods of applying termiticides to soils are broadcast spraying, subslab injection, and trenching/rodding. A low-pressure broadcast spray may be used to apply termiticides as a preconstruction treatment before slabs are poured or as a postconstruction treatment of inaccessible crawl spaces.

Trenching and rodding involves digging a narrow trench and then rodding into the soil at the bottom of the trench. The trench is also flooded, and the excavated soil is mixed with termiticide as the soil is replaced into the trench. The trench is dug right next to the face of the foundation wall or the masonry-work footing of any supporting posts or piers. The trench should never extend below the top of the footing of the foundation wall. Depending on the depth from the soil surface to the top of the footing, trenching may be done alone.

Rodding the soil is accomplished by applying the termiticide through hollow steel tubes inserted into soil at the bottom of a trench. A rod is usually made of a pipe, ½ of an inch in diameter and between 4 to 8 feet long, with a handle and shut-off valve at one end. The other end is fitted with a perforated tip to disperse the liquid laterally as well as downward. The termiticide is applied as the rod is moved slowly downward, allowing the termiticide to spread. The rod is never pushed down and then brought up as the termiticide is applied. To assure that an excessive amount of termiticide does not accumulate at the bottom of the rodding point, the termiticide is not applied as the rod is brought back up through the soil.

Exterior Perimeter Treatments

Recently, "exterior only" and "exterior mostly" treatments are being advocated by some pest management professionals. The method calls for applications of the newer non-repellent termiticides either as exterior perimeter treatments ***alone*** or as exterior perimeter treatments ***plus*** selected ***"hot spot" treatments***. The hot spots are either locations within the structure that show signs of termite activity or locations that are likely to show signs of termite activity in the future. Not all termiticide labels allow the use of this method. Those that do legally allow it, generally recommend a "full" treatment. Research results indicate that this method has great promise; however, we do not currently recommend it. Instead, we recommend a complete, exterior and interior barrier application to protect the entire structure if choosing the conventional soil application of termiticides as discussed in this chapter.

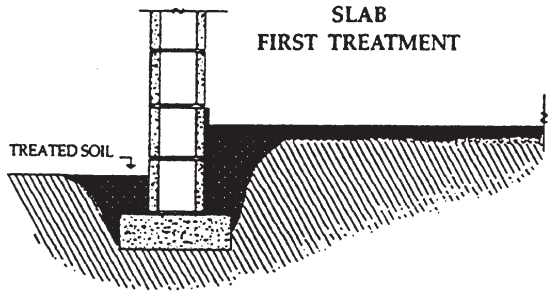

Figure 6-1. Termiticide treatment of the fill material prior to pouring a concrete slab protects wood in the building from termite attack.

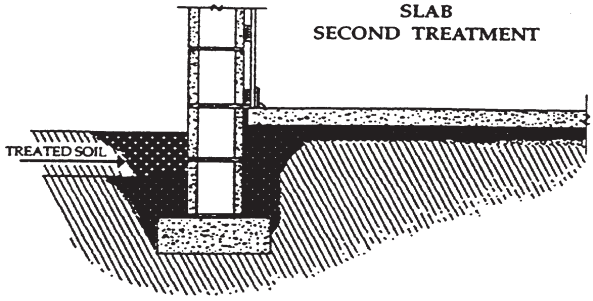

Figure 6-2. Application of a termiticide to soil around the foundation.

Termiticide Applications Before and During Construction

The ideal time to chemically protect a structure from subterranean termites is before and during construction of the foundation. This should be used in conjunction with good construction practices, *not* as a substitute for them. It is particularly important when using concrete slab-on-ground construction (such as with a slab home or a basement or garage with a concrete slab floor). In addition to slab-on-ground houses, two other basic construction types (crawl space houses and full-basement houses) are discussed in the following sections.

Slab-on-Ground Houses

Since they are especially susceptible to termite attack, this type of building should be protected by treating with a termiticide during construction. Soon after the sand, gravel or dirt fill have been installed and tamped, the entire area is treated before the concrete slab is poured.

