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## Efficacy of insecticides for the management of insect pests on pea

Sheeren Parveen Rien, Abhishek Shukla and Dwarka

### Abstract

A Field experiment was carried out during Rabi 2016-17 at Livestock Farm, JNKVV, Jabalpur, Madhya Pradesh. The experiment was designed in R.B.D with 8 treatments and 3 replications to evaluate the efficacy of seven insecticides viz., Emamectin benzoate 5 SG, Spinosad 45 SC, Flubendiamide 20 WDG, NSKE 10%, Dimethoate 30 EC, Imidachlorpid 17.8 SL, Indoxacarb 15.8 EC. The results revealed that among seven insecticide 10 DAS is found effective to Significantly control *Aphis crassivora* population were recorded in the treatments of imdachlorpid 17.8 SL, and dimethoate 30 EC. In the case of *Acyrtosiphon pisum* almost all insecticide comparatively reduced the activity. Although NSKE 10% performed well in reducing the population of aphid.

**Keywords:** Efficacy, *Aphis crassivora*, *Acyrtosiphon pisum*, Dimethoate 30 EC and Imidachlorpid 17.8 SL

### 1. Introduction

Vegetable pea (*Pisum sativum*) is an important pulse crop of India. Pea is cultivated for the fresh green seeds, tender green pods and dried seeds and foliage Pea (*Pisum sativum* Linn.) is the prime vegetable crop of Indian sub-continent. The protein concentration of pea range from 15.5 to 39.75 percent (Davies *et al.* 1985) <sup>[5]</sup>. It is grown in many tropical and subtropical countries including Burma, India, Ethiopia, Morocco, Columbia, Ecuador, Peru and Pakistan. (Khan *et al.*, 2013) <sup>[7]</sup>. Among insect pests of peas, pea leaf miner (*Phytomyza horticola* Goureau (Diptera: Agromyzidae) 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 (Molites and Gabriel, 1975) <sup>[9]</sup>. Pea aphid infestation causes severe economic losses in pea crop- by reducing crop yield and contamination of crop for processing or fresh market. Plants representing *Fabaceae* serve as main host for aphid pea that includes field pea, alfalfa and clovers (Van Embden *et al.*, 2007) <sup>[12]</sup>. In general, there is low productivity of pulse including pea because, the crop is grown on marginal lands, low rainfall, poor management, poor crop husbandry, high rate of flower and susceptibility to pest and disease (Basayya *et al.*, 2018) <sup>[2]</sup>.

### 2. Method and Material

The plot size was 4m×3m with the spacing of 45 cm & 20 cm between rows and plants, respectively. Vegetable pea variety Arkel was sown on November 29, 2016. The crop was given two irrigations during the season. All recommended package of practices of pea cultivation was adopted during the crop season. Weekly observations were conducted for recording the density of aphids. Application of insecticides was conducted once at 65 days after sowing. Periodic post treatment observations (3, 7 and 10 days after application) were recorded to evaluate the efficacy of different treatments. Second application of insecticide treatments was not planned due to the low level of insect pests after the first application.

**Table 1:** Treatment Details

Treatments	Insecticides	Formulation	Dose/ha
T1	Emamectin benzoate	5 SG	150 gm
T2	Spinosad	45 SC	162 ml
T3	Flubendiamide	20 WDG	250gm
T4	NSKE	10%	25 litre
T5	Dimethoate	30 EC	750ml
T6	Imidacloprid	17.8 SL	125 ml
T7	Indoxacarb	15.8 EC	350ml
T8	Untreated control		

