Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(1): 538-542
Received: 11-11-2017
Accepted: 13-12-2017

Suresh Jakhar
Department of Entomology, SKN College of Agriculture, Jobner Rajasthan, India

Ashok Sharma
Department of Entomology, SKN College of Agriculture, Jobner Rajasthan, India

Pawan Kumar Choudhary
Department of Entomology, SKN College of Agriculture, Jobner Rajasthan, India

Correspondence
Suresh Jakhar
Department Of Entomology, Skn College Of Agriculture, Jobner Rajasthan, India

Response of different doses of nitrogen and phosphorus on the incidence of sucking pests of Indian bean, *L. purpureus*

Suresh Jakhar, Ashok Sharma and Pawan Kumar Choudhary

Abstract
A field experiment was conducted at Horticulture farm, S.K.N. college of Agriculture, Jobner (Rajasthan) during *kharif* season 2013. Out of 16 nitrogen and phosphorus fertilizer doses, the treatment of $N_{30}P_0$ kg h^{-1} had maximum pests population, whereas N_0P_{60} kg ha^{-1} harboured minimum counts.

Keywords: Lablab, Aphid, Jassid, Whitefly, Nitrogen, Phosphorus

Introduction
Indian bean, *Lablab purpureus* (Linn.) Sweet commonly known as hyacinth bean, egyptian bean, dolichos bean or *sem* (Family: Fabaceae) is one of the most ancient crops among cultivated plants. It is presently grown through out the tropical regions in Asia and Africa. It is a perennial herbaceous plant, occupies an important place among the fruit vegetable crops grown in the field as well as in kitchen gardens. It is primarily grown for green pods, while dry seeds are used in various vegetable food preparations. It is one of the major sources of proteins, minerals and dietary fiber. The green pods have a high nutritive value, comprising of protein 3.8 g, carbohydrate 6.7 g, vitamin-A 312 IU, mineral 0.9 g, fat 0.7 g and oxalic acid 1 mg in per 100 g. The foliage of the crop provides hay, silage and green manure. It is also grown for medicinal and ornamental purposes (Bose *et al.*, 1993) [1].

In India, *L. purpureus* as a field crop is mostly confined to the peninsular region and cultivated to a large extent in Karnataka and adjoining districts of Tamil Nadu, Andhra Pradesh and Maharashtra. Karnataka contributes a major share, accounting for nearly 90 per cent in terms of both area and production in the country. Insect pests are major constraints in reducing the productivity of Indian bean. The crop is attacked by a number of insect pests *viz.*, aphid, *Aphis craccivora* Koch.; jassids, *Empoasca fabae* (Harris)*; E. krameri* Ross & Moore and *E. kerri* Pruthi; pod borer, *Etiella zinckenella* (Treit.); white fly, *Bemisia tabaci* (Genn.); stem fly, *Ophiomyia phaseoli* (Tryon); hairy caterpillars, *Ascotis imparta (*WaIk.*);* bihar hairy caterpillar, *Spilosoma obliqua* (Walk.) etc. Among these, aphids, jassids and white flies have been reported as one of the major sucking pests infesting Indian bean. Both the nymphs and adults cause damage by sucking the cell sap from the tender portions of plant and also from lower portion of the leaves. In case of severe infestation, these pests attack all parts of the plants including pods which result in stunted growth and decreased yield. The honey dew secretion of the aphids provides a suitable media for the development of sooty mould and fungi which ultimately hamper the process of photosynthesis (David and Kumarswami, 1982) [2].

Being a leguminous crop, Indian bean is highly responsive to nitrogenous fertilizer application especially in early stage. Nitrogen promotes the leaf, stem, other vegetative growth and increase the protein content. The added phosphorous is reported to serve dual purpose in legume by increasing the yield of current as well as succeeding crop. An adequate supply of phosphorous has been reported beneficial for better growth and yield (Sammauria *et al.*, 2009) [8]. Judicious applications of fertilizers are known to be effective in managing the sucking pests. Fertilizer applications changed the proportion of nutrient composition in plant tissues and consequently their nutritive value helped in the management of sucking pests (Ram and Gupta, 1992 and Rustamani *et al.*, 1999) [6, 7].

