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EFFICACY OF DIFFERENT BOTANICALS AGAINST RED PUMPKIN BEETLE (*Aulacophora foveicollis*) IN BITTER GOURD (*Momordica charantia* L.)

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ABSTRACT

To study the efficacy of different botanicals /plant extracts against Red Pumpkin Beetle (Aulacophora foveicollis. Lucas) an experiment was conducted at Research Farm of Khyber Pakhtunkhwa Agriculture University Peshawar during Kharif, 2009. Three varieties Ambika, Rama Krishna and Phauja were sown. Four different treatments Methomyl, Neem seed extract, Parthenium hysterophorus extract and Eucalyptus leaves extract were applied. Among the treatments Methomyl (synthetic insecticide;) and Parthenium hysterophorus extract showed significant results against Aulacophora foveicollis where minimum adult population was observed as compared to check plot. Minimum percent damage to the crop of red pumpkin beetle was found in plots treated with Methomyl and Parthenium as compared to the check plot. It is concluded that Parthenium hysterophorus plant extract have the ability to minimize the population below critical threshold level of Red Pumpkin Beetle in Bitter gourd. So, the extract can be used instead of synthetic pesticides or can be supplemented to avoid excessive use of chemicals for the safe and friendly environment.

Key words: Red pumpkin beetle. bitter gourd, *Parthenium hysterophorus*, population.

INTRODUCTION

Bitter gourd (*Momordica charantia* L.) belongs to family Cucurbitaceae is a cross-pollinated crop. Honey bees are the pollinators of bitter gourd. It is a common vegetable grown in Asia and other part of the world. It is normally grown as an annual crop, but can perform as a perennial in areas with mild, frost-free winters. In the plains the summer season crop is sown from January to June (Singh *et al.* 2006). In Pakistan the total area under bitter gourd cultivation was 6015 hectares with a total production of 52732 tones

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while in Khyber Pakhtunkhwa the bitter gourd was cultivated on 873 hectares with a total production of 5905 tones during 2007-08 (MINFAL, 2007-08).

Singh *et al*. 2006 reported that the major insect pests of bitter gourd are Fruit Fly (*Bactrocera cucurbitae*), and Red Pumpkin beetle (*Aulacophora foveicollis*). Red Pumpkin Beetle (*Aulacophora foveicollis*) has been reported as a destructive insect pest of cucurbitaceous vegetables, specially cucumber and melons. This insect pest is widely distributed all over the South-East Asia. The adult beetle is red, oblong and approximately 6-8 mm long and lays its eggs at the base of the cucumber stem. A single female can lay 150 to 300 eggs. The adult beetles feed on the leaf lamina making irregular holes and also attack the flowers. They eat seedlings, young and tender leaves and flowers. (Rahaman and Prodhan, 2007; Rahman *et al.* 2008). Keeping the above facts and figures this study was conducted to compare the efficacy of different insecticides / botanicals against Red Pumpkin beetle (*Aulacophora foveicollis*) in Bitter gourd

MATERIALS AND METHODS

To study the insect pests of bitter gourd (*Momordica charantia* L.) on three different varieties Ambika, Rama Krishna and Phauja and their control with synthetic insecticide and botanicals during April 2009, an experiment was conducted at Research Farm of Khyber Pakhtunkhwa Agricultural University Peshawar. The experiment was laid in Randomized Complete Block Design (RCBD) with split plot arrangement replicated three times. The varieties were assigned to the main plots and treatments to sub plots. The detail of the treatments is given below:

1. Methomyl (synthetic insecticide as a standard)
2. Neem seed Extract
3. *Parthenium* plant Extract
4. *Eucalyptus* leaves Extract
5. Check / control

Uniform cultural practices were applied to all the treatments. After germination the field was observed daily till the infestation started. The treatments were applied when the pest population started on the plants. The data were recorded before spray and after 24 hours, 48 hours and 72 hours of pesticides application. The data recorded were subjected to ANOVA technique by using MSTATC computer software and significant means were separated by using Fishers Protected LSD test (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The data regarding effect of variety, time and treatment on the population of Red Pumpkin Beetle, *A. foveicollis* is presented in Table-