### 3. Results and Discussion

#### 3.1 Effectiveness of different insecticide and NSKE against *Apis craccivora* on pea

The data revealed a non-significant difference among different treatments at 3 DAS after spraying with ranged 21.80- 32.60 aphids/ plant, including untreated control. The data on 7 DAS after spraying lowest population were observed in the treatment dimethoate 30 EC @ 750 ml/ha (12.06 aphid /plant), imidacloprid 17.8 SL 125 ml/ha (15.4 aphid/plant) and in untreated control (17.2 aphids/ plant, respectively). The population of *Aphis craccivora* in other treatments was observed to be between 22.4 and 28.2 aphids/plant. However, it were examined at 10 DAS lowest population were recorded in the treatments of imdacloprid 17.8 SL @ 125 ml (7.4aphid/plant) and dimethoate 30 EC @ 750 ml/ha 8.2 aphids/plant, respectively) and both were at par. Population in all other treatments, including untreated control with ranged between 15.8 and 22.8 aphid/plant. (Fig 1)

#### 3.2 Effectiveness of different insecticide and NSKE against *Acyrtosiphon pisum* on pea

The data revealed all the treatments recorded the lowest population of *A. Pisum* at 3 DAS with ranged 0.0–3.4 aphid/plant. However, the data on 7 DAS lowest population (0.0 -1.33 individual/plant) were observed in all treatments as compared to untreated control (3.26 individuals per plant). Further, the data on 10 DAS population of *A. pisum* ranged between 0.0 and 1.53 individuals per plant. Significantly lower population of 0.0, 0.13, 0.29, 0.20, 1.22, and 0.46 aphids per plant were recorded in NSKE- 10%,

imidacloprid 17.8 SL @ 125 ml, flubendiamide 20 WDG @ 250 gm, dimethoate 30 EC @ 750 ml, indoxacarb 17.8 EC @ 350 ml and spinosad 45 SC @ 162 gm, respectively, which were at par and had lower population than untreated control (1.53 aphids). (Fig 2).

Based on the present studies, it can be inferred that the imidacloprid 17.8 SL @ 125 ml/ha and dimethoate 30 EC @ 750 ml/ha were adjudged as the best treatments for managing the population of *Aphis craccivora* in vegetable pea. It was observed that the population level of *Aphis craccivora* in the region remains low on vegetable pea and may be controlled by one spray of the insecticide. Superior performance of imidacloprid against *A. craccivora* found is by following the report of (Chaudhari *et al.*, 2015) <sup>[4]</sup> who reported that minimum population of *A. craccivora* was recorded after first spray treated with imidacloprid (10.92 aphid/twig) followed by acetamiprid (11.10 aphid/twig) and clothianidin (11.36 aphid/twig). Patil *et al.*, (2018) <sup>[10]</sup> opined that dimethoate and imidacloprid were quite promising in reducing the population of cowpea aphid. Patil *et al.*, (2014) <sup>[10]</sup> also reported that imidacloprid 0.005% was found to be most effective against *A. Craccivora*. It was also observed that almost all chemical insecticides comparatively reduced the activity of aphid and found superior over untreated control (2.15 mean aphids) but NSKE application resulted in the complete absence of *Acyrtosiphon pisum* from the crop. In evidence with the present study, Melase and Singh (2011) <sup>[8]</sup> also reported that lowest number of aphids per plant by NSKE and nimbecidine. NSKE 10% was recorded most effective for control of aphids per plant. Karker *et al.*, (2014) <sup>[6]</sup> concluded NSKE @ 5% to be an effective dose against sucking pest of brinjal. (aphid, whitefly, jassid). Sadozai *et al.*, (2009) <sup>[11]</sup> imidacloprid proved best followed by profenophos and Lambda-cyhalothrin. Abebe Megersa (2016) <sup>[1]</sup> stated that the highest mortality recorded through four days of experimentation was due to commercial insecticide (Endosulfan 35CE) and ranged from 66%-100% which was generally recorded within 24 hours of treatment application for control of *Acyrtosiphon pisum*. This evidences corroborated with present findings

