

Control of Argentine Ants In and Around
Structures in Southern California

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INTRODUCTION Argentine ants, *Linepithema humile* (Mayr), are the most prevalent pest species in and around structures in California (Knight & Rust 1990b), Australia (Anon. 1988), and South Africa (De Kock & Gillomee 1989). One of the most common strategies for their control has been the application of chemical barriers to prevent them foraging into undesired areas (Knight & Rust 1990b, Haack & Granovsky 1990). In California, a survey of pest control technicians (Knight & Rust 1990b) indicated numerous homeowner complaints after treatments and as many as 59% of the structures were retreated. Research has also been conducted on the application of Tangletrap, chlorpyrifos and diazinon barriers to the trunks of trees to prevent Argentine ants' disruption of biological control of homopterous pests (Haney, 1984, Haney *et al.* 1987, Moreno *et al.* 1987, Phillips *et al.* 1987). Knight & Rust 1990a) reported that thorough applications of chlorpyrifos and cyfluthrin around structures prevented Argentine ants from foraging around structures for about 30 days.

The objective of this study was to determine the long-term residual effectiveness of insecticide barriers applied as aqueous sprays against Argentine ants.

METHODS & MATERIALS

Soliciting cooperation. Informational flyers we prepared were circulated to all members of the U.C.R. staff and faculty (see attached flyer). When people called, an initial interview was conducted to determine the location of the property, extent of the infestation and their willingness to participate. Homeowners within a 15-mile radius of the U.C. Riverside campus were solicited for cooperation in the study. Because several trips to homes for post-treatment monitoring needed to be made, residences further away than 15 miles were excluded. Appointments were set up for each perspective cooperator. Some of the structures treated with sprays were at a private condominium complex, providing uniform areas to treat.

Monitoring ant populations. The exterior of homes suspected to have a significant number of *L. humile* were monitored with honey traps to determine the level of ant infestation before treatments were made. The traps consisted of an uncovered round stainless steel tins (2 cm deep by 6 cm diameter) provisioned with about 15 ml of honey. One trap was placed at each corner of the house and others midway along each wall, for a total of 8 traps per residence. Whenever possible the traps were positioned adjacent to the foundation and concealed under boards, vegetation, paper or other objects to prevent children or animals from disturbing the traps or eating the honey.

The traps were set in place in the late afternoon (usually approximately 4:00 p.m.) and retrieved the next morning at about 8:00-9:00 a.m. As they were retrieved, each trap was quickly covered with a lid to prevent ant escape and placed with other traps from the same property in individually marked plastic bags. Bags containing the traps were placed in an ice cooler and returned to the laboratory where they were placed in the freezer for at least 24 hours to kill the ants. The traps were then rinsed with hot water and the contents passed filter paper in through a Buchner funnel. Filtering separated the ants from the honey. The ants remained on the filter paper and were transferred to large petri dishes or porcelain pans where the number per trap was counted and recorded.

Only homes where ants were trapped in at least 6 of eight traps were used in the test, with a minimum of 25 ants/trap. A map of the premise drawn to scale was prepared for each site. The location of sidewalks, patios, trees, flower beds, and other areas that were treated was noted on the map, as were the locations of the traps. The surface area to be sprayed was estimated for each property.

Post-treatment monitor traps were placed at each home in the same sites trapped before the spray treatments. Post-treatment evaluations by trapping were conducted at 7, 30 and 60 days post-spray. Two untreated sites were monitored weekly to estimate foraging levels and determine when declines in foraging activity could be expected.

Treatment around the structure. Aqueous sprays were applied with a 50-gallon FMC power sprayer. Spray was applied in the morning hours before there was wind and before temperatures exceeded 95°F. The sprayer was equipped with a full-time agitator, a JD9-C nozzle (Hudson Mfg. Co.), and a Flow Master electronic flowmeter to accurately determine the amount of spray applied. Spray treatments were applied at about 70 p.s.i. flow pressures. The treatment configuration consisted of a 6- to 8-foot-wide band around the exterior of the residence, the band extending about 1-2 feet vertically and about 4-6 feet horizontally. Spray was also applied about 4-6 feet wide along the margins of sidewalks and pathways and around stepping stones bases of trees, potted plants, garbage cans, and other areas likely to be visited by Argentine ants. Cynoff WSB (0.059% and 0.029%) and Dragnet FT (0.03%) sprays were applied at a rate approximately equivalent to 3 gal finish spray per 1,000 ft². Dursban 50WP (0.06% and 0.09%) and Tempo 20WP (0.004% and 0.009%) sprays were applied at a rate of 10 gal finish spray per 1,000 ft². A combination treatment of 0.15% cyfluthin granules and 0.009% cyfluthin sprays (Tempo 0.15G + 20WP) was also tested. The granules were applied at 10.8g/m² in the flower beds, plantings, grass, and soil surrounding the foundation of the house and sprays were applied on all the concrete and stucco surfaces, patios, margins of sidewalks and pathways. Only one application was made at each site, there being no regularly scheduled treatments.