Horizontal Barriers. The termiticide is applied over the entire underslab area and also under any attached porches, terraces, carports, and garages where the fill consists of sand, soil or unwashed gravel (**Figure 6-1**). Hollow block voids are injected with termiticide to create a continuous barrier. The termiticide should be applied so that it reaches the footing.

Vertical Barriers. Trenching and rodding along the inside and outside of the foundation, including porches and patio is used to apply the termiticide. (**Figure 6-2**).

Crawl Space Houses

Crawl spaces are low, less than 3 feet high, and usually have exposed soil. The exposed soil, short distance to floor joists and sills, and unkept nature make crawl spaces an ideal habitat for termites. The termiticide selected should produce little or no odor because exposed treated soil in a crawl space can become a smelly nuisance if low-odor termiticides are not used.

Mechanical Alterations. Any pieces of wood left on top of the soil should be removed; contractors will often leave construction debris in crawl spaces. Capping the soil with a layer of concrete will prevent swarmers from emerging. The soil should be treated before the cap is poured

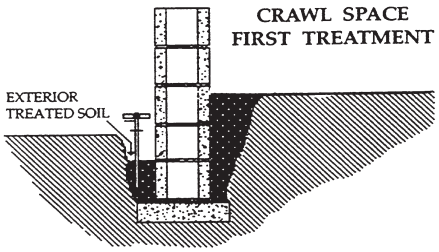

Figure 6-3. Preconstruction treatment of inside and outside foundation perimeter.

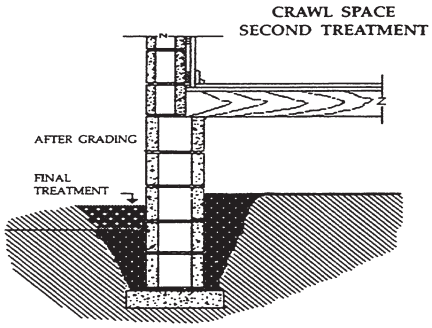

Figure 6-4. Second treatment after the final grading.

to form an effective barrier. The crawl space should be vented to help minimize moisture and odor buildups. It is recommended that the total area of vents be equal to 1/150 of the total area of the crawl space.

Soil Treatments. The soil adjacent to foundation walls are treated by trenching and rodding along the inside of the foundation (**Figure 6-3**).

A horizontal barrier across the surface of the crawl space is created by applying the termiticide over the entire surface area. If buried wood cannot be removed, the termiticide should be injected under the soil surface near the wood. The treated soil is sometimes covered with a layer of polyethylene plastic.

Trenching and rodding along the outside of the foundation is also done, including areas such as porches and patios. When the top of the footing is more than 12 inches below the surface, trenching and rodding is done to the top of the footing (**Figure 6-4**).

Full-Basement Houses

The application of a termiticide to a typical house with a basement is done in the same manner as recommended for slab-on-ground construction.

Soil around the foundation, piers, utility lines, and load-bearing walls is treated with termiticide by trenching and rodding. Where there are hollow block foundations or voids in masonry foundations, these are treated as well. The termiticide is applied so it reaches the top of the footing. Prior to laying the slab, termiticide is applied to the sand or gravel fill to create a horizontal barrier just as with the slab-on-ground house.

Special note: If the concrete slab cannot be poured the same day, the treated soil is usually covered with a waterproof cover, such as polyethylene sheeting. This will protect the treatment from adverse weather.

Controlling Existing Termite Infestations

Even when careful planning was done before construction and excellent construction practices were used, and all efforts to avoid moisture-buildup problems have been made, termite infestations can still occur. Infestations also sometimes occur in structures where barrier applications of termiticides were done during construction. Ridding existing termites from these structures, along with making them resistant to future infestation, should be the major goal of the pest control company using the termiticide barrier application method. Often, buildings become infested because, during or after construction little or no attention was paid to the preventive measures that would have made the structures more resistant to termites (see Chapter 4: *Preventing Termite Infestations*). It is in such buildings that termites can cause heavy damage if left untreated.

