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Insect Pests of Oil Palm (*Elaeis guineensis*) in India

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Oil palm nurseries and plantations in India were surveyed during May, 1985 – December, 1991, and the nature and extent of infestation by important insect pests are provided.

In Little Andamans, Limacodid Thosea andamanica *Holloway and Psychids* Metisa *sp. and* Eumeta *sp. causing defoliation are the major pests, while Diaspid* Aspediotus destructor *Signoret and Aphid* Astegopteryx rhaphidis *(Van der Goot) are the potential pests.*

Nature of damage and intensity of infestation by spindle bug, Carvalhoia arecae *Miller & China, rhinoceros beetle* Oryctes rhinoceros *L., red palm weevil* Rhynchophorus ferrugineus *Oliver, Coccoids, termites and other defoliating insects are reported. Pest incidence in oil palm in relation to intercrops is also highlighted.*

In India, oil palm *Elaeis guineensis* Jacq., is infested by a wide range of fauna which include insects, birds and mammals (Dhileepan, 1987). Among them, role of insects as pests of oil palm was reported in earlier studies (Dhileepan, 1988, 1991a, 1991b). In the present study, the nature and extent of infestation by important insect pests are provided, along with the list of other species of insects reported from newer areas of oil palm cultivation.

SURVEY

Nursery

Oil palm nurseries at Palode (Kerala state) were surveyed at monthly intervals during May, 1985 to January, 1992. Oil palm nurseries at Shimoga, Bhadra, Konnali and Sidhipura (Karnataka state) were surveyed during 1989–1990. Oil palm nurseries at Eluru, Kantaru and Lakshimipuram (Andhra Pradesh state) were surveyed during 1989–1991. Oil palm nurseries at Sawantwadi (Maharashtra state) and Hut Bay (Little Andaman Island) were surveyed during 1989 and 1991 respectively.

Field palms

All the mature and established plantations in India, namely, Palode, Thodupuzha, Chithara, Yeroor, Kulathupuzha, Cannanore (all in Kerala state) and the plantation at Little Andamans (Andaman & Nicobar Islands) were surveyed during 1985–1991. The plantation at Palode (40 ha) was surveyed at monthly intervals, while the plantations at Yeroor (1 753 ha), Chithara (1 018 ha) and Kulathupuzha (1 000 ha) were surveyed at quarterly intervals. Plantations at Thodupuzha (40 ha) and Cannanore (10 ha) were surveyed during 1986 and 1989 respectively. The plantation at Little Andamans (1 593 ha) was surveyed during 1991. Newly emerging oil palm plantations in Karnataka (1 020 ha) and Andhra Pradesh (1 050 ha) were also surveyed during 1989–1991.

RESULTS

In India, 54 species of insects infesting oil palm were reported so far (Dhileepan, 1991b). In the present study, five other species of insects are reported as pests

of oil palm in Little Andaman, along with seven species of already known insect pests, reported from newer areas of oil palm cultivation *(Table 1)*. In addition, nature and extent of damage by insect pests are also provided.

The spindle bug

The spindle bug *Carvalhoia arecae* Miller & China (Miriidae: Heteroptera) primarily a serious pest of areca palms, has in recent years attained the pest status in oil palm also. However, intensity of infestation by *C. arecae* in oil palm was comparatively lesser than in areca palms. The nymphs and adult bugs suck the sap from the spindle and the unfolding leaves, resulting in linear necrotic lesions *(Figure 1)*. Oviposition by female bugs also cause spindle necrosis. In oil palm, infestation by *C. arecae* was noticed only in the nursery and in the field planted with young palms in Kerala state. Occasionally infestation by *C. arecae* was also noticed in the young field planted palms at Charmadi, in Karnataka state.

