

Invasive Ant Species Recorded in Cashew Plantations with Reference to Yellow Crazy Ant, A Threat to Ecosystem

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Ants are the important insects belonging to Hymenoptera order of class Insecta. More than 10,000 known ant species occur around the world. They are key stone species, playing several important ecological roles including the suppression of pest population of different crops, pollinating flowers, tillage of soil and aeration etc. But, some ant species damage agricultural crops directly or by aiding sucking pests like scales, aphids, mealy bugs etc. Some ants raid stored food, some damage pollen grains, while others may damage indoor structures and some are invasive species posing threat to biodiversity in an ecosystem.

Invasive Ant Species

The term invasive refers ‘tending to spread very quickly and undesirably or harmfully’. Some ant species are considered invasive and are reported to be threat to biodiversity. Typically, the abundance is what makes the invasive ants to be such a problem for people's lives, agriculture and the environment. There are many ant species categorized as invasive. The common ones reported in different parts of the world includes, *Anoplolepis gracilipes* Smith, *Monomorium pharaonis*, *Paratrechina longicornis*, *Pheidole megacephala* (F.), *Solenopsis invicta*, *Solenopsis geminata* F., *Tapinoma melanocephalum* F etc. The details on 44 invasive ant species of the Pacific Islands are available in PIA key web page. The invasive ant species recorded in cashew plantations of Puttur, Karnataka state include, *Anoplolepis gracilipes* (yellow crazy ant), *Pheidole megacephala* (F.), *Tapinoma melanocephalum* F. (Ghost ant) and *Solenopsis geminata* F.

Invasive ant colonies have many queens (polygyny), which increases reproductive output and leads to larger colony size. Colonies spread by budding and form super colonies. For spreading distances of more than a few meters, invasive ants rely on accidental transport by people, also called jump-dispersal. Invasive ants behave very aggressively towards other ants and other animals within their foraging territory.

Yellow crazy ant (*Anoplolepis gracilipes* Smith F. 1857) – an invasive ant species. Other common names: Crazy ant; long-legged ant; Maldive ant. Yellow crazy ant (YCA) is a common ant species present in the cashew plantations of Puttur, Karnataka. It is abundantly seen in cashew plantations, and its nests are found beneath the fallen leaves. The ants also tend aphids, mealy bugs and scales seen on cashew leaves or fruits. This ant species is thought to originate from Africa but can now be found throughout the Pacific. It is a relatively large, yellow to orange colored ant with long legs, large eyes and extremely long antennal scapes. These ants are one of the world's worst invasive species. They can form huge super-colonies containing thousands of queens and have worker densities reaching up to 20 million ants per hectare.



Fig. 1. Yellow crazy ants tending aphids (*Toxoptera aurantii*) on cashew inflorescences and cashew nuts.

This species has been nominated by invasive species specialist group (ISSG) as one of the 100 'world's worst' invaders. A more recent study using ecological niche modeling suggested that YCA is originated from south Asia, expanded into Europe and then into Afrotropical regions, after which it formed its current distribution. YCA is widespread across the tropics, and populations are especially dense in the Pacific region. It has invaded in numerous locations worldwide, including Hawaii, the Seychelles and Zanzibar. It is unpalatable to most vertebrate predators.

Habitats of YCA

These ants often nest under leaf litter or in cracks and crevices. There are ready invaders of disturbed habitats such as urban areas, forest edges or agricultural fields. YCA successfully colonize in a variety of agricultural systems. For example, in New Guinea it nests in the crowns of coconut trees, feeding off honeydew-producing scale insects and palm flower nectar. On Christmas Island, its nests were on crab burrows, woody debris of the forest floor, tree hollows, epiphytes and the hollows created at the base of palm leaves. The ability of *A. gracilipes* to live in human dwellings or human-frequented areas has meant it has become a serious pest in many households and buildings. YCA is also capable of invading undisturbed habitats. Although *A. gracilipes* typically nests under leaf litter or in holes in the ground, it forages extremely competitively over every surface within its territory, including forests trees. The ant colonies readily migrate, if disturbed.



Fig. 2. *A. gracilipes* in human dwellings and its developmental stages (right)

Life Cycle

The life cycle of YCA varies from 76 to 84 days. Eggs hatch in 18-20 days, and worker larvae develop within 16-20 days. Pupal period of worker ants is around 20 days, while for queens it is 30-34 days.

Threat to Biodiversity

1. These ants are reported to pose a major threat to biodiversity. They can out-compete and displace native insects, invertebrates and also vertebrates, which are crucial for ecosystem health. These ants' prey on, or interfere with the reproduction of a variety of arthropods, reptiles, birds and mammals. The impacts of YCA are best known from Christmas Island, where they have been responsible for the death of up to 20 million red land crabs, causing major changes to the rainforest ecosystem. It is commonly referred as ecological meltdown" of Christmas Island (O'Dowd et al. 2003).

2. In Hawaii, ground nesting seabirds, such as red-tailed tropicbirds and wedge-tailed shear waters suffer dreadfully as YCA which are acid-spraying constantly moving over them. Often their eyes swell shut due to the acid and they have to try to take off blind.

3. YCA also troubles beneficial insects, resulting in negative impacts in pest management aspect. In Zanzibar, this species has been reported to displace the native weaver ant, *Oecophylla longinoda*, which is an effective predator of the coconut bug, *Pseudotheraptus wayi*. Similarly in Malaysia and Indonesia, YCA eliminated the native ants *Oecophylla smaragdina* and *Dolichoderus* spp. that protect cocoa plants against the mirid bug, *Helopeltis* spp.

Thus, high densities of YCA have the potential to devastate native key stone species, resulting in a rapid alteration of ecosystem processes and negative effects on endemic species. YCA is sometimes regarded as a beneficial insect and reported as a predator of coconut pests like *Amblyopelta cocophaga*, *Melittomma insulare*, *Oryctes monoceros* etc. However, due to the negative impacts of this ant species it would outweigh any potential benefit from bio-control within horticultural systems.

Management Measures

Toxic baits having stomach poisons are commonly used against these ants. Detailed information on the management of the yellow crazy ant is compiled by the ISSG. One promising approach is use of pheromones to disrupt the reproduction by the queen as suggested by O'Dowd *et al.* 1999. There are several initiatives around the world to manage this dreadful invasive ant species. Since 2003, CSIRO has been working on the Yellow Crazy Ant Management Project. As a result, these ants have been eradicated from 26 locations covering more than 295 hectares on aboriginal land in the Northern Territory. The Pacific Ant Prevention Programme aims to prevent invasive ant species from establishing within or spreading between countries in the Pacific. 'The Invasive Ant Risk Assessment Project' of New Zealand has ranked YCA as a high-risk threat to New Zealand. Thus, strong quarantine measures are essential to prevent the movement of yellow crazy ants.

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