

Amphibians

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continue with annual sampling. The invertebrate material is still under study and will be the basis for future analysis.

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CONTROL OF THE FIRE ANTS Ochetomyrmex auropunctata AND Solenopsis geminata ON THE GALAPAGOS ISLANDS

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INTRODUCTION

The little fire ant, Ochetomyrmex auropunctata, and the tropical fire ant, Solenopsis geminata, were believed to have been introduced to the Galapagos Islands about sixty and over one hundred years ago, respectively. Both of these ant species are serious pests on several of the islands, causing reductions in populations of native and endemic ants and other invertebrates (Clark et al., 1982; Lubin, 1984), attacking young and weak Galapagos tortoises and land iguanas and stinging humans in their homes, yards, and gardens and along National Park trails.

O. punctata is now found on seven of the thirteen major islands in the Galapagos, while S. geminata is found on most of the islands. Populations of O. punctata are extremely heavy, having spread considerably on Santa Cruz. Where densities are high, few native ants exist (Clark et al., 1982). Lubin (1984) also discovered that the total number of insect species and the abundance of insects are reduced in those areas infested by O. auropunctata.

Because of serious problems with these ants and an increase in their distribution and abundance, the Charles Darwin Research Station decided to seek assistance and advice from experts on fire ant control. Dr. Marcia H. Wilson of the CDRS contacted Dr. David F. Williams of the USDA-ARS. A trip was planned for Dr. Williams to visit the Galapagos in June 1987 in order to review the problem first-hand and to offer advice to officials of the CDRS and the Galapagos National Park Service (GNPS).

This is the report of the findings of Drs. Williams and Wilson and their recommendations as to the best approach for controlling these ants in the Galapagos Islands.

DISCUSSION

Previous attempts have been undertaken to control and/or eradicate these two ant species from the islands, but control has been temporary and eradication has failed. Control measures used against *O. punctata* after its discovery on Santa Fe Island consisted of clearing all vegetation in the infested area and then burning it. After this, the area was sprayed with a pyrethrin-resmethrin mixture (single treatment), followed by DDT sprays (double treatment). Other chemicals have also been used against this ant, as well as against *S. geminata*. The majority of them, however, are not registered for ant control, offer little hope of control, and can cause great harm to the environment by affecting other animals in the treated areas. When used as control agents, most of these chemicals kill foraging worker ants, but do not enter the nest and kill the queen(s) of the colonies. Therefore, any control is only temporary.

Queens in fire ant colonies are "egg factories" and can produce 1000-2000 eggs in twenty-four hours. This tremendous reproductive capacity negates control measures that simply reduce the worker population in a colony. At best, present control measures offer only temporary control and, at worst, cause damage to the environment and kill non-target, harmless insects, invertebrates, and other animals. Unless used properly, these can be quite toxic to humans.

Previously reported infestations of *O. punctata* on Santa Fe occurred over a two-hectare area, with control applied to a total of three hectares. We conducted a survey, using baits of tuna placed in a grid pattern (bait transects) over the entire area suspected of being infested with *O. punctata*. These transects indicated that the ant had spread beyond the original infestation boundaries. We were unable to treat all of the area, due to limitations of time and personnel and the difficulty of the terrain, but we did apply Amdro and Logic to two hectares where the heaviest infestations of *O. auropunctata* were found. We explained to GNPS personnel, who have ultimate responsibility for controlling the ants on park lands, the importance of returning to Santa Fe within the next few days and determining, with bait transects, the limits of the area infested with *O. auropunctata*. Once this is done, the remaining infested area can be treated with Amdro or Logic, or both, including a

fifty-meter border around the known infestation. We recommended a second treatment three to four months later, with a third and probably a final application one year after the initial treatment.

On Santa Cruz, applications of Amdro bait were made around the exterior walls and foundations of all buildings of the CDRS to control O. auro-punctata. In addition, Amdro was applied around the tortoise rearing house, where S. geminata is a serious pest, and to all the tortoise holding pens, especially the egg-laying and feeding areas, which had the heaviest infestations of S. geminata.

Immediately after bait applications, both species were observed feeding heavily on the Amdro bait. Large numbers of "bone piles" of dead workers were noticed twenty-four hours later. In addition, the large foraging trails into buildings and rearing pens, observed the day before the bait application, were conspicuously absent.

In the community of Bellavista on Santa Cruz, we applied Amdro to the yard (ca. 20 x 50 m) of one homeowner to control the heavy infestation of S. geminata. Additional bait was left with the homeowner for future treatment and he was asked to compare the control produced by Amdro with the control obtained by his neighbors, who are using a spray solution of diazinon. Other major infestations of S. geminata were in the community park and playground and the schoolyard. These areas are small enough that we recommended an application of either Amdro or Logic be made, with additional treatments at four- and twelve-month intervals after the initial application. Ideally, better control and management of S. geminata would be obtained if all homeowners in the community treated their property with the fire ant baits.

RECOMMENDATIONS

For uninhabited islands that are infested with fire ants, such as Santa Fe and Pinzon, the first and most important thing is to determine the limits of the areas infested with ants by means of bait transects. Once the infestation has been defined, an application of Amdro or Logic should be made, covering the entire infested area, including a fifteen- to twenty-meter border to assure that no small colonies escape. In the case of S. geminata, this border should probably be extended much further, as much as one hundred meters or more. Following the first application, a second treatment should be made three to four months later. Finally, a third and possibly last application of bait should be made one year after the first treatment. During the first year, bait transects should be operated once a month. If, three months after the final treatment, no worker ants are found feeding on the bait stations, it can be assumed that eradication of these ants has occurred from that particular island. However, it is imperative to maintain a regular monitoring program using bait transects operated every three months. Then, if any workers reappear on the bait stations, an application of bait to this area can immediately suppress the new introduction.

The feasibility and potential for successful eradication of isolated populations of fire ants from the uninhabited islands is excellent. Once accomplished, however, it will be necessary to maintain a program of monitoring bait stations on a quarterly basis. Also, it is necessary to prohibit visitors from carrying to these islands food, boxes, plant material, and other items that may contain fire ant queens or small colonies. If it is necessary to camp on these islands to study the flora or fauna, special care must be taken to ensure that all items taken to the campsites are free from fire ants.

Eradication of O. auropunctata and S. geminata from inhabited islands, where the movement of people and their goods between the continent and the islands occurs on a regular basis, is highly unlikely and probably not feasible. However, reduction of the existing heavy populations of these two pest ants can be accomplished. Bait toxicants such as Amdro or Logic should be applied around houses, in yards and pastures, and along the sides of trails and roads wherever heavy populations of these ants are found. A second application three to four months later should be made and then a third application should be made approximately six months after the second.

Once the major ant populations are reduced, a monitoring program using bait stations should be established. Whenever populations of ants increase above a tolerable level, baits can be applied to these sites. In this way, large amounts of fire ant bait will not be wasted nor indiscriminately dispersed in the environment.

Finally, it is extremely important that someone with expertise in ants and their control should follow up on these recommendations and our bait tests. Scientific evaluation of these control measures against O. auropunctata and S. geminata should be continued, since the success or failure of such measures will affect future control strategies. In addition, the effects, if any, that these fire ant bait toxicants might have on other, non-target organisms is very important and should be closely monitored, especially in an area such as Galapagos.

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