

INCIDENCE OF SUCKING PEST COMPLEX AND LEAF MINER AT DIFFERENT SOWING DATES IN PEA (*PISUM SATIVUM* L.)

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ABSTRACT

A field experiment was conducted to study the incidence of sucking pest complex and leaf miner at different sowing dates during 2014-2015 and 2015-2016 at University of Agricultural Sciences Dharwad. A total of 25 insect pests were recorded of which 14 insect pests belonged to Lepidoptera, 5 belongs to Hemiptera, 3 belongs to coleoptera and 1 each from Diptera, Thysanoptera and Orthoptera. The sucking pest complex viz., aphids, thrips, leaf hoppers, leaf miner and green mirid bug population during June I Fortnight crop sown recorded least of 0.49, 1.60, 0.76, 2.42 / three compound leaf and 0.06/ plant respectively. The highest population of aphids, thrips, leaf hopper, leaf miner and green bug in the crop sown during July I Fortnight which recorded 1.24, 3.24, 1.90, 4.54 /three compound leaf and 0.09 plant respectively. Hence, the early sowing during I Fortnight June exhibited maximum yield of 18.83 q/ha and least sucking pest population and leaf miner population.

INTRODUCTION

Garden pea, (*Pisum sativum* L.) is the second most principal pod and pulse cum vegetable crop which play a key role in human and animal nutrition. It 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). In India vegetable pea is cultivated over an area of 4,59,000 hectares with a production of 43,29,000 tonnes and the productivity of 9.4 tonnes / ha during 2015. The major pea growing states are Bihar, Haryana, Punjab, Himachal Pradesh, Orissa, and Karnataka. In Karnataka, vegetable pea is cultivated over an area of 1,530 hectares with a production of 22,550 tonnes and the productivity of 14.73 tonnes/ha during 2015 (Anon, 2015).

Pea *P. sativum* is attacked by pea thrips, *Caliothrips indicus*, pea aphid, *Acyrtosiphon pisum*, leaf miner, *Phytomyza sp.* and gram pod borer, *Helicoverpa armigera* reported by Prasad *et al.* (1984) and Mahobe and Narsinghani (1986). Among insect pests of peas, pea leaf miner *Phytomyza horticola* is a serious hold back in cultivation of pea causing 90% damage to the pea crop by mining young leaves which leads to stunting and low flower production. The reduction in pea yield due to pea aphid infestation is 42 per cent under field condition (Warrington *et al.*, 1987). Pea aphid which sucks juice from growing tips then cover the whole plant (Bijjur and Verma 1995). Pea thrips, *Caliothrips indicus* also come under the category of serious pests of peas. Due to their infestation, tissue surface becomes silvery and may result to the failure of flowers production and also change structure of plant and pods. At the range of 250 eggs per 10 flowers causes reduction

in the harvest by up to 60%. Among the various pests, aphid, whitefly and leafhopper causes considerable loss in the yield of field pea by sucking the sap from the ventral surface of leaves (Mahobe and Narsinghani 1986).

Hence the present experiment was therefore conducted to find out which is the best date of sowing in order to reduce the sucking pest and leaf miner population in pea.

MATERIALS AND METHODS

The study was carried out under open field conditions to know the pest scenario of pea during *kharif* 2014 and 2015 at Entomology Block, Main Agricultural Research Station (MARS), UAS, Dharwad. The pea variety sweet pearl was used for the study. The experiment comprised of four dates of sowing as treatments viz., June I Fortnight, June II Fortnight, July I Fortnight and July II Fortnight. The plot size used under each treatment was 3.6 x 2 m with the spacing of 30 cm x10 cm between rows and plants and they were replicated five times under Randomized completeblock design (RCBD). The crop was raised as per recommended package of practices except plant protection measures. Further, observations were taken at weekly intervals from seven days after germination till harvesting of the crop on the incidence of major insect pests viz., sucking pests like aphids, thrips, leaf hoppers, green mirid bug and also leaf miner by following standard protocols, at different crop growth stages. The number of aphids, thrips, leafhoppers and leaf miner population per three leaves each selected from top, middle and bottom portions of a plant was counted separately on ten randomly selected plants and expressed as population per three leaves and number of bugs

per plant was recorded. The population of sucking pests was recorded on three leaves selected randomly from the top, middle and bottom canopy from the selected plants at weekly interval starting from seven days after germination till the removal of the crop (Babu and Meghwal, 2014). Yield was harvested from each plot separately and converted into quintal/ha. Finally the insect observations values were subjected to Square root transformations and statistical analysis was made.