**Table 2:** Effect of different insecticides and NSKE against *Aphis craccivora* on pea

Treatments number	Dose /ha	* Mean population of <i>Aphis craccivora</i> per plant				Overall mean population/ plant
		Pre treatment	Post treatment			
			3 days	7 days	10 days	
(T1) Emamectin benzoate 5 SG	150 gm	28.86 (5.40)**	24.40 (4.97)	22.4 (4.76)	20.1 (4.52)	22.3 (4.77)
(T2) Spinosad 45 SC	162 gm	28.53 (5.36)	26.46 (5.11)	23.5 (4.83)	20.8 (4.54)	23.58 (4.90)
(T3) Flubendiamide 20 DG	250 gm	38.73 (6.25)	32.33 (5.70)	28.2 (5.35)	22.6 (4.78)	27.21 (5.26)
(T4) NSKE 10%	25 litre	43.86 (6.58)	32.60 (5.74)	25.06 (5.03)	16.06 (4.05)	24.57 (5.00)
(T5) Dimethoate 30 EC	750 ml	41.66 (6.49)	25.60 (5.10)	12.06 (3.54)	8.2 (2.94)	15.28 (3.97)
(T6) Imidachlorpid 17.8 SL	125 ml	39.80 (6.34)	26.40 (5.15)	15.4 (3.96)	7.4 (2.79)	16.4 (4.08)
(T7) Indoxacarb 15.8 EC	350 ml	44.53 (6.67)	31.26 (5.60)	26.3 (5.16)	21.06 (4.63)	26.20 (5.16)
(T8) Untreated control	-	19.80 (4.50)	21.80 (4.60)	17.2 (4.20)	15.8 (4.00)	18.26 (4.33)
S.Em±		0.260	0.383	0.292	0.308	1.789
CD at 5%		NS	1.161	0.887	0.935	5.425

NS= Non significant

\* Mean of 50 sample plants

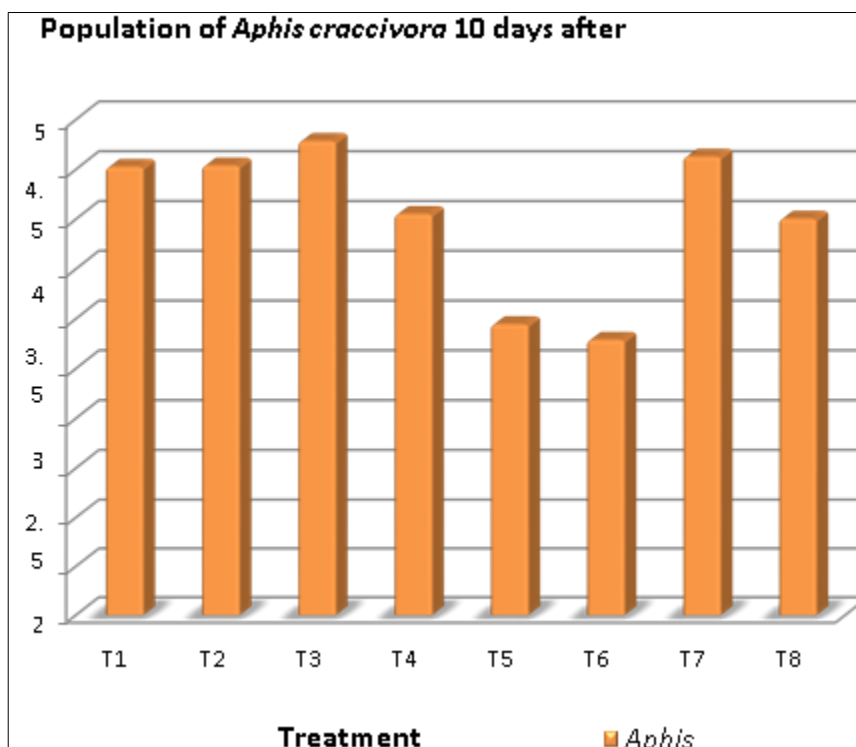
\*\*values in parentheses are  $\sqrt{x + 0.5}$  transformed values

