

## Effect of Sowing and Varietal on the Incidence of Major Insect Pests of Garden Pea (*Pisum sativum* Linn.)

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**ABSTRACT:** A field experiment was conducted in the entomological experimental farm of School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema campus using Split Plot Design to study the effect of dates of sowing and varieties on pest complex of garden pea, *Pisum sativum* Linn. Four pea varieties and three sowing dates were selected. Late sown crop i.e. 31<sup>st</sup> October harboured the minimum infestation of pea aphid, *Acrythosiphon sativum* and pod borer, *Helicoverpa armigera* population than the early sown crop i.e. 19<sup>th</sup> October which was recored with maximum infestation. Maximum aphid and pod border infestation was observed on varieties Lovely 65 and Arkel, respectively while minimum insect pest infestation was observed on the variety Azad P-1.

**Key word:** Pea insects, Varietal, Sowing dates.

### INTRODUCTION

Garden pea is commonly cultivated during cool season throughout the world. Madhya Pradesh is the highest producer of peas in India with a productivity of 12.82 q /ha (Anonymous 2013). In North eastern states, pea cultivation covers an area about 5.75 lakh hectares i.e. total cultivable area is 14.04% (Anonymous 2012). In Nagaland pea cultivation covers about 7.02 ha with productivity of 10.45 q/ha with productivity of 10.45 q/ha and production of 7.34 MT. (Anonymous 2013). Garden pea is highly nutritive and contains a high percentage of digestible protein, carbohydrate and vitamins. It is cultivated for fresh green seeds; tender green pods dried seeds and foliage as herb (Roe, 1977).

The major insect pests of garden pea viz. pea aphid (*Acrythosiphon pisum*), pod borers (*Helicoverpa armigera*) and stem fly (*Ophiomyia Phaseoli*). Pea aphid which suck juice from growing tips then cover the whole plant. Pod borers, the young caterpillars of the pod borers bore into the pods and feed on the seeds (Bijur and Verma 1995). Pea stem fly maggots mine the leaves, bore inside the petioles and tender stems and tunnel downwards. The affected leaves turn yellow and the stems drop down and wither away (Sharma *et al.* 1997).

### MATERIALS AND METHODS

Experiment was carried out in the Entomological farm SASRD Medziphema campus situated at Medziphema, Nagaland, 25p 45' 53" North latitude and 93p 53' 04" East longitude having an elevation of 310 meters above sea level (msl).

The experiment was carried out in the field condition during the month of October 2012 - January 2013. The experiment was conducted in Split Plot Design keeping three different dates of sowing i.e. on 19<sup>th</sup> October, 25<sup>th</sup> October and 31<sup>st</sup> October 2013 as main plot and four varieties viz. Lovely 65, Arkel, G-8 and Azad P-1 as sub-plot. For the estimation of aphids population five (5) plants were randomly selected from sub-plot and the population was recorded at 15 days interval from three leaves each from top, middle and bottom whereas for pod borer the population were recorded from 5 randomly selected plants from each plot. The data collected on the aphid were subjected to the square root transformation and percentage of pod borer infestation was transformed in angular transformation before analyzing statistically.

### RESULTS

As presented in table (1) Eight insect species appeared on garden pea at different crop stages. During October

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**Table 1**  
**Insect pests recorded on garden pea during the investigation.**

Sl. No.	Common Name	Scientific Name/ Order/ Family	Damaging Stages	Crop phenology	Damaged plant parts
1.	Pea aphid	<i>Acyrthosiphon pisum</i> (Hemiptera: Aphididae)	Nymph and adult	Seedling, vegetative & pod formation stages	Leaves & tender parts of the plant
2.	Pod borer	<i>Helicoverpa armigera</i> (Lepidoptera: Noctuidae)	Caterpillar	Flowering and fruiting stages	Pods
3.	Tobacco caterpillar	<i>Spodoptera litura</i> Fabr. (Lepidoptera: Noctuidae)	Caterpillar	Vegetative stage	Foliage
4.	Flea beetle	<i>Monolepta signata</i> (Coleoptera: Chrysomelidae)	Adult	Vegetative stage	Foliage, pods
5.	Pod boring weevil	<i>Apion clavipes</i> (Coleoptera: Curculionidae)	Adult	Vegetative stage	foliage, pods & tender parts of plant
6.	Pea leaf miner	<i>Phytomyza atriconis</i> (Diptera: Agromyzidae)	Larvae	Vegetative stage	Foliage
7.	Grasshopper	<i>Hieroglyphus banian</i> (Orthoptera: Acrididae)	Nymph and Adult	Early vegetative stage	Foliage
8.	Leaf webber	<i>Psara bipunctalis</i> (Lepidoptera: Pyraustidae)	Caterpillar	Vegetative & pod formation stages.	Foliage