At Palode, infestation by *C. arecae* was noticed throughout the year, with the highest incidence during the month of June and lowest during the month

TABLE 1.
ADDITIONS TO INSECT FAUNA ASSOCIATED WITH OIL PALM IN INDIA

Insect species	*Family*	*Nature of damage*	*Category*	*Location*
HOMOPTERA				
Aspidiotus destructor Signoret	Diaspididae	Encrust mature leaves	++	LA, AN
Hemiberlesia sp.	Diaspididae	Encrust fruit bunches	+	LA, AN
*Dysmicoccus brebipes** (Cockrell)	Pseudococcidae	Encrust fruit bunches	+	LA
Astegopteryx rhaphidis (Van der Goot)	Aphididae	Colonise on under surface of mature leaves	++	LA
*Proutista moesta** Westwood	Derbidae	Infest mature leaves	+	LA, AN
LEPIDOPTERA				
Thosea andamanica Holloway	Limacodidae	Larves cause defoliation	+++	LA
Metisa sp.	Psychidae	Larvae cause defoliation	+++	LA
Eumeta sp.	Psychidae	Larvae cause defoliation	++	LA
Spodoptera litura F.*	Noctuidae	Larvae cause defoliation	+	A
Dasychira mendosa Hb.*	Lymantriidae	Larvae cause defoliation	+	A
COLEOPTERA				
*Rhynchophorus ferrugineus** Oliver	Curculionidae	Grubs feed on soft tissues and meristem and kill palm	+	A, K
ISOPTERA				
Odontotermes sp.*	Termitidae	Feed on roots, inflorescence, fruits and spear cluster	++	A

LA = Little Andaman; AN = Andaman (Port Blair); K = Karnataka A = Andhra Pradesh
+++ = Major pests; ++ = Potential pests; + = Other insect associated with oil palm
* Insects reported from newer areas of oil palm cultivation.

of February *(Table 2)*. In the nursery, the spindle bug infestation was more when the seedlings were maintained under areca garden than under oil palm plantation *(Table 3)*. At Palode, the incidence of spindle bug infestation in the oil palm nursery ranged from 11.8 to 31.8 per cent, during 1986–1988, when the seedlings were maintained under areca garden, has reduced drastically since 1989, when majority of the oil palm seedlings were maintained under oil palm instead of under areca garden *(Table 3)*.

In the field planted with young palms, infestation by *C. arecae* was noticed only when under-planted in areca garden; while no incidence was noticed when planted in cleared forests *(Table 4)*. When under-planted in areca garden, the intensity of infestation declined with the age of the palms, and no incidence was noticed 30 months after field planting.

The tussock caterpillar

The tussock caterpillar *Dasychira mendosa* Hb., a polyphagous insect, is a known pest of areca palm, cacao and other crops. They also infest oil palm, especially in the nursery at Palode and Shimoga. The larvae feed on the young and mature leaves, causing considerable defoliation. The percentage of seedlings

TABLE 2.
SPINDLE BUG INFESTATION IN OIL PALM NURSERY AND FIELD PLANTED YOUNG PALMS IN RELATION TO SEASON

Season	*Infestation in oil palm (%)*	
	Nursery	*Field palms*
June	13.3	46.2
February	2.9	22.8

defoliated ranged from 3 to 11 per cent at Palode and around 20 per cent at Shimoga. Occasional defoliation by *D. mendosa* was also reported from Yeroor plantation. At Kerala, though infestation by *D. mendosa* was noticed throughout the year, the highest incidence was recorded during the months of June–July, coinciding with the onset of rains. Defoliation by *D. mendosa* was also noticed in the oil palm plantations in Andhra Pradesh *(Table 1)*.

The rhinoceros beetle

The rhinoceros beetle *Oryctes rhinoceros* (L.) is primarily a serious pest of coconut palm, and in recent years has attained the pest status in oil palm also *(Figure 2)*. Infestation by *O. rhinoceros* was noticed in the oil palm plantations in Kerala, Andhra Pradesh, Karnataka, Maharashtra and Gujarat states, as well as in the Little

TABLE 3.
SPINDLE BUG INFESTATION IN THE OIL PALM NURSERY AT PALODE DURING 1986–91

Oil palm seedlings maintained under	*% of seedling infested by spindle bug*					
	1986	*1987*	*1988*	*1989*	*1990*	*1991*
Areca palm	11.8	18.1	31.8	13.3	16.3	15.7
Oil palm @	–	–	–	0.1	0.2	0.9