To control termite infestations in existing buildings, the pest control company will use many of the same principles as were already discussed for new buildings. It is best to eliminate favorable conditions that aid the development of termites near the structure and conditions that permit the passage of termites from the soil to the wood of the building. This is important because termites in the woodwork of a building will die if they are prevented from maintaining contact with the soil or other sources of moisture.

Termiticide Applications

In addition to controlling existing termites, a continuous chemical barrier will prevent future termite attack. Greater caution is required, however, because of the presence of plumbing, duct work, and electrical wiring, and because the building is probably occupied by people and/or pets. During application, the pest control technician should have an assistant constantly checking for leaks in the basement or other areas where termiticides should not enter.

Slab-on-Ground Houses. Termite infestations in houses built with a slab on the ground present serious control problems. It is difficult to place termiticides in the soil beneath such floors, where they will be effective. Applications are made by subslab injection, trenching and rodding, or both. Treating is done along the outside of the foundation and, just beneath the slab on the inside of foundation walls. Treatment will also be done just beneath the slab along both sides of interior footings and supported walls, along interior partitions, and along all cracks and expansion joints.

One way to treat soil beneath slabs is to drill a series of vertical holes through the concrete slab. The holes are made about 6 inches away from the wall and approximately 12 -18 inches apart to ensure a continuous termiticide barrier of the underlying soil (**Figure 6-5**).

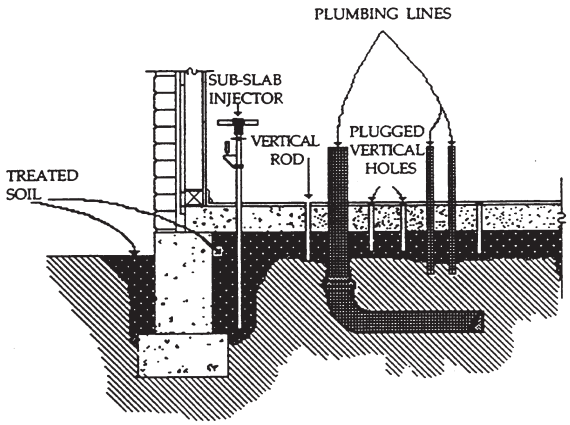

Figure 6-5. Treatment under concrete slab with vertical rodding at joints, cracks, and openings around plumbing.

Termiticides should NOT be applied until the termite control technician has located heat or air conditioning ducts, vents, water and sewer lines, and electrical conduits. Extreme caution is taken to avoid contaminating these structural elements and airways. If termiticides were injected into duct systems, you could be exposed to the termiticides.

Another method of slab treatment is for the technician to drill through the exterior foundation walls to the soil just underneath the slab. The termiticide is then introduced through these holes. This method, most often used under bathrooms or kitchens, is complicated and requires the use of horizontal rods (**Figure 6-6**).

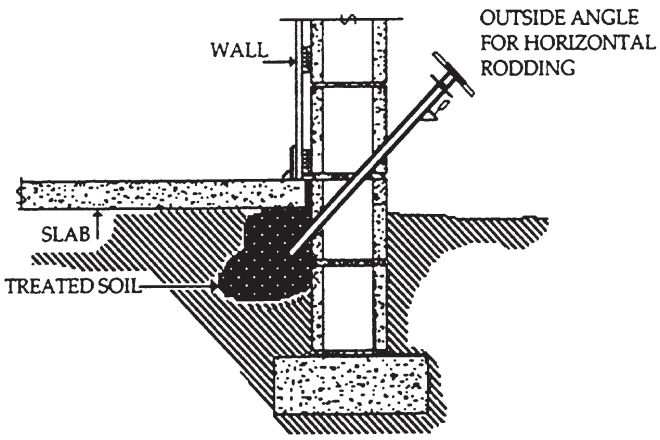

Figure 6-6. Horizontal rodding through exterior wall.

