



Prevalence of Major Insect Pests and Predators of Pigeon Pea (*Cajanus cajan* L.) in Middle Gujarat

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ABSTRACT

A survey was conducted on pigeon pea crop in Panchmahals district of Gujarat. A total of 3 talukas were surveyed to record major pigeon pea pests namely Spiny brown bug, *Clavigralla gibbosa* Spinola, Tur pod bug, *Riptortus pedestris* Fb., Green stink bug, *Nezara viridula* Linn., Aphids, *Aphis craccivora* Koch, *Aphis fabae* Scopoli, Cow bugs, *Otinotus oneratus* W., *Oxyrachis tarandus* F., Scale insect, *Ceroplastodes cajani* Maskell, *Icerya purchasi* Maskell, Mealybugs, *Phenacoccus solenopsis* Tinsley, *Paracoccus marginatus* W.& G., *Coccidohystrix insolita* Green, Leaf hoppers, *Empoasca kerri* Pruthi, Plume moth, *Exelastis atomosa* Walshingham, Pod borer, *Helicoverpa armigera* Hubner, Spotted pod borer, *Maruca testulalis* Geyer, Hairy caterpillars, *Spilosoma obliqua* Walker, Leaf webbers/folders, *Grapholita critica* Meyr., Blue butterfly, *Lampides boeticus* Linn., Blister beetles, *Mylabris pustulata* Thumberg, Ash/Grey weevil, *Myllocerus undecimpustulatus* Faust, Thrips, *Megalurothrips usitatus* Bagnall, Eriyophid mite, *Aceria cajani* Channa., Pod fly, *Melanogromyza obtusa* Malloch, and Termite, *Odontotermes* spp., Out of these pests, 9 insect species each were observed as regular and sporadic pests whereas other 2 as major and 5 as minor pests respectively. Total number of 25 insect pests species and 8 species of predators were recorded on pigeon pea crop during the period of study. The predators recorded mainly belonged to orders Coleoptera, Hymenoptera, Dictyoptera, Araneida and Neuroptera.

Key Words: Pigeon pea, Pests, Predators.

INTRODUCTION

Pigeon pea (*Cajanus cajan* L.) is widely grown in semi-arid region as an annual crop. India is the world's largest producer of pigeon pea and is the most important pulse crop. Among the various constraints for low productivity, attack by insects, mites and other pests is one of the important bottlenecks for successful production of the crop. Nearly, 300 species of insect pests are known to infest pigeon pea at its various growth stages in India (Lal and Singh, 1998). The production of pigeon pea pulse is greatly reduced by the injurious activities of these pest complexes (Kumar and Nath, 2003). This association of the pests with host plant is attracting a large number of natural enemies (Subharani and Singh, 2004). Pest scenario varies from place to place with the variation in the agro-climatic

conditions of the locality. Insects feed on all parts of the pigeon pea plant.

The primary focus of pigeon pea pest management research is on those most serious pests which attack reproductive structures, including buds, flowers, and pods. Pigeon pea has a great capacity to tolerate and recover from early season losses of flowers and young pods, provided the general health of the plant is good and that sufficient soil moisture is available. The key pests of pigeon pea can be grouped into three categories: flower and pod feeding lepidoptera, pod sucking hemiptera and seed-feeding diptera and hymenoptera. Information on pest complex in a specific agro-ecosystem is very much essential in devising pest management strategies which would not only be economically feasible but also ecologically sound.

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This study was carried out to investigate the pest intensity, plants of parts damaged and incidence of pests of pigeon pea, including crop-pest-natural enemy (predators) interactions in the district so that necessary integrated pest management strategies can be chalked out to solve the problem of the farmers in the area.

MATERIAL AND METHODS

Study area

Panchmahals district is a part of eastern hilly region of the state and sub-divided into two sub-micro regions namely, Mahi plain and forested scrub zone, on the basis of topography, climate, soils and natural vegetation. It lies between the parallels of latitude 22°17'2" and 23°20'2" and the meridians of longitude 73°20'2" and 74°22'. The length of the district from north to south is about 128.7 km and from east to west about 68.1 km. Out of the total geographical area (552049 sq km), of the district, cultivable land is 47 per cent and 22.50 per cent land is under forest cover and it ranks 5th in terms of area amongst all districts of the state. The region covers the western part of the district and includes Lunawada, Santrampur, Godhra, Kalol, Shehera, and Halol talukas.

The present investigations on survey and monitoring was carried out in Panchmahals district of Central Gujarat to identify insect pests and their predators of Pigeon pea (Local variety). Three talukas of Panchmahals district viz., Godhra, Kalol and Lunawada were selected and surveyed during three consecutive years i.e., 2010-11, 2011-12 and 2012-13. The survey was undertaken in 4 to 5 villages in each *taluka* with five fields in each village. The crops were surveyed regularly for recording observations on the incidence and intensity of pests. A questionnaire was used to obtain necessary information from farmers. Other sources of information during the visit included discussions from state extension agencies. Some pests were identified on the spot and some of them were brought to the KVK for their proper identification with the help of the appropriate technical literature. Based on their extent of incidence, the pests were categorized as major, minor, sporadic and regular. On the basis of intensity made by the particular pests, they were

grouped into pests of light, moderate and high importance.