@ Nursery maintained under oil palm only from 1989

TABLE 4.
SPINDLE BUG INFESTATION IN THE FIELD PLANTED OIL PALMS AT PALODE

Oil palm field planted under	*Palms surveyed*	*Palms infested (%)*
Areca garden	57	34.5
Cleared forest	60	0.0

Figure 1: Necrotic lesions in spears and unfolding leaves of oil palm seedlings due to spindle bug feeding.

Andaman Island *(Table 5).* However, intensity of infestation in oil palm was comparatively lesser than in coconut palms.

In Andhra Pradesh around 50 per cent of the plots surveyed in 14 locations under two districts showed *O. rhinoceros* damage, where the intensity of infestation ranged from 0.3 to 15.0 per cent *(Table 6).* In Karnataka state, around 40 per cent of the 15 demonstration plots surveyed under seven districts showed rhinoceros beetle infestation, where the incidence ranged from 3.6 to 63.6 per cent *(Table 6).* In all the oil palm plantations in Kerala state, *O. rhinoceros* damage was noticed where the incidence ranged from 1.5 to 13.5 per cent *(Table 6).* In the oil palm plantations at Maharashtra state and in Little Andamans, incidence though noticed, was very low (<0.01%). In Gujarat state, where oil palm has been recently introduced on an experimental basis (2 ha), the intensity of infestation ranged from 15 to 20 per cent.

Red palm weevil

Infestation by the red palm weevil *Rhynchophorus ferrugineus* Oliver, was noticed in majority of the oil palm plantations in Kerala, usually resulting in death of the palms. However, intensity of infestation by *R. ferrugineus* in oil palm was less frequent when compared with that in coconut palm. This is supported by the fact that weight of the emerging adults as well as proportion of female weevils emerged were higher in coconut than in oil palm and fishtail palm *(Table 7).* Damage is due to the feeding activity of the grubs, usually 12–87 per palm, which bore through and feed on the soft tissues of stem and meristem. Palms infested by *R. ferrugineus* showed gradual wilting and drying up of outer whorl of fronds. In some cases, rotting of spear was also noticed. Palms killed by lightning or due to spear-rot disease also acted as breeding sites for this pest. Except for the stray incidence at Manvi in Karnataka, and Eluru in

TABLE 5.
RHINOCEROS BEETLE INFESTATION IN THE OIL PALM PLANTATIONS IN INDIA

State	*Area (ha)*	*Infestation (%)*
Kerala	3 860	1.5 – 13.5
Karnataka	1 050	3.6 – 63.6
Andhra Pradesh	1 000	0.3 – 15.0
Gujarat	2	15.0 – 20.0
Little Andaman Island	1 593	<0.01

Figure 2: Nature of damage by rhinoceros beetle in field planted oil palm.

a. Damage to spears and unfolding fronds due to repeated infestation by rhinoceros beetle.

b. Damage to spear leaves due to feeding by rhinoceros beetles.

c. A palm recouping after a severe and repeated attack by rhinoceros beetles. Note the twist in the crown, due to damage in the meristem.

TABLE 6.
INTENSITY OF INFESTATION BY RHINOCEROS BEETLE IN INDIVIDUAL OIL PALM PLANTATIONS/ DEMONSTRATION PLOTS IN THE STATES OF KERALA, KARNATAKA AND ANDHRA PRADESH

State	*Location*	*Infestation (%)*
Kerala	Chithara	1.5 – 12.4
	Yeroor	4.2 – 13.2
	Kulathupuzha	2.1 – 13.5
	Arippa	2.2 – 6.9
	Palode	1.8 – 8.7
Karnataka	Navalgundu	34.6
	Bullapur	36.8
	Nagatibasapur	10.9
	Gangavathy	63.6
	Bukasagara	11.8
	Odderhatti	16.4
	Shikaripura	3.6
	Bhadra (BRP)	19.4
Andhra Pradesh	Lakshimipuram	1.5
	Vijayarai	3.6
	Seethapuram	1.8
	Kavugunta	0.4
	Gokavanam	15.0
	Veerampalam	0.3

Andhra Pradesh *(Table 1)*, infestation by *R. ferrugineus* has not been reported from other oil palm growing parts of this country.

