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RECORD OF HEMIPTERAN INSECT PEST DIVERSITY ON *MURRAYA KOENIGII* (L.) SPRENGEL (CURRY LEAF), A MEDICINALLY IMPORTANT PLANT FROM JAMMU REGION OF J AND K STATE

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ABSTRACT
Curry leaf (*Murraya koenigii*), a member of family Rutaceae is a semi-deciduous, aromatic pubescent shrub or a small sub-tropical tree used both as a food ingredient as well as in medicines. Leaves, seeds, bark, flowers and root of the plant are reported to contain lots of minerals and essential oils of immense medicinal value. Species diversity analyzed through consistent survey and sampling conducted in various districts of Jammu region from March 2008 to Feb. 2009 indicated that the curry leaf plantations are damaged mostly by insects belonging to order Hemiptera. A total of 8 insect species belonging to 7 different families of order Hemiptera were recorded to infest curry leaf plantations in different districts of Jammu region.

INTRODUCTION

Curry Leaf (*Murraya koenigii,* Rutaceae) is an important plant and known for its culinary and medicinal value. Leaves are widely used as food flavourant in Indian cookery for flavouring food stuffs. Curry leaves are also used in many Indian Ayurvedic and Unani prescriptions (Joseph and Peter, 1985). The whole plant including leaves, stem, flowers fruits and roots are used as tonic, stimulant, anti-flatulent, anti-diabetic, anti-oxidant (Khan *et al.,*1997), anti-carcinogenic(Khanum *et al.*, 2000) carminative and stomachic as well as used in curing digestive disorder, kidney disorder, eye disorder, burns and bruises, insect and snake bites, treatment of diabetes, anaemia, prevention of human stomach and skin cancers, reduction of the risk of thrombosis, improving animal fertility, increasing shelf life of meat products, prevention of premature graying of hair and strengthening of gums and teeth. In Jammu region of JandK State, plant is most widespread; grown wild in the Sub-Shivalik Himalayan ranges well distributed in Districts Jammu (74°4′ and 75°8′ East longitude and 32°0′ and 33°0′ North latitude), Kathua (32°17' to 32°55' North latitude and 75°32' to 76°16' East longitude), Samba and Udhampur but scarcely distributed in Districts Reasi, Rajouri and Poonch. Despite being highly culinary and medicinally important, curry leaf plantations in Jammu region are attacked by large number insect pests which decrease its extensive economic value. In view of no records on insect pests of *Murraya koenigii* from Jammu region and scanty information available from rest of the country an extensive survey was carried out to explore the pests of curry leaf, *Murraya koenigii* which indicated that curry leaf plantations are damaged mostly by insects belonging to order Hemiptera. Extensive investigation yielded a total of 8 insect species belonging to 6 different families of order Hemiptera infesting curry leaf plantations in different districts of Jammu region. The present paper records the taxonomic status, geographic distribution, host plants, diagnostic features and their mode and extent of the damage caused to the host plant.

MATERIALS AND METHODS

The field studies for recording the pest diversity on curry leaf plants were conducted in Jammu region during the period from March, 2008-Feb., 2009 to record the distribution of *Murraya koenigii* (Curry leaf) as well as insect pests associated with the plant along with mode of damage. The insects along with their immature stages were collected by traditional methods of hand picking and by using hand nets from study area. Collected insects were killed using ethyl acetate and later on pinned, stretched and finally oven dried for about half an hour at 35°C- 40°C to avoid fungal infection. General morphological descriptions of all the stages of insect pest were made under different magnifications of stereoscopic microscope. Feeding behaviour of larval stages was made both in the field as well as in the laboratory.

RESULTS AND DISCUSSION

Diaphorina communis

Distribution: Lim *et al.,* (1990) reported *Diaphorina communis* from Malayasia. In India, *Diaphorina communis* are known to occur in Dehradun (Uttar Pradesh), Haridwar, Rishikesh (Mathur, 1975) and in Jammu, Kathua and Samba districts of Jammu and Kashmir State.