2012 - January 2013 study period the best result, was recorded in late sown crop *i.e.* 31<sup>st</sup> October resulted in least infestation of aphid population with 0.95 and for pod borer the least infestation was recorded during 25<sup>th</sup> October with 0.72%. Best variety was Azad PI where least infestation was observed by both aphids and pod borers, followed by G8 and Arkel. Dates of sowing and varieties exhibited significant effect on aphid population and pod borer infestation throughout the crop period. Slightly higher level of aphid population was found at 45 DAS (11.45) and reach a peak at 60 DAS (22.54) and declined at 75 DAS (12.59). Slightly higher level of pod borer infestation was found at 30 DAS (2.68%) and reach a peak at 45 DAS (10.85%) and declined at 60 DAS (4.69%) and 75 DAS (3.24%). The pea aphid, pod borer, pea leaf miner and leaf webber appeared in all the sowing dates.

Dates of sowing exhibited significant influence on both aphid and pod borer population. As presented in Table 2 and 4. The crop sown on 19<sup>th</sup> October 2012 harboured the maximum infestation of aphid and pod borer. The highest incidence of aphid population was recorded on first date of sowing (19<sup>th</sup> October) with 22.54 aphid/plant at 60 DAS and the highest pod borer infestation of 10.85% was observed on first date of sowing (19<sup>th</sup> October). The lowest infestation of aphid and pod borer and was observed on 31<sup>st</sup> October (D<sub>3</sub>) sowing date with 0.95.

Varietal influence on aphid population varied significantly at all the stages of crop growth indicating thereby that the incidence of the pest had a direct relation on the different varieties being tested. Azad

PI was recorded with lowest mean aphid population and pod borer as shown in the table (2) and (4). The interaction between dates of sowing and varieties as presented on table (3) and (5) showed significant effect at 5% probability level. Manifestation of least infestation may be due to natural enemies like predators and parasitoids which appeared in

**Table 2**  
**Effect of dates of sowing and varieties on aphid population**

Treatment	15 DAS	30 DAS	45 DAS	60 DAS	75 DAS
D <sub>1</sub>	2.26 (1.75)	6.82 (3.35)	11.45 (5.17)	22.54 (6.56)	12.59 (4.13)
D <sub>2</sub>	3.66 (2.04)	7.05 (2.75)	13.67 (6.14)	13.93 (3.93)	9.24 (3.12)
D <sub>3</sub>	0.95 (1.21)	4.43 (2.23)	7.61 (14.17)	11.97 (3.52)	17.87 (4.43)
SEm±	0.07	0.17	0.25	0.04	0.10
CD (p=0.05)	0.20	0.46	0.70	0.12	0.28
V <sub>1</sub>	1.65 (1.47)	4.13 (2.15)	12.75 (5.06)	16.85 (5.29)	13.47 (3.78)
V <sub>2</sub>	3.19 (1.92)	6.76 (3.24)	12.25 (5.33)	13.27 (4.25)	10.38 (4.42)
V <sub>3</sub>	2.26 (1.66)	5.15 (2.94)	10.66 (5.88)	16.49 (5.25)	9.45 (3.69)
V <sub>4</sub>	2.46 (1.72)	7.36 (2.80)	7.98 (4.53)	17.92 (4.56)	12.62 (3.80)
SEm±	0.10	0.15	0.17	0.15	0.09
CD (p=0.05)	0.21	0.32	0.60	0.31	0.33

Note: D<sub>1</sub> = Sowing dates on 19<sup>th</sup> October, D<sub>2</sub> = Sowing done on 25<sup>th</sup> October, D<sub>3</sub> = Sowing done on 31<sup>st</sup> October, V<sub>1</sub> = Lovely 65, V<sub>2</sub> = Arkel, V<sub>3</sub> = G8, V<sub>4</sub> = Azad P1. Figure in the column are mean values and those in parenthesis are square root transformed values. DAS = Days after sowing. NS indicates non-significant at 5% level of significance

**Table 3**  
Effect of interaction of dates of sowing and varieties on aphid population at 15, 30, 45, 60 and 75 days after sowing

