A REPORT ON THE OCCURRENCE OF INSECT PESTS ON ZANTHOXYLUM ARMATUM DC. (FAMILY: RUTACEAE), AN IMPORTANT MEDICINAL PLANT IN JAMMU REGION

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INTRODUCTION
Zanthoxylum armatum DC [syn. Z. alatum Roxb] (Rutaceae) commonly known as toothache tree or prickly ash tree is an important medicinal plant. This is a shrub or small tree, which is almost entirely smooth and has a strong aromatic smell. Many authors like Mathur and Srivastava (1967), Bogarada (1975), Joshi et al. (1991), Perju and Oltean (2002) and Banjo et al. (2006) conducted studies on various aspects of insect pests of medicinal and aromatic plants in different parts of the world. Neubauer et al. (1974) studied the insect pests of peppermint while that of Catharanthus roseus was studied by Reddy et al. (1981). Parihar (1981) studied insect pests of Aak (Calotropis procera) and their significance in Rajasthan desert. Butani (1982) and Chandra (1992) reported the occurrence of the insect pests of Tulsi (Ocimum sanctum Linnaeus. Meshram et al. (1999) recorded Scutellera nobilis Fab. on Emblica officinalis. Insect pests infesting Gloriosa superb was studied by Swamy and Rajagopal (1995) where as the Outbreak of Spodoptera litura on bramhi was explained by Tripathi et al. (1997). Mitra and Biswas (2002) studied the insects of Ashwagandha and Bhagat (2004) recorded Mango mealy bug, Drosicha mangiferae infesting Ashwagandha. Rani et al. (2006) studied the major sucking pests of Aonla. As no comprehensive and detailed information regarding morphology, biology and mode of extent of damage of insect pests of Z. armatum is available in this particular state as well as in other parts of country, this has led present authors to conduct detailed investigations on the distribution, morphology and mode of extent of damage of caused by various pests to these plantations and decreasing its economic value in Jammu region of J and K state. The present paper details the complete morphology and mode of damage to Zanthoxylum armatum in Jammu region.

MATERIALS AND METHODS
The field investigations were carried out during 2007-08 in district Rajouri of Jammu Division of J&K State where Zanthoxylum armatum plantations were abundantly found. The insects along with their immature stages were collected from the fields by various methods such as hand picking, stem beating and also with the help of entomological nets. Later on collected specimens i.e., eggs, larvae, pupae and adults were preserved by traditional methods for further studies. General morphological studies were made under different magnifications of the stereoscope microscope. Photographs have been taken with SONY Cyber-Shot, Digital Still Camera, Model No.: DSC-T10 with 5x optical zoom having 7.2 effective mega pixels with inbuilt macro function for extreme closeup.

RESULTS AND DISCUSSION
During the period of observation, a total of 7 insect pests...
belonging to 4 families in 3 insect orders were recorded on Z. armatum. Most of the insects recorded were found to be defoliator and few were sap suckers (Table 1). These insects were recorded for the first time from Z. armatum plantations in Rajouri District of Jammu Division of J and K State. A general description of each insect species along with their damage pattern is discussed below one by one.

**Colaspomma semicostatum Jacoby** (Chrysomelidae: Coleoptera) (Fig. 1a, 1b, 1c)

**Number of specimen examined:** 30

**Distribution**
Sikkim, Darjeeling, Himalayas (Kimoto, 1967); Ranchi (Mishra et al., 1994); Shimla (Singh and Singh, 1997); Africa, Indonesia, China, Kathmandu, Nepal, India, Rajouri, J&K (Sudan, 2008).

**Description**
Adult oblong, convex, glabrous, small metallic greenish beetle with a length of about 4 to 5 mm. Head hypognathous, well inserted into the prothorax. Antennae orange, filiform, 11 segmented. Pronotum finely and sparsely punctured, subcylindrical, narrower than the elytra. Scutellum small, concolorous with elytra. Elytra punctuate, slightly striate, punctures coarser than on elytra. Legs metallic orange each with greatly thickened femora and bifid tarsal claws.

