

Nursery pest problems on some native tree species in Kerala province, India

G. Mathew

Entomology Division, Kerala Forest Research Institute, Peechi-680 653, Kerala, India

Insect pest problems in forest nurseries of selected indigenous tree species viz., *Calophyllum polyanthum*, *Dysoxylum malabaricum*, *Gmelina arborea*, *Garcinia gummi-gutta*, *Grewia tiliaefolia*, *Haldina cordifolia*, *Lagerstroemia microcarpa*, *Melia dubia*, *Vateria indica*, *Albizia odoratissima*, *Terminalia crenulata*, *Xylia xylocarpa* and *Pterocarpus marsupium* was studied at Peechi in Kerala State. The most serious pest incidence was noticed on *G. arborea* (by the caterpillars of *Epiplima fulvilinea*); *A. odoratissima* (by the Psyllid *Psylla oblonga*) and *Pterocarpus marsupium* [by the psyllids *Spanioneura (quadrimaculata)* group and *Arytaina* sp.]. Moderate damage to seedlings of *G. gummi-gutta* by the leafhopper *Busoniomimus manjunathi* and by an unidentified lepidopteran leaf miner were also recorded. All the other seedling species were relatively free from major pest infestation. Also, data are presented on the nature and intensity of pest damage.

Introduction

In Kerala, extensive forest plantations of a variety of tree species, both exotic and indigenous, have been raised in different area. Eucalypts, *Paraserianthes falcataria*, *Lucaenia leucocephala*, teak, *Gmelina arborea*, *Ailanthus triphysa*, *Bombax malabaricum* and *Swietenia macrophylla* are some of the tree species that have been raised in extensive plantations. Besides these, small-scale experimental plantations have also been raised, especially of some indigenous species such as *Albizia lebeck*, *A. odoratissima*, *Alstonia scholaris* and *Dalbergia latifolia* among the moist deciduous species and *Mesua nagassarium*, *Syzygium cumini*, *Toona ciliata* and *Vateria indica* among the evergreen species. Although the performance of most of these species was satisfactory during the initial phases, in the long run these plantations were not successful. There is not much documentary evidence on the various factors that adversely affected the plantations of these species, but it is presumed that incidence of insect pests would definitely be one of the major reasons leading to failure of these plantations. The exotic species are now abandoned either due to severe pest attack or for ecological reasons. Thus, *P. falcataria* (attacked by the bagworm *Pteroma plagiophleps* (Psychidae); eucalypts (attacked by subterranean termites); *L. leucocephala* (attacked by the psyllid *Heteropsylla cubana*) and *S. macrophylla* (attacked by the phycitid borer *Hypsipyla robusta*) are currently not favoured for extensive plantation programmes due to these problems (given in parentheses). It should be noted that the psyllid *H. cubana*, attacking *L. leucocephala*, is an introduced pest while all the remaining pests are indigenous.

Teak, despite attack by its specific insect pests *Hyblaea puera* Cram. and *Eutectona machaeralis* Wlk. continued to be the most acceptable tree species since damage by these insects did not seriously affect its survival. However, being a valuable hardwood species, teak was not a substitute for cheaper softwoods to meet the many industrial and domestic requirements. It was in this context that attempts were made to select appropriate native species that are suited to various end uses. The suitability of various native tree species for such purposes was evaluated after careful assessment of their productivity and relative susceptibility to pests and diseases under field conditions. Recently, various trials have been made using native species such as *Calophyllum polyanthum*, *Dysoxylum malabaricum*, *Gmelina arborea*, *Garcinia gummi-gutta*, *Grewia tiliaefolia*, *Haldina cordifolia*, *Lagerstroemia microcarpa*, *Terminalia crenulata*, *Melia dubia*, *Vateria indica*, *Albizia odoratissima*, *Xylia xylocarpa* and *Pterocarpus marsupium* (Mathew 1993, Nair et al. 2002). Data generated on the nursery pest problems for these species are summarized in this paper.

Materials and methods

Observations were made on seedlings raised in standard nursery beds (12x4 m) at Peechi. Five rectangular grids 30x30 cm in size, selected along diagonal transects within each bed formed the sampling units. The number of healthy and affected seedlings within each grid and the nature of damage caused to them were recorded. Up to 15% infestation was ranked as low, up to 25% as moderate, up to 50% as high, up to 75% as very high and above 75% as severe. Observations were repeated fortnightly.

Results

Details of the pests associated with the various seedling species and their nature of damage are given below.

