

Original Research Article

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## Succession of Insect Pest Complex and their Natural Enemies in Pigeonpea [*Cajanus Cajan* (L) Millsp.]

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### ABSTRACT

An experiment was conducted during *kharif* season 2015-2016 at experimental field, Department of Entomology, Live Stock Farm, Adhartal, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.), to observe the “Succession of Insect Pest Complex and Their Natural Enemies in Pigeonpea [*Cajanus Cajan* (L) Millsp.]”. Result revealed that 17 species of insects (13 pest and 4 natural enemies) were observed in pigeonpea i.e. Jassids *Empoasca fabae* Harris, Cow bug *Otinotus oneratus* W., Pod bug *Clavigralla gibbosa* Spinola, *Riptortus* sp., Red cotton bug *Dysdercus koengi* Fabricius, Green stink bug *Nezara viridula* Linn, Grasshopper *Cyrtacanthacris* sp. (L.), Red pumpkin beetle *Aulacophora foveicollis* (Lucas), Thrips *Megalurothrips usitatus* Baganll, Pod fly *Melanagromyza obtusa* (Malloch), Leaf webber *Grapholita critica* (Meyr), Gram pod borer *Helicoverpa armigera* (Hub.), Tur plume moth *Exelastis atomosa* (W.), Spider, *Hognan lenta*, Lady bird beetle, *Coccinella septempunctata* (Linn.), Green lace wing, *Chrysoperla* sp. and Wasp *Cotessia* (= *Apanteles*) sp.

#### Keywords

Pigeonpea [*Cajanus Cajan* (L) Millsp.],  
*Coccinella septempunctata*  
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### Introduction

Pigeonpea (*Cajanus cajan* (L) Millsp.) is an important multi-use shrub legume of the tropics and subtropics. The crop originated from India and moved to Africa about 4,000 years ago. Unlike other grain legumes, pigeonpea production is concentrated in developing countries, particularly in a few South and Southeast Asia and Eastern and Southern African countries. It is the preferred

pulse crop in dryland areas where it is intercropped or grown in mixed cropping systems with cereals or other short duration annuals without significantly reducing the yield (Joshi *et al.*, 2001). Its grain is of high nutritional value with high protein content that ranges from 21% to over 25% making it very valuable for improving food security and nutrition for many poor families who cannot afford dairy and meat-based diet (Kimani, 2001).

Pigeonpea has a wide range of products, including the dried seed, pods and immature seeds used as green vegetables, leaves and stems used for fodder and the dry stems as fuel. It also improves soil fertility through nitrogen fixation as well as from the leaf fall and recycling of the nutrients (Snapp *et al.*, 2002). It is an important pulse crop that performs well in poor soils and regions where moisture availability is unreliable or inadequate.

Pigeonpea a tropical grain legume, mainly grown in India and ranks second in area and production and contributes about 90% of the world's pulse production. In India during 2014 pigeonpea was cultivated in an area of 3.88 million ha and production of about 3.29 million tonnes, with a productivity of 849 kg/ha (DES, 2014).

In the country, the crop is extensively grown in Uttar Pradesh, Madhya Pradesh, Maharashtra, Karnataka, Andhra Pradesh and Gujarat. Uttar Pradesh has a unique distinction of contributing about 20% production in the country followed by Madhya Pradesh (Sahoo and Senapati, 2000). In Madhya Pradesh, during 2014 pigeonpea was cultivated in an area of about 0.49 million hectare with production of 0.46 million tonnes and 955 kg/ha productivity (DES, 2014). In Jabalpur, during 2013-14 it was cultivated in an area of 10,930 hectare with a total production of 9,700 tonnes and 886 kg/ha productivity (www.mpkrishi.org 2013-14).

Though India is the largest producer of pigeonpea, the productivity has always been a great concern, and the productivity of pigeonpea has not increased considerably during last decade. The damage caused by insect pests is one of the major reasons of low productivity. They key pests include pod borer complex *viz.* gram pod borer (*Helicoverpa armigera* Hubner), plume moth (*Exelastis*

*atomosa* Walsingham), pod fly (*Melanagromyza obtusa* Malloch) and pod bug (*Clavigralla gibbosa* Spinola) which cause considerable losses in grain yield ranging from 30 to 100% (Satpute and Barkhade, 2012).