Material and methods
The present investigations were conducted at Horticulture Farm, S.K.N. College of Agriculture, Jobner (Rajasthan) on Indian bean crop under field conditions during *Kharif* season 2013. The experiment was laid out in simple Randomized Block Design (RBD) with

response of different doses of nitrogen and phosphorus on the incidence of sucking pests. The variety, dolichus selection was sown in the third week of July, 2013 in plots of 1.8 X 1.2 m^2 sizes keeping row to row and plant to plant distance of 60 cm and 30 cm, respectively.

Table 1: Details of fertilizers used

S.No.	Nitrogen levels (kg/ha)	Phosphorus levels (kg/ha)
1.	$N_0 = 0$	$P_0 = 0$
2.	$N_1 = 10$	$P_1 = 20$
3.	$N_2 = 20$*	$P_2 = 40$*
4.	$N_3 = 30$	$P_3 = 60$

* Recommended dose

Table 2: Details of fertilizer combination used

S. No.	Treatment combinations	S. No.	Treatment combinations
1.	N_0P_0	9.	$N_{20}P_0$
2.	N_0P_{20}	10.	$N_{20}P_{20}$
3.	N_0P_{40}	11.	$N_{20}P_{40}$
4.	N_0P_{60}	12.	$N_{20}P_{60}$
5.	$N_{10}P_0$	13.	$N_{30}P_0$
6.	$N_{10}P_{20}$	14.	$N_{30}P_{20}$
7.	$N_{10}P_{40}$	15.	$N_{30}P_{40}$
8.	$N_{10}P_{60}$	16.	$N_{30}P_{60}$

The recommended doses of nitrogen and phosphorus were given in all the plots basally though urea and SSP, respectively. All the recommended agronomical practices were followed from time to time.

Method of observations

the incidence of major sucking pests was recorded from appearance of pests till harvest of the crop. Observations on population of sucking pests were recorded on three leaves one each from top, middle and bottom canopy of the five plants selected randomly in each replications in early hours (before 8.00 AM) at weekly intervals. The details regarding population counts of each pest has been described below:

aphid, *Aphis craccivora* Koch

Aphid population was counted on the shoot of each of the five tagged plants in each plot. When the aphid population appeared, the observations were recorded early in the morning by visual counting method.

Jassid, *Empoasea fabae* (Ishida)

The population of jassids was recorded by counting both nymphs and adults as per method described by Rawat and Sahu (1973). In the initial stage of the crop, counting of jassids was done on whole plant and in later stage, on three leaves *i.e.* top, middle and bottom of each tagged plant.

Whitefly, *Bemisia tabaci* (Genn.)

the population of whitefly was counted visually on whole plant in the initial stage and in later stage, on three leaves from upper, middle and lower portion of each tagged plant. For counting the whitefly population, the leaf was held at the petiole by thumb and fore fingers and twisted until the entire under side of leaf became clearly visible (Butter and Vir, 1990).

Result and discussion

Aphid, *A. craccivora*

The incidence appeared on 3rd September, 2013 and continued up to 12th November, 2013. Based on overall mean aphid population in the season, the observations indicated that the population ranged from 33.15 to 100.76 aphids/plant, the minimum (33.15 aphids/plant) being in N_0P_{60} kg ha^{-1} followed by $N_{10}P_{60}$, N_0P_{40}, $N_{10}P_{40}$, N_0P_{20}, $N_{30}P_{60}$, $N_{10}P_{20}$, N_0P_0 and $N_{20}P_{60}$ kg ha^{-1} with a population of 34.30, 39.97, 46.00, 47.31, 48.21, 57.03, 58.18, and 58.42 aphids/plant respectively and were comparable to each other. The maximum population (100.76 aphids/plant) appeared in $N_{30}P_0$ kg h^{-1}, followed by $N_{20}P_0$, $N_{30}P_{20}$, $N_{20}P_{20}$, $N_{20}P_{40}$, $N_{10}P_0$ and $N_{30}P_{40}$ kg ha^{-1}, *viz*., 82.15, 76.48, 75.24, 66.76, 65.79 and 60.24 aphids/plant respectively however, remained statistically at par with each other. The data on the effect of different doses of nitrogen and phosphorus on the population of aphid has been presented in (Table 3).