1. The statistical analysis of variance showed that the interaction on variety, time and treatment was non significant. Similarly the interactions of variety into treatment and variety into time was also non significant. Further more the treatments, time and the interaction of treatment and time are significant. The Table-1 shows that minimum number of adults / m² was found in the plot which was treated with chemical (1.28) and *Parthenium* (1.41). The maximum number of Red Pumpkin Beetle was found in control plot, which were 3.89 adults m^{-2}. At 0 hour the population of Red pumpkin beetle was 3.33 adult m^{-2} which was reduced with passage of time and at 24 hours the population was 2.19 and the after 48 and 72 hours the population were 2.49 and 2.61 adults m^{-2}, respectively. In Methomyl at 0 hour the population was 3.5 adult m^{-2}, and after 24, 48, and 72 hours the populations were 0.3, 0.4 and 0.8 adults m^{-2}. In check plot the plot the recorded population at 0 hour was 3.3, which reached to 3.9 after 24 hours. After 48 hours the population reached to 4.2 adults m^{-2}. The maximum number of 4.4 adults m^{-2} was recorded after 72 hours in the check plot.

The population and damage of red pumpkin beetle was reduced up to great extent by the application of Chemical control (Methomyl) and *Parthenium* extract. Plant products have the ability to repel the red pumpkin beetle and can reduce the damage. These findings are somewhat similar to the observations of Pankaj and Anita (2009). They observed the repellent properties of some plant products against red pumpkin beetle. Our results also in line with the result of Muhammad and Bilal (2004). They tested different synthetic insecticides i.e. Advantage, Tracer, Match and Deltaphose-R for the control of red pumpkin beetle and reported that the synthetic insecticide greatly affects the Haemocytes of red pumpkin beetle. Said and Muhammad (2000) reported that the different concentration of Seven dust can reduce the population of Red Pumpkin beetle. High concentration 2% can gave best results followed by medium 1% and low 0.5 %. In 2005 Shakil *et al.,* studied that the *Parthenium hysterophorus* and its derivatives can be used for control different insect and Root knot nematode. Parthenin, a sesquiterpene lactone, obtained from *Parthenium hysterophorus*, was converted into different derivatives by chemical and photochemical transformations and tested against 1st instar larvae of *Trogoderma granarium*, 3rd instar of *Spodoptera litura* and J2 of *Meloidogyne incognita* and were found were effective.

The data in Table-2 shows that the minimum percent damage was found in plot treated with Methomyl and Parthenium. The minimum damage was recorded in Methomyl 27.78 percent followed by *Parthenium* 31.11 percent. The percent damage in Neem and

Table-1. Effect of treatments, time and varieties of Bitter gourd on *A. foveicollis* population during 2009.

			V x T x Tr			
Variety	**Treatment**	**0hr**	**24hr**	**48hr**	**72hr**	**V x Tr**
Ambika	Methomyl	3.4	0.3	0.6	0.8	1.3
	Neem	3.0	3.0	3.2	3.7	3.2
	Parthenium	3.9	0.3	0.8	1.1	1.5
	Eucalyptus	3.2	3.4	3.0	3.9	3.4
	Check	3.4	3.9	4.0	4.4	3.9
Rama Krishna	Methomyl	3.4	0.4	1.0	0.8	1.4
	Neem	3.0	3.0	3.9	3.4	3.3
	Parthenium	3.7	0.4	0.8	1.0	1.5
	Eucalyptus	3.4	3.7	3.5	3.6	3.5
	Check	3.0	4.0	4.1	4.7	4.0
Phauja	Methomyl	3.7	0.3	0.5	0.9	1.4
	Neem	3.2	3.4	3.7	3.4	3.4
	Parthenium	3.4	0.4	0.9	0.9	1.4
	Eucalyptus	3.7	3.3	3.7	3.4	3.5
	Check	3.4	3.9	4.3	4.2	4.0
	Treatment		**Tr x T**			**Mean**
	Methomyl	3.5 def	0.3 j	0.7 hi	0.8 h	1.28 c
	Neem	3.1 g	3.2 fg	3.6 de	3.5 def	3.27 b
	Parthenium	3.6 cd	0.4 ij	0.8 h	1.0 h	1.41 c
	Eucalyptus	3.4 def	3.5 def	3.4 defg	3.6 cde	3.43 b
	Check	3.3efg	3.9 bc	4.2 ab	4.4 a	3.89 a
	Variety		**V x T**			**Mean**
	Ambika	3.4	2.2	2.4	2.7	2.61
	Rama Krishna	3.3	2.3	2.6	2.7	2.68
	Phauja	3.5	2.3	2.6	2.6	2.68
	Mean	**3.33 a**	**2.19 c**	**2.49 b**	**2.61 b**	

