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Efficacy of Different Insecticides against Thrips on Peas, *Pisum Sativum* (L.) in Vivo Condition

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Abstract. The experiment on the efficacy of different insecticides against thrips, *Caliothrips indicus* on peas, *Pisum sativum* L. was conducted at the experimental field of Agriculture Research Institute, Tandojam, during November, 2011 to February, 2012. The experiment was designed in Randomized Complete Block Design (RCBD) with four treatments and three replications. The insecticides Radiant, Crown and Finvil were applied thrice at the interval of 15 and 21 days of second and third spray respectively. The results showed that all three insecticides performed well in reducing pest population. However, Radiant gave best results against pea thrips, *Calothrip indicus*. The overall mean population per leaf 7.33, 8.78 and 10.23 of *Caliothrips indicus* was recorded in the plots treated with Radiant, Crown and Finvil, respectively as compared to control plot (12.13 thrips per leaf) during the first spray. During second spray the overall mean population per leaf 7.04, 8.02 and 8.97 of thrip was recorded in the plots treated with Radiant, Crown and Finvil, respectively as compared to control plot (14.30 thrips per leaf). Whereas, during third spray the overall mean population per leaf 3.92, 5.06 and 6.13 of thrip was recorded in the plots treated with Radiant, Crown and Finvil, respectively as compared to control plot (14.62 thrips per leaf). All insecticides performed well up to 72 hours interval. ANOVA results showed significant difference between treatments and LSD test showed that efficacy of different insecticides remained non-significant at 24, 48 and 72 hours.

Keywords: Insectides, thrips, peas

INTRODUCTION:

Pea, *Pisum sativum* L. is an annual plant, belongs to the family; *Leguminosae* and is a popular winter vegetable cultivated in various parts of the world. This crop is cultivated annually that grows from 45cm to over 2m tall, with an average spread of 23cm. The pulses crops are cultivated in Pakistan on an area of 1.492 million hectares and took production approximately of 983,000 tons. Plants cling to supports with tendrils; modern semi-leafless types are almost self-supporting. Peas are grouped according to the time taken to mature. The early groups are dwarfer and lower yielding. Pods are usually green but there are purple-podded cultivars (Banse, 2005; Kafka, 2005). Pea crop probably originated in Southwestern Asia, possibly Northwestern India, Pakistan or adjacent areas of former USSR and Afghanistan and thereafter spread to the temperate zones of Europe (Bianchini and Corbetta, 1976). Based on genetic diversity, four centers of origins, namely, Central Asia, the Near East, Abyssinia and the Mediterranean have been recognized (Bradley and Ellis, 2005). Peas were reported to be originally cultivated as a winter annual crop in the Mediterranean region (Zohary and Maria, 2000).

The major reasons for its low yield are cultivation on marginal land and imbalanced fertilizer application and attack of diseases and insect pests (Zohary and Maria, 2000). Peas are infested by a number of insect pests throughout its vegetative and production phases and the insect pests attack this crop included thrips, aphids, leaf beetle, Mexican bean beetle, Vegetable leafminer, leafhopper, spider mite, Corn earworm, European corn borer, Stink bugs, Limabean vine borer and Seed corn maggot (Sorensen *et al.,* 2000). Pea thrips, *Caliothrips indicus* (Thysanoptera: Thripidae) is a serious insect pest of peas; the adult female is 1.5-2.0 mm long, blackish-

brown to black, and somewhat flattened; and when attacks the plant, the surface of infested tissue becomes silvery and flowers sometimes fail to develop; plants and pods are also malformed. The presence of 250 eggs per 10 flowers reduces the harvest by up to 60%. For peas, thrips are more harmful to garden crops than field crops (GPP, 2009).

