Principes, 33(2), 1989, pp. 74–77

Bees and Palms in Peninsular Malaysia

RUTH KIEW AND MOHAMAD MUID

Department of Biology and Department of Plant Protection, Universiti Pertanian Malaysia, 43400 Serdang, Selangor, Malaysia

Bees which in Malaysia have been observed visiting palms belong to the genera *Apis* and *Trigona*. These include the two important honeybees in Malaysia, the Malaysian honeybee, *Apis cerana indica*, which can be kept in hives, and the giant honeybee, *Apis dorsata*. The sweat bees, *Trigona* spp., are important pollinators in the rain forest but they accumulate very little honey.

Palms and *Apis cerana indica*

The past five to ten years have seen a surge in beekeeping among smallholders as a means of supplementing their income. The impetus for this has partly been the high retail price of local honey (M$25 or US$9.70 per kilo compared with M$9 for imported Australian or Chinese honey) and partly because apicultural research on the local honeybee has put beekeeping on a sounder footing.

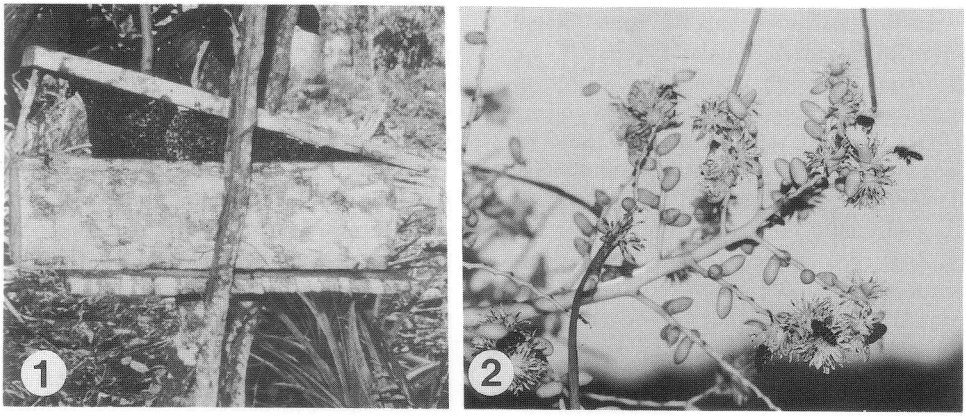
Prime beekeeping areas in Peninsular Malaysia are the coconut growing areas: Bagan Datuk (Perak), Tanjung Karang-Sabak Bernam (Selangor) and Batu Pahat-Pontian (Johore). This is because coconut supplies a steady source of nectar and pollen for the honeybee throughout the year. In mixed farming areas bees also forage preferentially on coconut. MaiShihah (1987*a*) found that they will go beyond their usual range (300–500 m) to collect coconut pollen and nectar.

Coconut provides both pollen and nectar to the bees. Observations on pollen loads carried in the pollen baskets of bees returning to the hive showed that *Apis cerana indica* collected coconut pollen from 0700–1300 hrs (MaiShihah 1987*b*). Male flowers release their pollen early in the morning. Both male and female flowers secrete nectar early in the morning and by 1000 hrs it has dried up. The female flowers have a second but smaller nectar secreting peak in the afternoon (Che Tek Kamariah 1985).

Coconut pollen forms over 85 percent of all pollen types found in honey from coconut growing areas and is the only pollen type found in all Malaysian honey investigated (MaiShihah 1987*a*). Farmers have remarked that after keeping bees their harvest of coconuts has increased, though they have no exact figures to substantiate this claim.

Annual honey yield averages about 4 to 5 kg per hive but there is a wide range, from 0 to 10 kg, the result of using genetically variable wild colonies and varying degrees of management, especially of requeening. Muid has found that vigorous dwarf hybrids of coconut at Tanjung Karang produce seven regular harvests of honey a year compared with the tall Malayan varieties which produce honey only between April and July. The stocking rate is about ten hives per hectare in coconut-coffee areas with a lower stocking rate in coconut-cacao areas. Although in absolute terms, this may seem a small monetary return for the time invested, beekeeping is an important supplementary cash input for the small farmer.

Under natural conditions, *Apis cerana indica* nests in hollow coconut trunks. Farmers also make simple hives out of coconut logs, which sell for M$3. They are called by the Javanese name, *gelodog*



1. A *gelodog*, a coconut trunk hive, containing a colony of *Apis cerana indica*. 2. *Apis cerana indica* bees collecting pollen from *Veitchia merrillii*.

(Fig. 1). Fragments of coconut husk also come in handy to burn in the smoker when handling the bees.

