

Pests and predators activity on new variety of dolichos bean [*Lablab purpureus* (L.) Sweet]



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SUMMARY

A study was carried out to investigate the incidence of different insect pests and predators on new variety, HA -4 of dolichos bean. The results of the field study revealed that 15 insect pests belonging to nine different families of five orders and five species of predators belonging to five different families coming under four orders. The sucking pest population was found throughout the year. The peak population of aphids (49.00/3 leaves), pentatomid (5.20/5 plants) and coreid bugs (11.20/5 plants) were observed on 60 days after sowing (DAS). Whereas, eurybrachid bugs (5.20/5 plants) recorded at 50 DAS. Among the pod borer complex, higher pod damage due to *Helicoverpa armigera*, *Maruca vitrata* and *Lampides boeticus* was 20.43, 16.66 and 10.20 per cent pod damage, respectively on 80 DAS, whereas, *Callosobruchus theobromae* (12.55 %) was observed on 90 DAS. The important predator's viz., robber fly, coccinellids, syrphids, green lacewing and dragonfly were prominent ones. The activity of predators was high between 40 and 60 DAS and population decline was observed thereafter.

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Dolichos, Pod
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Dolichos bean/field bean [*Lablab purpureas* (L.) Sweet] is an important pulse crop in India and Africa mainly grown for its fresh pods and dry seeds which have a very important place in dietary schedule of people of developing countries. It is being used as a vegetable by humans and as fodder for livestock. Green pods of field bean have high nutritive value because it has small amount of vitamin A, vitamin C, proteins, iron and calcium in raw state. The ripe seeds contain 20 to 28 per cent of protein. Karnataka state contributes a major share by producing about 18000 tonnes from an area of 85000 hectares accounting for nearly 90 per cent in terms of both area and production of this crop in the country (Anonymous, 2010). Although it is largely grown as a mixed crop with finger millet, maize, sorghum, castor and groundnut, it is also grown as pure crop both under rainfed and irrigated conditions. In spite of increased area in the state, its productivity is considerably low. Devastation by insect pests is considered as

one of the main impediments in stepping up the production of this crop. A number of pests severely ravage the buds, flowers and developing seeds of field bean crop. Govindan (1974) has recorded as many as 55 species of insects and one species of mite feeding from seedling stage to the harvest of this crop.

The sucking pests, lablab bug, *Coptosoma cribraria* (Fabricius.) and *Riptortus pedestris* (Fabricius) occur commonly and found in large numbers throughout the cropping period. The bugs were found in congregation on tender vines and sucked sap resulting in fading vines and shoots (Ayyar, 1963). Whereas, the aphid, *Aphis craccivora* Koch., a serious pest of this crop by sucking sap from tender shoots, inflorescence and pods resulting in drying up of tender shoot and premature fall of flower buds, flowers and tender pods. Among the pod borer complex, *Helicoverpa armigera* (Hubner), *Adisura atkinsoni* (Moore), *Maruca vitrata* (Geyer), *Callosobruchus theobromae* (Linnaeus), *Etiella zinckenella*

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(Treitschke), *Cydia ptychora* (Meyrick), *Exelastis atomosa* (Walshingham), *Sphenarches caffer* (Zeller) and *Lampides boeticus* (Linnaeus) are of considerable importance causing 80 per cent pod damage (Katagihallimath and Siddappaji, 1962). Since there is no systematic documentation of insect pests and their natural enemies, there is a need to establish the status of major arthropod pests and their natural enemies as a first step towards understanding their population dynamics and developing management strategies. However, the present study was undertaken to document the infestation level of all the pests, their predator species on this crop.