***Calophyllum polyanthum* (Guttiferae)**

Moderate leaf feeding by an unidentified lymantrid caterpillar was observed in the seedlings grown at Peechi. Application of 0.1% Ekalux 25 EC (Quinalphos) was effectively controlled the caterpillar.

***Dysoxylum malabaricum* (Meliaceae)**

Mild attacks of a leaf webbing pyralid caterpillar, acridid grasshoppers and mealy bugs were noticed in the nursery. No control measures were undertaken, as the incidence of these insects was sporadic and not injuring the seedlings. In the out-planted seedlings also, mild feeding by caterpillars, grasshoppers and mealy bugs was noticed although the damage was very negligible.

***Garcinia gummi-gutta* (Guttiferae)**

Severe infestation of seedlings by the leafhopper *Busoniomimus manjunathi* was observed on nursery seedlings plus on saplings and trees (Viraktamath and Viraktamath 1985). The adults and nymphs of this sap-sucking insect clustered on tender shoots causing die-back. This insect was attended by the ant *Plagiolepis* sp., that also plays a role in the dispersal of this insect (Maicykutty et al. 2002).

Besides the above, up to 10% of the nursery seedlings of *G. gummi-gutta* were damaged by a dipteran leaf miner, which led to crinkling and subsequent withering of leaves. Also, mild attack of aphids in a few seedlings, sucking the sap of tender leaves was recorded. A few instances of root feeding by termites also occurred on seedlings in the nursery beds.

***Gmelina arborea* (Verbenaceae)**

Moderate to heavy attack by an epiplemid caterpillar *Epiplima fulvilinea* Wlk. was noticed on the nursery seedlings. It was controlled by applying a 3% solution of Econeem. Also, the chrysomelid larvae of *Calopepla leayana* Lat. were also found feeding on the leaves of nursery seedlings, destroying about 10% of them. Minor attack of leaf miners, aphids and jassids were also seen on leaves. Shoot die-back caused by the tingitid *Tingis beesoni* Drake and the scolytid *Xyleborus fornicatus* Eichh. has also been reported on seedlings and can be controlled by applying a 0.03% solution of Rogor (dimethoate) (Nair et al. 1986).

***Grewia tiliaefolia* (Tiliaceae)**

No serious pest problem was noticed in the *G. tiliaefolia* nursery except for mild leaf webbing by the tortricid *Archips* sp. and sporadic mild defoliation by the weevil *Myloccerus* sp. during May-August. Both of these insects are considered to be minor pests in the nursery. Leaf rolling by the pyralid caterpillar *Lygropia orbinusalis* Wlk. and gall formation by an unidentified psyllid are the pest problems were reported earlier *G. tiliaefolia* seedlings (Nair et al. 1986). The galls, of the pouch type, developed on both the leaf stalk and veins of tender foliage leading to distortion and drying up of leaves. The intensity of infestation was moderate. The psyllids can be controlled by applying Nuvacron 36 EC (monocrotophos).

***Haldina cordifolia* (Rubiaceae)**

No pest problems were noticed *H. cordifolia* nursery seedlings during the present study. However, incidence of the pyraustid leaf roller *Parotis vertummalis* Guen. and the gregarious caterpillars of the epiplemid *Epiplima quandricaudata* are likely to build up in the nursery and young plantations (Nair et al. 1991), which can be controlled by the application of 0.1% solution of Ekalux 25 EC (quinalphos).

***Lagerstroemia microcarpa* (Lythraceae)**

Leaf feeding by the weevil *Indomias cretaceus* (Faust) and by the geometrid *Semiothisa* sp.; leaf webbing by the phycitid *Phycita* sp. and an unidentified tortricid; sap sucking by aphids as well as presence of an unidentified mite (Acari) were observed in the nursery. Seedling damage resulting from these insects was moderate to heavy. The weevil, *I. cretaceus* (Faust) attacked the tender foliage of seedlings causing leaf withering. Damage by this insect was noticed from August-October. The cotyledons and tender leaves of root trainer seedlings were also eaten away by the looping caterpillars of *Semiothisa* sp., which resemble a dry stem and thus often escape detection. The light reddish caterpillars of the tortricid webbed the tender leaves and shoots and fed from within. As feeding by this insect caused damage to the terminal shoot, growth was stunted on about 20% of the seedlings. Application of Ekalux 25 EC (0.1%) has been suggested for control of this pest (Nair et al. 1991). Incidence of an unidentified aphid that sucked sap from tender shoots was noticed on a few seedlings. This insect, which is spread by ants, is likely to develop into a potential seedling pest, if unattended. Infestation by a mite, which resulted in a fluffy overgrowth on the leaf surface causing seedling stunting, was also noticed during December. Fortnightly application of Dicofol (kelthane) at 0.05% gave good control.