RESULTS AND DISCUSSION

A total of insects pests belonging to six orders were reported during the course of investigation of which majority belonged to Lepidoptera, followed by Hemiptera, Coleoptera, Diptera, Thysanoptera and Orthoptera found associated with pea ecosystem in Dharwad (Table 1). Among all the insect pest *Scirtothrips dorsalis*, *Empoasca kerri*, *Liriomyza spp.*, *Helicoverpa armigera*, *Lampides boeticus*, *Cydia nigricana* and *Spodoptera exigua* was found to be major. Prabhakar and Roy (2008) and Mandal *et al.* (2009) have recorded 8 major pests infesting *Cajanus cajan* and other pulse crops.

Aphids (*Aphis craccivora*)

During 2014, the lowest mean aphids population 0.19 aphids /3 leaves was observed during June I fortnight sown crop followed by June II fortnight (0.28 aphids /3 leaves) which were on par with each other and significantly superior over other delayed sowing dates. (Table 2).

The minimum population of 0.78 aphids /3 leaves was recorded on the crop sown during June I fortnight, which was on par with sowing done during June II fortnight which recorded 0.95 aphids /3 leaves and found to be significantly superior over other dates of sowing. Whereas, maximum population of 1.46 aphids /3 leaves were noticed on the crop sown during July II fortnight in 2015 (Table 3).

The pooled data revealed that the significant lowest 0.49 aphids/3 leaves was recorded on the crop sown during June I fortnight. Whereas the crop sown during July II fortnight harbored the significant maximum 1.35 aphids/3 leaves (Table 4).

Thrips (*Scirtothrips dorsalis*)

During 2014, the significant lowest mean population of 1.49

Table 1: Species of insect pests recorded on pea (*Pisum sativum*) at UAS, Dharwad during *kharif* 2014 and *kharif* 2015

Sl no	Common name	Scientific name	Taxonomic position	Status
1	Thrips	<i>Scirtothrips dorsalis</i> (Hood)	Thysanoptera : Thripidae	Major
2	Aphids	<i>Aphis craccivora</i> (Coch)	Hemiptera : Aphididae	Minor
3	Whitefly	<i>Bemisia tabaci</i> (Gennadius)	Hemiptera : Aleyrodidae	Minor
4	Leaf hopper	<i>Empoasca kerri</i> (Pruthi)	(Homoptera : Cicadellidae)	Major
5	Green vegetable bug	<i>Nezara viridula</i> (Linnaeus)	Hemiptera: Pentatomidae	Minor
6	Green mirid	<i>Creontiades dilutes</i> (Stal)	Hemiptera: Miridae	Minor
7	Leaf miner	<i>Liriomyza spp.</i>	Diptera: Agromyzidae	Major
8	Black cutworm	<i>Agrotis ipsilon</i> (Hufnagel)	(Lepidoptera: Noctuidae)	Minor
9	Semilooper	<i>Thysanoplusia orichalcea</i> (Fabricius)	Lepidoptera : Noctuidae	Minor
10	Grass hopper	<i>Attractomorpha crenulata</i> (Fabricius)	Orthoptera : Acrididae	Minor
11	Pumpkin beetle	<i>Aulacophora faveicollis</i> (Lucas)	Coleoptera: Chrysomelidae	Minor
12	Weevil	<i>Myllocerus discolor</i> (Boheman)	Coleoptera: Curculionidae	Minor
13	Semilooper	<i>Thysanoplusiani</i> (Hubner)	Lepidoptera : Noctuidae	Minor
14	Semilooper	<i>Anticars iairrorata</i> (Fabricius)	Lepidoptera : Noctuidae	Minor
15	Semilooper	<i>Pantylia metaspila</i> (Walker)	Lepidoptera : Noctuidae	Minor
16	Tobacco cut worm	<i>Spodoptera litura</i> (Fabricius)	Lepidoptera : Noctuidae	Minor
17	Looper	<i>Scopula perlata</i> (Walker)	Lepidoptera : Geometridae	Minor
18	Legume web spinner	<i>Omiodes diemenalis</i> (Guenee)	Lepidoptera : Crambidae	Minor
19	Plume moth	<i>Exelasti satomosa</i> (Walsingham)	Lepidoptera : Pterophoridae	Minor
20	Gram pod borer	<i>Helicoverpa armigera</i> (Hubner)	Lepidoptera : Noctuidae	Major
21	Blue butterfly	<i>Lampides boeticus</i> (Linnaeus)	Lepidoptera : Lycaenidae	Major
22	Spiny pod borer	<i>Etiella zinckenella</i> (Treitschke)	Lepidoptera : Pyralidae	Minor
23	African pea moth	<i>Cydia nigricana</i> (Fabricius)	Lepidoptera : Tortricidae	Major
24	Beet armyworm	<i>Spodoptera exigua</i> (Hubner)	Lepidoptera : Noctuidae	Major
25	Tortoise beetle	<i>Cassid arubiginosa</i> (Muller)	Coleoptera : Chrysomelidae	Minor