RESULTS AND DISCUSSION

Insect pests population

Farmers' fields in all the areas visited had long-duration local pigeon pea cultivars with different heights and canopy development. Farmers plant pigeon pea in June/July and often harvest the pods from December through February. The data (Table 1) revealed that nearly twenty five species of insect and mite pests recorded during the crop season on pigeon pea included 12 hemipterous, 6 lepidopterous, 2 coleopterous and 1 each of homopterous, acarina, isopteraous, depterous, thysanopteraous pest which were identified from the study sites. Earlier, 31 insects' insect pest species from nine different orders were reported on pigeonpea from eastern Uttar Pradesh by Yadav *et al* (2009). Of these 9 species namely, Spiny brown bug, *Clavigralla gibbosa* Spinola, Tur pod bug, *Riptortus pedestris* Fb., Green stink bug, *Nezara viridula* Linn., Aphids, *Aphis craccivora* Koch, *Aphis fabae* Scopoli, Plume moth complex, *Exelastis atomosa* (Walshingham), Spotted pod borer, *Maruca testulalis* Geyer, Blue butterfly, *Lampides boeticus* L., Thrips, *Megalurothrips usitatus* Bagnall, were observed as regular pests which appeared in large numbers. Beside these 9 species namely, Cow bugs, *Otinotus oneratus* W., *Oxyrachis tarandus* F., Scale insects, *Ceroplastodes cajani* Maskell, *Icerya purchasi* Maskell, Mealybugs, *Phenacoccus solenopsis* Tinsley, *Paracoccus marginatus* Williams & Granara, *Coccidohystrix insolita* Green, Leaf webbers/folders, *Grapholita critica* Meyr, Eriyophid mite, *Aceria cajani* Channa were also noted as serious pests through sporadic occurrence. Out of these, two species viz., Pod fly, *Melanogromyza obtusa* Malloch and Pod borer *Helicoverpa armigera* Hubner were recorded as major pests on this crop by inflicting damage/incidence between 33 to 42 per cent while five species viz., Blister beetles, *Mylabris pustulata* Thunberg, Leaf hoppers, *Empoasca kerri* Pruthi, Hairy caterpillars, *Spilosoma obliqua* Walker, Ash/Grey weevil, *Myloccerus undecimpustulatus* Faust, Termite, *Odontotermes* spp., were recorded as minor pests on this crop.

Major Insect Pests and Predators of Pigeon Pea

Table 1. Incidence and intensity of insect-pests complex on pigeon pea.

Order / Family	Common name	Scientific name	Intensity	Plants of parts damaged	Incidence
Hemiptera					
Coreidae	Spiny brown bug	<i>Clavigralla gibbosa</i> Spinola	+	Leaves, pods	Regular
Alydidae	Tur pod bug	<i>Riptortus pedestris</i> Fb.	++	Leaves, pods	Regular
Pentatomidae	Green stink bug	<i>Nezara viridula</i> L.	+	All plant parts	Regular
Aphididae	Aphids	<i>Aphis craccivora</i> Koch	++	Young shoots, leaves, flowers, pods	Regular
		<i>Aphis fabae</i> Scopoli	+	Young shoots, leaves, flowers, pods	Regular
Membracidae	Cow bugs	<i>Otinotus oneratus</i> W.	+++	Tender shoots, stems	Sporadic
		<i>Oxyrachis tarandus</i> F.	+++	Tender shoots, stems	Sporadic
Coccidae	Scale insect	<i>Ceroplastodes cajani</i> Maskell	++	Leaves, Tender stems, Young shoots	Sporadic
		<i>Icerya purchasi</i> Maskell	++	Leaves, Tender stems, Young shoots	Sporadic
Pseudococcidae	Mealybugs	<i>Phenacoccus solenopsis</i> Tinsley	++	Young shoots, leaves, flowers, pods	Sporadic
		<i>Paracoccus marginatus</i> W.&G.	++	Young shoots, leaves, flowers, pods	Sporadic
		<i>Coccidohystrix insolita</i> Green	++	Young shoots, leaves, flowers, pods	Sporadic
Homoptera					
Cicadellidae	Leaf hoppers	<i>Empoasca kerri</i> Pruthi	+	Leaves	Minor
Lepidoptera					
Pterophoridae	Plume moth	<i>Exelastis atomosa</i> Walshingham	++	Buds, flowers, pods	Regular
Noctuidae	Pod borer	<i>Helicoverpa armigera</i> Hubner	+++	Buds, flowers, pods	Major
Pyrilidae	Spotted pod borer	<i>Maruca testulalis</i> Geyer	++	Leaves, flowers, pods	Regular
Arctiidae	Hairy caterpillars	<i>Spilosoma obliqua</i> Walker	+	Leaves, flowers, pods	Minor
Tortricidae	Leaf webbers/folders	<i>Grapholita critica</i> Meyr.	++	Leaves	Sporadic
Lycaenidae	Blue butterfly	<i>Lampides boeticus</i> Linn.	+	Buds, flowers, tender pods	Regular
Coleoptera					
Meloidae	Blister beetles	<i>Mylabris pustulata</i> Thumberg	+	Flowers	Minor
Curculionidae	Ash/Grey weevil	<i>Myllocerus undeci- mpustulatus</i> Faust	+	Leaves, roots	Minor
Thysanoptera					
Thripidae	Thrips	<i>Megalurothrips usitatus</i> Bagnall	+	Buds, flowers	Regular
Acarina					
Eriophyidae	Eriyophid mite	<i>Aceria cajani</i> Channa.	+	Leaves	Sporadic
Diptera					
Agromyzidae	Pod fly	<i>Melanogromyza obtusa</i> Malloch	+++	Pods, seeds	Major
Isoptera					
Termitidae	Termite	<i>Odontotermes</i> spp.	+	Stem	Minor
+ light	++ moderate	+++ high			