***Melia dubia* (Meliaceae)**

Sap sucking by scale insects, leaf mining by an unidentified dipteran fly, leaf webbing by a pyralid caterpillar and top shoot boring by a phycitid caterpillar were observed. However, none of the above was serious and did not affect seedling. Also, very rare attacks by a mealy bug was noticed to cause mortality of nursery seedlings. It can be controlled by applying a 0.05% solution of Nuvacron 36 EC (monocrotophos).

***Vateria indica* (Dipterocarpaceae)**

The bagworm, *Pteroma plagiophleps* Hamp. was noted feeding on seedling foliage. This polyphagous insect has the potential to cause serious damage to *V. indica*. Also, the incidence of the thyrnid leaf webber *Rhodoneura* sp. nr. *myrtaceae* Drury. was noticed in the nursery. It had been previously recorded as a pest of *V. indica* in natural stands (Nair et al. 1986). Incidence of the weevil *Indomias hispidulus* Mrshl., which feeds irregularly on the tender foliage of seedlings, occasionally caused minor damage to nursery seedlings. Leaf feeding by grasshoppers and root feeding by termites was also noticed on *V. indica* nursery seedlings.

***Xylia xylocarpa* (Leguminosae)**

No serious pest problems were noticed in the *Xylia* nursery except for damage caused by the weevil *Indomias hispidulus* Mrshl. which attacked the tender foliage of the seedlings leading to leaf withering. Incidence of this insect was noticed throughout the year and, depending upon the season, 12 to 41% of the seedlings were attacked.

***Pterocarpus marsupium* (Leguminosae)**

In the nursery, the psyllids *Spanioneura* sp. (*quadrimaculata* group) caused leaf vein galls and *Arytaina* sp. caused pouch galls resulting in the leaf crinkling and severe seedling stunting. Damage, when first noticed in September, occurred on 10.8% of the seedlings. This damage persisted until November of the next year when about 42% of the seedlings were affected. Kandasamy and Thenmozhi (1985) reported the latter as a pest of *P. marsupium*. Both the species of psyllids are considered as major nursery pests of this species and fortnightly application of 0.05% Nuvacron (monocrotophos) gave effective control. Also, incidence of the weevil *Indomias hispidulus* Mrshl., whose feeding punctures on leaves caused withering of the leaves. Its attack was observed from July-September when the new leaves appeared.

***Albizia odoratissima* (Leguminosae)**

Attack by the psyllid *Psylla oblonga* was the most serious problem leading to epicormic shoot formation and stunting and seedling die-back. In one observation block, about 40% of the seedlings were heavily affected. Within 8 months, the infestation level reached 98% of the seedlings and the infestation continued even when the seedlings were outplanted to the field. In the insecticide trials, fortnightly application of 0.05% Nuvacron (monocrotophos) effectively controlled this pest. Leaf webbing by the tortricid *Rhesala moestalis* Wlk. and sap sucking by the membracid bug *Oxyrachis tarandus* Fb. were the other pests associated with this seedling species in the nursery. *R. moestalis* is known as a defoliator of Albizias in India and can build up to epidemic proportions (Das and Sen Gupta 1960). About 25% of the seedlings were attacked by the leaf webber. Regarding the membracid bug, *O. tarandus*, a minor pest associated with various species of Albizias, usually affects saplings where it causes shoot stunting and die-back. This insect is tended by ants particularly *Crematogaster* spp. which also play a role in its distribution. Earlier, six species of insects including the bug, *O. tarandus* were reported from *A. odoratissima* in India (Browne 1968). No incidence of Albizia butterflies *Eurema blanda* Boisid. and *E. hecabe* Lin. was noticed during this study. *Eurema* spp. severely damage Albizias nursery seedlings and saplings in India (Browne 1968).

***Terminalia crenulata* (Combretaceae)**

Galls caused by the psyllid *Trioza* sp. severely damaged nursery seedlings. Immature stages of this bug develop on the stems and petioles, causing swelling and distortion. Growth was affected as the infestation occurred at the shoot terminus. As a result of infestation, epicormic shoots from which also become affected. Two species of psyllids viz., *T. hirsuta* Crawf. and *T. fletcheri minor* Crawf. are known on *T. paniculata* (Mathur 1975). Infestation usually progresses and persists in the nursery and application of a systemic insecticide such as Nuvacron (monocrotophos) at 0.05% is effective. Other than the psyllid, incidence of an unidentified weevil and a grasshopper feeding on the foliage was noted. The damage was negligible.