**Table 3:** Effect of different insecticides and NSKE against *Acyrthosiphon pisum* on pea

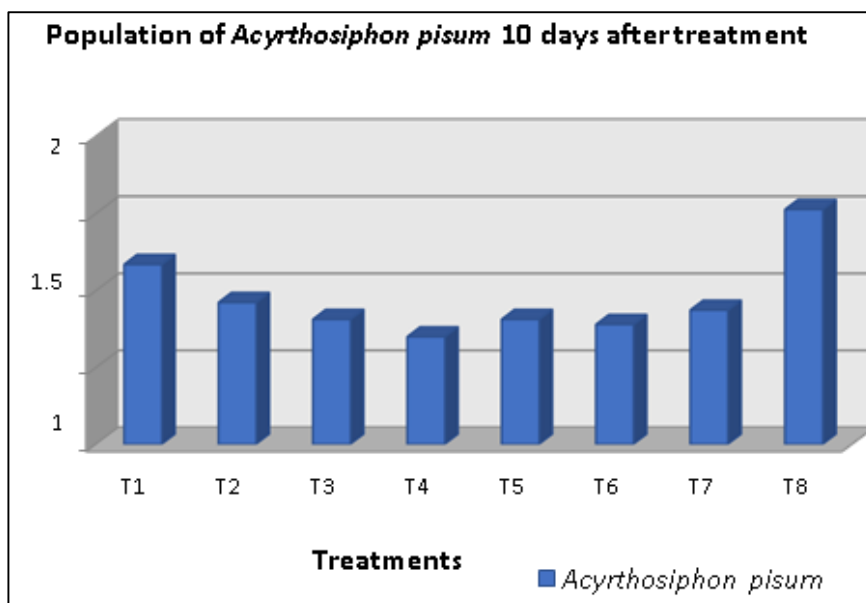
Treatments number	Dose /ha	*Mean population of <i>Acyrthosiphon pisum</i> per plant				Overall mean population/ plant
		Pre treatment	Post treatment			
			3 days	7 days	10 days	
T1 (Emamectin benzoate 5 SG)	150 gm	1.80(1.42)**	1.60 (1.41)	1.33 (1.28)	1.00 (1.17)	1.31 (1.34)
T2 (Spinosad 45 SC)	162 ml	1.46 (1.33)	0.66 (0.99)	0.53 (0.94)	0.46 (0.92)	1.34 (1.15)
T3 (Flubendiamide 20 WDG)	250gm	1.06 (1.19)	0.53 (0.98)	0.40 (0.90)	0.20 (0.81)	0.89 (0.94)
T4 (NSKE 10%)	25 litre	0.13 (0.78)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)	0.00 (0.70)
T5 (Dimethoate 30 EC)	750 ml	1.00 (1.09)	0.66 (0.99)	0.20 (0.81)	0.20 (0.81)	0.87 (0.93)
T6 (Imidachloprid) 17.8 SL)	125 ml	1.38 (1.66)	0.86 (1.12)	0.40 (0.92)	0.13 (0.78)	0.46 (0.67)
T7 (Indoxacarb 15.8 EC)	350 ml	0.73 (1.68)	0.66 (0.99)	0.93 (1.14)	1.22 (0.87)	1.11 (1.05)
T8 Untreated control	-	4.26 (2.17)	3.40 (1.96)	3.26 (1.93)	1.53 (2.58)	2.15 (1.46)
S.Em±		0.302	0.241	0.175	0.150	0.150
CD at 5%		NS	0.730	0.531	0.456	0.456

NS= Non significant

\* Mean of 50 sample plants \*\*values in parentheses are  $\sqrt{x + 0.5}$  transformed values



**Fig 1:** Efficacy of different chemicals against *Aphis craccivora* on pea after ten days of treatment



**Fig 2:** Efficacy of different chemicals against *Acyrthosiphon pisum* on pea after ten days of treatment

#### 4. Conclusion

NSKE application may be used effectively in managing *Acyrtosiphon pisum* population in vegetable pea crop. Imidachloprid 17.8 SL @ 125 ml / ha and dimethoate 30 EC @ 750 ml / ha were adjudged as the best treatments for managing the population of *Aphis craccivora* in vegetable pea.

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