Although, the insect pests are controlled by diversified measures but chemical control of insect pests is yet considered as more effective than rest of the methods. However, chemical insecticides are applied only if the insect population crosses the economic threshold level (ETL) and control measures are taken when population exceeds ETL. Crop protection with chemicals is desirable and unavoidable part of integrated pest management (Mohyuddin *et al.*, 1997). Even in the technologically advanced countries, about three percent of market value of agriculture crops is spent on toxic chemicals and their application while in Pakistan pesticides worth more than 10 billion rupees are imported. Ullah *et al.,* (2010) found that Confidor was found to be most effective against thrips and the least efficacy was recorded in case of Actara. While, Aslam *et al.,* (2004) found that the most effective insecticides for thrips were Confidor and Mospilan. Shivanna *et al.,* (2011) reported that Dimethoate was most effective on thrips at three days after spraying which were found to be superior over other treatments; and Kooner *et al.,* (2006) Triazophos 40 EC fetched the highest net returns (Rs.2717 ha^{-1}) over controlled by reduced the thrips damage effectively. Akhilesh and Paras, (2002) reported that Monocrotophos treated plots were superior in net returns and thrips infestation was lowest. Khattak *et al.,* (2004) indicated that efficacy of Mospilan 20SP, Actara 25WG, Polo 500EC, Tamaron 60SI and Confidor 200SL against thrips on mungbean was highest. Similarly, Bhudev *et al.,* (2005) concluded that azadirachtin 5 ml lit^{-1} was found least effective for the control of thrips and the maximum yield was obtained in plots treated with dimethoate 0.03%. Mahalingappa *et al.,* (2008) found that Profenofos

0.10 percent was most effective against mites and thrips. Sahito *et al.,* (2013) described that the sucking complex are consumed by the carnivorous / spiders potentially in vitro and vivo conditions. In view of the economic significance of thrips, the present study was carried out on efficacy of different insecticides against thrips on pea (*Pisum sativum* L.) at Tandojam.

MATERIALS AND METHODS:

The present experiment work was conducted at the experimental field of Agriculture Research Institute, Tandojam, during November, 2011 to February, 2012 for determining the efficacy of different insecticides against thrip, *Caliothrips indicus* on peas (*Pisum sativum* L.) crop. The experiment was designed in RCBD (Randomized Complete Block Design) with four (4) Treatments and three (3) Replications. A total of 2000 m^2 (½ acre) land, while 166.66 m^2 as sub-plot was used for sowing and conducting experiment. The variety (Italian Pea) was sown during November, 2011 by drilling method of sowing with all standard agronomical practices were carried out as usual for this experiment. Three insecticides against thrips on peas i-e., Radiant (Arysta Life Science), Crown (Target group of pesticides) and Finvil (Agrifarm Chemicals of Pakistan) were selected from different groups to assess their effectiveness by counting larval population. These insecticides were selected because they are new chemistry against thrips. The insecticides were sprayed thrice on the crop with the help of a knapsack hand - sprayer having a hollow – cone nozzle starting from the time when the population of thrips reached the economic threshold level. Application was done in the early morning. All insecticides were applied, first when newly bud formation appeared on 07-12-2011, second application was done after the interval of 15 days of first spray i.e., on 22-12-2011, and third and last application was done after 21 days of second spray i.e., on 13-01-2012. The further detail of each insecticide is given in Table-1. Six observations were taken for each application i.e., one day

before spray (Pre-treatment observation) and five (5) observations after spray (Post-treatment) at the interval of 24, 48, 72 hours, one week and two weeks. The data regarding the population of thrips were recorded from each plot before and after each spray from 5 plants taken at random. For this purpose, an upper leaf was taken from the first plant, middle from the second plant and a lower from the third plant, and so on. The data were statistically analyzed by analysis of variance (ANOVA) and significance of population means differences were also compared by (LSD) test.

