Recommended Current Treatments for Tick Control

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MANY SPECIES of ticks occur in the United States, and a number of them are important pests of man. Several species known as wood ticks infest recreational areas, lawns, and houses, as well as woods. Most of them will attack man, and their bites cause pain and discomfort. Certain species are also important vectors of disease. The Rocky Mountain wood tick (*Dermacentor andersoni* Stiles) and the American dog tick (*Dermacentor variabilis* Say) are the principal vectors of the dreaded Rocky Mountain spotted fever and are also capable of transmitting tularemia (*1,2*). The lone star tick (*Amblyomma americanum* L.) apparently is not an important disease vector, although it has been shown to carry tularemia, Rocky Mountain spotted fever, and Bullis fever, but it probably is a more frequent source of annoyance in the southern States than any other species.

The black-legged tick (*Ixodes ricinus scapularis* Say) and several other less common species apparently are not carriers of disease and do not readily attack man, but they are annoying under certain conditions. Although they are not wood ticks, ticks belonging to the genus *Ornithodorus* are extremely painful biters, and several species are vectors of relapsing fever.

The widespread distribution of ticks and the fact that they are vectors of serious diseases as well as a source of annoyance have aroused much public interest in methods of control and protection from these pests. The armed services are also greatly interested in methods of safeguarding troops in camps and maneuver areas where ticks occur. At the Orlando, Fla., laboratory of the Entomology Research Branch, United States Department of Agriculture, special attention has been given to the development of insecticides and repellents for use by the armed forces. Most of these materials are suitable for general use and are therefore worthy of recommendation to the public.

This brief review outlines what can be done to control ticks and to protect individuals from tick attacks.

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Control With Insecticides

Ticks vary a great deal in their habits and distribution. It is therefore desirable to determine the area of infestation before attempting to apply an insecticide. Identification of the species will often provide a general idea of its distribution. For example, the American dog tick usually is concentrated along the edges

of paths or roads, whereas the lone star tick may be less regularly distributed over the infested area.

Area Treatments

The distribution and abundance of ticks can be determined by slowly dragging a white flannel cloth over the ground and vegetation and examining it at intervals of about 100 paces, or by careful observation of the ground and vegetation at randomly selected points in an area.

A number of chlorinated hydrocarbon insecticides will control the common species of ticks in their natural habitats (*3–5*). DDT, chlordane, toxaphene, and dieldrin are especially effective. Applications of from 1 to 2 pounds an acre will usually give good control within a few days and prevent reinfestation of an area for a month or more.

Lindane and benzene hexachloride (BHC) are also highly effective. Applications equivalent to only 0.1 pound an acre of gamma isomer of BHC will immobilize all stages of the lone star tick within a few hours. In this respect, BHC is far superior to the other chlorinated hydrocarbon insecticides. However, one-half pound of BHC, or more, is usually necessary to assure effective control of existing tick populations and freedom from reinfestation for several weeks or more.

As little as one-fourth pound of parathion an acre will provide excellent, immediate control of ticks and apparently prevent reinfestation for a month or more. No information is available on the effectiveness of other organic phosphorus insecticides, but several of them probably would give control. However, because parathion and some other phosphorus insecticides are highly toxic to man and animals, they should be employed only in an emergency or when none of the chlorinated hydrocarbon insecticides is available.

Pyrethrum and nicotine sulfate will give quick knockdown of ticks and some measure of control. However, since neither material possesses much residual toxicity, frequent applications are necessary to keep ticks under control. Pyrethrum sprays and dusts should contain 0.1 to 0.2 percent of pyrethrins. Nicotine sulfate sprays should contain 0.5 to 1 percent of the toxicant, and dusts, 2 percent.

Sprays and dusts may be applied with equally good results. Their effectiveness is dependent on the amount of insecticide and the thoroughness with which it is distributed over the infested area. Applications of from 15 to 25 gallons of spray an acre are required to treat lawns or similar areas where the vegetation and ground cover are relatively thin, but 50 or more gallons an acre are required for thorough coverage of woods or brushy areas. The concentration of insecticide in the spray should be adjusted to give the desired dosage for an acre. Suspensions and emulsions are preferable to oil solutions, which will burn the vegetation and which also are expensive.

Applications of from 20 to 25 pounds of dust an acre will usually give adequate coverage in thinly vegetated areas, but in woods and brushy areas 40 pounds an acre may be needed. Five-percent and 10-percent dusts are equally suitable. Using a 10-percent dust at a rate of 25 pounds an acre will give more than the necessary amount of insecticide, but this may be necessary to achieve good control under adverse conditions and will at all times assure a maximum period of freedom from reinfestation.

The type of equipment to use in applying treatments for the control of ticks will depend on whether the area is small or large. A 2-gallon or 3-gallon hand sprayer or a plunger-type or rotary-type hand duster is satisfactory for treating lawns and grounds up to 1 or 2 acres. On larger areas a power sprayer or duster should be used. When power equipment is used, swath intervals should not exceed 40 to 50 feet. Attempts to drift sprays or dusts over wider swaths will give uneven coverage and erratic results.

Sprays may be applied by airplane or helicopter provided that the vegetative canopy is not too dense for the material to penetrate. Good control of the American dog tick along roadsides and lightly wooded areas has been obtained with 1 pound of DDT per acre in 1 or 2 gallons of oil solution (*5, 6*).