Pod infesting insect pests recorded at Jabalpur are gram pod borer (*H. armigera* Hubner), pod bug (*C. gibbosa* Spinola), pod fly (*M. obtusa* Malloch) and plume moth (*E. atomosa* Walsingham). Out of the four pests, *M. obtusa* has established as the most important pest on the basis of pod and grain damage which range from about 55 to 85 and 29 to 63 per cent, respectively (Landge, 2009). Pod fly now has become an important biotic constraint in increasing the production and productivity under subsistence farming conditions, irrespective of agro ecological zones. The survey of Marathwada region of Maharashtra during 2007–08 revealed that the damage by pod fly ranged from 25.5 to 36% (Anonymous 2008). The estimates of avoidable losses due to pod borer complex, mainly pod fly and *H. armigera* were 43.5 and 30.2%, respectively (Anonymous 2012). The present study was done to observe the “Succession of Insect Pest Complex and Their Natural Enemies in Pigeonpea [*Cajanus Cajan* (L) Millsp.]”.

## Materials and Methods

The present investigation entitled, “Succession of Insect Pest Complex and Their Natural Enemies in Pigeonpea [*Cajanus Cajan* (L) Millsp.]” was carried out in the experimental field, Department of Entomology, Live Stock Farm, Adhartal, Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) during *kharif* season 2015-2016.

## Methodology of observations

Observations on different insects were recorded on 25 randomly selected plants twice

in a standard week. It was initiated after germination and was taken upto the maturity of the crop. Observations of jassids (nymph + adult) were recorded on six leaves per plant viz., each from 2 upper, middle and lower leaves per plant. Observations on leaf webber, spider, green stink bug (nymph + adult), pod bug (nymph + adult), pod borer larvae and plume moth(larvae + pupae) were recorded on per plant basis, while pod fly maggot were recorded on randomly selected 25 pods per 5 plants. Sweep nets were used for population monitoring of weak and active insect fliers and the methodology was adopted as proposed by Abd-Elsamed *et al.*, (2011). Meteorological data were collected and correlation studies were carried out with the various insect population.

## **Results and Discussion**

Result revealed that 17 insects were observed in pigeonpea i.e. Jassids *Empoasca fabae* Harris, Cow bug *Otinotus oneratus* W., Pod bug *Clavigralla gibbosa* Spinola, *Riptortus* sp., Red cotton bug *Dysdercus koengi* Fabricius, Green stink bug *Nezara viridula* Linn, Grasshopper *Cyrtacanthacris* sp. (L.), Red pumpkin beetle *Aulacophora foveicollis* (Lucas), Thrips *Megalurothrips usitatus* Baganll, Pod fly *Melanagromyza obtusa* (Malloch), Leaf webber *Grapholita critica* (Meyr), Gram pod borer *Helicoverpa armigera* (Hub.) and Tur plume moth *Exelastis atomosa* (W.) Spider, *Hognan lenta*, Lady bird beetle, *Coccinella septempunctata* (Linn.), Green lace wing, *Chrysoperla* sp. and Wasp *Cotessia* (= *Apanteles*) sp (Table 1).

### **Leaf webber, *Grapholita critica* Meyr (Lepidoptera: Tortricidae)**

First appearance of the leaf webber was observed when the crop age was about 8 days *i.e.*, vegetative stage. The pest was present on the crop during the vegetative stage and

remained available upto the fourth week of November *i.e.* reproductive stage of the crop (115 days). Similar findings have been reported by Kumar and Nath (2003), Ambhure (2012), Pandey (2013), Pawar *et al.*, (2014) and Shinde and Patel (2014). They also reported that leaf webber infested pigeonpea during the vegetative and remained available upto the reproductive stage of the crop.

### **Jassid, *Empoasca fabae* Harris (Hemiptera: Cicadellidae)**

First appearance of jassid was observed when the crop age was about 53 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the second week of December *i.e.* maturity stage of the crop (110 days). Similar findings have been reported by Kumar and Nath (2003), Balikai and Yelshetty (2008), Mahalle (2008), Landge (2009), Pandey (2013), Pawar *et al.*, (2014) and Shinde and Patel (2014). They also reported that jassids infested pigeonpea during the vegetative stage and remained available upto the reproductive stage of the crop. However, in the present study incidence of the jassids was observed in the seedling stage and it was available till the maturity stage of the crop.

