INTRODUCTION

The Western Ghats has a status of being one of the 25 biodiversity hotspots of our planet (Myers, 2000). The number of total endemic tree species in the Western Ghats is estimated to be 1500 (Mackinnons and Mackinnons, 1986). One such tree species Cinnamomum sulphuratum, also known as Matta dalchini is an endemic tree to Western Ghats, which is in a vulnerable state as per International Union for Conservation of Nature red list. The species is distributed in Karnataka, Kerala and Tamilnadu. It is a small to medium sized tree; about 8 m tall and 70 cm girth. The tree flowers during January to May and fruits in June - July. Propagation of this species is mainly through seeds besides cuttings. They have both economical and commercial uses. Leaves are used as spice in cooking and bark is used to cure cough and headache, in making incense sticks, spider poison and also as a mouth refresher.

There has been a decline in the population of C. sulphuratum during last ten years with more old and damaged trees and very few recruits. Due to excessive leaf collection the flowering is impeded and thereby lacks fruiting. In spite of regular production of seeds it is often difficult to obtain required quantity of seeds for natural and artificial plantation of C. sulphuratum. So, it is evident that the availability of quality seeds is much essential. In general, seeds are vulnerable to attack by fungi, insects and bacteria. Among them fungi and insect pests are the major groups of organisms causing loss of viability to seeds. It was felt necessary to study the incidence of insect pests in C. sulphuratum, their biology and

RECORD OF WEEVIL, Alcidodes sp. DAMAGING THE SEEDS OF Cinnamomum sulphuratum

S. MANIVANNAN, H.C. NAGAVENI and R. SUNDARARAJ
Institute of Wood Science and Technology, 18th cross
Malleswaram, Bangalore- 560 003, Karnataka, India.
E-mail: manivannan311984@gmail.com

ABSTRACT : A weevil, Alcidodes sp. (Coleoptera: Curculionidae) was found to infest the seeds of Cinnamomum sulphuratum. The biology of Alcidodes sp. was studied. The eggs were oval, elongate, broadly rounded at the ends and pale yellow in colour and lasted for about 5-8 days. The larvae were ‘C’ shaped, measuring 9-10 mm in length, white in colour and found feeding inside the seed for a period of 30 - 35 days, while the pupal period lasted for 12-15 days. The adults were stout, elongate, oval, black in colour and light brown stripes running alternately throughout the length of the elytra. The mean percent infestation of seeds ranged from 32- 38.62 during the two years of study. Infestation has adversely affected the seed germination and a decreasing trend in germination was observed, with increase in infestation level.

Key words: Alcidodes sp., Cinnamomum sulphuratum, germination, seed pest

damage potential as no information is available on these aspects. With these objectives the present study has been carried out.

MATERIALS AND METHODS

The study was carried out in the Subramanya forest area, Karnataka, South India (12° 63' N; 75° 61' E) during 2008 and 2009. The assessment on the incidence of the pests was carried out by following cut open method in 100 randomly selected seeds from the freshly collected seed lot in four replications. Nature and the extent of damage were studied by visual observations of the symptoms and by counting the number of damaged seeds collected using interception traps by lopping the branchlets of the tree during the months of June - July. For studying the number of eggs /seed, randomly selected 100 seeds were taken in three replicates and were observed for the presence of ovipositional puncture. Freshly laid eggs were used for studying the incubation period of eggs. The eggs were placed in the niches and on moist filter papers in petridishes to study hatching. The total larval period was derived by observing the newly hatched larvae and the other larvae of different age groups and sizes. The pupal period was determined by observing the mature larvae at intervals till the emergence of adults.

Germination tests

The germination tests were carried out by categorizing the seeds into five groups based on visual observations, namely healthy, seeds having 0-15% infestation, 16-30% infestation, 31-50% infestation and 51-100% infestation as separate groups. The germination studies were carried out in the field conditions in a plastic tray with water outlet with four replications each consisting of 25 seeds. The germination counts were taken till 45 days after sowing. The percent germination was calculated and compared with healthy seeds using ANOVA at 5% level of significance.

RESULT AND DISCUSSION

Pest incidence

The studies on the incidence of the pests in C. sulphuratum showed the presence of Alcidodes sp. (Coleoptera: Curculionidae). The adult weevils were active during the months of March to Mid-July and the population reached its peak during the second week of June, coinciding with the availability of the host tree species.

Pest status and nature of damage

The weevil is a serious pest as both grubs and adults caused damage to the seeds. Grubs caused more damage than the adults. The adults usually laid a single egg inside the seed, but in rare cases two ovipositional punctures were noticed (Fig 2.). The seeds examined by the cut open method showed either the presence of egg or grubs inside the seed (Fig 3). In most of the seeds the embryo was intact without any damage. But in some exceptional cases, the eggs were laid near to embryo, which helped the grubs to feed on them after the emergence.

Life cycle of Alcidodes sp.

The adult female made a hole by using its mandible and laid a single egg inside the seed with its ovipositor. The eggs were oval, elongate, broadly rounded at the ends and pale yellow in colour, with smooth dorsal surface. The egg stage lasted for about 5-8 days. Normally only a single egg was found in a seed but in some cases two ovipositional punctures was found in a single seed. The larvae were 'C' shaped, measuring up to 9-10 mm in length, white in colour and are apodous.

The larvae after hatching started feeding on the internal contents of the seed around the hole in which the eggs were laid. The grubs during their development fed on both the cotyledons (Fig. 4.). The larvae were found feeding inside the seed for a period of about 30 - 35 days. The pupae resembled the adult in appearance. Pupation
Different life stages of *Alcidodes* sp.

period lasted for 12-15 days. The adult emerged out of the circular hole made on the seed surface. The adults were stout, elongate, oval, black in colour and light brown stripes running alternately throughout the length of the elytra. The weevil had strong mandible. The fresh adults developed from the pupae were found less active.

**Germination Studies**

The germination results conducted in the field conditions revealed that the weevil infestation significantly reduced the germination in the infested seeds. A decreasing trend in germination was observed, as there was increase in percentage of infestation. The healthy seeds of *C. sulphuratum* showed an average percent germination of about 77.75 and 77 during 2008 and 2009. The seeds which had 0-15% infestation and 16-30% showed maximum germination during 2008 (69.25 and 63), but the germination studies conducted in 2009 showed slight reduction in germination. The germination in the seeds, which had 31-50 % infestation, did not show much variation during the two years of study. But the seeds which suffered from 51-100% infestation, showed significant reduction in the germination percentage.

The present study indicated the association of *Alcidodes* sp. with the seeds of *C. sulphuratum* in an undisturbed ecosystem. The study has highlighted the effect of insect infestation on the seeds of a tree species which is under greater threat. It is necessary that before the population of the insect pest increases drastically, studies on its natural enemies such as parasites and predators would be a major contribution towards conserving this tree species.

### REFERENCEs