Table 2: Effect of sowing dates on overall mean population of insect pests of pea during *kharif* 2014

Dates of sowing	Population (No/ 3 compound leaf)*				Population (No/plant)*	Yield(q/ha)
	Aphids	Thrips	Leaf hopper	Leaf miner		
June I fortnight	0.19(0.83) ^b	1.49(1.41) ^b	0.44(0.97) ^c	2.38(1.70) ^c	0.04(0.73) ^a	19.39 ^c
June II fortnight	0.28(0.89) ^b	2.44(1.71) ^a	1.13(1.28) ^b	3.47(1.99) ^b	0.04(0.73) ^a	16.24 ^b
July I fortnight	1.08(1.26) ^a	2.84(1.83) ^a	1.82(1.52) ^a	4.51(2.24) ^a	0.06(0.75) ^a	14.67 ^a
July II fortnight	1.23(1.31) ^a	2.57(1.75) ^a	1.50(1.42) ^b	4.23(2.18) ^b	0.04(0.73) ^a	15.87 ^b
S.Em. (±)	0.04	0.04	0.04	0.04	0.03	0.35
C.D. (0.05)	0.11	0.13	0.12	0.12	NS	1.02

*Mean of five replication; Note: Figures in the parentheses are $VX + 0.5$ transformed values; In vertical columns, means followed by similar alphabets are not different statistically (0.05) as per DMRT

Table 3: Effect of sowing dates on overall mean population of insect pests of pea during *kharif* 2015.

Dates of sowing	Population (No/ 3 compound leaf)*				Population (No/plant)* Green bug	Yield (q/ha)
	Aphids	Thrips	Leaf hopper	Leaf miner		
June I fortnight	0.78(1.13) ^b	1.70(1.48) ^c	1.07(1.25) ^c	2.45(1.72) ^c	0.07(0.73) ^a	18.27 ^c
June II fortnight	0.95(1.20) ^b	2.81(1.82) ^b	1.35(1.36) ^{bc}	3.52(2.00) ^b	0.09(0.73) ^a	15.23 ^b
July I fortnight	1.40(1.38) ^a	3.63(2.03) ^a	1.98(1.58) ^a	4.57(2.25) ^a	0.11(0.75) ^a	13.26 ^a
July II fortnight	1.46(1.40) ^a	2.92(1.85) ^b	1.70(1.48) ^{ab}	4.30(2.19) ^a	0.09(0.73) ^a	14.98 ^b
S.Em. (+ _)	0.04	0.04	0.04	0.04	0.03	0.34
C.D. (0.05)	0.12	0.12	0.13	0.12	NS	0.96

*Mean of five replication; Note: Figures in the parentheses are $VX + 0.5$ transformed values; In vertical columns, means followed by similar alphabets are not different statistically (0.05) as per DMRT

Table 4: Effect of sowing dates on overall mean population of insect pests of pea (Pooled)

Dates of sowing	Population (No/ 3 compound leaf)*				Population (No/plant)* Green bug	Yield (q/ha)
	Aphids	thrips	Leafhopper	Leafminer		
June I fortnight	0.49(0.99) ^b	1.60(1.45) ^c	0.76(1.12) ^c	2.42(1.71) ^c	0.06(0.74) ^a	18.83
June II fortnight	0.62(1.06) ^b	2.63(1.77) ^b	1.24(1.32) ^{bc}	3.50(2.00) ^b	0.07(0.75) ^a	15.73
July I fortnight	1.24(1.32) ^a	3.24(1.93) ^a	1.90(1.55) ^a	4.54(2.24) ^a	0.09(0.76) ^a	13.96
July II fortnight	1.35(1.36) ^a	2.75(1.80) ^b	1.60(1.45) ^{ab}	4.27(2.18) ^a	0.07(0.75) ^a	15.42
S.Em. (+ _)	0.04	0.04	0.04	0.04	0.03	0.31
C.D. (0.05)	0.11	0.12	0.13	0.11	NS	1.01

*Mean of five replication; Note: Figures in the parentheses are $VX + 0.5$ transformed values; In vertical columns, means followed by similar alphabets are not different statistically (0.05) as per DMRT

thrips /3 leaves was recorded in the crop sown during June I fortnight which was superior over other dates of sowing. Whereas the highest mean population of 2.84 thrips /3 leaves was observed on the crop sown during July I fortnight (Table 2).

