INVITED ARTICLE

CONTROL OF ARGENTINE ANT, *LINEPITHEMA HUMILE* (MAYR), IN WESTERN AUSTRALIA - THE PAST, PRESENT AND FUTURE

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ABSTRACT

The Argentine ant, Linepithema humile (Mayr), was first recorded in Australia in 1939 and in Western Australia in 1941. Since the 1950s, this ant has been contained in its distribution in Western Australia with the aid of organochlorine chemicals. The most recent organochlorine pesticide to be used was heptachlor. In response to public and political pressure, the use of heptachlor for this purpose has now been suspended. This paper discusses the consequences of replacing heptachlor with less persistent chemicals such as chlorpyrifos and outlines some of the potential new approaches to control which are being investigated by staff of the Agriculture Protection Board of Western Australia.

INTRODUCTION

Despite having a native ant fauna numbering anywhere up to 2,000 species, Western Australia possesses surprisingly few ant pests. The introduced Singapore ant, *Monomorium destructor* (Jerdon), is a domestic nuisance where it has become established in the north and south of the state (Anon 1973). More recent observations suggest that, in descending order of importance, *Technomyrmex albipes* (Fr. Smith), *Ochetellus glaber* (Mayr) and *Pheidole megacephala* (Fabr) are the most important domestic pests in the south of the state, while *M. destructor* is a problem in the north (P Davis and J van Schagen pers. comm.). However, the most notorious pest in Western Australia is the Argentine ant, *Linepithema humile* (Mayr) (Anon 1973).

First described as *Iridomyrmex humilis* (Mayr) from specimens collected in Argentina, this species is thought by some to have originated in Southern Brazil. It was spread to New Orleans, USA around 1891 and later established in California and also the north-eastern states of North America. It was first recorded in Victoria, Western Australia in 1939 and in Western Australia in 1941. It is now present in all southern states of Australia.

PEST STATUS IN AUSTRALIA

The reasons why Argentine ants are regarded as pests fall into three categories: (1) domestic/commercial nuisance; (2) environmental damage; and (3) agricultural damage.

1. Domestic/Commercial Nuisance

In view of the large numbers of ants which can build up, and also because of the invasive nature of this species, Argentine ants can be a problem in dwellings, hospitals, garden installations and in food production establishments. In addition to the obvious discomfort of having swarms of ants in one's midst, they can also act as vectors of bacteria (Ipinza-Regla *et al.* 1981) and can create difficulties in the production and sale of food.

2. Environmental Damage

The extremely large size and densities of colonies, and also the generalist nature of the Argentine ant, puts it in direct competition with many native ant species. There are many examples in the literature of Argentine ants displacing local species, and in some cases causing local extinction of such ants; this is also known to occur in Western Australia (Majer and Flugge 1984). As well as being a threat to the conservation of native ants, Argentine ants may disrupt the ant-seed dispersal systems which occur in South Africa (Bond and Slingsby 1984) and probably in many other regions where this ant has been introduced. There is also evidence that Argentine ants have an adverse effect on many types of ground-dwelling arthropods and even on lizards and nestling birds.

3. Agricultural Damage

Agricultural productivity can be reduced by the presence of Argentine ants in two ways; by direct impact on primary productivity and by the disruption of foreign export markets. Argentine ants can affect citrus yields by directly destroying buds, blooms and fruit of plants. However, their greatest potential impact on productivity results from their Homoptera-tending activities. By these activities, they can encourage the buildup of homopterans and may actually interfere with the activity of biological control agents which have been introduced or encouraged in order to limit such pests.

Export markets may be affected by the presence of insects in produce. Presence of such organisms could potentially lead to the banning of imports by receiving countries. Australia monitors the cleanliness of its export produce under the auspices of the Export Control Act (1982) and would prohibit export of produce supporting Argentine ants. I know of no instances of Australian exports being curtailed due to the presence of Argentine ants but, nevertheless, the potential is there for this to happen.