Jassid, *E. fabae*

The incidence appeared on 3rd September, 2013 and continued up to 12th November, 2013. The overall mean jassid population in the season indicated that the population ranged from 4.70 to 14.18 jassids/plant, the minimum (4.70 jassids/plant) being in N_0P_{60} kg ha^{-1} followed by $N_{10}P_{60}$, N_0P_{40}, $N_{10}P_{40}$, N_0P_{20}, N_0P_0, $N_{20}P_{60}$, $N_{10}P_{20}$, $N_{30}P_{60}$, $N_{20}P_{40}$, $N_{10}P_0$ $N_{20}P_{20}$ and $N_{30}P_{40}$ kg ha^{-1} with a population of 5.27, 5.73, 6.73, 6.88, 7.45, 7.45, 8.12, 8.24, 9.00, 9.24, 10.33 and 11.03 jassids/plant respectively and were comparable to each other. The maximum population (14.18 jassids/plant) appeared in $N_{30}P_0$ kg h^{-1}, followed by $N_{30}P_{20}$ and $N_{20}P_0$ kg ha^{-1}, *viz*., 13.09 and 11.94 jassids/plant respectively however, stood statistically at par with each other. The data presented in (Table 4) represent the effect of different doses of nitrogen on the population of jassid.

White fly, *B. tabaci*

The incidence appeared on 3rd September, 2013 and continued up to 12th November, 2013. The data on overall mean white fly population in the season indicated that the population ranged from 2.24 to 9.21 whiteflies/plant, the minimum (2.24 whiteflies/plant) being in N_0P_{60} kg ha^{-1} followed by N_0P_{40}, $N_{10}P_{60}$, N_0P_{20}, N_0P_0, $N_{20}P_{60}$, $N_{10}P_{40}$, $N_{30}P_{60}$, $N_{10}P_{20}$, $N_{20}P_{40}$, $N_{10}P_0$, $N_{30}P_{40}$, and $N_{20}P_{20}$ kg ha^{-1} with a popul**a**tion of 2.85, 3.54, 3.76, 4.48, 4.64, 4.79, 4.79, 5.85, 5.97, 6.45, 6.48 and 6.82 whiteflies/plant respectively and were stood at par with each other. The maximum population (9.21 whiteflies/plant) was reported in $N_{30}P_0$ kg h^{-1}, followed by $N_{30}P_{20}$ and $N_{20}P_0$ kg ha^{-1}, *viz*., 8.03 and 7.55 whiteflies/plant respectively however, stood statistically at par with each other. The data presented in (Table 5) represent the effect of different doses of nitrogen on the population of white fly.

Table 3: Response of different doses of nitrogen and phosphorus on the incidence of *Aphis craccivora* on Indian bean