Singh and Singh (1997) studied the life-history, feeding and reproductive potential of Colaspomma semicostatum on Impatiens thomsoni Hooker, a weed under coniferous forests in the western Himalayas and also recorded Populus ciliata as its alternate host plant.

**Damage**
During the monsoon season the adult beetles were recorded feeding voraciously on the leaves. They eat young leaves and make small holes on the leaf. Besides, these beetles were found to feed on the buds, stem and sometimes the surface of young fruits. The damaged buds fail to flower. In severe infestation damage resulted in necrosis, reduced growth and defoliation of the host plants.

**Colaspomma semicostatum** was found throughout India feeding on the foliage of numerous species of trees mainly Pinus roxburghii, Tectona grandis, Vitex negundo, Cassia fistula and Citrus species from March to July. Besides this, the insect was observed feeding gregariously on the foliage of Impatiens thomsoni growing abundantly at altitude of 2,015 m above sea level on moist places in Deodar forests in Shimla (Singh and Singh, 1997). Mishra and Jayaswal (1995) reported Colaspomma semicostatum as a new pest of Shorea robusta.

**Monolepta signata Olivier** (Chrysomelidae: Coleoptera) (Fig. 2a, 2b, 2c)

**Number of specimen examined:** 30

**Distribution**
Sri Lanka, India, South-East Asia, China, Philippines, Java, Malaysia, Bangladesh, Nepal; Sikkim, Himalayas, Tamil Nadu, Arunachal Pradesh, Tripura, Gujaratt, Assam, Orrisa, Uttar Pradesh, Haryana, Kerala, Karnataka, Maharashtra, West and East Khasi Hills, West Bengal, Kolkata, Darjiling, Jhalpaiguri, Koch Bihar, Medinipur and Murshidabad, Rajouri, J&K (Sudan, 2008).
green scales with a central black streak and two black patches laterally. A deep reddish brown furrow separates the pronotum and elytra. Elytra elongate, striated, clothed with greenish yellow scales, blunt, apically evenly rounded, broad anterior, slightly narrow and rounded posteriorly and completely cover the abdomen. Legs almost similar, reddish brown and hairy; femur elongate, stout, cylindrical upto middle, broad at the centre with a ventral femora tooth and slightly narrow at the posterior end.

**Damage**

Adults feed on the host plants externally and cause appreciable damage to this plant. They mainly feed on the leaves from the outer margins or may also feed upon the epidermis of the tender stems by making irregular scratches with its mouth parts. Infested plants have damaged and dried foliage, particularly at the shoot tips. Flower buds also become the victims of the adults. *Platymycterus himalayanus* was recorded for the first time feeding on *Zanthoxylum armatum* from Jammu region (present studies).

*Papilio polytes* Linnaeus (Papilionidae: Lepidoptera) (Fig. 4a, 4b, 4c)

**Number of specimen examined:** 50

**Distribution**

Pakistan, India, Nepal, Burma, Sri Lanka, Myanmar, Thailand, Southern and Western China, Taiwan, Hong Kong, Japan, Vietnam, Laos, Kampuchea, Andamans, Nicobars, Eastern and Peninsular Malaysia, Brunei and Indonesia (except Moluccas and Irian Jaya), Northern Marianas (Saipan) and Philippines (c.f. internet***); Vishakhapatnam (Alturi et al., 2002); Andhra Pradesh, West Bengal, Kolkata, (Mondal et al., 2004), Kaniyanchal, Kerala, Shillong, Jalpaiguri, Rajouri, J&K (Sudan, 2008).

**Description**

**Adult**

Jet black butterfly with a wingspan of about 9.0 to 10.0 cm and having a row of white spots along the middle part of hind wings. Forewing lowered to cover part of the hind wing; a typical stance of the Common Mormon.

**Male**

A dark coloured swallow tailed butterfly. Upper forewing with a series of white spots decreasing in size towards the apex. Upper hind wing with a complete discal band of elongated white spots. Hind wing with or without red crescents on the margin. Males smaller in size than the females.