CONTROL OF ARGENTINE ANTS IN AUSTRALIA

As with the control of most other ant pests (Hadlington and Gerozisis 1985), control of Argentine ants was initially facilitated by the broadscale application of pesticides. In the late 1940s a range of pesticides, including carbon bisulphide, sodium cyanide, calcium fluoride, sodium fluoride and DDT were investigated for control of the ant. DDT was used with some success (Wilson 1951) but did not achieve eradication. In the early 1950s a joint program was developed between the CSIRO and the WA and NSW Departments of Agriculture in order to evaluate the efficiency of dieldrin and chlordane in Argentine ant control. Both pesticides proved successful for eradicating colonies (Pasfield 1952, Forte and Greaves 1956) and, in 1954, the Western Australian Government initiated a program which attempted to eradicate the Argentine ant. The program was carried out under the auspices of the Argentine Ant Act (1954) and involved the spraying of 2% pesticide around the perimeter of the infestation and, within the infestation, the spraying of grid lines spaced 3 m apart.

The program was successful in curtailing and reducing the distribution of Argentine ants which meant that there was a reduction in areas treated from the mid-1950s through to the early 1960s. Thereafter, the amount of area treated per year has been more or less constant. Within time, dieldrin and chlordane were replaced by heptachlor, which was considered to be more suitable due to its less persistent nature. Since 1985, the policy had been to use heptachlor for general Argentine ant control and the organophosphate, chlorpyrifos in pastures and environmentally sensitive areas.

The control program has been successful in containing the infestations of this ant, but large-scale eradication has not been possible. This is partly because large infestations of ants occur in and around some environmentally sensitive wetlands.

THE FUTURE OF ARGENTINE ANT CONTROL IN WESTERN AUSTRALIA

In 1986 an infestation of ants was discovered in Denmark, a town in the south of Western Australia. Just after this, a second infestation was noted in the Perth suburb of Coolbinia. In both instances, surveys were carried out and residents were notified that a spray program was scheduled for their area.

As a result of concern about spraying, resident action groups were formed to oppose this form of control. The debate was followed keenly by the press and media and, in early 1988, the State Government suspended the use of heptachlor for Argentine ant control while a review of the procedure was carried out.

Three specialists were contracted to evaluate the situation and reports were presented on: 1) a general review of the control program (Whitehouse 1988); 2) on the ecotoxicology of the biocides being used (Porter 1988); and 3) on the human health hazards of heptachlor (Drew 1988). Following the presentation of these reports, the WA Environmental Protection Authority recommended to the State Government that heptachlor be withdrawn from use against Argentine ants. They also recommended that new methods of control be evaluated.

The current situation is that the organophosphate, chlorpyrifos, can be used against Argentine ants. The problem here is that spraying costs in excess of A$640 per hectare, compared with A$105 for the use of heptachlor. In addition, the pesticide does not appear to be sufficiently residual to achieve total eradication of colonies; colonies may well resurge

after a period of two to three years, rendering retreatment a necessity.

In response to the weakness of the organophosphate chemical as a long-term means of controlling Argentine ants, the Agriculture Protection Board of Western Australia initiated a research program to investigate new methods of control.

They are currently evaluating toxicant and insect growth regulator (IGR) baits on laboratory colonies with a view to running field trials on the most promising compounds. Toxic baits under investigation include hydramethylnon, sulphuranol, avermectin, sulfuramid, borax and alsystin. IGRs under investigation include fenoxycarb, methoprene and Sumitomo S-31183. These compounds are being presented with a sugar/protein bait in order to cater for worker and queen requirements respectively. In order to make the baits more attractive to Argentine ants, the trail pheromone, cis-9-hexadecanol, may in the future be investigated as a possible additive.

The researchers are also mindful of the environmental effects of these control methods and are looking at the relationship between Argentine ants and the native ant fauna, and also at ways in which baiting can be carried out in such a way that it is specific to Argentine ants. Hopefully, these new leads will result in environmentally safe ways of containing the Argentine ant in Western Australia. However, whether or not they will be as effective as the heptachlor approach to control is a matter of doubt.

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