Means followed by the same letter in columns and rows are non significant at 5% level of probability

LSD for Treatment = 0.30
LSD for Time = 0.15
LSD for Tr x T = 0.40

Table-2. Effect of treatment, time and varieties of Bitter gourd on percent damage of *A. foveicollis* during 2009.

		V x T x Tr				
Variety	**Treatment**	**0hr**	**24hr**	**48hr**	**72hr**	**V x Tr**
Ambika	Methomyl	40.0	31.6	28.3	25.0	31.2
	Neem	33.3	36.6	40.0	50.0	40.0
	Parthenium	36.0	26.6	25.6	25.0	28.3
	Eucalyptus	33.3	43.3	44.3	46.0	41.7
	Check	30.0	38.3	44.0	48.3	40.1
Rama Krishna	Methomyl	33.3	23.3	22.6	20.6	25.0
	Neem	30.0	40.0	42.3	46.6	39.7
	Parthenium	40.0	28.3	26.6	26.6	30.2
	Eucalyptus	23.3	31.6	33.3	37.3	31.4
	Check	31.6	43.3	46.6	49.0	42.6
Phauja	Methomyl	30.0	30.0	26.6	21.6	27.0
	Neem	29.3	38.33	40.0	43.3	37.7
	Parthenium	41.67	36.6	31.6	29.0	34.7
	Eucalyptus	3.0	35.0	37.3	39.0	35.5
	Check	33.3	41.6	45.0	48.3	42.0
	Treatment		**Tr x T**			**Mean**
	Methomyl	34.5 f	28.3 ij	25.8 k	22.4 l	27.78 c
	Neem	30.8 gh	38.3 de	40.7 c	46.6 ab	39.17 ab
	Parthenium	39.2 cd	30.5 ghi	28.0 j	26.6 jk	31.11 c
	Eucalyptus	28.8 hij	36.6 ef	38.3 de	40.7 c	36.17 b
	Check	31.6 g	41.1 c	45.2 b	48.5 a	41.64 a
	Variety		**V x T**			**Mean**
	Ambika	34.5	35.3	36.4	38.8	36.30
	Rama Krishna	31.6	33.3	34.3	35.9	33.82
	Phauja	32.8	36.3	36.1	36.2	35.40
	Mean	**33.02 c**	**35.00 b**	**35.64 b**	**37.02 a**	

Means followed by the same letter in columns and rows are non significant at 5% level of probability

LSD for Treatment = 4.08
LSD for Time = 1.07
LSD for Tr x T = 4.52

Eucalyptus were 39.17 and 36.17, respectively. The maximum damage was recorded in the check plot. The percent damage at 0 hour was 33.02. After 24 hour the percent damage reached to 35.00. At 48 hours the percent damage was 35.64. The damaged reached to 37.02 percent after 72 hours. The Table-2 also revealed that at 0, 24, 48 and 72 hours the percent damage in Methomyl was 34.5, 28.3, 25.8 and 22.4, respectively. The *Parthenium* has also showed good results. At 0 hour the Percent damage was 39.2 while 26.6 percent damage was recorded after 72 hours. The percent damage at check plot at 0 and 72 hours was 31.6 and 48.5, respectively. The minimum damage was found in Methomyl followed by *Parthenium*, *Eucalyptus* and Neem. The maximum percent damage was recorded in check plot.