S.No.	Fertilizer combinations	Mean aphid population/plant*											
		Date of observations											
		3/09/2013	10/09/2013	17/09/2013	24/09/2013	1/10/2013	8/10/2013	15/10/2013	22/10/2013	29/10/2013	5/11/2013	12/11/2013	Mean
1.	N_0P_0	1.00	1.67	14.33	28.33	70.00	105.00	152.33	145.00	115.00	92.00	41.67	69.67
		(1.22)***	(1.47)	(3.85)	(5.37)	(8.40)	(10.27)	(12.36)	(12.06)	(10.75)	(9.62)	(6.49)	(8.38)
2.	N_0P_{20}	0.67	1.00	10.67	24.67	56.33	97.33	135.00	122.00	84.33	65.00	34.33	57.39
		(1.08)	(1.22)	(3.34)	(5.02)	(7.54)	(9.89)	(11.64)	(11.07)	(9.21)	(8.09)	(5.90)	(7.61)
3.	N_0P_{40}	0.00	0.67	7.00	20.67	45.00	80.33	124.33	112.67	75.00	50.00	25.33	49.18
		(0.71)	(1.08)	(2.74)	(4.60)	(6.75)	(8.99)	(11.17)	(10.64)	(8.69)	(7.11)	(5.08)	(7.05)
4.	N_0P_{60}	0.00	0.67	6.00	15.67	35.00	69.00	120.00	98.33	65.00	32.00	14.33	41.45
		(0.71)	(1.08)	(2.55)	(4.02)	(5.96)	(8.34)	(10.98)	(9.94)	(8.09)	(5.70)	(3.85)	(6.48)
5.	$N_{10}P_0$	1.67	6.00	25.33	35.00	82.67	131.33	153.00	143.33	121.00	99.00	45.00	76.67
		(1.47)	(2.55)	(5.08)	(5.96)	(9.12)	(11.48)	(12.39)	(11.99)	(11.02)	(9.97)	(6.75)	(8.78)
6.	$N_{10}P_{20}$	1.00	3.67	19.00	26.67	75.67	117.00	139.67	130.00	101.67	88.33	37.67	67.30
		(1.22)	(2.04)	(4.42)	(5.21)	(8.73)	(10.84)	(11.84)	(11.42)	(10.11)	(9.43)	(6.18)	(8.23)
7.	$N_{10}P_{40}$	1.00	2.67	14.33	21.67	50.00	87.67	135.33	120.00	92.33	56.33	29.67	55.55
		(1.22)	(1.78)	(3.85)	(4.71)	(7.11)	(9.39)	(11.65)	(10.98)	(9.64)	(7.54)	(5.49)	(7.49)
8.	$N_{10}P_{60}$	0.67	1.33	10.33	17.00	42.67	72.33	113.33	97.33	65.00	30.00	15.33	42.30
		(1.08)	(1.35)	(3.29)	(4.18)	(6.57)	(8.53)	(10.67)	(9.89)	(8.09)	(5.52)	(3.98)	(6.54)
9.	$N_{20}P_0$	2.67	10.33	35.33	50.00	102.00	182.33	198.33	167.67	125.00	95.00	70.00	94.42
		(1.78)	(3.29)	(5.99)	(7.11)	(6.57)	(8.53)	(14.10)	(12.97)	(11.20)	(9.77)	(8.40)	(9.74)
10	$N_{20}P_{20}$	2.33	8.33	29.67	39.33	95.33	170.67	194.33	151.00	111.00	89.00	61.67	86.61
		(1.68)	(2.97)	(5.49)	(6.31)	(9.10)	(13.08)	(13.96)	(12.31)	(10.56)	(9.46)	(7.88)	(9.33)
11.	$N_{20}P_{40}$**	1.67	5.33	21.33	31.00	82.33	161.67	185.00	142.00	105.00	74.67	45.00	77.73
		(1.47)	(2.42)	(4.67)	(5.61)	(9.10)	(12.73)	(13.62)	(11.94)	(10.27)	(8.67)	(6.75)	(8.84)
12.	$N_{20}P_{60}$	1.00	3.33	17.67	26.33	72.67	152.67	172.33	125.00	84.33	65.00	30.33	68.24
		(1.22)	(1.96)	(4.26)	(5.18)	(8.55)	(11.92)	(13.15)	(11.20)	(9.21)	(8.09)	(5.55)	(8.29)
13.	$N_{30}P_0$	3.00	24.33	50.00	75.00	135.00	208.33	235.00	183.33	150.00	105.00	81.00	113.64
		(1.87)	(4.98)	(7.11)	(8.69)	(11.64)	(14.45)	(15.35)	(13.56)	(12.27)	(10.27)	(9.03)	(10.68)
14.	$N_{30}P_{20}$	2.33	17.33	37.00	64.33	100.00	160.00	173.33	151.67	108.33	95.00	51.67	87.36
		(1.68)	(4.22)	(6.12)	(8.05)	(10.02)	(12.67)	(13.18)	(12.34)	(10.43)	(9.77)	(7.22)	(9.37)
15.	$N_{30}P_{40}$	1.67	11.67	27.67	46.33	86.00	138.33	141.67	127.33	81.67	68.33	37.00	69.79
		(1.47)	(3.49)	(5.31)	(6.84)	(9.30)	(11.78)	(11.92)	(11.31)	(9.06)	(8.30)	(6.12)	(8.38)
16.	$N_{30}P_{60}$	1.33	6.00	18.00	37.33	73.00	100.00	120.00	113.00	75.00	55.33	27.67	56.97
		(1.35)	(2.55)	(4.30)	(6.15)	(8.57)	(10.02)	(10.98)	(10.65)	(8.69)	(7.47)	(5.31)	(7.58)
S.E.m±		0.24	0.67	0.74	0.78	0.88	1.09	0.78	0.06	0.71	0.86	0.86	0.74
CD at 5%		0.69	1.93	2.15	2.25	2.54	3.17	2.27	1.76	2.05	2.49	2.49	2.15