**Female**

Females with a broad whitish area with many black veins or stripes on forewings. Middle of hind wings with a white area with some black veins and a chain of red spots next to the margin and a red spot on back.

**Caterpillar**

First few instars closely resemble those of the Lime Butterfly (*Papilio demoleus*). Later instars dark green in colour with a dark and bright transverse black band with an eye spot on each side on the 4th and 5th segments, a black and white oblique band on the 8th and 9th segments and yellowish brown head with deep red osmeterium.

**Damage**

Caterpillars of *Papilio polytes* feed on the leaves of *Zanthoxylum armatum*. They are serious defoliators and feed on the leaves until they pupate in that host plant. They eat the cuticle of leaves leaving behind small circular holes in the leaves. In severe attacks, it voraciously eats the complete leaf by gnawing at the edges remaining the veins and thorns intact thus leading to total defoliation of the plants.

Mondal et al. (2004) observed *Papilio polytes* feeding on the leaves, terminal shoots, inflorescences and fruits of *Aristolochia indica* in West Bengal, India. Severe infestation by full-grown larvae resulted in the complete defoliation of plants. The greatest damage was observed in October and November.

*Papilio polyctor* Boisduval (Papilionidae: Lepidoptera) (Fig. 5a, 5b, 5c, 5d, 5e, 5f)

**Number of specimen examined:** 50

**Distribution**

Eastern Afghanistan, Central Asia, Western China, Northern India, Nepal, Burma, Bhutan, Myanmar, Thailand, Northern
Description

Adult
A very common beautiful swallowtail butterfly with a wingspan of about 9-13 cm. Body and wings black in background with a scattering of green scales on the dorsal surface of abdomen. Upper surface of the fore wing with diffuse golden green to green banding on the middle area. Hind wing with a long spatulate tail producing from vein 3 and a series of purplish red lunule encircling the top of black spots along the wing margin. Upper surface of the hind wing with blue or green patches and with three or four claret red crescents on the margin. Underside of hind wing bears prominent violet and metallic green bundles along the entire wing margin.

Caterpillar
Dull green with some yellowish markings, thorax with a remarkable shield like covering projecting a little over the head and marked with slender involute black lines; 7th to the 12th segments with lateral obliquely placed pale yellowish lines.

Damage
Caterpillar of Papilio polyctor feeds voraciously on the leaves of Zanthoxylum armatum and cause significant damage to this plant. It starts feeding along the margins of leaf and eats up whole leaf causing defoliation reducing the leaves to mere veins. The caterpillars generally feed on leaves but sometimes also feed on flowers and inflorescences of host plants. In severe infestations, whole of the branches are eaten up there by causing complete defoliation of the plant (present studies).

Erthesina fullo (Thunberg) (Pentatomidae: Hemiptera) (Fig. 6a, 6b, 6c)

Number of specimen examined: 40

Distribution
Europe, Northern and South East Asia, India, Japan, China, Taiwan, Vietnam, Hong Kong; Assam, Dehradun, South 24 Pgs (Bakkhali) and Puruliya (Belmura) and in various parts of Sunderbani, Nowshera, Kalakote and Rajouri (Sudan, 2008).

