MARVELS OF INSECTS
The Oil Palm Pollinating Weevil

DR. R. MAHINDAPALA
Director,
Coconut Research Institute

The Oil Palm or "Katupol" in Sinhala, botanically known as Elaeis guineensis, is an oil-producing plant found in a wild, semi-wild and cultivated state in the equatorial tropics. Large areas in Africa, South East Asia and South America have been planted with oil palm. The principal oil extracted from the fruit of oil palm is commonly called palm oil and has a major share of the edible oil market in the world.

Compared to other oil producing plants such as coconut, ground nut and soya bean, oil palm is the most efficient oil producing plant since its production from a unit area of land is the highest. The average oil production in oil palm is 1570 kg per hectare, as against 1015 kg in coconut and 140 kg in soya beans.

The oil palm is a large perennial palm somewhat similar to the coconut palm but with a thicker crown of leaves. The Sinhala name **Katupol** aptly describes the rather vicious thorns, more like small spikes, found in the fronds. The male and female flowers are produced separately, and the fruits, which are deep red to purple in colour when ripe are slightly smaller than an arecanut. The fruit produces two kinds of oil. The outer fibrous portion of the fruit yields palm oil, which is the major commercial product. The small kernel in the hard-shelled nut yields palm kernel oil, similar in composition to coconut oil.

Oil palm appears to be indigenous to West and Central Africas. Large extents have been planted in West Africa, South America, Malaysia and Indonesia producing the major portion of palm oil found in the world market. Oil palm had been introduced to Sri Lanka in the late 50's, and a plantation of over 1000 hectares has been established at Nakiyadeniya in the Galle district.

This plantation, currently under the management of the Sri Lanka State Plantations Corporation has its own factory to process the fruits and produce palm oil which is used locally for a variety of purposes. The area under oil palm is on the increase, with new areas otherwise unsuitable for traditional plantation crops being converted to oil palm. There are now several smaller satellite plantations around Nakiyadeniya.

As stated earlier, the male and female flowers are produced separately in the same plant, but at different times. In order to produce fruits, it has therefore been necessary to artificially pollinate the female flowers. Firstly, ripe male flowers are cut and pollen in the form of a fine powder is collected. Pollen is then manually dusted on to the female flowers to pollinate them. A large work force had been used for these tedious processes of pollen collection and dusting them on to female flowers. To dust the female flowers, it is necessary to climb the trees and get inside the crown full of thorny fronds, which is rather hazardous, for the thorns can indeed be very painful. A work force of over 100 had been employed daily for this uninteresting, tedious and hazardous job.

Quite recently, an insect scientifically known as *Elaeidobius kamerunicus* was discovered in the Cameroons actively pollinating the female flowers of oil palm. This insect is a weevil, similar in size and appearance to the common flour weevil, 'gulla', with a snout which is a characteristic feature of weevils.

These weevils feed on pollen grains, found abundantly in male flowers. When the weevils visit male flowers for feeding, the pollen grains also get lodged in various body parts of the weevil, particularly on the legs and the snout.

A large number of tightly-packed female flowers, each about the size of a small arecanut, is found in a bunch, which weighs about 7-10 kg. Sometime afterwards, the female flowers become receptive for pollination, and

discharge a characteristically scented nectar. The nectar is identifiable by humans if one smells a female flower when it is receptive, but the weevils can identify it at quite a considerable distance. The weevils, which have been feeding on pollen grains, then visit receptive female flowers attracted by the scented nectar, and during their feeding and explorations, deposit pollen grains on female flowers thereby pollinating them.

A few insects were imported to Sri Lanka and were kept in quarantine in the laboratories of the Coconut Research Institute. During the period of quarantine, a large number of tests were done to ensure that there were no 'unwelcome' insects and to ascertain that they only fed on pollen of oil palm. This test was particularly important as there should be no damage to other economically important plants. Of course, tests in other countries have shown clearly that this weevil is very specific to oil palm and that it does not damage other plants.

After a series of rigorous tests, the weevil was found to be 'pure' (fed only on oil palm pollen). Then began the multiplication of the weevil in the laboratory, which was a fairly straight forward task. The female weevil, after feeding on pollen, lays eggs inside male flowers. The eggs hatch out and tiny grubs come out. These grubs feed on male flowers and develop into adult weevils, after passing through several stages of the life cycle. It takes about 10 days from egg laying to the emergence of an adult weevil.

A few hundred laboratory-bred adult weevils were released at the Nakiyadeniya State Plantation on oil palms with freshly-opened male flowers. As soon as the weevils were released, they were seen flying excitedly near the cluster of male flowers and alighting on them. They were then seen slowly walking over the male flowers, and after sometime, were white in appearance for they were completely covered with pollen. The cluster of male flowers (also called inflorescence) which were tagged at the time weevils were released was examined 10 days afterwards.

We were jubilant to find the grubs in the now withered male flowers indicating that the weevils had laid eggs, which was evidence of their acceptance of the local conditions and establishment. At that time, the weevils were seen hovering around receptive flowers and feeding on the sweet nectar. To our joy, it was obvious that the weevil was going to do what it was supposed to do.

The progress of the establishment of the weevil and its spread in the vast plantation were monitored by frequent visits to the plantation and examination of inflorescences. Within a matter of two months, the weevil had spread to a distance of 1.5 km (about 1 mile) from the point of original release and after about four months of the release of the first consignment of weevils, the entire plantation was 'infested' with it.

When it was evident that the weevil was established in the entire plantation, manual pollination was stopped.

The fruits of this operation are now visible. The weevil is a vastly superior pollinator than the human being. It not only pollinates the superficial female flowers in the bunch but also goes into the crevices in the bunch thereby pollinating those female flowers which are lodged deep in the bunch that are inaccessible to human beings during artificial pollination.

Termination of manual pollination has saved several million rupees annually. The work force that has been employed in manual pollination can now be redeployed for more productive and less hazardous work. Not only that, since the weevil can crawl freely, they pollinate those flowers that are deep inside the bunch resulting in an increased number of fruits thereby increasing the palm oil production significantly.

The marvels of insects are yet again demonstrated. The weevil now does a job earlier done by human beings, much more efficiently and at no cost to us, not only at Nakiyadeniya but also at other satellite oil palm plantations bringing in more income to the state.