Extension folder

Pollinators of cashew and their importance

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Introduction

Cashew is an important tree nut crop, grown in several regions of the country. Production of cashew is hampered by several biotic as well as abiotic factors. Inadequate pollination is a primary factor for poor nut set and yield. As cashew is a cross pollinated crop, it requires insects especially bees for pollination. Knowledge on pollinators of cashew in a particular region is very much important to devise suitable conservation measures for them.

Cashew floral biology and pollination

Anthesis of cashew flowers occurs between 9.00 am and 2.00 pm depending on the sun shine and over 80 per cent of the perfect flowers remain open between 10.00 am and 12.00 N. Peak period of anther dehiscence occurs between 9.30 and 11.30 hours. The viability of pollen grains of staminate and perfect flowers is high. Stigma becomes receptive one day prior to anthesis and retains its receptivity for two days.

As the pollen grains of cashew are sticky in nature, possibility of wind pollination is ruled out. Though cashew flowers profusely, only less than 10 % are hermaphrodite flowers in majority of genotypes and only 4-6 % of hermaphrodite flowers set fruits, and the remaining shed away may be due to physiological reasons or other biotic factors. Due to coincident flowering of male and hermaphrodite flowers on the same inflorescence, self-pollination may also happen to a lesser extent. But, the nature of cashew flower requires insects to carry pollen grains for pollination and hence, cashew is necessarily a pollinator dependent crop.

Insect species as pollinators of cashew

Insect visitors documented on cashew flowers at ICAR-DCR, Puttur include 40 species belonging to Hymenoptera, Coleoptera and Lepidoptera. But, bees are the important pollinators of cashew flowers. Bees include both honey bees and wild bees. Honey bees comprise *Apis dorsata*, *Apis cerana indica*, *Apis flore*a and stingless bees, *Tetragonula irridipennis*. Among the wild bees, *Braunsapis* spp., *Ceratina* spp., *Pseudapis oxybeloides*, *Lasioglossum* sp., *Seledonia* sp. are common on cashew flowers.

Ants are abundant on cashew flowers, but their role as pollinators is narrow and not clearly understood.

Common bee species recorded on cashew

***Apis cerana indica* F. (Apidae: Hymenoptera) (Indian bee/ Asian bee)**

It is a common bee species visiting cashew flowers. Its main foraging reward is nectar.

***Apis florea* (Apidae: Hymenoptera) (Little bee / Dwarf honey bee)**

It builds a single-comb nest, smaller, vertical, in branches of bushes, hedges, buildings, caves, empty cases etc. This species visits cashew flowers from early morning to afternoon hours, but mainly for nectar.

***Tetragonula* sp. (Apidae: Hymenoptera) (Stingless bees/ Dammer bees)**

It visits cashew early in the morning and forages till evening. They collect lot of pollen grains on flowers, but also forage on leaves, inflorescences, developing nuts and fruits mostly for extra floral nectarines.

***Apis dorsata* Fab. (Apidae: Hymenoptera) (Rock bee/ Giant honey bee**

It builds a single, large, exposed comb under tree branches, high hedges, under cliffs, rather than in cavities. They are highly ferocious. Its visits are very rare on cashew flowers, hence could not be important pollinators.

WILD BEES/ NATIVE BEES (NON - *APIS* SPECIES)

***Braunsapis* spp. (*B. mixta* and *Braunsapis picitarsis*) (Apidae: Hymenoptera)**

Braunsapis bees are quite lean and black, and less than 1 cm in length. These species are solitary and nest in stems and twigs, preferably pithy stems including cashew. These tiny bees forage on cashew flowers by its characteristic short vibrant movements.

***Ceratina hieroglyphica* Smith (Apidae: Hymenoptera): Small carpenter bee**

C. hieroglyphica is also a predominant bee species visiting cashew flowers. It is a stem nesting bee; collects lot of pollen grains to feed its larva.

***Ceratina binghami* Cockerell (Apidae: Hymenoptera)**

This species is slightly more bluish or bright metallic green in colour. The bees nest in dried cashew stems, hollow reeds and thatch, excavate tunnels in dried pithy branches of trees.

***Pseudapis* spp. (Halictidae: Hymenoptera)**

These ground-nesting bees live independently.

Pseudapis oxybeloides have large tegula and pale bands on the abdomen. They prefer to nest in soils. This bee species gather spollen and nectar from a variety of flowers, and is a very good forager.

***Lasioglossum* sp. (Halictidae: Hymenoptera) (Sweat bee)**

Lasioglossum bees are small, black and nest in the ground, but some nest in rotten logs. This species is common on cashew flowers, but can also be seen over the leaf surface at times. Though it prefers nectar in fresh flowers, also visits extra floral nectarines.

***Seledonia* sp. (=*Halictus* sp.) (Halictidae: Hymenoptera) (Furrow bees**

Bees are shiny in nature and small. The hair bands are apical and not basal. This species is common on cashew flowers. It also collects lot of pollen grains.

BEE FORAGING BEHAVIOUR

Bees after foraging on flowers in an inflorescence move to nearby inflorescence of the same tree or nearby cashew trees then fly away, which is an ideal behaviour for effective cross pollination. In general, flower visitors are abundant during morning hours and peak foraging period of most of the bee species is between 11.00 am and 1.00 pm. High visitation frequency of bees may increase the chances of pollen delivery on the hermaphrodite flower thus increases the chance of fruit setting. Thus increasing the population of bees in a region will certainly improve productivity of cashew.

ADVANTAGES OF BEE KEEPING IN CASHEW

There are studies showing the cashew flowers that were restricted for bee visits set very less fruits or no fruits. Keeping honey bee colonies were reported to increase the cashew yield to a tune of 10-30 % in certain regions of Tamil Nadu and Karnataka. But several factors including available bee flora in and around cashew plantations, crop management practices adopted, ecosystem and weather factors influence bee visits on cashew flowers. Further, confined studies carried out in ICAR-DCR, Puttur indicated that *Apis cerana*, *Braunsapis mixta* and *Tetragonula iridipennis* are efficient pollinators of cashew.

SIMPLE MEASURES FOR CONSERVATION OF BEES

a. Keeping bee colonies during flowering season.

b. Providing artificial bee nest sites like cut stems of bamboo, cashew, lantana, Johnson grass for occupancy by the native bees like *Braunsapis* spp.

c. Enhancing bee flora in and around plantations to provide needed nectar and pollen for the bees to survive throughout the year.

Plenty of plants including many crops have been documented as bee friendly plants. Crops belonging to Asteraceae, Fabaceae etc attracts lots of bees. Besides, wild flora, avenue trees and few weed species are bee friendly. Common plants in this region viz., *Antigonon leptopus* (railway creeper/ coral vine), *Caesalpinia* sp., *Cuphea* sp., *Wedalia trilobata*, *Leucas aspera*, *Mimosa pudica* etc are the efficient bee flora. These plants can be grown in borders or as bunds or patches inside the plantations which in turn help the bees to sustain their life throughout the year.

d. Avoiding insecticidal sprays during flowering period in general, and during peak foraging hours of the bees. In most cases it is between 11.00 am – 1.00 pm, which will help the bees to avoid direct contact with pesticidal sprays.

e. As nests of few important stem nesting bees are found in dried cashew sticks and pruned ends of cashew trees, avoiding destruction of such dried sticks and exposing soft pith by making more cut ends will invite bees to occupy them as nests and survive.

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