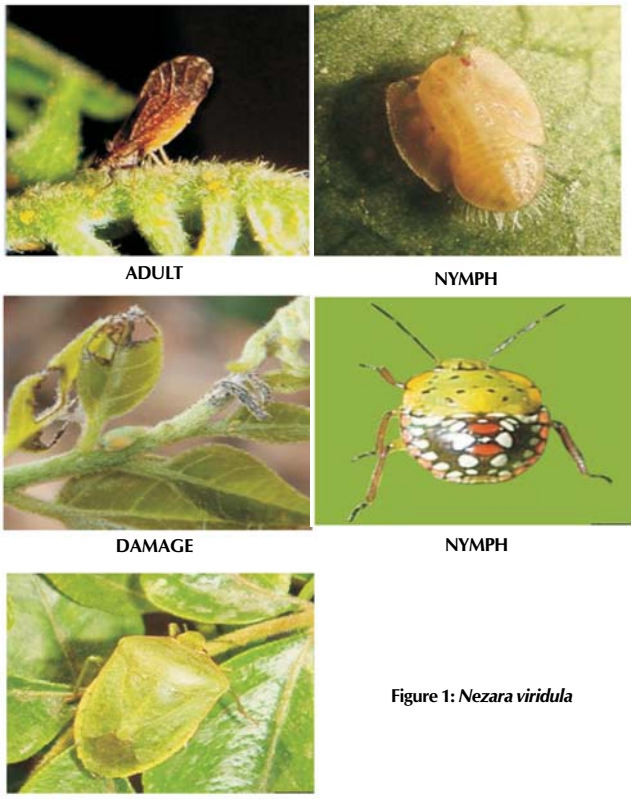
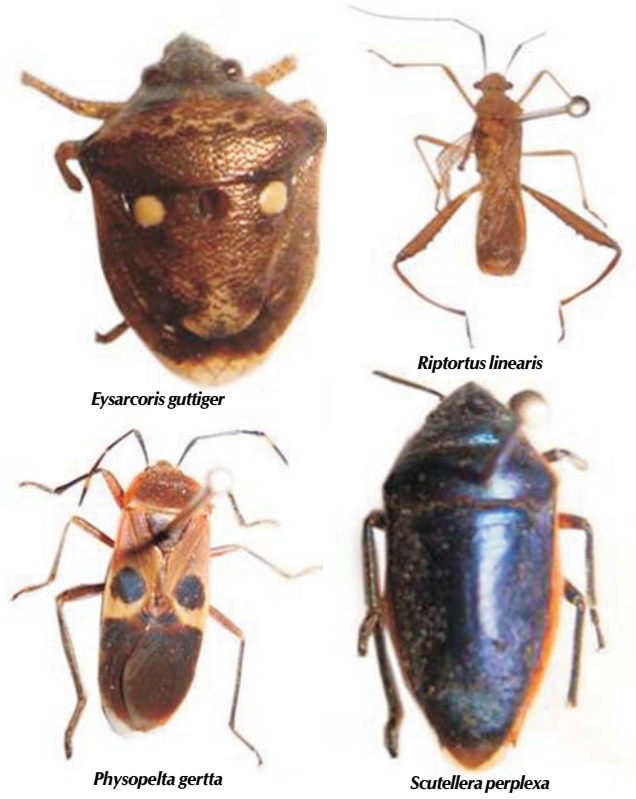


Figure 1: *Nezara viridula*



Host plants: Commonly found on *Murraya koenigii* Spreng. and *Murraya paniculata* (L.), rarely on *Citrus* species (Mathur, 1975). Adults have been observed on Citrus in Malaysia (Lim *et al.,* 1990).

Diagnostic features

Adult: Head somewhat but not greatly declivous, finely punctate, slightly smaller than thorax. Eyes large and recessive. Antennae small, 10-segmented with few setae, imbricate, 1st broadly transverse, 2nd slightly smaller than 1st, longer than broad, remaining segments slender. Thorax somewhat arched, robust, finely punctate. Pronotum well developed, distinct and prominent; prescutum and scutum broader than long. Scutellum small, narrowly transverse, somewhat vase shaped, broad anteriorly with prominent antero-lateral angles. Forewings large, widest subapically, narrowly rounded at apex. Hindwings with coastal margin, armed with 7 or 8 simple and 4 to 6 hooked setae. Legs moderate sized, coarsely pubescent and thickly beset with minute points, tibia longer than femora, tibial groove quite long, middle and hind tibiae with three and two stout, setae, respectively, hind tibiae without basal spur, with 7 black teeth like spines at apex, basal segment of tarsi of the hind legs bear claw-like spines. Abdomen longer than broad, sparsely pubescent on dorsal side and coarser on ventral side. Adult passes through five instar nymphs.

Damage

Diaphorina communis is one of the most destructive pest of *Murraya koenigii* plantations in the area of the investigator. Both nymphs and adults cause severe damage to plantations by sucking large quantities of sap from the tender growing shoots and leaves which consequently dry up. Extent of damage further becomes alarming when overwintering adults aggregate on newly forming leaf buds, feed and mate on them. Such an aggregation and feeding results in distortion of leaf buds which provides improved oviposition sites.