Table 2. List of predatory insects of pigeon pea agro-ecosystem.

Order	Family	Common name	Scientific name
Coleoptera	Coccinellidae	Lady bird beetle	<i>Coccinella septempunctata</i> Linn. <i>Coccinella transversalis</i> Fabricius
Hymenoptera	Formicidae	Carpenter ants Ants	<i>Camponotus</i> spp. <i>Myrmica rubra</i> Linnaeus
Dictyoptera	Mantidae	Praying Mantis	<i>Mantis religiosa</i> Couple
Araneida	Lycosidae	Spiders	<i>Lycosa</i> sp., <i>Paradosa</i> sp.
Neuroptera	Chrysopidae	Green lacewing	<i>Chrysoperla carnea</i> Stephens

Balikai and Yelshetty (2008) have listed 30 insect species infesting pigeon pea at various stages of plant growth at northern Karnataka. Similarly, Marimuthu *et al* (2012) reported 20 insect species belonging to 9 orders and families identified from U.P. According to Dialoke *et al* (2010) pod borer, *Helicoverpa armigera* Hubner is one of the serious pests of pigeon pea.

Insect predators of Pigeon pea

Eight predatory insect species, belonging to five orders and families were collected from Panchmahals district of Central Gujarat. Overall predatory insect species abundance on pigeon pea found in all the three talukas. In general, insect predators' abundance at Kalol taluka was higher than that of other two talukas. It suggested that the Kalol had more environmental diversity to sustain higher number of species than other sites. It might have resulted in the interaction between food availability and abundance of natural resources. The region is known to grow maize crop which harbours many predators (Table 2) including lady bird beetle, ants, praying mantis, spiders, green lacewing etc. These results are in agreement with those reported by Duffield (1995) that the higher insect abundance was ascribed to edaphic and locally prevailing ecological factors. Wang *et al* (2000) stated that the reduction in species richness was mainly caused by the loss of the rarely encountered species; therefore, distribution of insect pests and predatory species in the selected study areas seemed to be dependent on climatic factors such as temperature, relative humidity, rain fall and wind.

CONCLUSION

It can be concluded that there was incidence of different species of insect pests in pigeon pea

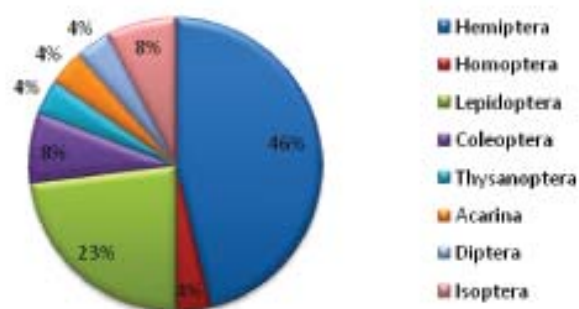


Fig. 1. Insect pest percentage within the pigeon pea agro-ecosystem.

growing areas surveyed in Panchmahals district. The dominant species pod fly and pod borer exhibited the tendency to be the most serious key pest of pigeon pea in Central Gujarat. The majority of farmers grow sole crops of pigeon pea and hence farmers in these areas may be advised to adopt the system of growing pigeon pea as intercropping with other crops, particularly maize so as to minimize the incidence of pod borers and pod sucking bugs in pigeon pea pods. In the present study, it was observed that studies on different insect species communities could be useful for a better understanding of insect biodiversity interaction and for enhancing pest management strategies in pigeon pea growing areas.

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