MATERIALS AND METHODS

The studies were conducted during the rainy season of the year 2010 at Zonal Agricultural Research Station, Bengaluru. Dolichos variety, HA 4 was planted during second week of September. After germination, the observations were made on the population fluctuation of important pests from five randomly selected plants with 10 days intervals. Sucking pests like aphids was recorded by counting the number on three leaves from tagged plants. Similarly, the incidence of bug population was observed on five plants per spot. The damage due to pod borer complex was determined by recording the per cent pod damage on five randomly selected plants on 40th, 50th, 60th, 70th, 80th and 90th days after sowing. In order to know the predominant species, the damage of pod borer was assessed based on the nature of damage caused by each of these species and also green pods were cut opened for observing the presence of larvae of different species. Per cent pod damage was computed as per the formula.

$$\text{Per cent pod infestation} = \frac{\text{Total no. of damaged pods}}{\text{Total no. of pods}} \times 100$$

The data obtained were subjected to arc sine transformation and then statistically analyzed. The immature stages of different insect species which occurred on the crop were collected and reared in the laboratory till adult emergence to confirm the species identity. Similarly, observations were also made on the number of predators on the tagged plants. The data obtained were subjected to square root transformation and then statistically analyzed. Statistical interpretation of data was done by following the Fischer's analysis of variance technique as given by Panse and Sukhatme (1967). The results were computed at five per cent level of

significance. Critical differences were worked out whenever F test was significant.

RESULTS AND DISCUSSION

The insect species recorded during cropping period are listed in Table 1. The studies indicated that the crop is prone to infestation by 15 insect pests belonging to nine different families coming under five orders. The species which damaged the crop to a greater extent included defoliators, sucking pests and podborer complex (Fig. 1). Among the sucking insects, aphid, *A. craccivora* incidence was noticed in large number from October to first fortnight of December with a population range of 14.00 to 49.00 aphids per 3 leaves (Table 2). Both nymphs and adults usually were found in colonies on tender twigs, inflorescence and pods. The results are in conformity with the observations made by Govindan (1974). The bug, *Eurybrachys tomentosa* was usually sucking the sap from twigs and rarely from the pods. Similar observations were made by Rekha and Mallapur (2007) on dolichos bean. The incidence was noticed from first fortnight of October to second fortnight of November with a population range of 1.40 to 5.20 bugs per 5 plants. The Pentatomid bug, *Nezara viridula* and *Dolicoris indicus* were also noticed in main cropping season. The population ranged from 0.40 to 5.20 bugs per 5 plants. The nymphs and adults of coreid bug, *R. pedestris* were observed at later stages of crop growth and were found sucking the sap from the pods. Resulting to sap sucking, brown spots appeared on the pod and also shriveling of seeds was noticed. The bug population ranged from 1.20 to 11.20 bugs per 5 plants. Govindan (1974) also recorded the



Fig. 1 : Insects and their damage in *Lablab purpureas*

Table 1: Insect fauna recorded on dolichos bean during Kharif, 2010 at GKVK campus Bengaluru

Sr. No.	Insect pest	Scientific name	Systematic position
1.	Aphid	<i>Aphis craccivora</i>	Homoptera: Aphididae
2.	Eurybrachid bug	<i>Eurybrachys tomentosa</i>	Homoptera: Eurybrachidae
3.	Pentatomid bugs	<i>Nezara viridula</i> <i>Dollicoris indicus</i>	Pentatomidae: Hemiptera
4.	Coreid bugs	<i>Riptortos pedestris</i> <i>Anoplocnemis phasiana</i> <i>Clavigrella horrens</i>	Coreidae: Hemiptera
5.	Grass hopper	<i>Chrotogonus ranacea</i>	Acrididae: Orthoptera
6.	Semilooper	<i>Plusia signata</i>	Noctuidae: Lepidoptera
7.	Bihar hairy caterpillar	<i>Spilosoma obliqua</i>	Arctidae: Lepidoptera
8.	Spotted podborer	<i>Maruca testularis</i>	Pyralidae: Lepidoptera
9.	Gram podborer	<i>Helicoverpa armigera</i>	Noctuidae: Lepidoptera
10.	Blue butterfly	<i>Lampides boeticus</i>	Lycaenidae: Lepidoptera
11.	Blister beetle	<i>Zonbris pustulata</i>	Meloidae: Coleoptera
12.	Bruchid	<i>Callosobruchus theobromae</i>	Bruchidae: Coleoptera
13.	Coccinellid	<i>Harmonia axyridis</i>	Coccinellidae: Coleoptera
14.	Robber fly	<i>Dysmachus trigonus</i>	Asilidae: Diptera
15.	Syrphid	<i>Eristalinus taeniops</i>	Syrphidae: Diptera
16.	Green lacewing	<i>Chrysoperla plorabunda</i>	Chrysopidae: Neuroptera
17.	Dragonfly	<i>Pantala flavescens</i>	Libellulidae: Odonata