Statistical Evaluation. Posttreatment monitor traps were placed at each home at the same sites trapped before spray treatments. Posttreatment evaluations were conducted at 7, 30 and 60 days. Two untreated sites were monitored weekly to estimate foraging levels and determine when natural declines in foraging activity could be expected.

Pre- and posttreatment ant trap counts were analyzed with a Wilcoxon's signed rank test for each home treated. Sprays were considered to be effective in greater than 8 of 10 homes evaluated for each treatment (X^2 analysis) had a significant decrease in trap counts at a given trapping period.

RESULTS AND DISCUSSION

The use of an electronic flowmeter on the power spray equipment permitted application of the sprays at rates very close to our targeted rates. Compared with the target rate of 1 gal/100 ft² with Dursban and Tempo sprays, the actual rates of application varied from 1 gal of spray per 102.1 ft² to 1 gal per 113 ft². Cynoff and Dragnet were applied at 1 gal of finish spray per 358 ft² to 1 gal per 382 ft², slightly exceeding the target rate of 1 gal/333 ft².

Applications of Dursban (chlorpyrifos) 50WP provided >80% reductions in the number of ants trapped for at least 30 days (Tables 1-4) but day 60 the 0.09% and 0.06% sprays provided only 75.8% and 16.2% reductions, respectively. Both concentrations of spray provided significant reductions in at least 7 of 9 treated homes for at least 30 days (Table 18).

The 0.009% sprays of Tempo (cyfluthrin) 20WP (14 g) also provided >80% reductions in ant trap counts for at least 30 days (Table 5). By day 60 only 3 of the 10 treated homes had significant reductions (Table 18). The lower concentration of Tempo 20WP (0.004%) provided 97.5% reductions at 7 days and only 66.1% reductions at day 30 (Table 17). Only 5 of 10 treated homes had significant reduction in ant trap counts at day 30 (Table 30).

Combination treatments with Tempo WP sprays and granules provided >85% reductions at day 7 (Table 17). Ant counts increased at

day 30, but subsequently dropped at day 60 (Table 9). The number of homes with significant decreases in trap counts actually increased at day 60 (Table 18).

The 0.059% Cynoff (cypermethrin) sprays provided significant reductions for only 7 days (Tables 17 and 18). After 30 days, it was necessary to retreat at three homes because of homeowner complaints about ants (Tables 11 and 12). The lower concentration of Cynoff (0.0295%) failed to provide significant reductions even at day 7 (Tables 13 and 14), and the perimeter of two of the homes were retreated after 30 days because of homeowner complaints.

The Dragnet (permethrin) sprays provided 87.1% and 56.4% reductions in trap counts at day 7 and 30, respectively (Table 16). However, only 6 of the 10 treated homes had significant reductions at day 7 (Table 18).

The number of ants trapped around the outside of an untreated home in Riverside varied between 2,000 to 6,000 ants from June until September (Fig. 1). During September the trap counts climbed to nearly 10,000 before falling precipitously in early October. After October 19, the number of ants foraging nearly dropped to zero. Complaints by homeowners of ants invading indoors corresponded to times of greatest numbers of ants trapped outdoors. There were few complaints before June or after mid-October.

Conclusions

- 1). A single application of Dursban 50WP and 0.009% Tempo 20WP sprays provided significant reductions in the numbers of Argentine ants trapped around homes for at least 30 days.
- 2). A single application of Dragnet or Cynoff failed to provide significant reductions in the number of ants trapped.
- 3). Factors that are likely to contribute to the decreased performance of the chemical barriers are exposure to strong sunlight, heat, alkaline surfaces such as concrete, stucco and soil, and repeated irrigation.

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