D x V Interaction	Number of Aphid population																			
	15 DAS				30 DAS				45 DAS				60 DAS				75 DAS			
	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>
<b>D<sub>1</sub></b>	2.48 (1.73)	3.71 (2.05)	2.23 (1.65)	1.80 (1.51)	4.91 (2.33)	9.48 (4.43)	8.93 (3.86)	4.46 (2.23)	6.76 (5.86)	14.42 (5.56)	6.78 (4.78)	7.76 (9.39)	36.01 (8.29)	40.11 (9.25)	26.54 (8.23)	28.24 (5.20)	16.87 (4.29)	12.77 (4.03)	8.47 (4.46)	9.23 (3.71)
<b>D<sub>2</sub></b>	1.34 (1.36)	4.65 (2.27)	4.89 (1.32)	3.76 (2.06)	4.74 (2.29)	6.60 (2.66)	7.44 (2.82)	9.42 (3.15)	9.80 (5.03)	8.56 (4.90)	19.6 (8.21)	11.51 (5.29)	22.04 (5.70)	18.79 (4.39)	20.87 (9.39)	21.18 (5.51)	7.70 (2.88)	6.46 (2.63)	10.77 (3.36)	11.95 (3.53)
<b>D<sub>3</sub></b>	1.13 (1.28)	1.21 (1.31)	0.78 (1.14)	0.68 (1.09)	2.74 (1.8)	4.19 (2.16)	2.58 (1.75)	8.20 (2.95)	16.64 (5.06)	12.25 (5.33)	5.59 (3.76)	4.67 (3.76)	7.73 (4.27)	9.46 (4.12)	18.68 (4.16)	16.20 (4.38)	15.76 (4.03)	8.91 (5.95)	16.69 (4.14)	4.11 (3.10)
SEm±	0.18				0.26				0.83				1.58				0.16			
CD (p=0.05)	0.37				0.55				1.14				2.16				0.33			

**Note:** D<sub>1</sub> = Sowing dates on 19<sup>th</sup> October, D<sub>2</sub> = Sowing done on 25<sup>th</sup> October, D<sub>3</sub> = Sowing done on 31<sup>st</sup> October, V<sub>1</sub> = Lovely 65, V<sub>2</sub> = Arkel, V<sub>3</sub> = G8, V<sub>4</sub> = Azad PL.

Figure in the column are mean values and those in parenthesis are square root transformed values.

DAS = Days after sowing

NS indicates non-significant at 5% level of significance

considerable numbers during the late planting date. (Among the varieties the maximum benefit.

## DISCUSSIONS

In the present investigation, eight insect species were recorded on garden pea at various stages of its growth. Several workers have reported various insect pests on garden pea from different parts of the world. Pod borer, *Helicoverpa armigera* damaged pods as well as large number of buds and flowers too. Similar incidence of pod borer was reported Bharatnagar *et al.* (1981). Pea aphid and pod borer appeared as regular pests during the investigation. The present findings are in agreement with Prasad *et al.* (1984). Pod borer, *Helicoverpa armigera* was an important pests of regular occurrence. Similar incidence of pod borer was reported by Chauhan (1992). Pea aphid, pod borer, pea leaf miner and leaf webber appeared in all the sowing dates. Similar incidence of these insect pests were recorded by (1981), Bijjur and Verma (1995), Sharma *et al.* (1997) and Boyar, D.M. (2003). The damaged due to grasshopper was more pronounced during early vegetative stage. Its incidence could perhaps be due to polyphagous nature of the pests.

Dates of sowing exhibited significant influence on aphid and pod borer population. The crop sown on 19<sup>th</sup> October 2012 harboured the maximum infestation of aphid and pod borer both. Steene, F. van de and Vulsteke, G. (1999) stated that the higher infestation rate was observed when the crop was sown earlier which was in accordance with the present findings. Late sown crop i.e. on 31<sup>st</sup> October 2012 gave the minimum infestation of, aphid and pod borer. The present findings are in agreement with Moshtohor (2006) who reported that the pea sown on 30<sup>th</sup> October harboured significantly the lowest seasonal mean number of all the pest. This may be due to natural enemies (predators and parasitoids) appeared in considerable numbers and these tended to increase as planting date was delayed, reported by Wale, M. (2002).

Varietal influence on aphid population varied significantly at all the stages of the crop growth indicating thereby that the incidence of the pest had a direct relation on the different varieties being tested. 'Lovely 65' was recorded with highest mean aphid population.

Therefore from the present study it can be suggested that dates of sowing in varietal is a promising method adjustment of date of sowing and use of resistance varieties are effective measures to