Aerial applications of sprays containing 5 pounds of DDT or one-half pound of BHC (10 percent gamma isomer) an acre reduced the numbers of lone star ticks in typical wooded and brushy habitats but did not give satisfactory control (*4*). Apparently most of the spray

adhered to the vegetation, and the amount reaching the ground litter was insufficient to form an effective residue. However, in heavily wooded areas in South Carolina, aerial applications of 2 or 3 pounds of DDT an acre gave immediate reductions of 20 to 70 percent of the ticks. This reduction gradually rose to 70 to 90 percent over a period of 2 months when check populations were increasing (*3*). Similar treatment might be effective against this species in lightly vegetated or relatively open areas, or if the insecticides are applied as dusts or granules.

It is advisable to start area treatments early in the spring when ticks first become annoying. However, because the potential of reinfestation is greatest during the spring, subsequent treatments may be necessary. A treatment made late in the spring or early in the summer when tick populations are at their peak will usually provide satisfactory control for the rest of the season.

House Treatments

Wood ticks seldom infest houses, but sufficient numbers may be brought in on the clothing or by animals to cause some annoyance to the occupants. If ticks are found in large numbers in a house, they are most likely to be brown dog ticks (*Rhipicephalus sanguineus* Latr.), since that species is scattered by dogs (*7*). The brown dog tick can pass its entire life cycle indoors if dogs are kept in the house. This species seldom attacks man, but its presence in households is no less disturbing to the occupants than that of other species.

Tick infestations in houses can be controlled with many of the sprays that have been approved for household use. Formulations containing DDT, chlordane, or lindane, or combinations of these materials are especially effective contact killers. Thorough applications on baseboard, floor, and wall surfaces will continue to kill ticks for several weeks if the residues are not removed. If it is sufficiently thorough, a single treatment will control an infestation, although ticks will continue to come from their hiding places over a period of several weeks until all are killed. If large numbers of ticks continue to appear after the second or third week after spraying, a second application should be made.

Dusts may also be used for the control of ticks in houses, but they are more difficult to apply than sprays and are unsightly in exposed places.

Because tick infestations in houses are difficult to eradicate and treatments are often odorous and unsightly, the homeowner should take care to prevent infestations. Members of the household should remove infested clothing before entering the house, and dogs should be treated periodically with insecticides. Approved formulations for the treatment of animals are available commercially. If these precautions are taken and ticks are kept under control on the premises, infestations will rarely occur in houses.

Protection With Repellents

The application of a repellent to exposed skin provides little protection against ticks, since they crawl underneath clothing and attach on untreated portions of the body. The application of repellents to the entire body might prevent attachments for a few hours, but such extensive treatments are impracticable and might prove injurious. For these reasons, clothing treatments with repellents are suggested instead of skin treatments.

Clothing Treatments

The mosquito repellents, dimethyl phthalate and 2-ethyl-1,3-hexanediol, are not first-rate tick repellents, but they will provide fairly good protection as clothing impregnants. A person wearing socks, shirt, and trousers impregnated with 2 grams of one of these materials per square foot can expect about 75-percent protection from ticks. Better protection can be obtained with Indalone, but it is not as widely available. All three repellents are safe for use as clothing treatments at the dosage indicated (*8*, *9*).

N-Butylacetanilide, *N*-propylacetanilide, undecylenic (hendecenoic) acid, and hexyl mandelate are highly effective tick repellents, but none of them has been cleared for unrestricted civilian use. They may be used only under adequate supervision, such as that given to troops.

Clothing should be saturated with a solution

or emulsion of the repellent by dipping the garment into it or by pouring on enough to saturate it.

Rayon and nylon fabrics should not be treated with repellents. Nylon is nonabsorbent and will not retain enough repellent to be effective, and rayon is injured by some repellents.

A 5-percent solution or emulsion of the repellent will give a deposit of about 2 grams a square foot on denim, ordinary cotton khaki, or light wool clothing. About 3 pints is required to thoroughly wet a complete outfit of socks, shirt, and trousers of these fabrics. A smaller amount is sufficient for lighter fabrics.

Acetone and dry-cleaning solvents are suitable for use in impregnating both cotton and woolen clothing. Slightly less than an ounce of repellent to a pint of these solvents will make about a 5-percent solution. One ounce of repellent, 1 pint of water, and 2 ounces of a good emulsifier, such as Tween 80 or Triton X–100, or 1 ounce of laundry soap, will make an emulsion containing about 5 percent of repellent. The laundry soap should first be dissolved in the water; then the repellent should be added slowly to the mixture while it is being stirred vigorously by hand or with a household mechanical mixer. The synthetic detergents in common use for dishwashing and other household cleaning are not suitable for making emulsions, but most of the soaps are satisfactory.

After clothing has been wetted, it should be wrung out by hand, hung up outdoors, and allowed to dry thoroughly before it is worn. Properly treated clothing will provide good to excellent protection against ticks, as well as chiggers and mosquitoes, for several days to a week if it is not subjected to wetting by rains or wading in streams or lakes. Clothing should be thoroughly washed and re-treated at weekly intervals or before each infrequent excursion outdoors.

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