The significant least population of 1.70 thrips /3 leaves was recorded on the crop sown during June I fortnight which was superior over other sowing dates. Whereas significant highest thrips population 3.63 /3 leaves was observed on the crop sown during July I fortnight in 2015 (Table 3).

The pooled data revealed similar trend the significant lowest 1.60 thrips /3 leaves was recorded on the crop sown during June I fortnight. The crop sown during July I fortnight recorded the significant maximum of 3.24 thrips /3 leaves (Table 4).

Leaf hopper (*Empoasca kerri*)

During 2014, the significant lowest leafhopper population 0.44 leaf hopper /3 leaves (Table 2) was observed on the crop sown during June I fortnight which was significantly superior over other sowing dates. Whereas significant highest population 1.82 /3 leaves was noticed during July I fortnight sown crop.

In 2015, significant minimum population 1.07 leaf hoppers / 3 leaves (Table 3) was noticed on the crop sown during June I fortnight which was superior over other sowing dates. The significant highest mean population of 1.98 leaf hoppers /3 leaves was observed on the crop sown during July I fortnight.

The pooled data also indicated that the significant lowest 0.76 leafhoppers /3 leaves (Table 4) was recorded on the crop sown during June I fortnight. The crop sown during July I fortnight recorded the significant maximum of 1.90 leafhoppers /3 leaves.

Green mirid (*Creontiades dilutes*)

In 2014, the highest mean population 0.06 bug /plant (Table 2) observed during July I fortnight sown crop followed by rest of the sowing dates which recorded 0.04 bug /plant.

During 2015, the least mean population 0.07 bug /plant (Table

3) noticed during June I fortnight sown crop followed by June II fortnight, July II fortnight and July I fortnight which were recorded 0.09 bug, 0.09 bug and 0.11 bug population /plant respectively.

The pooled data shows that the lowest mean population of 0.06 bug /plant (Table 4) was recorded on the crop sown during June I fortnight. Whereas the crop sown during July I fortnight recorded the significant maximum of 0.90 bug population /plant.

Leaf miner (*Liriomyza spp.*)

During 2014, the significant lowest mean population of 2.38 maggots /3 leaves (Table 2) was observed during June I fortnight sown crop which was significantly superior over other sowing dates. The significantly highest mean population of 4.51 maggots /3 leaves was recorded during July I fortnight sown crop.

In 2015, significantly least mean population of 2.45 maggots/ 3 leaves (Table 3) were noticed on the crop sown during June I fortnight which was superior over other sowing dates. Whereas the significant highest population of 4.57 and 4.30 population/3 leaves was noticed during July I fortnight and July II fortnight sown crop, respectively.

The pooled data indicates that the lowest mean population of 2.42 maggots/3 leaves (Table 4) was recorded on the crop sown during June I fortnight. Whereas the crop sown during July I fortnight recorded the maximum of 4.54 maggots/3 leaves.

The increase in sucking pests in delayed sowing (July I fortnight) was mainly due to dry weather prevailed during that period which favoured the multiplication. This observation closely agrees with the findings of Emam *et al.* (2006) reported that the earliest sowing date harboured significantly lowest seasonal mean number of thrips (*Thrips tabaci*), aphids (*Aphis craccivora*) and leafminers (*Liriomyza trifolii*) infesting leaves or flowers on sweet pea.

Pod yield (q/ha)

June I fortnight sown crop was found to be superior with highest yield (19.39 q/ha) (Table 2). Next best sowing dates were June II fortnight (16.24 q/ha). The significantly lowest yield (14.67 q / ha) was recorded in the crop sown in July I fortnight during 2014.

Similar trend was observed during 2015, the maximum yield (18.27 q/ha) was recorded in the early sown crop during June I fortnight was found to be superior among all other sowing dates. This was followed by June II fortnight which recorded (15.23 q/ha). Whereas the significant lowest yield (13.26q / ha) was noticed in the crop sown during July I fortnight (Table 3).

The pooled results shows that June I fortnight sown crop was found to be superior with highest yield (18.83 q/ha) (Table 4). The significantly lowest yield (13.96 q / ha) was recorded in the crop sown in July I fortnight.

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