### **Cow bug, *Otinotus oneratus* W. (Hemiptera: Membracidae)**

First appearance of cow bug was observed when the crop age was about 53 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the second week of November *i.e.* reproductive stage of the crop (77days). The present findings confirm the findings of Mahalle (2008), Ambhure (2012) and Pandey (2013). They also reported that cow bug infested pigeonpea during the vegetative stage and remained available upto the reproductive stage of the crop.

### **Grasshopper *Cyrtacanthacris* sp. (L.)**

First appearance of the grasshopper was observed when the crop age was about 64 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the third week of November *i.e.* reproductive stage of the crop (80 days). However, no information about grasshopper on pigeonpea seems to be available in the literature.

### **Pod bug, *Clavigralla gibbosa* Spinola (Hemiptera: Coreidae)**

First appearance of the pod bug was observed when the crop age was about 74 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the first week of January *i.e.* maturity stage of the crop (116 days). The present findings are in accordance with the findings of Minja *et al.*, (1999), Joshi and Shrivastava (2006), Mahalle (2008), Balikai and Yelshetty (2008), Rana *et al.*, (2008), Landge (2009), Srilaxmi and Paul (2010), Ambhure (2012), Pandey (2013), Pawar *et al.*, (2014), Shinde and Patel (2014), Vikram (2015) and Pandey *et al.*, (2016). They also reported that pod bug infest pigeonpea from vegetative stage and remained available upto the maturity stage of the crop.

### **Riptortus, *Riptortus* sp. (Hemiptera: Coreidae)**

First appearance of riptortus pod bug was observed when the crop age was about 74 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the first week of January *i.e.* maturity stage of the crop (112 days). The present findings are in accordance with the findings of Joshi and Shrivastava (2006), Mahalle (2008), Balikai and Yelshetty (2008), Landge (2009) and

Ambhure (2012). They also reported that riptortus pod bug infest pigeonpea from vegetative stage and remained available upto the maturity stage of the crop.

### **Red cotton bug, *Dysdercus koengi* Fabricius (Hemiptera: Pyrrhocoridae)**

First appearance of the red cotton bug was observed when the crop age was about 74 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the third week of November *i.e.* reproductive stage of the crop (63 days). The present findings are in conformity with the findings of Pandey (2013). He also reported that red cotton bug infest pigeonpea during the vegetative stage and remained available upto the reproductive stage of the crop.

### **Red pumpkin beetle, *Aulacophora foveicollis* (Lucas) (Coleoptera: Chrysomelidae)**

First appearance of the red pumpkin beetle was observed when the crop age was about 74 days *i.e.* vegetative stage. It is evident that the pest was present on the crop during the vegetative stage and remained available upto the second week of October *i.e.* reproductive stage of the crop (28 days).

The present finding confirms the findings of Pandey (2013) and Pawar *et al.*, (2014). They also reported that red pumpkin beetle infest pigeonpea from vegetative stage and remained available upto the reproductive stage of the crop.

### **Green stink bug, *Nezara viridula* Linn (Hemiptera: Pentatomidae)**

First appearance of the green stink bug was observed when the crop age was about 88 days *i.e.* vegetative stage.