Methomyl and *Parthenium* plant extract showed minimum damage which confirms the results of Datta and Saxena (2001). They studied the eleven derivates from *Parthenium* and recorded that the *Parthenium hysterophorus* L. has the ability to act as anti feedent which has minimized the damage caused by different insect pests. According to Araya and Emana (2009) the botanical powders have good effect in controlling Colepterous beetle. The insecticidal activities of the botanical powders are broad and variable and dependent on different factors like the presence of bioactive chemicals, which need to be identified, isolated and manufactured in the factory for pest management. The plant powders may act as fumigant, repellent, stomach poison and physical barrier. The damage can be minimized by controlling the population of red pumpkin beetle by using extracts of different plants, which confirms the results of Pankaj and Anita (2009) who tested different plant extract as a repellent of Red Pumpkin beetle. The plant extract can be used instead of synthetic pesticides or can be supplemented to avoid excessive use of chemicals for the safe and friendly environment.

REFERENCES CITED

Araya, G.S., and G. Emana. 2009. Evaluation of botanical plants powders against *Zabrotes subfasciatus* (Boheman) (Coleoptera: Bruchidae) in stored haricot beans under laboratory condition. Afri. J. Agric. Res. 4 (10): 1073-1079.

Datta, S. and D.B. Saxena. 2001. Pesticidal properties of Parthenin (from *Parthenium hysterophorus* L.) and related compounds. Pest. Manag. Sci. 57(1):95-101.

MINFAL. 2007-08. Fruit, Vegetables and condiments Statistics of Pakistan. Govt. of Pakistan, Ministry of Food and Agriculture (Economic Wing) Islamabad. pp. 11-18.

Muhammad, A. S. and T. Bilal. 2004. Toxicity of some insecticides on the haemocytes of red pumpkin beetle, *Aulacophora foveicollis lucas*. Pak. Entomol. 26(1): 109-114

Pankaj, T. and S. Anita. 2009. Laboratory assessment of the repellent properties of ethanolic extracts of four plants against *Raphidopalpa foveicollis lucas* (Coleoptera: Chrysomelidae). Int. J. Sustain. Crop Prod. 4(2): 1-5.

Rahaman, M.A. and M.D.H. Prodhan. 2007. Effects of net barrier and synthetic pesticides on red pumpkin beetle and yield of cucumber. Int. J. Sustain. Crop Prod. 2(3): 30-34.

Rahaman, M.A., M.D.H. Prodhan and A.K.M. Maula. 2008. Effect of botanical and synthetic pesticides in controlling *Epilachna* beetle and the yield of bitter gourd. Int. J. Sustain. Crop Prod. 3(5): 23-26.

Said, M.K., and J. Muhammad. 2000. Efficacy of different Concentrations of Sevin Dust against Red Pumpkin Beetle (*Aulacophora foveicollis* Lucas) causes damage to Muskmelon (*Cucumis melo* L.) crop. Pak. J. Biol. Sci. 3(1):183-185.

Shakil, N. A., D.B. Saxena, Pankaj, D. Prasad, A.K. Gupta, S. Kirti. 2005. Bio-activity of *Parthenium* and Its Derivatives Against Insects and Root-knot Nematode. Ann. Plant Prot. Sci. 13(1): 13-17.

Singh, N.P., D.K. Singh, Y.K. Singh and V. Kumar. 2006. Vegetables Seed Production Technology, 1st Ed. International Book Distributing Co., Lucknow. pp.143-145.

Steel, R.G.D. and J.H. Torrie. 1980. Principles and procedures of statistics: A biological approach. 2nd Ed. McGraw Hill Book Co. New York, p. 481.