Structures with Ducts in the Slab. Applying a termiticide to an existing structure with intraslab or subslab air circulation ducts must be done with great care. Intraslab ducts are completely encased in the slab (**Figure 6-7**). The ducts of a subslab system rest on a vapor barrier, with the concrete poured on top (**Figure 6-8**). Puncturing a duct or allowing termiticide to leak into these ducts results in serious problems.

If your home has air ducts in the slab, some additional procedures should be used by the pest control company that is conducting the treatment. They should attempt to locate a diagram or blueprint of the duct systems, determine what the ducts are constructed of, and how tight the joints are. Measurements of the depth, width, and location of the ducts should be made. Inspection of the ducts should be done carefully, using a mirror and a flashlight, for soil deposits and evidence of breaks in the ducts. Swarmers coming from the ducts also indicates a break in the integrity of the duct work.

The termiticide needs to be applied beneath the slab, under or around the ducts. Subslab injectors are made for injecting the chemical beneath the slab. The pest control technician will drill the holes carefully (**Figure 6-9**) so they do not puncture the ducts.

During and after treatment, the ducts must be checked for signs of the termiticide. The heating system should be turned on and checked for odors. If an odor is detected, the system should be turned off, and the source of the odor determined. Leakage in the ducts must be removed.

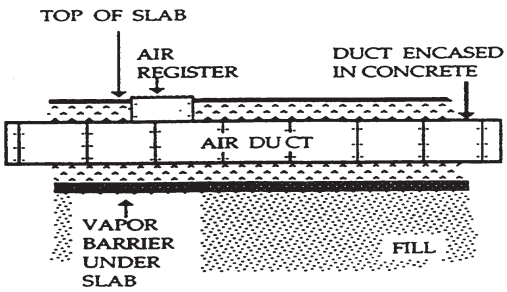

Figure 6-7. Intraslab air duct system.

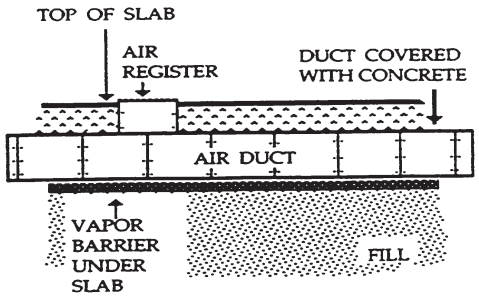

Figure 6-8. Subslab air duct system.

Raised Cement Porches, Terraces, Entrance Slabs, Sidewalks, and Driveways. All of these that are either filled with soil or are directly on the soil must have the soil next to the foundation treated. Treatment is done by drilling through the concrete or tunneling under the concrete next to the foundation wall.

Crawl-Space Houses. Buildings with crawl spaces can be treated easily and effectively. In general, trenching and rodding is done adjacent to and around all piers and along both the inside and outside of all foundation walls. Piers, chimney bases, and utility entrances are also treated. Broadcast applications in crawl spaces of existing structures are only allowed if the crawl space is inaccessible.

Basement Houses. Where footings are greater than 1 foot of depth from the grade to the bottom of the foundation, application is made by trenching and rodding. Areas along the outside of foundation walls and, if necessary, beneath the basement floor along the inside of foundation walls, as well as along interior load-bearing walls, conduits, and piers should also be treated.

Foundations with Holes, Cracks, Voids, or of Stone or Rubble. Stone and rubble foundations, found mainly in older structures, are particularly susceptible to termite attack primarily because of gaps between the stones. The gaps may never have been filled with mortar or the mortar may have deteriorated. Termites can exploit these gaps and tunnel within the wall. Additionally, the floor joists may be close to the fill, as in the crawl space, embedded into the foundation, or a porch or crawl space without ventilation may exist, which results in damp soil and an ideal hidden location for construction of mud tubes.