**Table.1** Succession of insect complex on pigeonpea at Jabalpur during kharif 2015-16

S W (Date of Observation)	Insects Name				Crop age (days)	Crop Stage
	Name		Order	Family		
	Common	Scientific				
31 <sup>st</sup> to 35 <sup>th</sup> (30/7/2015 to 2/9/2015)	Leaf webber	<i>Grapholita critica</i> (Meyr)	Lepidoptera	Tortricidae	30-60	VS
	Jassid	<i>Empoasca fabae</i> (Harris)	Hemiptera	Cicadellidae		
	Cow bug	<i>Otinotus oneratus</i> W.	Hemiptera	Membracidae		
	Grasshopper	<i>Cyrtacanthacris</i> sp.	Orthoptera	Acrididae		
	Spider	<i>Telamonia dimediata</i>	Araneae	Salticidae		
	Lady bird beetle	<i>Coccinella septempunctata</i> Linn.	Coleoptera	Coccinellidae		
	Green lace wing	<i>Chrysoperla</i> sp.	Neuroptera	Chrysopidae		
	Wasp	<i>Cotessia (Apanteles)</i> sp.	Hymenoptera	Braconidae		
36 <sup>th</sup> to 39 <sup>th</sup> (3/9/2015 to 30/9/2015)	Leaf webber	<i>Grapholita critica</i> (Meyr)	Lepidoptera	Tortricidae	61-90	VS
	Jassid	<i>Empoasca fabae</i> (Harris)	Hemiptera	Cicadellidae		
	Cow bug	<i>Otinotus oneratus</i> W.	Hemiptera	Membracidae		
	Grasshopper	<i>Cyrtacanthacris</i> sp.	Orthoptera	Acrididae		
	Pod bug	<i>Clavigralla gibbosa</i> Spinola	Hemiptera	Coreidae		
	Red pumpkin beetle	<i>Aulacophora foveicollis</i> (Lucas)	Coleoptera	Chrysomelidae		
	Riptortus	<i>Riptortus</i> sp.	Hemiptera	Coreidae		
	Red cotton bug	<i>Dysdercus koengii</i> (Fabricius)	Hemiptera	Pyrrhocoreidae		
	Green stink bug	<i>Nezara viridula</i> Linn.	Hemiptera	Pentatomidae		
	Spider	<i>Telamonia dimediata</i>	Araneae	Salticidae		
	Lady bird beetle	<i>Coccinella septempunctata</i> Linn.	Coleoptera	Coccinellidae		
	Green lace wing	<i>Chrysoperla</i> sp.	Neuroptera	Chrysopidae		
	Wasp	<i>Cotessia (Apanteles)</i> sp.	Hymenoptera	Braconidae		
40 <sup>th</sup> to 44 <sup>th</sup> (1/10/2015 to 4/11/2015)	Leaf webber	<i>Grapholita critica</i> (Meyr)	Lepidoptera	Tortricidae	91-120	VS
	Jassid	<i>Empoasca fabae</i> (Harris)	Hemiptera	Cicadellidae		
	Cow bug	<i>Otinotus oneratus</i> W.	Hemiptera	Membracidae		
	Grasshopper	<i>Cyrtacanthacris</i> sp.	Orthoptera	Acrididae		
	Pod bug	<i>Clavigralla gibbosa</i> Spinola	Hemiptera	Coreidae		
	Red pumpkin beetle	<i>Aulacophora foveicollis</i> (Lucas)	Coleoptera	Chrysomelidae		
	Riptortus	<i>Riptortus</i> sp.	Hemiptera	Coreidae		
	Red cotton bug	<i>Dysdercus koengii</i> Fabricius	Hemiptera	Pyrrhocoreidae		
	Green stink bug	<i>Nezara viridula</i> Linn.	Hemiptera	Pentatomidae		
	Pod fly	<i>Melanagromyza obtusa</i> Malloch	Diptera	Agromyzidae		
	Gram pod borer	<i>Helicoverpa armigera</i> Hub.	Lepidoptera	Noctuidae		
	Thrips	<i>Megalurothrips usitatus</i> Bagnall	Thysanoptera	Thripidae		
	Plume moth	<i>Exelastis atomosa</i> Walsingham	Lepidoptera	Pterophoridae		
	Spider	<i>Telamonia dimediata</i>	Araneae	Salticidae		
	Lady bird beetle	<i>Coccinella septempunctata</i> Linn.	Coleoptera	Coccinellidae		
	Green lace wing	<i>Chrysoperla</i> sp.	Neuroptera	Chrysopidae		
	Wasp	<i>Cotessia (Apanteles)</i> sp.	Hymenoptera	Braconidae		
	Jassid	<i>Empoasca fabae</i> (Harris)	Hemiptera	Cicadellidae		