* Mean of three replications, five plants in each replication

** Recommended dose *** Values in parentheses are $\sqrt{x + 0.5}$

Table 4: Response of different doses of nitrogen and phosphorus on the incidence of *Empoasea fabae* on Indian bean

S.No.	Fertilizer combinations	Mean jassid population/plant*											
		Date of observations											
		3/09/2013	10/09/2013	17/09/2013	24/09/2013	1/10/2013	8/10/2013	15/10/2013	22/10/2013	29/10/2013	5/11/2013	12/11/2013	Mean
1.	N_0P_0	0.67	1.00	3.33	3.00	5.00	14.00	15.00	19.00	14.00	5.00	2.00	7.45
		(1.08)***	(1.22)	(1.96)	(1.87)	(2.35)	(3.81)	(3.94)	(4.42)	(3.81)	(2.35)	(1.58)	(2.82)
2.	N_0P_{20}	0.67	1.00	2.33	2.67	4.00	12.00	14.67	18.00	13.00	4.33	3.00	6.88
		(1.08)	(1.22)	(1.68)	(1.78)	(2.12)	(3.54)	(3.89)	(4.30)	(3.67)	(2.20)	(1.87)	(2.72)
3.	N_0P_{40}	0.00	0.67	1.00	2.00	3.33	10.00	13.33	15.67	11.00	4.00	2.00	5.73
		(0.71)	(1.08)	(1.22)	(1.58)	(1.96)	(3.24)	(3.72)	(4.02)	(3.39)	(2.12)	(1.58)	(2.50)
4.	N_0P_{60}	0.00	0.67	1.00	1.67	2.33	7.67	11.33	12.67	9.67	3.33	1.33	4.70
		(0.71)	(1.08)	(1.22)	(1.47)	(1.68)	(2.86)	(3.44)	(3.63)	(3.19)	(1.96)	(1.35)	(2.28)
5.	$N_{10}P_0$	1.33	2.00	4.00	5.00	7.00	14.00	17.00	20.33	16.00	10.00	5.00	9.24
		(1.35)	(1.58)	(2.12)	(2.35)	(2.74)	(3.81)	(4.18)	(4.56)	(4.06)	(3.24)	(2.35)	(3.12)
6.	$N_{10}P_{20}$	1.00	1.33	3.00	4.00	6.00	12.00	15.00	18.67	15.00	9.33	4.00	8.12
		(1.22)	(1.35)	(1.87)	(2.12)	(2.55)	(3.54)	(3.94)	(4.38)	(3.94)	(3.14)	(2.12)	(2.94)
7.	$N_{10}P_{40}$	1.00	1.00	2.67	3.00	5.00	10.00	12.00	16.00	12.67	7.33	3.33	6.73
		(1.22)	(1.22)	(1.78)	(1.87)	(2.35)	(3.24)	(3.54)	(4.06)	(3.63)	(2.80)	(1.96)	(2.69)
8.	$N_{10}P_{60}$	0.67	1.00	2.00	3.33	4.00	7.33	10.33	13.00	9.00	5.00	2.33	5.27
		(1.08)	(1.22)	(1.58)	(1.96)	(2.12)	(2.80)	(3.29)	(3.67)	(3.08)	(2.35)	(1.68)	(2.40)
9.	$N_{20}P_0$	2.00	4.00	5.00	7.00	9.00	18.67	22.67	26.00	18.00	12.00	7.00	11.94
		(1.58)	(2.12)	(2.35)	(2.74)	(3.08)	(4.38)	(4.81)	(5.15)	(4.30)	(3.54)	(2.74)	(3.53)
10	$N_{20}P_{20}$	2.00	3.33	4.00	6.00	7.00	16.67	19.00	24.00	17.33	10.00	4.33	10.33
		(1.58)	(1.96)	(2.12)	(2.55)	(2.74)	(4.14)	(4.42)	(4.95)	(4.22)	(3.24)	(2.20)	(3.29)
11.	$N_{20}P_{40}$**	1.00	1.67	2.33	5.00	6.67	15.67	17.33	21.67	16.67	7.00	4.00	9.00
		(1.22)	(1.47)	(1.68)	(2.35)	(2.68)	(4.02)	(4.22)	(4.71)	(4.14)	(2.74)	(2.12)	(3.08)
12.	$N_{20}P_{60}$	1.00	1.00	2.00	3.00	5.67	13.33	17.00	19.67	13.00	5.33	1.00	7.45
		(1.22)	(1.22)	(1.58)	(1.87)	(2.48)	(3.72)	(4.18)	(4.49)	(3.67)	(2.42)	(1.22)	(2.82)
13.	$N_{30}P_0$	1.00	5.00	7.00	10.00	14.00	21.00	25.00	30.00	20.00	15.00	8.00	14.18
		(1.22)	(2.35)	(2.74)	(3.24)	(3.81)	(4.64)	(5.05)	(5.52)	(4.53)	(3.94)	(2.92)	(3.83)
14.	$N_{30}P_{20}$	0.67	5.00	6.00	8.00	13.00	19.33	23.67	27.00	21.33	14.00	6.00	13.09
		(1.08)	(2.35)	(2.55)	(2.92)	(3.67)	(4.45)	(4.92)	(5.24)	(4.67)	(3.81)	(2.55)	(3.69)
15.	$N_{30}P_{40}$	0.67	4.00	5.00	6.00	11.00	16.00	20.00	23.00	18.67	12.67	4.33	11.03
		(1.08)	(2.12)	(2.35)	(2.55)	(3.39)	(4.06)	(4.53)	(4.85)	(4.38)	(3.63)	(2.20)	(3.40)
16.	$N_{30}P_{60}$	1.00	3.00	4.00	5.00	9.00	13.00	11.67	17.33	14.33	9.00	3.33	8.24