**Table 4**  
Effect of dates of sowing and varieties on pod borer infestation

Treatment	15 DAS	30 DAS	45 DAS	60 DAS	75DAS
D <sub>1</sub>	0.93 (2.63)	2.68 (5.32)	10.85 (10.76)	4.69 (6.97)	3.24 (1.24)
D <sub>2</sub>	0.72 (2.05)	3.10 (5.75)	4.32 (6.73)	2.30 (4.82)	3.36 (3.08)
D <sub>3</sub>	0.78 (2.18)	2.95 (5.59)	2.32 (4.92)	1.44 (3.69)	3.90 (1.33)
SEm±	0.15	0.16	0.12	0.13	0.18
CD (p=0.05)	NS	NS	0.33	0.37	NS
V <sub>1</sub>	0.89 (2.32)	2.68 (5.32)	5.37 <sup>b</sup> (7.22)	3.35 <sup>a</sup> (5.90)	2.60 (1.16)
V <sub>2</sub>	1.03 (2.86)	2.43 (5.07)	8.03 <sup>a</sup> (8.78)	2.47 <sup>a</sup> (4.90)	3.80 (1.33)
V <sub>3</sub>	0.91 (2.49)	2.72 (5.30)	4.50 <sup>b</sup> (6.40)	2.33 <sup>a</sup> (4.76)	6.60 (3.94)
V <sub>4</sub>	0.40 (1.47)	2.98 (5.56)	5.42 <sup>b</sup> (7.98)	2.84 <sup>a</sup> (4.87)	2.25 (1.10)
SEm±	0.17	0.16	0.34	0.29	0.18
CD (p=0.05)	NS	NS	0.71	NS	0.37

Note: D<sub>1</sub> = Sowing dates on 19<sup>th</sup> October, D<sub>2</sub> = Sowing done on 25<sup>th</sup> October, D<sub>3</sub> = Sowing done on 31<sup>st</sup> October, V<sub>1</sub> = Lovely 65, V<sub>2</sub> = Arkel, V<sub>3</sub> = G8, V<sub>4</sub> = Azad P1. Figure in the column are mean values and those in parenthesis are square root transformed values. DAS = Days after sowing  
NS indicates non-significant at 5% level of significance

reduce insect pests complex of garden pea. Further investigation is therefore suggested to achieve higher goal on controlling insects of garden pea

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**Table 5**  
**Effect of interaction of dates of sowing and varieties on pod borer infestation at 15, 30, 45, 60 and 75 days after sowing**

D x V Interaction	Pod borer infestation																			
	15 DAS				30 DAS				45 DAS				60 DAS				75 DAS			
	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>	V <sub>4</sub>
<b>D<sub>1</sub></b>	0.67 (2.11)	1.38 (3.88)	0.92 (2.59)	0.74 (1.94)	2.64 (5.31)	2.20 (4.97)	1.82 (4.33)	1.50 (3.99)	9.58 (10.28)	16.14 (13.41)	6.18 (8.10)	11.50 (11.28)	2.60 (8.01)	3.47 (6.16)	4.01 (6.51)	5.22 (7.21)	3.02 (1.22)	4.46 (1.41)	3.82 (1.33)	1.66 (1.02)
<b>D<sub>2</sub></b>	0.93 (2.49)	0.65 (2.33)	1.15 (2.43)	0.13 (0.96)	3.72 (6.36)	2.38 (5.09)	2.54 (5.21)	3.74 (6.36)	3.50 (5.95)	5.32 (7.61)	5.12 (7.46)	3.21 (5.91)	2.99 (5.40)	2.21 (4.76)	1.73 (4.16)	2.26 (4.95)	2.06 (1.09)	2.64 (1.17)	6.76 (8.90)	1.99 (0.60)
<b>D<sub>3</sub></b>	1.08 (2.37)	1.06 (2.86)	0.66 (2.25)	0.33 (1.51)	1.68 (4.28)	2.61 (5.16)	3.81 (6.37)	3.69 (6.34)	3.02 (5.47)	2.62 (5.32)	2.10 (3.63)	1.54 (5.26)	1.71 (4.31)	1.75 (4.07)	1.25 (3.62)	1.04 (2.76)	2.82 (1.17)	4.40 (1.40)	5.26 (1.50)	3.11 (1.23)
SEm±	0.29	0.27	0.13	0.50	0.30															
CD (p=0.05)			NS			NS				0.59					NS					0.65

Note: D<sub>1</sub> = Sowing dates on 19<sup>th</sup> October, D<sub>2</sub> = Sowing done on 25<sup>th</sup> October, D<sub>3</sub> = Sowing done on 31<sup>st</sup> October, V<sub>1</sub> = Lovely 65, V<sub>2</sub> = Arkel, V<sub>3</sub> = G8, V<sub>4</sub> = Azad P1.  
 Figure in the column are mean values and those in parenthesis are square root transformed values.  
 DAS = Days after sowing  
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Figure 1: Pea aphid, *Acrythosiphon pisum*



Figure 2: Pod borer, *Helicoverpa armigera*



Figure 3: pod boring weevil, *Apion clavipes*



Figure 4: Tobacco caterpillar, *Spodoptera litura*



Figure 5: Flea beetle, *Monolepta signata*



Figure 6: Damage caused by leaf webber, *Psara bipunctalis*

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