Table 2 : Incidence of sucking pests on dolichos bean at different crop growth stages during Kharif, 2010

Pests	30 DAS	40 DAS	50 DAS	60 DAS	70 DAS	80 DAS	90 DAS
Aphids/3 leaves	27.00	36.00	45.00	49.00	43.00	24.00	14.00
Eurybrachid bugs/5plants	4.00	4.60	5.20	1.40	0.00	0.00	0.00
Pentatomid bugs/5 plants	0.00	0.40	3.60	5.20	4.60	2.20	0.00
Coreid bugs/5 plants	0.00	1.60	7.60	11.20	9.20	6.40	1.20

DAS: Days after sowing

incidence of *R. pedestris* during September to January. Singh and Patel (1968) reported *C. gibbosa* and *C. horrens* as pest of red gram pods. *R. pedestris* has been observed sucking the pods of lablab, cowpea, blackgram, greengram, ridgegourd and wheat. Whereas, *Anoplocnemis phasiana* has been reported to feed on grapes, brinjal, lablab, redgram, groundnut, glyricidia, pongemia and ridgegourd (Puttarudraiah and Maheswaraiyah, 1956).

Among the pod borers, the early larval instars of *H. armigera* bored into the flower buds and tender pods while, the later instars damaged mature and developing pods making circular holes on pods and feeding on individual seeds of the pod. These observations are in conformity with Mallikarjunappa (1989). The pod damage due to *H. armigera* ranged from 9.27 to 20.43 per cent. The peak infestation of the pest (16.40 to 20.43 per cent pod damage) was observed on 70 to 80 days old crop during December month (Table 3). The early instar larvae

of spotted pod borer, *M. testularis* bored into the seeds and fed on the contents of pods by remaining inside whereas, the grownup larvae caused damage by excavating the seeds. The infested pods when opened revealed the presence of caterpillars and excretory pellets and similar observation were made by Jagginnavar (1988) in cowpea. The spotted pod borer caused about 5.07 to 16.66 per cent pod damage. The peak infestation (12.12 to 16.66 %) was observed on 70 to 80 days old crop *i.e.* during December month. Bruner (1931) also recorded the peak incidence of *M. testularis* from November to December month. Bruchids are major and growing problem in pulses, especially in Dolichos and are known to infest both in field and storage causing qualitative and quantitative losses. The field observation was too low and it was very difficult to detect at harvest. Bruchids are most often not detected until seed has been stored for a reasonable period and breed rapidly in storage and by the time they are detected, the infested grain is usually

Table 3 : Incidence of pod borers on dolichos bean at different crop growth stages during Kharif, 2010