Nezara viridula Linnaeus, 1758

Distribution: It is cosmopolitan and presently distributed throughout the tropical and sub-tropical regions of Africa, America, Asia and Europe (Sudan, 2008). In India, recorded from Assam, Himachal Pradesh, Madhya Pradesh,

Table 1: Hemipteran insect pests recorded in the study area

Name	Order	Family	Pesttype	Status
Diaphorina communis	Hemiptera	Psyllidae	Sap sucker	Major
Nezara viridula L.	Hemiptera	Pentatomidae	Sap sucker	Minor
Eysarcoris guttiger Thun.	Hemiptera	Pentatomidae	Sap sucker	Minor
Riptortus linearis Fabr.	Hemiptera	Coreidae	Sap sucker	Minor
Physopelta gutta Burm.	Hemiptera	Largiidae	Sap Sucker	Minor
*Physopelta schlanbusch i*Fabr.	Hemiptera	Largiidae	Sap Sucker	Minor
Scutellera perplexa Fabr.	Hemiptera	Scutteleridae	Sap sucker	Minor
Sycanus sp.	Hemiptera	Reduviidae	Predator	Minor

Maharashtra and West Bengal; in Jammu, Kathua and Samba districts of Jammu and Kashmir State.

Host Plants: Host range of *Nezara viridula* encompasses over 30 families of dicotyledons and a number of monocots (Hoffman, 1935). It is highly polyphagous and shows strong preference for certain legumes (Corpuz, 1969). Host crops of economic importance include Beans, Cabbage, Citrus, Cotton, Macadamia nuts, Rice, Sugarcane and Wheat (Sudan, 2008) and *Murraya koenigii*.

Diagnostic features

Adult: Bug 12-18 mm long, green with piercing and sucking mouth parts, protruded out in form of a long beak like structure called the rostrum. Eyes black. Head and anterior portion of pronotum with yellow marks, scutellum devoid of prominent spots. Antennae 5- segmented; apical 3 segments light brown. Ventral scent (stink) gland pore short and broad located on the sternum between 2nd and 3rd leg. Abdomen with small black dots along sides. Wings completely cover the abdomen.

Nezara viridula passes through five nymphal instars before attaining adult status, which vary in colour from black in the early very small nymphal stages to green in the late nymphal stages.

Damage: Adults and nymphs obtain their food by piercing plant tissues of curry leaf plant with mandibular and maxillary stylets thereby extracting plant fluids. Adults cause maximum damage attacking all parts of plant including stem, petioles, foliage, flowers, fruits and seeds.

***Eysarcoris guttiger* Thunberg**

Distribution: Ceylon, Burma, China, Japan, India (Distant, 1902). In India, Sikkim, Naga Hills, Mumbai, Kolkata, West Bengal (Distant, 1902), in Jammu, Kathua and Samba districts of Jammu and Kashmir State.

Host plants: *Eysarcoris* sp. is phytophagous, feeding on variety of host plants including *Sesamum indicum*, *Chrysanthemum*, *Justicia adhatoda*, *Mentha* sp. and *Solanum nigrum* (Sudan, 2008) and *Murraya koenigii*.

Diagnostic features

Adult: Body obovate, moderately broad and somewhat strongly convex beneath, thickly punctured with bronzy black, punctures nearly confluent on the head, anterior area of the pronotum and lateral angles of the pronotum. Lateral angles of the pronotum obtusely prominent. Scutellum with large spot near each basal. Antennae hairy. Abdomen (excluding lateral and apical margins) shiny black. Legs black, ochraceous and punctuate.

Damage: *Eysarcoris guttiger* was found feeding on *Murraya koenigii* during April-May. Adults were found sucking sap from leaves, tender stems, flowers, flower buds, fruits and seed pods of the host plant. Bugs cause significant damage by piercing plant tissue as extracting plant juice.

***Riptortus linearis* Fabricius**

Distribution: Ceylon, Burma (Distant, 1902), Indonesia, Japan (Higuchi and Nakamori, 1999), Nigeria (Soyelu *et al*., 2007). In India, Assam (Hussain and Saharia, 1994), Bangalore, Darjeeling (Distant, 1902), Uttar Pradesh, Maharastra (Ghuguskar, 2001), Madhya Pradesh, Himachal Pradesh (Nair, 1995), in Jammu district of Jammu and Kashmir State.