		(1.22)	(1.87)	(2.12)	(2.35)	(3.08)	(3.67)	(3.49)	(4.22)	(3.85)	(3.08)	(1.96)	(2.96)
S.E.m±		0.22	0.32	0.34	0.35	0.42	0.33	0.36	0.34	0.31	0.46	0.36	0.42
CD at 5%		0.64	0.92	0.99	1.02	1.23	0.97	1.06	0.99	0.90	1.33	1.04	1.23

* Mean of three replications, five plants in each replication

** Recommended dose *** Values in parentheses are $\sqrt{x + 0.5}$

Table 5: Response of different doses of nitrogen and phosphorus on the incidence of *Bemisia tabaci* on Indian bean

S.No.	Fertilizer combinations	Mean white fly population/plant*											
		Date of observations											
		3/09/2013	10/09/2013	17/09/2013	24/09/2013	1/10/2013	8/10/2013	15/10/2013	22/10/2013	29/10/2013	5/11/2013	12/11/2013	Mean
1.	N_0P_0	0.33	1.33	1.67	3.33	5.00	8.33	10.00	6.00	5.33	4.67	3.33	4.48
		(0.91)***	(1.35)	(1.47)	(1.96)	(2.35)	(2.97)	(3.24)	(2.55)	(2.42)	(2.27)	(1.96)	(2.23)
2.	N_0P_{20}	0.00	1.00	1.33	2.67	3.67	7.33	9.33	5.00	4.33	4.00	2.67	3.76
		(0.71)	(1.22)	(1.35)	(1.78)	(2.04)	(2.80)	(3.14)	(2.35)	(2.20)	(2.12)	(1.78)	(2.06)
3.	N_0P_{40}	0.00	1.00	1.00	2.00	3.00	6.33	7.33	3.67	3.00	2.00	2.00	2.85
		(0.71)	(1.22)	(1.22)	(1.58)	(1.87)	(2.61)	(2.80)	(2.04)	(1.87)	(1.58)	(1.58)	(1.83)
4.	N_0P_{60}	0.00	0.67	1.00	1.67	2.67	5.00	6.33	3.33	2.00	1.33	0.67	2.24
		(0.71)	(1.08)	(1.22)	(1.47)	(1.78)	(2.35)	(2.61)	(1.96)	(1.58)	(1.35)	(1.08)	(1.66)
5.	$N_{10}P_0$	0.67	1.33	4.00	5.00	10.00	13.00	15.00	11.00	6.00	3.00	2.00	6.45
		(1.08)	(1.35)	(2.12)	(2.35)	(3.24)	(3.67)	(3.94)	(3.39)	(2.55)	(1.87)	(1.58)	(2.64)
6.	$N_{10}P_{20}$	0.67	1.00	3.67	4.00	8.00	11.33	14.33	10.00	5.00	4.33	2.00	5.85
		(1.08)	(1.22)	(2.04)	(2.12)	(2.92)	(3.44)	(3.85)	(3.24)	(2.35)	(2.20)	(1.58)	(2.52)
7.	$N_{10}P_{40}$	0.00	0.67	3.00	3.67	7.33	9.33	11.00	8.00	4.00	4.00	1.67	4.79