S W (Date of observation)	Insects Name				Crop age (days)	Crop Stage
	Name		Order	Family		
	Common	Scientific				
45 <sup>th</sup> to 48 <sup>th</sup> (5/11/2015 to 2/12/2015)	Cow bug	<i>Otinotus oneratus</i> W.	Hemiptera	Membracidae	121-150	RS
	Grasshopper	<i>Cyrtacanthacris</i> sp.	Orthoptera	Acrididae		
	Pod bug	<i>Clavigralla gibbosa</i> Spinola	Hemiptera	Coreidae		
	Red pumpkin beetle	<i>Aulacophora foveicollis</i> (Lucas)	Coleoptera	Chrysomelidae		
	Riptortus	<i>Riptortus</i> sp.	Hemiptera	Coreidae		
	Red cotton bug	<i>Dysdercus koengii</i> Fabricius	Hemiptera	Pyrrhocoreidae		
	Green stink bug	<i>Nezara viridula</i> Linn.	Hemiptera	Pentatomidae		
	Pod fly	<i>Melanagromyza obtusa</i> Malloch	Diptera	Agromyzidae		
	Gram pod borer	<i>Helicoverpa armigera</i> Hub.	Lepidoptera	Noctuidae		
	Thrips	<i>Megalurothrips usitatus</i> Bagnall	Thysanoptera	Thripidae		
	Plume moth	<i>Exelastis atomosa</i> Walsingham	Lepidoptera	Pterophoridae		
	Spider	<i>Telamonia dimediata</i>	Araneae	Salticidae		
	Lady bird beetle	<i>Coccinella septempunctata</i> Linn.	Coleoptera	Coccinellidae		
	Green lace wing	<i>Chrysoperia</i> sp.	Neuroptera	Chrysopidae		
Wasp	<i>Cotessia (Apanteles)</i> sp.	Hymenoptera	Braconidae			
49 <sup>th</sup> to 52 <sup>th</sup> (3/12/2015 to 31/12/2015)	Jassid	<i>Empoasca fabae</i> (Harris)	Hemiptera	Cicadellidae	151-180	MS
	Pod bug	<i>Clavigralla gibbosa</i> Spinola	Hemiptera	Coreidae		
	Riptortus	<i>Riptortus</i> sp.	Hemiptera	Coreidae		
	Green stink bug	<i>Nezara viridula</i> Linn.	Hemiptera	Pentatomidae		
	Pod fly	<i>Melanagromyza obtusa</i> Malloch	Diptera	Agromyzidae		
	Gram pod borer	<i>Helicoverpa armigera</i> Hub.	Lepidoptera	Noctuidae		
	Thrips	<i>Megalurothrips usitatus</i> Bagnall	Thysanoptera	Thripidae		
	Plume moth	<i>Exelastis atomosa</i> Walsingham	Lepidoptera	Pterophoridae		
Spider	<i>Telamonia dimediata</i>	Araneae	Salticidae			
1 <sup>st</sup> to 2 <sup>nd</sup> (01/01/2016 to 14/01/2016)	Pod fly	<i>Melanagromyza obtusa</i> Malloch	Diptera	Agromyzidae	181-195	MS
	Thrips	<i>Megalurothrips usitatus</i> Bagnall	Thysanoptera	Thripidae		
	Spider	<i>Telamonia dimediata</i>	Araneae	Salticidae		

VS = Vegetative stage, RS = Reproductive stage (Flowering / Poding stage), MS=Maturity stage

It is evident that the pest was present on the crop during the vegetative stage and remained available upto the first week of January *i.e.* maturity stage of the crop (98 days). The present findings confirm the findings of Landge (2009), Ambhure (2012), Pandey (2013) and Pawar *et al.*, (2014). They also reported that green stink bug infested pigeonpea during the vegetative and remained available upto the maturity stage of the crop.

**Thrips, *Megalurothrips usitatus* Bagnall (Thysanoptera: Thripidae)**

First appearances of the thrips were observed when the crop age was about 94 days *i.e.* reproductive stage. It is evident that the pest was present on the crop during the reproductive stage and remained available upto the second week of January *i.e.* maturity stage of the crop (92 days).The present

findings corroborates the findings of Kumar and Nath (2003) Balikai and Yelshetty (2008), Mahalle (2008), Landge (2009) Ambhure (2012), Pandey (2001) and Pawar *et al.*, (2014). They also reported that thrips infested pigeonpea during the reproductive stage and remained available upto the maturity stage of the crop.