Termiticide Treatments. Interior (soil under the floor) and exterior termiticide applications down to the footing are essential. When soil treatments on the exterior are done, seepage into the structure must not be allowed. Trenching, treating the excavated soil, and then shoveling the treated soil back into the trench will lower the risk of termiticide seepage into critical areas of the structure. Even so, the pest control technician or their helper should be inside watching for leaks during the application.

Multiple Brick, Concrete Blocks, Hollow Tile, etc. Holes are drilled horizontally through mortar joints into void areas where hidden termite tunneling may be occurring. The termiticide is injected so that it reaches the top of the footing. Basement construction of multiple-brick foundations should be treated below grade level from the inside and above grade level from the outside.

The voids in hollow-tile walls run horizontally so a termiticide treatment cannot reach below the point of treatment. The tile must not be drilled through directly because it is easily cracked. A thorough grade-level termiticide application to obtain good soil coverage on both sides of the foundation (i.e., where there is a crawl space) is one of the best methods of treatment. This is also true for fieldstone foundations. Little can be done to treat voids so complete treatment of the soil is of the utmost importance. Fieldstone foundations must be patched and all cracks and voids must be filled before treatment.

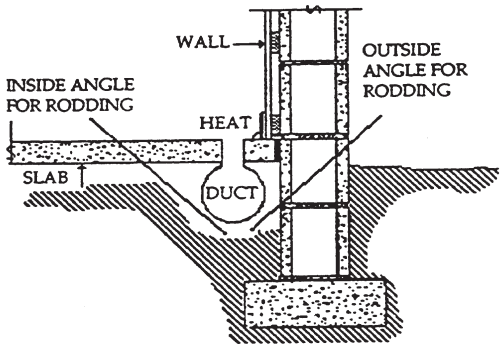

Figure 6-9. Subslab perimeter heat duct showing the angles needed to rod the termiticide system.

Houses With Wells, Cisterns, Springs or High Water Table or Near Ponds, Lakes or Streams. The technicians must apply the termiticide without contaminating water supplies. They should take special precautions if wells, cisterns, or springs are located near the treatment area. They must know and comply with the restrictions placed on termiticide applications by state or local pesticide regulations regarding the minimum acceptable distance between wells and sources of pollution.

The well's location, distance from the structure, depth and location of the supply line must all be recorded during the original inspection. It is especially important to locate water wells and cisterns because the well may be buried and cannot be seen.

Treatment Procedures Near the Well and Supply Lines. The soil nearest the well should not be treated by trenching and rodding. As the areas along the foundation are trenched, the soil should be placed on a waterproof tarp. The termiticide is then applied to the soil on the tarp, mixed, and the treated soil is then placed back into the trench. This is called a treated backfill application.

Extreme care is needed when applying a termiticide around the water supply line. The termiticide may follow the pipe and reach the well. The supply pipe should be uncovered from the structure out toward the well for a short distance so that seepage along the pipe can be seen. The treated soil method discussed earlier should be used to apply the termiticide along the foundation near the supply pipe.

Treatment Odors

The most common complaint about termite treatments is the odor that can remain afterwards. Although the termiticides themselves have little odor, the oil-based ingredients, and related compounds in the formulation can create odors. Under certain conditions these odors can be strong, offensive, and long lasting. To prevent odor buildup, the structure must be ventilated. Windows and doors should be opened, and fans can be used to circulate air. Activated charcoal filters can also be used in place of existing filters to trap odors as the furnace circulates air in the house or attached to the ventilation fans. Dehumidifiers are sometimes used to reduce moisture and enhance the drying process.

Crawl spaces pose special problems. Vents should be installed if they are not present. If there is excess moisture or dampness, the pest control technician should postpone treatments until the soil dries. If a clump of soil squeezed in your hand retains its shape without flaking or falling apart, the soil is probably too wet. Remember, it is forbidden to apply termiticides into saturated or frozen soil.