Table-1. Insecticides with their trade, common names, group and doses used in present study

RESULTS:

First spray

The results after the application of first spray of different insecticides to

S. No.	Trade name	Active ingredient	Group	Company	Dose ml/acre	Dose ml/sub plot
T1	Radiant	Spinetorm 120% SC	Spinocid	Arysta Life Science	80	3.33
T2	Crown	Imidacloprid 200SL	Neonicot-onide	Target	125	5.20
T3	Finvil	Fipronil	Spinosid	Agrifam Chemicals	600	25
T4 / Control	Without Pesticide	-	-	-	-	-

suppress thrips, *Caliothrips indicus* population on peas pre-treatment and post-treatment intervals of 24, 48, 72 hours, one week and two weeks, the data showed that the population of *Caliothrips indicus* was significantly higher in all treatments (Table-2). At pre-treatment observations the average populations of *Caliothrips indicus* on sub plots (T_1, T_2, T_3 and T_4) were 10.27, 10.73, 11.60 and 11.50 thrips per leaf respectively. The post treatment observation after 24 hours interval of insecticides application revealed that the average pest populations in T_1, T_2, T_3 and T_4 were 4.03., 6.43, 7.57 and 12.20 thrips per leaf respectively, which showed that the effect of these insecticides against *Caliothrips indicus* in ascending order was T_1 (Radiant) > T_2 (Crown) > T_3 (Finvil) > T_4 (Control). It is noticed from this table that after 24 hours of insecticides application Radiant was found to be more effective against *Caliothrips indicus* than rest of the insecticides. The post-treatment effectiveness of these pesticides varied with the time intervals, displayed the maximum effect at 72 hours intervals. After 72 hours interval all pesticides lost their effectiveness. Consequently, the population of *Caliothrips indicus* started increasing. Overall performance of the pesticides revealed that Radiant performed well followed by Crown and Finvil. The overall mean population of *Caliothrips indicus,* 7.33, 8.78 and 10.23 was per leaf, respectively. LSD test showed that significant difference between all treatments with ($P<0.001$) value.

Table-2. Average population of *Caliothrips indicus* per leaf after application of insecticides (first spray)

Treatments	Pre-treatment	Post-treatment					Mean
		24 hrs	48 hrs	72 hrs	1 week	2 week	
Radiant	10.27	4.03	5.10	5.60	8.93	10.03	7.33
Crown	10.73	6.43	7.13	7.33	10.20	10.87	8.78
Finvil	11.60	7.57	8.43	8.73	12.27	12.80	10.23
Control	11.50	12.20	11.63	11.97	12.27	13.20	12.13

Second spray

The data on average population of *Caliothrips indicus* at pre-treatment and post treatment intervals of 24, 48, 72 hours, one week and two weeks are presented in Table-3. At pre-treatment observations the average populations of *Caliothrips indicus* on sub plots (T_1, T_2, T_3 and T_4) were 10.63, 11.33, 12.90 and 14.20 thrips per leaf, respectively. The post treatment observation after 24 hours interval of insecticides application revealed that the average pest populations in T_1, T_2, T_3 and T_4 were 4.07, 5.70, 7.37 and 13.63 thrips per leaf, respectively which showed that the effect of these insecticides against *Caliothrips indicus* in ascending order was T_1 (Radiant) > T_2 (Crown) > T_3 (Finvil) > T_4 (Control). It was noticed from this table that after 24 hours of insecticides application Radiant was found to be more effective against *Caliothrips indicus* than other insecticides. The post-treatment effectiveness of these pesticides varied with the time intervals, displayed the maximum effect at 72 hours intervals. After 72 hours interval all pesticides lost their effectiveness. Consequently, the population of *Caliothrips indicus* started increasing. Overall performance of the pesticides revealed that Radiant performed well followed by Crown and Finvil. The overall mean population of *Caliothrips indicus,* 7.04, 8.02 and 8.97 was per plant, respectively. LSD test

showed that significant difference between all treatments with ($P<0.001$) value.