		(0.71)	(1.08)	(1.87)	(2.04)	(2.80)	(3.14)	(3.39)	(2.92)	(2.12)	(2.12)	(1.47)	(2.30)
8.	$N_{10}P_{60}$	0.00	0.67	2.00	3.33	5.00	6.33	9.00	6.33	3.00	2.33	1.00	3.54
		(0.71)	(1.08)	(1.58)	(1.96)	(2.35)	(2.61)	(3.08)	(2.61)	(1.87)	(1.68)	(1.22)	(2.01)
9.	$N_{20}P_0$	1.00	2.33	5.00	5.33	11.00	12.67	17.00	12.67	8.00	5.00	3.00	7.55
		(1.22)	(1.68)	(2.35)	(2.42)	(3.39)	(3.63)	(4.18)	(3.63)	(2.92)	(2.35)	(1.87)	(2.84)
10	$N_{20}P_{20}$	1.00	2.00	4.00	6.00	11.00	12.67	15.00	11.00	6.33	4.00	2.00	6.82
		(1.22)	(1.58)	(2.12)	(2.55)	(3.39)	(3.63)	(3.94)	(3.39)	(2.61)	(2.12)	(1.58)	(2.71)
11.	$N_{20}P_{40}$**	0.67	1.00	3.67	5.33	10.00	11.00	14.33	10.00	5.33	2.00	2.33	5.97
		(1.08)	(1.22)	(2.04)	(2.42)	(3.24)	(3.39)	(3.85)	(3.24)	(2.42)	(1.58)	(1.68)	(2.54)
12.	$N_{20}P_{60}$	0.00	1.00	2.67	3.33	8.00	10.33	12.00	8.00	3.00	1.67	1.00	4.64
		(0.71)	(1.22)	(1.78)	(1.96)	(2.92)	(3.29)	(3.54)	(2.92)	(1.87)	(1.47)	(1.22)	(2.27)
13.	$N_{30}P_0$	1.33	4.00	6.00	8.00	12.67	14.33	19.33	14.00	10.00	7.33	4.33	9.21
		(1.35)	(2.12)	(2.55)	(2.92)	(3.63)	(3.85)	(4.45)	(3.81)	(3.24)	(2.80)	(2.20)	(3.12)
14.	$N_{30}P_{20}$	1.00	3.67	5.00	7.33	11.33	12.67	17.33	13.00	8.33	5.33	3.33	8.03
		(1.22)	(2.04)	(2.35)	(2.80)	(3.44)	(3.63)	(4.22)	(3.67)	(2.97)	(2.42)	(1.96)	(2.92)
15.	$N_{30}P_{40}$	1.00	3.33	4.33	5.33	9.67	11.00	14.67	11.33	5.33	4.00	1.33	6.48
		(1.22)	(1.96)	(2.20)	(2.42)	(3.19)	(3.39)	(3.89)	(3.44)	(2.42)	(2.12)	(1.35)	(2.64)
16.	$N_{30}P_{60}$	0.67	2.33	4.33	4.00	8.33	9.33	10.00	8.00	2.33	2.33	1.00	4.79
		(1.08)	(1.68)	(2.20)	(2.12)	(2.97)	(3.14)	(3.24)	(2.92)	(1.68)	(1.68)	(1.22)	(2.30)
S.E.m±		0.18	0.28	0.34	0.28	0.39	0.29	0.35	0.35	0.38	0.32	0.26	0.39
CD at 5%		0.53	0.83	0.98	0.83	1.13	0.84	1.04	1.02	1.09	0.95	0.77	1.14

