

## Prevailing insect pests of ber (*Ziziphus mauritiana* Lamk) and their natural enemies in hot arid ecosystem

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**ABSTRACT :** In this present study, about seven insect pests such as fruit fly (*Carpomyia vesuviana* Costa), stone weevil (*Aubeus himalayanus* Voss), ber butter fly (*Tarucus theophrastus* Fabricius), leaf webber/rollers (*Synclera univocolis* Walker), bark eating caterpillar (*Indarbela* sp), termite (*Odontotermes* sp) and grey weevil (*Myllocerus* sp) were recorded. The damage of leaf feeders viz., ber butterfly, leaf webber and grey weevil damage was more during June to September and stone weevil damage was noticed from October to February. The fruit fly was recorded from November to February. In case of natural enemies, the fruit fly parasitoids *Fopius* sp and other hymenopterans, braconids (*Apanteles* sp), ichneumonid wasp; neuropterans, green lace wing (*Chrysoperla* sp) and spiders also have also been reported during this period. Beside to ber fruit fly, the stone weevil and ber butter fly seems to be serious pests of ber in this region.

**Keywords:** *Ziziphus mauritiana*, insect pests, natural enemies

The ber (*Ziziphus mauritiana* Lamk.), 'desert apple' is a major fruit crop extensively cultivated in the arid and semi-arid region of Rajasthan, Haryana, Punjab, Gujarat and other parts of India. The fruit is quit nutritious, contains rich in vitamin C, second only to aonla and guava and much higher than citrus and apple (2). It is gaining popularity among the growers because of its adaptability to adverse climatic condition and good returns in hot arid ecosystem with limited inputs. However, the avoidable loss is more due to insect pests and diseases. Although does have recommended management practices, the intensive farming practices like introduction of improved varieties and irrigation leads unpredictable change in insect pests eco-system too. The pests such as fruit fly (*Carpomyia vesuviana* Costa), chafer beetle (*Holotrichia* sp.) and bark eating caterpillars (*Indarbela tetraonis* Moore) (*Indarbela quadrinotata* Walker) are considered as major pests of this region (5). Beside these, the ber butterfly *Tarucus theophrastus* Fab. damaging newly sprouting ber shoots at Punjab (4) and stone weevil infesting ber and seems to be serious at early stage of fruit set at Bikaner, Rajasthan (*Aubeus himalayanus* Voss) (1) also been reported in the ber. Hence, the present study has been undertaken to investigate the status of existing insect pests of ber and their natural enemies in this hot arid region.

### MATERIALS AND METHODS

After a month of pruning the new sprouting branches of ber trees were carefully monitored for insect pests. The fortnight observation has been taken in the cultivars Gola and Seb during 2008-09 and 2009-10 at Experimental Block of Central Institute for Arid Horticulture Bikaner. The per cent damage of leaf (ber butterfly, leaf webber/roller and grey weevil) and fruit (ber fruit fly and stone weevil) were taken from the randomly selected trees. The data was obtained from different stratum of the tree. For fruit fly exit hole indication as well as fruit cutting method has been taken as

identification mark and the fruits with naked puncture; black egg laid mark at the stylar end of fruits were taken for stone weevil. The sample was drawn from the selected branches consisting 20 fruits per sample. The damage of bark eating caterpillar and termite was recorded by counting number of affected branches per tree and total number of tree infested tree and per cent damage was computed. Beside these, the existing natural enemies (eggs and nymphs population of *Chrysoperla* sp and *Apanteles* sp (cocoon) were recorded throughout the seasons. To determine the *Fopius* sp, a fruit fly parasitoid induced mortality in the natural condition the five samples consisting 20 fruit fly infested fruits per sample has been collected and kept for adult parasitoid emergence under room temperature. The adults parasitoids emerged from the samples were recorded periodically and per cent mortality was worked out.

### RESULTS AND DISCUSSION

Among the seven insect pests recorded, three of them belongs to the arthropod family Lepidoptera; two from Coleoptera; each from Diptera and Isoptera (Table 1.). During vegetative phase (June – September) the ber butterfly (*Tarucus theophrastus*) and leaf webber (*Synclera univocolis*) were noticed and the incidence was the tune of 36 to 40 and 10 to 13 percent respectively (Table 2).

The overall incidence was higher in the cultivar Seb than the Gola (Figure 1). The activity of natural enemies *Apanteles* sp and *Chrysoperla* sp was more during this period and it was decreasing in trend towards the reproductive phase. The range of *Apanteles* sp parasitization on leaf roller was about 12 percent.

From the first week of October, the incidence of stone weevil was noticed in both the cultivars, it was observed in early developing butts, half matured as well as  $\frac{3}{4}$ <sup>th</sup> matured fruits. In case of matured fruits, there was no indication for the further stone weevil grub development. The damage was

**Table 1. Prevailing pests of ber in hot-arid ecosystem**

Sl. No.	Name of the Pests	Scientific name	Family	Order
1	Ber butter fly	<i>Tarucus theophrastus</i> Fab.	Lycaenidae	Lepidoptera
2	Leaf webber	<i>Synclera univocolis</i> Walker	Pyraustidae	Lepidoptera
3	Stone weevil	<i>Aubeus himalayanus</i> Voss	Curculionidae	Coleoptera
4	Fruit fly	<i>Carpomyia vesuviana</i> Costa	Tephritidae	Diptera
5	Bark eating caterpillars	<i>Indarbela</i> sp	Cossidae	Lepidoptera
6	Grey weevil	<i>Mylocerus</i> sp	Curculionidae	Coleoptera
7	Termite	<i>Odentotermes</i> sp	Termitidae	Isoptera