Scales and mealybugs

Diaspids *Hemiberlesia lataniae* (Signoret), *Chrysomphalus aonidum* Linn , and *Pinnapsis aspidistrae* (Signoret) and Pseudococcid *Dysmicoccus brevipes* (Cockerell) infesting oil palm fruit bunches are of economic importance. Coccoids infesting fruit bunches were noticed at Chithara and Kulathupuzha plantations, throughout the year, and the incidence was more in ripe bunches than in unripe bunches *(Table 8)*. In the oil palm plantations at Palode and Little Andamans, only *D. brevipes* infested the fruit bunches. However, the actual economic loss due to coccoids infesting fruit bunches, particularly the oil quality is yet to be assessed. *D. brevipes* also infested the pre-anthesising male and female inflorescences at Chithara and Kulathupuzha plantations.

The pseudococcid, *Palmicultor* sp. infested the spear leaves and the unfolding young leaves of the newly planted oil palm in Shimoga, Karnataka. In palms with severe infestation, the entire spear cluster appear white due to the congregation of the mealybugs *(Figure 3)*, and resulted in yellowing of unfolding leaves and stunted growth of the palms. Diaspids *Ischnaspis longirostris* (Signoret) and *C. aonidum* Linn infested oil palm leaves at Palode. In Little Andamans, diaspid *Aspidiotus destructor* encrusted the oil palm leaves *(Table 1)*.

TABLE 7.
IMPACT OF PALM HOSTS ON ADULT WEIGHT AND SEX-RATIO OF RED PALM WEEVIL

Host plant	*No.*	*Just emerged adult weight (g)*		*Sex-ratio (Male: Female)*
		Male	*Female*	
Cocos nucifera	34	1.577 ± 0.316	1.579 ± 0.481	1.0: 1.3
Elaeis guineensis	43	1.282 ± 0.231	1.321 ± 0.341	1.2: 1.0
Caryota urens	30	1.068 ± 0.305	1.051 ± 0.369	1.0: 1.0

TABLE 8.
INTENSITY OF INFESTATION BY COCCOIDS IN THE OIL PALM FRUIT BUNCHES AT CHITHARA AND KULATHUPUZHA PLANTATIONS

Year	Bunches infested by coccoids (%)	
	Unripe bunches	Ripe bunches
1987	7.1	39.5
1988	6.8	54.6
1989	10.7	52.6
1990	7.6	55.9
1991	8.3	48.5

Figure 3: Mealybug Palmicultor *sp. encrusting the spears and unfolding leaves of field planted oil palm in Karnataka.*

Nettle caterpillars and caseworms

Among the caseworms (Psychids) recorded from mainland, *Manatha albipes* Moore causing occasional defoliation in the Yeroor plantation is of economic importance. In Little Andamans, Limacodid *Thosea andamanica* Holloway and Psychids *Metisa* sp. and *Eumeta* sp. caused severe defoliation *(Figure 4)* due to frequent out-breaks, and attained major pest status *(Table 1).* Defoliation by Psychids and Limacodids was restricted mostly to outer whorl of fronds and occasionally in the middle whorl of fronds. In Little Andamans, among the Psychids, *Metisa* sp. caused serious defoliation and the number of caseworms per infested frond ranged from 13 to 168. The

Figure 4: Defoliation by Limacodid and Psychids in the oil palm plantations in Little Andamans.

a. A frond defoliated by Limacodid Thosea andamanica

b. A palm completely defoliated by Psychids Metisa *sp. and* Eumeta *sp.*

Limacodid also caused severe defoliation, especially in the younger plantations, where the number of larvae per infested frond ranged from 3 to 82.