Conclusions

Sap sucking insects and defoliators are the major groups of nursery pests noticed in this study. Of these, infestation by plant bugs was the most serious problem with several species such as *Garcinia gummi-gutta*, *Albizia odoratissima*, *Lagerstroemia microcarpa*, *Terminalia crenulata*, *Grewia tiliaefolia* and *Pterocarpus marsupium*. In the former, a leafhopper *Busoniomimus manjunathi* that caused mortality of seedlings and saplings was a serious pest. Each of the remaining species was attacked by specific psyllid bugs which caused severe stunting and seedling mortality. On *L. microcarpa*, an aphid bug was noticed which could develop into a potential pest. With the other species, psyllids were the most serious problem. *A. odoratissima* was attacked by *Psylla oblonga*, *T. crenulata* by *Trioza* sp., *G. tiliaefolia* by an unidentified psyllid and *Pterocarpus marsupium* by *Spanioneura* sp. (*quadrifasciata* group) and *Arytaina* sp. The plant bugs, because of their life history peculiarities can develop quickly and cause seriously damage seedlings.

Among defoliating insects heteroceran caterpillars and curculionid/chrysomelid beetles were important seedling pests. Among the caterpillar pests, special mention should be made of the epiplemid *Epiplema fulvilinea* that severely defoliated *Gmelina arborea*. Similarly, the bagworm *Pteroma plagiophleps* found on *Vateria indica*, has the potential to develop into a serious pest and because it is polyphagous, it can spread to other species as well. Among the weevils, *Indomias hispidulus* and *Indomias cretaceous* are two closely related species associated with various tree species, but they are unlikely to develop into serious pests.

Another aspect that needs to be considered in species trials is the possibility of nursery pests becoming a problem in plantations. The plant bugs recorded on *G. gummi-gutta*, *A. odoratissima*, *L. microcarpa*, *T. crenulata* and *P. marsupium* as well as the bagworm noticed on *V. indica* are already known to attack saplings and trees and hence sufficient care should be taken to check their build up in plantations.

References

- Browne, F.G. 1968. Pests and diseases of forest plantation trees. An annotated list of principal species occurring in the British Commonwealth. Clarendon Press, Oxford. 1330 p.
- Das, G.M. & Sen Gupta, N. 1960. On the biology of *Rhesala moestalis* Wlk. (Lepidoptera: Noctuidae) - a serious pest of nursery and young shade trees in tea in North-East India. Indian Agric. 4: 95–103.
- Kandasamy C. & Thenmozhi K. 1985. New record of leaf vein gall on *Pterocarpus marsupium* Roxb. (Leguminosae) induced by a psyllid. Curr. Sci. 54:288.
- Maicykutty P., Mathew, G., Bhaskar, H., Ushakumari, R. & Thomas, J. 2002. A new leafhopper pest of Malabar tamarind *Garcinia cambogia* Desr. Insect Environment, 8: 136–137.
- Mathew, G. 1993. Nursery pests of selected indigenous tree species and their management in Kerala, India. In: Perrin, R. & Sutherland, J.R. (eds.) Diseases and insects in forest nurseries, INRA, Dijon, France. p. 145–151.
- Mathur, R.N. 1975. Psyllidae of the Indian Subcontinent. ICAR, New Delhi. 429 p.
- Nair, K.K.N., Chacko, K.C., Menon, A.R.R., Bhat, K.V., Mathew, G., Ali, M.I.M. & Pandalai, R.C. 1991. Studies on selected indigenous species for future plantation programmes in Kerala. KFRI Research Report (submitted to the Ministry of Environment and Forests, New Delhi). 193 p. (mimeo).
- Nair, K.S.S., Mathew, G., Mohanadas, K. & Menon, A.R.R. 1986. A study of insect pest incidence in natural forests. KFRI Research Report 44. 28 p.
- Nair, K.K.N., Mohanan, C. & Mathew, G. 2002. Plantation technology for nine indigenous tree species of Kerala. KFRI Research Report 231. 110 p. (mimeo).
- Viraktamath, S. & Viraktamath, C.A. 1985. New species of *Busoniomimus* and *Idioscopus* (Homoptera: Cicadellidae: Idiocerinae) breeding on mango in South India. Entomol. 10: 305–311.