Host plants: Fig, Maize, Millets, Pulses, Sorghum, Soyabean, Sweet Potato (Nair, 1995) and *Murraya koenigii*.

Diagnostic features

Adult: Dark cinnamon-brown and about 14-16 mm long; pronotum, scutellum, corium and lateral areas of sternum distinctly punctate; first, second and third joints of antennae, disk of sternum, and abdomen black. Lateral areas, base and some spots on abdomen, luteous; pronotum with spot at the middle margin. Apex of scutellum, pale luteous. Hind femora stout, with spines on ventral surface, humeral angle drawn out into spine.

Damage: Adults of *Riptortus linearis* Fabr. were recorded feeding on leaves and flowers of host plant (*Murraya koenigii*), sucking sap during April thereby causing damage to the plant. However, infestation is not very severe.

***Physopelta gutta* Burmeister, 1834**

Distribution: It is widely distributed in Australian region (extra-limital distribution)- East Timor , Indonesia, Aru Islands; Papua New Guinea; Oriental region- Burma(Myanmar), Indonesia, Java, Sumatra, Timor; Philippines, Srilanka, Taiwan; Palaerctic region- Afghanistan, China, Japan (Cassis *et al*., 2002). In India**:** Assam: Margherita and North Khasi hills (Distant, 1904), in Jammu district of Jammu and Kashmir State.

Diagnostic features

Adult: A medium sized bug, reddish; with a length of about 16 mm. Body divisible into head, thorax and abdomen and pilose. Head small, broader elongated into rostrum. Head with a pair of well defined compound eyes and a pair of antennae; base of apical joint of antennae ochraceous and base of first joint of antennae dull reddish. Head with a large spot at the basal end. Pronotum (excluding margins), scutellum and basal of corium fuscous; a discal rounded spot and apical angles of corium and the membrane black. Thorax with three pair of legs; coxae, trochanters and femora dull reddish beneath.

Damage: Bugs in large numbers appear during June-July, extracting juice from the seeds and sucking sap from the stem with its piercing and sucking mouth parts. As a result, seeds fail to ripen and stem becomes stunted. The damage caused by the insect does not appear to be of much intensity.

***Physopelta schlanbuschi* Fabr**

Distribution: Burma, China and India (Distant, 1904).

Diagnostic features

Adult: Bug about 13-16 mm in length reddish–ochraceous. Antennae large and pilose; apical joints grayish, first, second joints almost subequal in length. Pronotum with two spots on anterior lobe, two large transverse spots near anterior margin of posterior lobe. Scutellum with a rounded discal spot; a lateral series of long transverse linear spots present on sternal and abdominal incisures. Apex of rostrum, tibiae and tarsi black, base of first joint of antenna and apex of scutellum sanuineous. Posterior area of pronotum sparingly but very coarsely punctuate; clavus somewhat coarsely , corium much more finely punctuate.

Damage: Bugs cause damage to plant by extracting sap with its piercing and sucking mouth parts resulting in the malformation of stem seeds and fruits.

***Scutellera perplexa* Fabricius**

Distribution: Bengal, Uttar Pradesh (Nair, 1995), Coimbatore (Ambika *et al*., 2007), Uttaranchal; in Jammu, Kathua and Samba districts of Jammu and Kashmir State.

Host plants: *Jatropha curcas*, Castor, Cotton, Grape, Vine, *Emblica officinalis* (Nair, 1995), *Murraya koenigii*.

Diagnostic features

Adult metallic blue with 6-8 spots on elytra and 2 spots on scutellum and a longitudinal black streak from prothorax up to the middle of the elytra. Female bugs usually larger than male, about 19.0-21.0mm in length to 8.0-9.0 mm in width. Male bugs measure about 16.0-18.0 mm in length and 6.0-7.0 mm in width.

Damage: Adults and nymphs cause significant damage to curry leaf with its piercing and sucking mouth parts, elongated proboscis extract sap and juices from fruits, seeds and leaves.

***Sycanus* sp.**

Disribution: Ethopian, Oriental regions and China (Distant, 1904) and in India (Jammu and Kathua district of JandK state).

Diagnostic features

Adult: Elongated; head long, somewhat slender about as long as pronotum and scutellum together, post ocular much longer than anteocular area. Rostrum with basal joint longer than anteocular portion of head. First joint of antenna about as long as anterior femora. Pronotum constricted before the middle anterior lobe much narrower than posterior lobe. Scutellum with a long erect spine.

Damage: It is predatory in nature feeding on the larvae of various Lepidopteran insect pests.

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