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## Efficacy of Synthetic Insecticide and Botanical Infusions Against Onion Thrips in Balochistan, Pakistan-I

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**Abstract:** A synthetic insecticide (Monocrotophos 40WSL) and three botanical infusions (*Datura alba* Seed Extract Infusion, SEI; *Calotropis procera* Latex Infusion, LI and *Citrullus colocynthus* Fruit Extract Infusion, FEI) were tried against onion thrips on broadcasted onion variety “Chlitan 89” in Quetta, Pakistan. All tested insecticides caused mortality of onion thrips at various degrees of significance over untreated control. *C. procera* LI, proved it self the best among the tested botanical insecticides and provided 42.67 % control after Monocrotophos that caused 76.24 % mortality of onion thrips. *D. alba* SEI and *C. colocynthus* FEI showed minimal control (17.23 and 6.77 % respectively) of the said pest than other tested insecticides but the results encourage the idea of pollution free methods of pest control. The *C. procera* LI can be used as good as any other botanical insecticide in Integrated Pest Management (IPM) of onion thrips

**Key Words:** Synthetic insecticide, botanical insecticide, IPM, Quetta, Balochistan, Pakistan

### Introduction

Onion is the top most cultivated condimental crop in the province of Balochistan, which is grown over an area of 28.01 thousand hectares (Anonymous, 1999-2000). Thrips are the major problem on this crop in the province (Hazara *et al.*, 1999 a). Farmers of the region have least awareness to control this pest. Mostly insecticides are used for the purpose but now they are reported ineffective and providing moderate control. To avoid further resistance in this pest different entomologist tried different non-chemical methods. Pink (Anonymous, 1998) and blue sticky traps (Ellis and Bradley, 1992) were tried successfully against thrips. Coll and Bottrell (1995) encouraged *Orius insidiosus* as a biological agent in the thrips niche. Gami *et al.* (1994) obtained 96% thrips mortality by *Humicola* sp.. Anonymous (1992), Klein *et al.* (1993), William (1994), Bottenberg and Singh (1996) and Hazara *et al.* (1999 b) used neem (*Azadirachta indica*) extracts to control thrips. However all neem products are not equally effected specially in adult stages of the pest. On the other hand, even the botanical insecticides disappointed the users when neem products were reported toxic to beneficial insects like lady beetles (Julie and Strak, 1998). Ellis and Bradley (1992) reported that the pest could be well controlled, if the crop debris is destroyed properly. Jensen (1999) emphasize on a balanced application of IPM against thrips. Therefore the purpose of this study was to determine if botanical insecticides, other than neem, are effective in controlling

thrips in specific Agro-Socio Economic system of Balochistan, Pakistan.

### Materials and Methods

To test the efficacy of a synthetic insecticide and three botanical infusions, a trial was established on the edge of an agricultural farm, Quetta, Balochistan, Pakistan, during 2001. The trial area was the part of the field that could be isolated from regular plant protection activities. Monocrotophos 40WSL, *Datura* (*Datura alba*, Solanaceae) Seed Extract Infusion, SEI, Ak (*Calotropis procera*, Asclepiadaceae) Latex Infusion, LI and Kharingri or Thumba (*Citrullus colocynthus*, Cucurbitaceae) Fruit Extract Infusion, FEI along with an untreated (control) were tried in Randomize Complete Block Design (RCBD) with split plot arrangement in four replications. Each replication was 8 x 10 m<sup>2</sup> size. Onion variety “Chiltan-89” was cultivated by broadcast method.

One day prior to application, one kg *D. alba* seeds were grind and boiled for ten minutes in ten liters of water to make a 10% concentrated solution, as described by Bottenberg and Singh (1996). The solution was left over two hours to cool down. Ten grams of washing powder was added to the infusion as adjuvant, as suggested by Hazara *et al.* (1999 a). The mixture was thoroughly stirred for ten minutes and was strained through a sieve.

A day before spray, one kg fruit of *C. colocynthus* was mashed and boiled for ten minutes in 10 liters of water to make 10% concentrated solution. The solution was left

Table 1: Schedule of spray and meteorological details, of onion field, Quetta, during 2001

Spray #	Date	Time	Temperature (°C)	RH (%)	Wind Speed	Wind Direction
01	24-06-01	6:00 pm	25.8	27.0	8.0 km h <sup>-1</sup>	North West to East
02	04-07-01	5:40 pm	28.4	49.5	13.0 km h <sup>-1</sup>	South West to East
03	14-07-01	6:35 pm	28.9	39.0	9.33 km h <sup>-1</sup>	North West to East
04	24-07-01	6:20 pm	28.9	38.5	14.7 km h <sup>-1</sup>	North West to East

over night. On application day the solution was strained with the help of sieve after thoroughly stirring. Ten grams of the said adjuvant was thoroughly mixed in it.