Apis cerana indica kept in hives will also forage on other cultivated palms depending on their availability. In the Batu Pahat area where sago, *Metroxylon sagu*, is widely cultivated, sago pollen accounted for 7 percent of the pollen in honey from that area (MaiShihah 1987*a*).

The Manila palm, *Veitchia merrillii*, attracts bees in its vicinity, which avidly collect pollen and also nectar. Each flower has 60 stamens with large white anthers (Fig. 2). In the mixed farming area at Universiti Pertanian Malaysia, *Veitchia* pollen accounted for 7 percent of the pollen in honey. Fruit set is heavy.

Kiew observed that the honeybee was the most regular visitor on the MacArthur palm, *Ptychosperma macarthuri*, though in lesser numbers than for *Veitchia*. Bees began to visit the male flowers when there were about twenty or more male flowers open on a single inflorescence and peaked in number (10 to 20 bees at any one time) when there were between 200 and 300 flowers open. They began to visit the flowers as they were opening (0700 hrs) and were most active before 0900 hrs. Although there were more female flowers open in the peak flowering period (between 400 and 1,200 flowers, male and female, on a single inflorescence) only a few bees (1–3 at any one time) visited the female flowers irregularly and then later (1000 hrs) than the male flowers. However, their behavior indicated they were collecting nectar as they systematically circled the stigma. Fruit set in *P. macarthuri* in Malaysia is heavy indicating that pollination is successful. *Apis cerana indica* is probably the major pollinator as the only other insect visitors seen, and then only rarely, were a blowfly and a wasp species (the latter probably a predator of the honeybee).

Mardan and Kiew (1985) recorded the betel nut, *Areca catechu*, as a pollen source. Lee (1980) reported that the Royal palm, *Roystonea regia*, was exceptionally attractive to all species of bees, and that *Apis cerana indica* was only able to forage for pollen from the fallen male flowers as those on the inflorescences were "always under the control of wild bees." Burkill (1919) observed that *A. cerana indica* collected pollen from the fallen flowers of the sugar palm, *Arenga pinnata*, perhaps for the same reason. He also reported pollen collection from the Princess palm, *Dictyosperma album*. Kiew has also observed clouds of *Apis cerana indica* in the wild collecting pollen from the orange-yellow flowers of *Arenga westerhoutii*.

In the coastal regions of Samut Songkram in Southern Thailand, nipa, *Nypa fruticans*, is an important pollen source as it flowers throughout the year (Wongsiri 1987). In Malaysia, Fong (1987) noted that apid bees (?*Apis cerana*) visited male flowers in the morning to collect pollen. He considered them to be pollen thieves.

Apis cerana indica is the major pollinator of coconut. In both the Manila and MacArthur palms, *Apis cerana indica* is the most abundant visitor and visits both the male and female flower (though the latter less frequently and in lower numbers). It is likely therefore that *Apis cerana* is a pollinator of these two palms. In other species where pollen is collected from the male flowers but the female flower is not visited, it is probably just a pollen thief.

Apis cerana indica also avidly visits male inflorescences of the oil palm, *Elaeis guineensis*, for its copious pollen. (Oil palm in Malaysia is mostly pollinated by the introduced weevil, *Elaeiodobius kamerunicus*). This source of pollen is not recommended as it results in dark, bitter honey.

Palms and Wild *Apis* and *Trigona* Bees

The giant honeybee, *Apis dorsata*, nests in tall trees in the lowland rain forest where it builds its single combs below the branches. Between twenty to more than a hundred combs can be found on a single tree. The bee forages widely over the forest but it is also found in orchard areas. Makhdzir Mardan (pers. comm.) in the course of his research on this bee was told by honey hunters that *Apis dorsata* forages on a wide range of palms. These include coconut, betel nut, oil palm, nipa, bertam (*Eugeissona tristis*), bayas (*Oncosperma horridum*), nibong (*O. tigillarium*), ibul (*Orania sylvicola*), salak (*Eleiodoxa conferta*) and several rattans. It is not known whether the bee collects only pollen or both pollen and nectar.

Burkill (1919) noted that *A. dorsata* visited coconut as well as the ornamental palms, *Chrysalidocarpus lutescens*, the Princess, and Royal palms.

There are about 30 species of *Trigona* in Malaysia. Fong (1987) reported two species of *Trigona* visited both the male and female inflorescences of nipa in greater numbers than did *A. cerana indica*. He considered that they are pollen robbers. *Trigona* spp. are also reported to visit male flowers of bertam, which produce purple pollen (Dransfield 1970, cited by Henderson 1986) and *Iguanura wallichiana* (obs. by Kiew). Dransfield (1979) observed trigonids and honeybees visiting male flowers of *Plectocomia* sp., a rattan with hyacinth-scented flowers. Kiew observed male flowers of *Daemonorops didymophylla* visited by *Trigona melina* (identified by Khoo S. G.), which collected pollen. In all these palms the trigona bee was not observed visiting the female flowers, so they are unlikely to be pollinators.