Table-3. Average population of *Caliothrips indicus* per leaf after application of insecticides (second spray)

Spray 3

Treatments	Pre-treatment	Post-treatment					Mean
		24 hrs	48 hrs	72 hrs	1 week	2 week	
Radiant	10.63	4.07	4.03	4.33	9.23	9.93	7.04
Crown	11.33	5.70	5.27	5.57	9.63	10.63	8.02
Finvil	12.90	7.37	6.60	6.83	9.40	10.73	8.97
Control	14.20	13.63	14.70	15.47	14.60	13.17	14.30

The data on average population of *Caliothrips indicus* at pre-treatment and post-treatment intervals of 24, 48, 72 hours, one week and two weeks are presented in Table-4. At pre-treatment observations the average populations of *Caliothrips indicus* on sub plots (T_1, T_2, T_3 and T_4) were 10.67, 11.77, 12.53 and 15.60 thrips per leaf, respectively. The post treatment observation after 24 hours interval of insecticides application revealed that the average pest populations in T_1, T_2, T_3 and T_4 were 3.43, 4.67, 6.50 and 14.13 thrips per leaf respectively, which showed that the effect of these insecticides against *Caliothrips indicus* in ascending order was T_1 (Radiant) > T_2 (Crown) > T_3 (Finvil) > T_4 (Control). It was noticed from this table that after 24 hours of insecticides application Radiant was found to be more effective against *Caliothrips indicus* than other insecticides. The post-treatment effectiveness

of these pesticides varied with the time intervals, displayed the maximum effect at 72 hours intervals. After 72 hours interval all pesticides lost their effectiveness. Consequently, the population of *Caliothrips indicus* started increasing. Overall performance of the pesticides revealed that Radiant performed well followed by Crown and Finvil. The overall mean population of *Caliothrips indicus,* 3.92, 5.06 and 6.13 was per leaf, respectively. LSD test showed that significant difference between all treatments with (P>0.001 value.

Table-4. Average population of *Caliothrips indicus* per leaf after application of insecticides (third spray)

Treatments	Pre-treatment	Post-treatment					Mean
		24 hrs	48 hrs	72 hrs	1 week	2 week	
Radiant	10.67	3.43	2.83	2.43	2.13	2.03	3.92
Crown	11.77	4.67	4.07	3.53	3.27	3.03	5.06
Finvil	12.53	6.50	5.10	4.53	4.17	3.93	6.13
Control	15.60	14.13	14.33	15.37	14.33	13.97	14.62

It was very clear from the result obtained that Radiant performed well in reducing the population of *Caliothrips indicus* on pea crop followed by Crown and Finvil during the all three sprays. Analysis of variance showed significant difference between treatments and LSD test showed that efficacy of different insecticides remained non-significant at 24, 48 and 72 hours.

DISCUSSION:

The result of the present study indicated that the thrip is one of the serious pests of pea crop. Its damage is more severe at the stages of bud, flower and fruit formation. Khan, (2003) recorded that garden pea; *Pea sativum* (primate) variety was grown on two different dates i.e., 1-10-1998 and 1-12-1998 at Agriculture Research Institute Tandojam. The results indicated that four species of insect pests namely pea thrip, *Caliothrips indicus* (Thripidae: Thysoneptora), pea aphid, *Acyrothosiphan pisum-harris* (Aphididae: Homoptera), leaf miner, *Phytomyza* sp. (Agromyzidae: Diptera) and gram pod borer, *Helicoverpa armigera*, Hubner (Noctuidae: Lepidoptera) attacked pea crop sown in October and December. However, the population density of insect was higher on crop sown in December as compared to crop sown in October. The overall mean population of thrips, aphids, leaf miner and gram pod borer recorded on garden peas sown in October and December was 10.47 and 13.72; 2.25 and 3.45; 0.22 and 0.64; 0.94 and 1.24 per leaf per plant, respectively. All pests completed too well defined overlapping generations on early and late sown pea crop.