Latex of *C. procera* was collected through out the spring and summer season in polyethylene bag (15 x 10 cm), tied on the cut tips of the branches. The collection was kept in glass jars at below 3±1°C in a refrigerator. It was observed that early in the morning the plants fetch more latex than late hours. On the day of spray ten percent infusion in water having ten gram of said adjuvant was prepared, as mentioned above.

On the day of spray Monocrotophos 40WSL was diluted @ 200 ml per 100 l H<sub>2</sub>O. The formulations were sprayed four times by Knapsack according to the schedule (Table 1). First spray was applied when the thrips population reached to threshold level, 6-10 thrips per plant (Hazara *et al.*, 1999 b). Second, third and fourth spray were applied with ten days intervals each. Pretreatment thrips counts were made by counting total number of thrips on five randomly selected plants from each plot a day before spray. Counting the total number of thrips on same number of randomly selected plants after three, six and nine days, made post-treatment evaluations.

Data were analyzed by the Microcomputer Statistical Program for Experiments, Designs and Analysis (Russell, 1992). Pesticide treatments were considered as main plots while pre and post-treatment evaluation timings as sub plots. Observations were recorded on thrips population. Analysis of Variance (ANOVA) was constructed to test the significant differences between the variables. Least Significant Difference (LSD) test was applied to differentiate the means.

## Results and Discussion

Table 2 depicts the efficacy of a synthetic and three different insecticides against onion thrips at Quetta, Balochistan. All tested insecticides provided control of onion thrips at various degrees of significance over untreated control. Monocrotophos 40WSL provided, the best mortality (76.24%) of onion thrips among the tested insecticides. Hazara *et al.* (1999 a) reported 80% onion thrips control by Methamidophos 60 SL in the same environment. *C. procera* LI, proved it self the best among the tested botanical insecticides and rated second as a whole. The infusion provided 42.67% control of the said

Table 2: Effect of different control treatments on onion thrips population and percentage control, in Quetta, during the season 2001

Treatments	Number of thrips per plant	%Control
Monocrotophos (40WSL)	3.319e*	76.24
<i>Datura alba</i> (SEI)	11.56c	17.23
<i>Calotropis procera</i> (LI)	8.006d	42.67
<i>Citrullus colocynthus</i> , (FEI)	13.02b	06.77
Un-Treated (Control)	13.97a	00.00

Table 3: Onion thrips population counted at different intervals, before and after spray, in Quetta, during the season 2001

Treated Insecticides	Pre treatment		Post treatment	
	(One Day)	(Three Days)	(Six Days)	(Nine Days)
Monocrotophos (40WSL)	5.612a	1.425d	1.837c	4.400b
<i>Datura alba</i> (SEI)	14.57b	7.765d	8.825c	15.07a
<i>Calotropis procera</i> (LI)	10.38a	4.750d	7.050c	9.850b
<i>Citrullus colocynthus</i> , (FEI)	13.35a	12.55b	13.15a	13.01a
Un-Treated (Control)	13.84b	13.75b	14.82a	13.49c

\* Lower case letters indicates significant difference across the row using LSD test value 0.3310 at 5% level

pest. Hazara *et al.* (1999 a) reported about 40 and 60% control of onion thrips by two different botanical formulation, Neem Seed Extract and Neembokil 60 EC (a commercially prepared botanical insecticide of *A. indica*), respectively. Though *D. alba* SEI and *C. colocynthus* FEI showed minimal activity against the pest than other tested insecticides but the results encourage the idea of pollution free methods of pest control. These kinds of infusions may use in thrips IPM with other controlling methods as a part.

Table 3 reveals the pre and post treatment control. Monocrotophos 40WSL had maximum residual effects. All botanical insecticides were affected up to six days. Best results were obtained after three days of insecticides applications. It seems that *D. alba* seed extract infusion encourages thrips population after six days.

The above results prove that *C. procera* latex infusion can be used as effective as any other botanical insecticide against onion thrips.

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