* Mean of three replications, five plants in each replication

** Recommended dose *** Values in parentheses are $\sqrt{x + 0.5}$

Discussion

Excessive use of inorganic/organic fertilizers generally creates congenial conditions for rapid multiplication of many insect pests. In order to evaluate the response of different doses of nitrogen and phosphorus on the incidence of sucking pests of indian bean, the present work was undertaken and observations revealed that the population of aphid, jassids and white fly increased with the increase in nitrogen doses and decreased in phosphorus doses. In the present observations the minimum populations of these pests were recorded in n_0p_{60} kg ha^{-1} followed by n_0p_{40}, $n_{10}p_{60}$, n_0p_{20}, n_0p_0, $n_{10}p_{40}$, $n_{20}p_{60}$, $n_{30}p_{60}$, $n_{10}p_{20}$ and $n_{20}p_{40}$ kg ha^{-1}. The maximum population was noticed in $n_{30}p_0$ kg h^{-1} application, followed by $n_{30}p_{20}$, $n_{20}p_0$, $n_{20}p_{20}$, $n_{30}p_{40}$ and $n_{10}p_0$ kg ha^{-1}.the present findings get support from the observations of ram and gupta (1992) [6] who found that high dose of phosphorous reduced the incidence of aphid infesting *brassica campestris* whereas, a higher dose of nitrogen led to increased incidence. Likewise, rustamani *et al.*, (1999) [7] reported that higher doses of nitrogen fertilizer favoured the multiplication of jassids and white fly population infesting cotton also support the present findings. Similarly, mandal *et al.* (2006) [5] also observed the influence of different levels of fertilizers on the damage potential of jassids on okra crop at pusa (bihar) and found that increasing level of phosphorus with decreased level of nitrogen resulted in minimum pest infestation support the present results. The present result get support from the finding of kumar (2013) [4] who observed that increased dose of nitrogen favoured higher population of jassids and white fly in brinjal crop.

Acknowledgement

The authors are thankful to the Dean, College of Agriculture, Sri Karan Narendra Agriculture University, Jobner- Jaipur for providing necessary facilities and permission to conduct the study.

References

1. Bose TK, Som MG, Kabir J. Vegetable Crops. Published by Naya Prakash 206 Bidhan Sarani, Calcutta, 1993, 612.
2. David BV, Kumarswami T. Elements of Economic Entomology. Popular Book Depot, Madras, 1982, 173.
3. Gupta MP, Ram S. Role of fertilizer (phosphorus and potassium) and granular insecticide in the pest management of lucerne (*Medicago sativa* L.). *Bhartiya Krishi Anusandhana Patrika.* 1989; 4(4):201-207.
4. Kumar K. Population dynamics and management of sucking pests of brinjal. Thesis submitted to S.K. Rajasthan Agricultural University, Bikaner, 2013.
5. Mandal SK, Sah SB, Gupta SC. Influence of fertilizer combinations on the incidences of insect pests of

okra. Journal of Applied Zoological Research. 2006; 17(1):61-66.
6. Ram S, Gupta MP. Role of fertilizer (N, P & K) in insect pest management of mustard meant for fodder production. Indian Journal of Agricultural Research. 1992; 26(1):35-39
7. Rustamani MA, Memon N, Leghari MH, Dhaunroo MH, Sheikh SA. Impact of various fertilizer levels on the incidence of sucking pest complex in cotton. Pakistan Journal of Zoology. 1999; 31(4):323-326.
8. Sammauria R, Yadav RS, Nagar KC. Perfomance of cluster bean (*Cyamopsis tetragonoloba*)as influenced by nitrogen and phosphorus fertilization and biofertilizers in Western Rajasthan, Indian journal of agronomy. 2009; 54(3):319-323.