PROSPECTS AND FUTURE DIRECTIONS FOR USING *OECOPHYLLA* ANTS AS BIOCONTROL AGENTS IN HORTICULTURE AND FORESTRY

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As predators of pests, about 15 species of ants from 8 genera are recognized as being beneficial for horticultural crops and forest trees. Among these, *Oecophylla* ants have been used more extensively than other genera of ants due to their efficiency in controlling numerous pests. From 304 to 1994 (1690 years), 47 pest species were recorded as prey of *Oecophylla* ants. The ants were initially used on citrus to control its main pests, and later extended to coconut and cocoa. During this long period, the ants were used without considering the colonies from which they came, resulting in difficulty in maintaining the ant populations at stable and high levels. Therefore, frequent and labour intensive transplantation was necessary. In the latter 1990s, the *Oecophylla* ant technology was developed, and it consisted of separating and transplanting the ant colonies, managing queen ants, creating a mixed-cropping system and reducing competitive ant species. With this technology, the ant populations can be kept stable and high for a long period. Ant pheromone, exocrine compounds and the relationship between extra-floral nectar and the ants were also found to play an important part in controlling pests. These developments have accelerated the use of the ants. From 1995 to 2009 (15 years only), an additional 56 pest species were controlled by the ants. The use of the ants also extended to cashew, mango and African mahogany. Eight IPM programs using *Oecophylla* ants as a key element have led to increases in farm net incomes of >100% on coconut, >70% on mango, 13-50% on cashew and 40% on African mahogany compared to conventional management. Having considered farm income, farmers' health, food safety and environmental pollution associated with pesticides, we suggest that existing IPM programs be modified to use the ants as a key element where possible and that further study is needed on the potential of the ants to control pests on additional horticultural crops and forest trees.

MATING STRATEGY AND COLONY REARING OF *OECOPHYLLA SMARAGDINA*

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With the increasing use of weaver ants, *Oecophylla sp*. in biological control, the availability of wild colonies may become a problem in many regions. Therefore, rearing of colonies in artificial nurseries could be a possibility in the future. Very little is known about their mating strategy, so it is crucial to investigate where and when they mate in order to find newly fertilized queens, or to develop methods to mate the queens in captivity. Field observations and experiments were carried out in Darwin NT, Australia to elucidate the mating strategy. Further, an array of artificial nesting sites was tested in order to find the most efficient method to collect the fertilized queens when they search for a place to found a new colony. Rearing colonies from fertilized queen to colonies with thousands of workers is not problematic, but it requires relatively long time. We have tested several methods to boost colony growth in order to reduce the time to mature colony. The following successful methods have been tested: 1) Use multiple queens to start the colony. 2) Add pupae to the founding queens when they get larvae.3) Add extra brood to the colony frequently during the growing phase. It is our hope to make nurseries where *Oecophylla* colonies for use in biological control can be reared fast and efficient, so they can be produced and sold for a reasonable price. The advantages of artificially reared colonies are: 1) No need for expert knowledge to obtain colonies. 2) Stable supply. 3) No impact on natural populations and ecosystems. 4) The age of the queens is known.