Pea is attacked by a variety of insect pests such as, thrips, aphids, leaf beetle, Mexican bean beetle, Vegetable leaf miner, leaf hopper, spider mite, Corn earworm, European corn borer, Stink bugs, Limabean vine borer and Seed corn maggot (Sorensen *et al.,* 2000). Among them thrip is one of the serious pest which infects 90-100% loss to crop. Chemicals i.e., insecticides are the most effective to control pea thrips throughout the world. (Ullah *et al.,* 2010) examined the effect of different insecticides against thrips, *Caliothrips indicus* population; the insecticides; Thiodan, Confidor, Tracer, Megamos and Actara were sprayed three times and data were taken at 24 hours, 72 hours, seven days and 10 days intervals. Except Actara, all insecticides were significantly effective against the pest as compared to control. Maximum cost-benefit ratio was recorded for Confidor (39.45) and the least was recorded for Actara (3.41) treated plots. (Sadozai *et al.,* 2009) evaluated the efficacy of

different insecticides for the management of field pea thrips (Thysanoptera: Thripidae) on field pea crop in at Tarnab, Peshawar. Six treatments (Five insecticides + control) were replicated four times in randomized complete block design. Five insecticides Karate 2.5EC 330 ml/acre, Thiodan 35EC 800 ml/acre, Confidor 20% SL 60 ml/acre, Curacron 500EC 500 ml/acre and Crown 200SL 100 ml/acre were applied twice at ETL. All the insecticides were significantly better than untreated check in reducing pest population after both applications. Crown proved best followed by Curacron and Karate. (Patcharaporn, 1995) studied on the efficiency of certain insecticides against pea thrips and leaf eating beetle on pea was also carried out at faculty of Agriculture Nakorn Srithammarat.

The present result showed that Radiant performed well in reducing population of *Caliothrips indicus* on pea crop followed by Crown and Finvil during the all three sprays, but their effectiveness almost non-significant with each other. It is very clear from the result obtained that Radiant performed well in reducing the population of thrips on pea crop followed by Crown and Finvil during the all three sprays. Ali, (2006) evaluated the efficacy of Deltaplan 2.5% EC (deltamethrin) against thrips *Caliothrips indicus* at the University of Cezira Research Farm on peas. The biological and yield data, Deltaplan 2.5EC was effective as Decis 2.5% (counterpart) EC in controlling thrips on peas. This was agreed with the findings of (Khattak *et al.,* 2004) who evaluated the efficacy of Mospilan 20SP, Actara 25WG, polo 500EC, Tamaron 60SI and confidor 200SL against Whitefly, jassids, and Thrips on mungbean. All the tested insecticides reduced the mean percent population of whiteflies even at 240 hours after spray. Similar, trend of insecticides efficacy remained at 240 hours after spray. Similar, trend of insecticides efficacy was also noticed against trips, but Atari 25WG lost its efficacy at 240SP, hours after spray. Against jassids, Misplay 20SP, polo 500EC and Confider 200SL at 120 hours and 240 hours after spray were

completely ineffective. Variation in the mean percent population of the test insects by insecticides especially, a sudden drop in the efficacy of insecticides at 72 hours after spray almost against the tested insect pests could be because of the special temporary changes in the environmental conditions. Radiant, Crown and Jatara may be sprayed on pea crop against increasing population of thrips, *Caliothrips indicus*. The crop may be sprayed at 15 days of interval after ascertaining the ETL for the pest. At least three (3) sprays may be applied for the control of thrips from sowing up to harvesting of the crop.

References:

- Akhilesh K and Paras, N. 2002. Evaluation of Insecticides and their Schedules against Flower Thrips, *Megalurothrips usitatus* on Pigeon pea. Pesticide Res. J. 14 (2): 258-262.
- Ali AE. 2006. Evaluation of deltaplan 2.5 EC (deltamethrin) for the control of thrips, thrips *Caliothrips indicus* on pea. Agricultural Research Corporation, Wad Medani (Sudan), Wad Medani (Sudan), Pp. 34-39.
- Aslam M, M. Razaq, SA. Shah and Ahmad F. 2004. Comparative efficacy of different insecticides against sucking pests of pulses. J. Res. Sci., 15 (1): 53-58.
- Banse G. 2005. Growing pulses (Book), 1st Ed. Vilely and Sons, New York, Pp. 235-241.
- Bhudev B, JK. Sharma and Kumawat, KC. 2005. Efficacy of Insecticides against Sucking Insect Pests of Bean, *Vigna aconitifolia*. Annals of Plant Protection Sciences, 13 (1): 91-93.
- Bianchini F and Corbetta F. 1976. The Complete Book of Fruits and Pulses. New York: Crown Publishers, Inc. USA. Pp. 343-344.
- Bradley FM and Ellis BW. 2005. Rodale's All-New Encyclopedia of Organic Gardening: The Indispensable Resource for Every Gardener, Emmaus, Pennsylvania: Rodale Press, Pp. 3-7.
- GPP, 2009. Pea thrips, *Caliothrips indicus* (Thysanoptera: Thripidae). Green Plant Protection: http://www.greenplantprotection

- Kafka B. 2005. Vegetable Love, New York: Artisan, Pp. 12-13.
- Khan HU. 2003. Effect of different sowing dates on population of insect pests of garden peas (*Pisum sativum* L.). Balochistan J. Agri. Sci., 4 (2): 34-38.
- Khattak MK, S. Ali, JI. Chishti, AR. Saljiki and Hussain, AS. 2004. Efficacy of certain insecticides against some sucking insect pests of mungbean (*Vigna radiata* L.). Pak. Entomol. 26 (1): 75-80.
- Kooner BS, HK. Cheema and Taggar, GK. 2006. Efficacy of different insecticides as foliar sprays against bean thrips, *Megalurothrips distalis* (Karny) in mungbean. ISHS Acta Horticulturae, 752, Pp. 234.
- Mahalingappa PB, KD. Reddy, KN. Reddy and Subbaratnam, GV. 2008. Efficacy of certain insecticides against thrips infesting pulses. J. Res. Angrau, 36 (1): 11-15.
- Mohyuddin AI, G. Jilani, AG. Khan, AI. Humza and Mehmood Z. 1997. "Integrated pest management of major sucking pests by conservation, redistribution and augmentation of natural enemies", Pak. J. Zool., 29 (3): 293-298.
- Patcharaporn K. 1995. Comparative efficiency of insecticides against pea thrips *Caliothrips indicus* and leaf eating beetle (Menolepta sp.) on pea crop. Nakhon Ratchasima (Thailand), Pp. 12-20.
- Sadozai A, Zeb, Q. Iqbal, T. Anwar, S. Badshah, H. Ali, A. Ahmad, M. Tahir, M. 2009. Testing the efficacy of different insecticides against field pea thrips *Caliothrips indicus* in Tarnab, Peshawar. Sarhad J. Agri. 25 (2).
- Sahito HA, MA. Talpur, MA. Soomro, AH. Mastoi and Dhiloo, KH. (2013). Feeding Efficacy of Spiders on Sucking Complex of Okra, *Abelmoschus Esculentus* L. J. Agri. and Sustainability. 2 (2): 142-159.
- Shivanna BK, BN. Gangadhara, R. Nagaraja, MK. Basavaraja, K. Swamy and Karegowda, C. 2011. Bio efficacy of new insecticides against sucking insect pests of transgenic peas. Int. J. Sci. & Nature, 2 (1): 79-83.
- Sorensen KN, JR. Baker, CC. Carter and Stephan, DL. 2000. Pests of Beans and Peas. http://ipm.ncsu.edu/ag295/html/bean_pea_key.htm
- Ullah F, M. Mulk, A. Farid, MQ. Saeed and Sattar, S. 2010. Population Dynamics and Chemical Control of peas against thrips, *Caliothrips indicus*. Pakistan J. Zool., 42 (4): 401-406.
- Zohary D and Maria, H. 2000. Domestication of Plants in the Old World, third edition. Oxford: University Press. Pp. 106.