**Table 2. Nature of damage of existing pests of ber**

SL.No.	Pest	Symptoms and intensity of damage
1	Ber butter fly <i>Tarucus theophrastus</i>	Larvae feed on sprouting tender shoots, leaves and flower buds. Infested leaves gives whitish look due to chlorophyll feeding finally the leaves remain with long streaks.
2	Leaf webber <i>Synclera univocolis</i>	The newly hatched caterpillar attacks unopened and partially opened leaves and leaf folding with silken threads. The larvae consumes green matter by scrapping, leaving behind the papery epidermis. In severe state, the tree gives unhealthy appearance and stunted growth on growing point.
3	Stone weevil <i>Aubeus himalayanus</i>	Black colour egg laid marking in the styler end of fruits. Misshaping, fruit dropping immature ripening, shrinking due to endosperm damage and drying of fruits also the mark of infestation.
4	Fruit fly <i>Carpomyia vesuviana</i>	Maggot starts feed on pulp and the infested fruits packed with excreta of maggot. Severe condition, fruits drop off.
5	Bark eating caterpillars <i>Indarbela</i> sp	Presence of webs at angles weakening and cleavage of branches at fruit development stages.
6	Grey weevil	Damaged leaves with serrated margin and webbed leaves
7	Termite	Main trunk with termite mounts

**Table 3. Seasonality of pests and their damage intensity**

Name of the Pests	Feeds on	Intensity of damage (%)	Season
Ber butter fly <i>Tarucus theophrastus</i> Fab.	Leaves	25 - 40	June- Sep
Leaf webber <i>Synclera univocolis</i> Walker	Leaves	10 - 13	Aug - Sep
Stone weevil <i>Aubeus himalayanus</i> Voss	Stone	24 - 43	Oct - Feb
Fruit fly <i>Carpomyia vesuviana</i> Costa	Pulp	5.48 - 6.73	Nov - Feb
Bark eating caterpillars <i>Indarbella</i> sp	Branches axis	50 - 75	Aug - Feb
Grey weevil <i>Mylocerus</i> sp	Leaves	5 - 13	Sep - Dec
Termite <i>Odentotermes</i> sp	Main trunk	49	Feb - April

the tune of 24 per cent in Gola and 43 per cent in Seb (Table 2) and it was noticed throughout the season (October-February). The fruit fly incidence was noticed during November and it was continued up to February. The mean damage was 16.71 in Gola and 6.73 in Seb. About 49 per cent of ber trees were infested with termites during February to April; the damage of bark eating caterpillar and grey weevil was 50 to 75 and 5 to 13 per cent respectively.

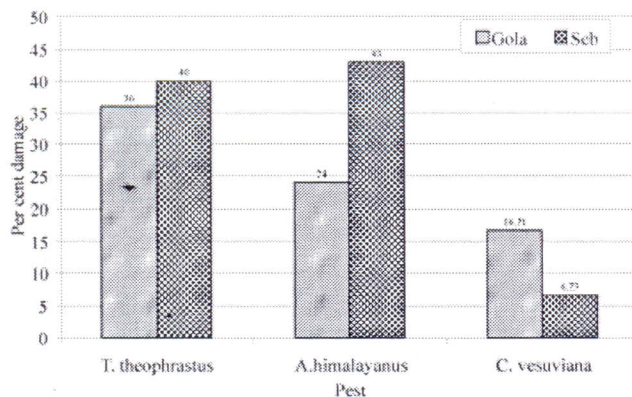
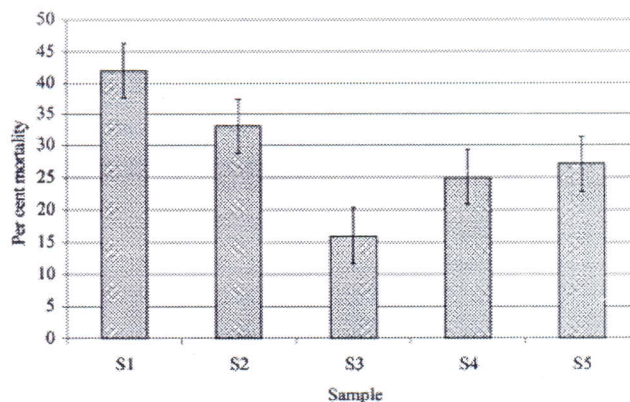
The population of Ichneumonids was negligible. Though the reported pests are very much familiar to ber trees, the fruit weevil and ber butter fly seems to be new emerging issues in this region. The severe fruit drop at initial stage of fruit development due to stone weevil attack is getting attention. Too little information is available about stone weevil.



Table 4. Status of natural enemies in ber in hot arid eco-system

Sl. No.	Name of beneficial insect	Nature of parasitoid	Host	Season
I	Parasitoids (Hymenopterans)			
	<i>Fopius</i> sp (Braconidae)	Egg-pupal	Ber fruit fly	Nov-Feb
	<i>Apanteles</i> sp (Braconidae)	Larval	Ber leaf webber/roller	Aug-Nov
	Ichneumonids	Larval	Leafwebber/roller	Aug-Nov
II	Predators (Neuropterans)			
	<i>Chrysoperla</i> sp	Prey of soft bodied insects		Aug-Dec
III	Non insect predators (Spiders)	Prey of soft bodied insects	All soft bodied insects	June- Mar

Figure 1. Status of Major pests of ber in the cultivars Gola and Seb

Figure 2. *Fopius* sp induced mortality in fruit fly *C. vesuviana* pupa

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