Crop period	<i>Helicoverpa armigera</i>	<i>Maruca testularis</i>	<i>Callosobruchus theobromae</i>	<i>Lampides boeticus</i>
40	2.60 (9.28) ^c	0.96 (5.62) ^{cd}	1.30 (6.54) ^c	0.30 (3.14) ^b
50	3.60 (10.93) ^{bc}	3.06 (10.07) ^{bc}	1.53 (7.10) ^{bc}	0.57 (4.33) ^b
60	6.40 (14.65) ^{abc}	3.71 (11.10) ^b	2.72 (9.49) ^{bc}	0.98 (5.68) ^{ab}
70	8.00 (16.42) ^{ab}	4.41 (12.12) ^{ab}	3.95 (11.46) ^{ab}	1.88 (7.78) ^{ab}
80	12.19 (20.43) ^a	8.23 (16.66) ^a	4.73 (12.56) ^a	3.15 (10.22) ^a
90	7.72 (16.13) ^{ab}	0.97 (5.65) ^{cd}	1.25 (6.42) ^a	1.05 (5.88) ^{ab}
Range	9.27 – 20.43	5.60 – 16.66	5.39 – 12.55	3.13 – 10.20
S.E.M ±	11.58	6.68	3.27	6.24
C.D. (P=0.05)	1.74	1.32	0.93	1.28
CV	7.04	7.88	6.20	12.45

Figures followed by same letters in the column do not differ significantly by DMRT (P = 0.05)

Original values were transformed into arc sine transformation

Table 4 : Activity of predators on dolichos bean at different days of crop growth

Crop period	Coccinellids Grubs/plant	Robber flies /plant	Syrphids /plant	Green lacewings /plant
40	0.81 (1.90) ^a	0.00 (1.00) ^a	0.12 (1.34) ^a	0.00 (1.00) ^a
50	0.18 (1.42) ^a	0.00 (1.00) ^a	0.03 (1.18) ^a	0.05 (1.22) ^a
60	0.12 (1.34) ^a	0.01 (1.10) ^a	0.00 (1.00) ^a	0.07 (1.26) ^a
70	0.07 (1.26) ^a	0.07 (1.26) ^a	0.01 (1.10) ^a	0.00 (1.00) ^a
80	0.00 (1.00) ^a	0.03 (1.19) ^a	0.00 (1.00) ^a	0.00 (1.00) ^a
90	0.01 (1.10) ^a	0.03 (1.19) ^a	0.00 (1.00) ^a	0.01 (1.10) ^a
Range	1.00 – 1.90	1.00 – 1.26	1.00 – 1.34	1.00 – 1.26
S.E. ±	0.42	0.24	0.21	0.19
C.D. (P=0.05)	0.33	0.25	0.23	0.22
CV	14.66	13.00	12.36	11.72

Figures followed by same letters in the column do not differ significantly by DMRT (P = 0.05)

Original values were transformed to $\sqrt{x+1.0}$

unmarketable. The bruchid, *C. theobromae* is responsible for most infestations in dolichos and pod damage ranged from 5.39 to 12.55 per cent. The peak infestation (11.45 to 12.55 %) was observed on 80 to 90 days old crop. Kulkarni (1990) reported upto 36.66 per cent pod damage due to *C. theobromae* While, Naveena (2009) recorded 0.00 to 39.98 per cent pod damage on dolichos under field conditions. The caterpillars of *L. boeticus* bored into the flower buds and tender pods and these observations are in accordance with the earlier report of Mallikarjunappa (1989) on dolichos bean. The pest damaged 3.13 to 10.20 per cent of pods with peak activity (7.78 to 10.20 % pod damage) on 70 to 80 days old crop during December. These observations are in close agreement with Aoki (1927) who recorded larvae of *L. boeticus* in large numbers on beans during December month.

The important predator's viz., robber fly, coccinellids, syrphids, green lacewing and dragonfly belonging to five different families coming under four orders were among

the observed ones during study period (Table 4). The activity of predators was high at 40 to 50 days after sowing and thereafter it was found to be negligible. Larvae collected from the field were observed for the presence of parasitoids but nothing emerged out. Remya (2010) and Thejaswi *et al.* (2008) also recorded the natural enemies on field bean which included *Campoletis chloridae* Uchida, *Bracon* sp. Nr. Green, *Herpector coastalis* (Str.), *Cryptopeltis tenuis*, mirids, syrphids and carabid predators.

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