**Pod fly, *Melanagromyza obtusa* Malloch (Diptera: Agromyzidae)**

First appearance of the pod fly was observed when the crop age was about 106 days *i.e.* reproductive stage. It is evident that the pest was present on the crop during the reproductive stage and remained available upto the first week of January *i.e.* maturity stage of the crop (80 days). Similar findings have been reported by Reddy *et al.*, (1998), Minja *et al.*, (1999), Singh *et al.*, (2001),

Joshi and Shrivastava (2006), Balikai and Yelshetty (2008), Mahalle (2008), Rana *et al.*, (2008), Landge (2009), Meena *et al.*, (2010), Srilaxmi and Paul (2010), Rathore (2011), Ambhure (2012), Pandey (2013), Pawar *et al.*, (2014), Shinde and Patel (2014), Vikram (2015) and Pandey *et al.*, (2016). They also reported that pod fly infested pigeonpea during the reproductive stage and remained available upto the maturity stage of the crop.

**Pod borer, *Helicoverpa armigera* Hub. (Lepidoptera: Noctuidae)**

First appearance of the pod borer was observed when the crop age was about 109 days *i.e* reproductive stage. It is evident that the pest was present on the crop during the reproductive stage and remained available upto the first week of January *i.e* maturity stage of the crop (77 days). The present findings confirms the findings of Reddy *et al.*, (1998), Minja *et al.*, (1999), Singh *et al.*, (2001), Yelshetty *et al.*, (2005), Joshi and Shrivastava (2006), Balikai and Yelshetty (2008), Mahalle (2008), Rana *et al.*, (2008), Landge (2009), Srilaxmi and Paul (2010), Rathore (2011), Ambhure (2012), Pandey (2013), Pawar *et al.*, (2014) and Shinde and Patel (2014). They also reported that pod borer infested pigeonpea during the reproductive stage and remained available upto the maturity stage of the crop.

**Tur plume moth, *Exelastis atomosa*, Walsingham (Lepidoptera: Pterophoridae)**

First appearance of pigeonpea plume moth was observed when the crop age was about 123 days *i.e* reproductive stage. It is evident that the pest was present on the crop during the reproductive stage and remained available upto the second week of January *i.e* maturity stage of the crop (67 days). The present findings are in agreement with those of Reddy *et al.*, (1998), Singh (2001), Balikai and

Yelshetty (2008), Mahalle (2008), Rana *et al.*, (2008), Landge (2009), Ambhure (2012), Pandey (2013), Pawar *et al.*, (2014) and Shinde and Patel (2014). They also reported that plume moth infested pigeonpea during the reproductive stage and remained available upto the maturity stage of the crop.

**Spider, *Hognan lenta* (Lycoasidae: Araneae)**

First appearance of the spider was observed when the crop age was about 1 day *i.e* seedling stage. It is evident that the natural enemy was present on the crop during the seedling stage and remained available upto the second week of January *i.e* maturity stage of the crop (189 days). However, no information about spider on pigeonpea seems to be available in the literature.

**Lady bird beetle, *Coccinella septempunctata* (Linn.) (Coleoptera: Coccinellidae)**

First appearance of the lady bird beetle was observed when the crop age was about 53 days *i.e* vegetative stage. It is evident that the natural enemy was present on the crop during the vegetative stage and remained available upto the third week of October *i.e* reproductive stage of the crop (56 days). The present findings are in agreement with those of Kumar and Nath (2007), Ambhure (2012) and Pandey (2013). They also reported that lady bird beetle were observed on pigeonpea from vegetative stage and remained available upto the reproductive stage of the crop.

**Greenlace wing, *Chrysoperla* sp. (Neuroptera: Chrysopidae)**

First appearance of the greenlace wing was observed when the crop age was about 57 days *i.e* vegetative stage. It is evident that the natural enemy was present on the crop during

the vegetative stage and remained available upto the second week of November *i.e.*, reproductive stage of the crop (73days). The present findings are in conformity with the findings Kumar and Nath (2007) and Ambhure (2012). They also reported that greenlace wing were observed on pigeonpea from vegetative stage and remained available upto the reproductive stage of the crop.

**Wasp, *Cotessia* (= *Apanteles*) sp. (Hymenoptera: Braconidae)**

First appearance of the wasp was observed when the crop age was about 57 days *i.e* vegetative stage. It is evident that the natural enemy was present on the crop during the vegetative stage and remained available upto the second week of November *i.e.* reproductive stage of the crop (73 days). The present findings corroborate the findings of Kumar and Nath (2007), Ambhure (2012) and Pandey (2013). They also reported that wasps were observed on pigeonpea from vegetative stage and remained available upto reproductive stage of the crop.

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