Table 1: Description of insect pests on Zanthoxylum armatum

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Scientific Name</th>
<th>Order</th>
<th>Family</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Colasposoma semicostatum Jacoby</td>
<td>Coleoptera</td>
<td>Chrysomelidae</td>
<td>Defoliator</td>
</tr>
<tr>
<td>2.</td>
<td>Monolepta signata Olivier</td>
<td>Coleoptera</td>
<td>Chrysomelidae</td>
<td>Defoliator</td>
</tr>
<tr>
<td>3.</td>
<td>Platymycterus himalayanus Marshall</td>
<td>Coleoptera</td>
<td>Curculionidae</td>
<td>Defoliator</td>
</tr>
<tr>
<td>4.</td>
<td>Papilio polytes Linnaeus</td>
<td>Lepidoptera</td>
<td>Papilionidae</td>
<td>Defoliator</td>
</tr>
<tr>
<td>5.</td>
<td>Papilio polyctor Boisduval</td>
<td>Lepidoptera</td>
<td>Papilionidae</td>
<td>Defoliator</td>
</tr>
<tr>
<td>6.</td>
<td>Erthesina fullo (Thunberg)</td>
<td>Hemiptera</td>
<td>Pentatomidae</td>
<td>Sap sucker</td>
</tr>
<tr>
<td>7.</td>
<td>Nezara viridula (Linnaeus)</td>
<td>Hemiptera</td>
<td>Pentatomidae</td>
<td>Sap sucker</td>
</tr>
</tbody>
</table>
the top of forehead runs a prominent central yellow streak or line up to the pronotum. Scutellum large, triangular with small yellow spots but never entirely covering the abdomen. Abdomen appears externally, the front and back flange reason black with yellow horizontal spots. Legs black with yellowish white tibia and tarsi. Wings black all developed and projecting beyond the tip of abdomen with slightly narrow wing region in the abdomen.

**Nymph**

Nymphs small, rounded to oval, creamish yellow to light grayish brown and with orange spots on the back; eyes, antennae and legs black.

**Damage**

The nymphs and adults of *Erthesina fullo* were found feeding by sucking the sap from the leaves and tender stems of *Zanthoxylum armatum*. The damage to the plants is caused by the removal of the sap and by an actual injury to the plant tissues. Feeding on stems or twigs may cause dwarfing or wilting. Leaf feeding results in a characteristic spotting or browning and wilting of the leaves. Joshi et al. (1984) recorded this pest from the poplars (*Populus* sp.) in northeastern regions of India.

*Nezara viridula* (Linnaeus) (Pentatomidae: Hemiptera) (Fig. 7a, 7b, 7c)

**Number of specimen examined:** 40

**Distribution**

Tropical and subtropical regions of the Americas, Africa, Asia, Australasia and Europe (Todd, 1989 and Panizzi, 2008); Hawaii and California (Capinera, 2001); Maharashtra, Himachal Pradesh, Assam, West Bengal, Birbhum (Ballavpur forest), Koch Bihar (Sonarpur), Jalpaiguri (Alipurduar, BTR), Medinipur (Sharikarpur Forest), Murshidabad; Sunderbani, Nowshera, Kalakote and Rajouri in J&K (Sudan, 2008).

**Description**

**Adult**

Adult shield shaped with an overall dull or solid green with piercing and sucking mouthparts. Mouth with a long beak like structure called the rostrum. Eyes dark red or black. Adult males average about 12 mm in length and females average about 13 mm recognized by their ovoid shape, five segmented antennae, third and fourth antennae segments mostly reddish except at base and their malodorous scent. Ventral scent (stink) gland pore short and broad located on the sternum between the second and third leg. Side of pronotum slightly concave in anterior half and second abdominal sternite with rounded medial spine. Abdomen with small black dots along sides. Wings completely cover the abdomen.

**Nymph**

Nymphal stages oval shaped, wingless but look similar to an adult counterpart, vary in color from black for very small nymphs to green for larger nymphs with a distinctive pattern of white spots on the abdominal segments; abdomen yellowish green with red spots on the median line.

**Damage**

The bugs feed by piercing plant tissue with needle like styles. Adults and nearly all nymphal stages (2nd to 5th nymphal stages) suck plant sap from leaves, flowers, bolls, buds, fruits and from the seeds of a wide array of crops. All plant parts are fed upon but growing shoots and developing flowers and fruits are preferred. Attached shoots usually wither or in extreme cases may die. Feeding on fruits causes scarring and dimpling known as “cat facing” which results in premature abscission. The damage on fruit from the punctures is hard brownish or black spots. Young fruit growth is retarded and it often withers and drops from the plant.


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REFERENCES