Termites

In the oil palm nursery at Bhadra, Karnataka, two species of termites (*Pericapritermes* sp. and *Hypotermes* sp.) feed on the roots of the seedlings maintained in polybags, resulting in stunted growth of the seedlings. In Andhra Pradesh, termite *Odontotermes* sp. infested the field planted with young palms *(Figure 5).* Termite infestation in oil palm was restricted to plantations with red soil and without adequate irrigation.

Other sap-feeding insects

Aphids *Schzaphis rotundiventris* (Signoret) and *Mysteroneura setariae* (Thomas) infested the oil palm seedlings in Karnataka state, especially in areas where the nurseries are surrounded by sugar cane fields. In Little Andaman

Figure 5: Termite attack in the field planted oil palm in Andhra Pradesh
a. Termite attacking spear cluster
b. Termite feeding roots and male inflorescence
c. Termite feeding roots and fruit bunch.

Island, the aphid *Astegopteryx rhaphidis* (Van der Goot) infested oil palm leaves during summer months *(Table 1)*. However, none of the aphid species caused any serious damage to oil palm. Other sap feeding insects infesting oil palm include *Proutista moesta, Ricania speculum* and *Flata* sp. Among them *P. moesta* which is noticed in all the oil palm growing areas, attains importance, as they are known to be vectors of mycoplasma like organisms (MLO) causing root (Wilt) disease of coconut and yellow leaf disease of areca palms, in the Kerala state.

DISCUSSION

Large scale oil palm cultivation in India was initiated only during mid-seventies in the Kerala state, and subsequently in Little Andaman Island. More recently, oil palm has been introduced into the non-traditional areas like Andhra Pradesh, Karnataka and Maharashtra states. Pest scenario in oil palm varied greatly with the varying agro-ecosystems, depending upon the local crops. In general, in all the oil palm growing areas, *O. rhinoceros* infestation was noticed, which was presumably due to the presence of coconut palms in these areas, either as a native crop or as an introduced crop. In Kerala, majority of the insects infesting oil palm are known pests of coconut and areca palms, which are the major traditional crops in this state. In Little Andamans, where the oil palm plantation was established in the forest area, except for the diaspid *A. destructor,* all the other species of insects infesting oil palm, especially Limacodids and psychids were not previously known to be pests of any crops. Both in Andhra Pradesh and Karnataka states, the pest incidence varied depending upon the local crops as well as upon the intercrops. In Karnataka, Pseudococcid infestation was more prevalent, when oil palm was grown near sapota *(Achras zapota)* trees. Similarly nurseries located near sugar cane fields had a very high incidence of aphid infestation. In Andhra Pradesh, defoliation by *Spodoptera litura* was noticed when oil palm was grown near tobacco *(Nicotiana tabaccum)* fields or when tobacco was grown as intercrop with oil palm. In both Andhra Pradesh and Karnataka states, intercrop by *O. rhinoceros* in oil palm was more severe, when under planted in coconut garden, than as a pure crop. However, no major pest incidence was noticed, when other intercrops like sorghum, maize, mulberry, lily, onion, chillie, banana, groundnut, *etc.,* were grown with oil palm in Andhra Pradesh.

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REFERENCES

DHILEEPAN, K. (1987). Pests of oil palm and their management strategies in India. In: *Training on Production Technology for oil palm.* Central Plantation Crops Research Institute, Research Centre, Palode, Kerala, India. pp. 14–17.

DHILEEPAN, K. (1988). Incidence and intensity of rhinoceros beetle infestation in the oil palm plantations in India. *J. Plantation Crops,* 16: 126–129.

DHILEEPAN, K. (1991a). Insect pests of intercrops and their potential to infest oil palm in an oil palm based agroforestry system in India, *Tropical Pest Management,* 37: 57–58,

DHILEEPAN, K. (1991b). Insects associated with oil palm (*Elaeis guineensis* Jacq.) in India. *FAO Plant Prot. Bull.,* 39 (2/3): 94–99.