Palms therefore are an important food source for bees. Primarily they collect pollen, which as a protein source, is an important foodstuff for the developing larvae. As Burkill remarked (1919) in most cases the bees obtain "food without giving what would seem adequate return," i.e., they are not the pollinators. However, in palm species that they visit, the male flowers are produced in abundance, usually have many large stamens, which produce copious pollen. The fact that these species all reproduce by seed shows that pollen theft by bees does not jeopodize their pollination.

Palm species pollinated by *Apis cerana indica* in Malaysia include the coconut, MacArthur, and Manila palms. They initially attract the bee to the inflorescence by the mass effect of the simultaneous opening of many showy orange-yellow or white flowers. Scent seems of minor importance as they are scarcely scented. The Manila palm flowers smell faintly of honey, those of the MacArthur palm have a slight sourish smell, and coconut flowers smell faintly sweet.

Cross pollination is effected by the male flowering phase being separated by a few days from the female phase on a single inflorescence. Pollen and nectar of the male flowers are only available early in the morning, after which the female flowers secrete nectar. This effects the movement of bees from male flowers on one inflorescence to the female flowers on another inflorescence, which results in pollination.

Literature Cited

BURKILL, I. H. 1919. Some notes on the pollination of flowers in the Botanic Gardens, Singapore, and in other places of the Malay Peninsula. Gdns.' Bull. Str. Settl. 2: 165–176.

CHE TEK KAMARIAH, K. 1985. Nilai gula dan struktur nektari bagi beberapa tumbuhan utama lebah Malaysia. Honours project thesis (unpublished), Dept. Biology, Universiti Pertanian Malaysia.

DRANSFIELD, J. 1970. Studies in the Malayan palms *Eugeissona* and *Johannesteijsmannia*. Ph.D. Thesis (unpublished), University of Cambridge (cited by Henderson, 1986).

DRANSFIELD, J. 1979. A manual of the rattans of the Malay Peninsula. Forest Department, Malaysia.

FONG, F. W. 1987. Insect visitors to the nipa inflorescence in Kuala Selangor. Nature Malaysiana 12(1): 10–13.

HENDERSON, A. 1986. A review of pollination studies in the Palmae. Bot. Rev. 52: 222–259.

LEE, C. K. 1980. Honey bees in Malaysia. Nature Malaysiana 5(3): 26–33.

MAISHIHAH, H. A. 1987*a*. Atlas debunga tumbuhan lebah Malaysia dan analisis spektrum debunga madu Malaysia oleh *Apis cerana* indica. Honours project thesis (unpublished), Dept. Biology, Universiti Pertanian Malaysia.

MAISHIHAH, H. A. 1987*b*. Kajian permulaan perlakuan lebah madu (Apis cerana) dalam pemilihan tumbuhan debunga dan nektar di stesyen hidroponik Universiti Pertanian Malaysia. Honours project thesis (unpublished), Dept. Biology, Universiti Pertanian Malaysia.

MARDAN, M. AND R. KIEW. 1985. Flowering periods of plants visited by honeybees in two areas of Malaysia. Proc. 3 Int. Conf. Apic. Trop. Climates, Nairobi, 1984: 209–216.

WONGSIRI, S. 1987. Regulation of *Apis cerana* absconding during a dearth period. Publications of Bee Biology Research Unit, Chulalongkorn University, Thailand.

Principes, 33(2), 1989, pp. 77–78

Seed of Trithrinax campestris

RON HARRIS

965 Terrace 49, Los Angeles, CA 90042

The palm *Trithrinax campestris* is both very rare and unique. The upper surfaces of the leaves on its multiple trunks are covered with a white woolly fuzz which makes the palm look white rather than green. And because it is a native of Argentina, it is far more cold tolerant than most palms.

When I first came to work as curator of the palm and jungle gardens at the Huntington Gardens, San Marino, California, Inge Hoffmann of the International Palm Society's Seed Bank, and John Tallman of Ventura College, asked me for seed of *Trithrinax campestris*. I went into the garden to check on our mature specimen of this species, and found six green seeds on one old inflorescence, plus at least twelve new flower heads forming.

A few people warned me to protect the seeds from rodents, but I didn't move fast enough. One by one the new flower heads were eaten, after which the seeds disappeared. Since then requests have come from all over the world for seeds of this palm—together with suggestions on how to protect the seeds from rodents by placing some type of wire mesh around the inflorescence. That procedure works well for most palms, but not for *Trithrinax*