If odors persist for more than a week, special procedures may be needed. Odor-masking or odor-eliminating products are available. These products are used during the termiticide application by adding them directly to the spray tank or at anytime following the completion of the application whenever odors linger. If odors continue to persist, there may be a more serious problem, and you may need to contact the local health department for advice.

Conventional Termiticide Field Testing Summary

Remember from chapter 5 that the US Department of Agriculture Forest Service does liquid termiticide testing at 4 locations (Arizona, Florida, Mississippi and South Carolina). To evaluate the results, EPA guidelines are used. The guidelines require no termite penetration through the treated soil in any plot for at least five years before a termiticide will be registered.

The USDA Forest Service employs two methods for testing soil-applied liquid termiticides, the ground board test and the concrete slab test. Each test method is replicated 10 times at each of the 4 sites. The ground board test consists of a pine board centered in a 17x17-in. plot of exposed treated soil. The concrete slab test simulates a preconstruction treatment. It consists of a 17x17-in. plot of treated soil covered by a 21x21-in. concrete slab. A covered 4-in. pipe extends through the center of the concrete. The pipe contains a pine block placed on the treated soil.

In both tests, data are collected annually on the amount of damage to test blocks and the presence of termites and mud tubes in attacked plots. Damage is read using the Gulfport scale, where 0 = no damage, 1 = nibbles to surface etching, 2 = light damage with penetration, 3 = moderate damage, 4 = heavy damage and 5 = block failure.

The number of years that termiticides remained effective reported in tables 6-1 and 6-2 (pages 10 and 11) are for the concrete slab tests only. To remain effective, no damage to the board can occur.

Table 6-1. Number of years that non-repellent termiticides remained effective in concrete slab tests at four sites plus the average of all sites, applying the EPA guidelines.

Product (active ingredient) (% a.i.) [Years in trial]	Arizona	Florida	Mississippi	South Carolina	Average
Chlorfenapyr (Phantom) (0.125%) [8 years]	8	1	1	6	4
Chlorfenapyr (Phantom) (0.25%) [8 years]	8	8	2	5	5.8
Fipronil (Termidor 80WG) (0.06%) [10 years]	10	10	10	10	10
Fipronil (Termidor 80WG) (0.125%) [10 years]	10	10	10	10	10
Fipronil (Termidor SC) (0.06%) [5 years]	5	4.5	5	5	4.9
Fipronil (Termidor SC) (0.125%) [5 years]	5	4.5	5	5	4.9
Imidacloprid (Premise 75) (0.05 %) [12 years]	12	6	2	10	7.5
Imidacloprid (Premise 75) (0.1 %) [12 years]	12	12	2	5	7.8

Table 6-2. Number of years that repellent termiticides remained effective in concrete slab tests at four sites plus the average of all sites, applying the EPA guidelines.

Product (active ingredient) (% a.i.) [Years in trial]	Arizona	Florida	Mississippi	South Carolina	Average
Bifenthrin (Biflex TC) (0.06%) [18 years]	16	18	7	10	12.8
Bifenthrin (Biflex TC) (0.125%) [18 years]	10	9	2	17	9.5
Cypermethrin (Demon TC) (0.25%) [22 years]	4	10.5	3	4	5.4
Cypermethrin (Demon TC) (0.5%) [22 years]	4	4.5	7	12	6.9
Fenvalerate (Tribute) (0.5%) [26 years]	12	3	7	4	6.5
Fenvalerate (Tribute) (1.0%) [26 years]	12	6	10	6	8.5
Permethrin (Dragnet) (0.5%) [26 years]	13	4	5	4.5	6.6
Permethrin (Dragnet) (1.0%) [26 years]	15	15	5	10.5	11.4
Permethrin (Torpedo) (0.5%) [24 years]	11	6	3	1.5	5.4
Permethrin (Torpedo) (1.0%) [24 years]	19	24	3	6.5	13.1