International Journal of Current Trends in
Pharmacobiology and Medical Sciences
Volume 1 • Number 5 (October-2016) • ISSN: 2456-2432
Journal homepage: www.ijctpms.com

Original Research Article

Study on the Infestation Level and Effective Chemical Control of Pomegranate Fruit Borer (*Virachola isocrates*)

Imtiaz Ali[1]*, Hayat Ali Shah[1], Abdul Latif[1], Muhammad Mehran Anjum[2] and Nawab Ali[2]

[1]*Departmet of Plant Protection, The University of Agriculture, Peshwar-Pakistan*
[2]*Departmet of Agronomy, The University of Agriculture, Peshwar-Pakistan*

Corresponding author.

Abstract

Keeping in view the importance of pomegranate fruit borer (*Virachola isocrates*) different insecticides, cypermethrin, bifenthrin, lambda-calothrin and methomyl were tested against pomegranate fruit borer at Agriculture Reasearch Institute Mingora Swat during summer 2015. The experiment was laid out in Randomized Complete Block Design, with three replications. Each replication was assigned with 5 treatments (cypermethrin, limebda silothrin, methomyl, bifenthrin and control). Results showed that all the chemical application proved significantly from each other. Most effective was methomyl which reduced the infestation level from (6.66) to (3.85) followed by biferthrin (4.67), lambda-calothrin (10.91). Infestation in the control remains increased due to no chemical application.

Article Info

Accepted: 21 October 2016
Available Online: 25 October 2016

Keywords

Chemical control
Infestation
Pomegranate borer

Introduction

The pomegranate, botanical name *Punica granatum* L., belongs to the family Lythraceae. An attractive shrub or small tree, with average height of 20-30 feets, the pomegranate is much-branched, more or less spiny, and extremely long-lived. The leaves are evergreen or deciduous, opposite or in whorls of 5 or 6, short-stemmed. Showy flowers are home on the branch tips singly or as many as 5 in a cluster (Morton, 1987).

The fruit has leathery skin or rind, basically yellow more or less overlaid with light or deep pink or rich red. The interior is separated by membranous walls and white spongy tissue into compartments packed with transparent sacs filled with tart, flavorful, fleshy, juicy, red, pink or whitish pulp. In each sac, there is one white or red, angular, soft or hard seed. The seeds represent about 52% of the weight of the whole fruit (Morton, 1987). Pomegranate produce best on deep, heavy loams, but are adapted to many soil types from pure sand to heavy clay. Yield is usually low on sand while, fruit color is poor on clay. Growth on alkaline soil is poor. Optimum growth is associated with deep fairy heavy, moist soil is pH of range 5.5 to 7.0.

In the Northern Hemisphere, the fruit is typically in season from September to February, [and in the Hemisphere from March to May (Larue and James, 1980). It is widely cultivated throughout the Middle East and Caucasus region, North Africa and Tropical Africa, the India subcontinent, Central Asia, and the drier parts

of southeast Asia. In recent years, it has become more common in the commercial markets of Europe and the Western Hemisphere (Morton, 1987).

The pomegranate fruit could be considered a functional food because it has valuable compounds in different parts of the fruit that display functional and medicinal effects. These can act as antioxidant (Çam et al., 2009), as antitumoral (Hamad and Al-Momene, 2009) or antihepatotoxic (Celik et al., 2009) agents, and improve cardiovascular health (Davidson et al., 2009).

They have been seen to have antimicrobial (Duman et al., 2009), anti-inflammatory (Lee et al., 2010), antiviral (Haidari et al., 2009), antidiabetic (Xu et al., 2009) properties, and they can improve oral (Di Silvestro et al., 2009) and skin (Aslam et al., 2006) health. They help prevent Alzheimer's disease (Singh et al., 2008) and improve sperm quality (Türk et al., 008) and erectile dysfunction in male patients (Forest et al., 2007).

According to the broodier published by (Pakistan Agriculture research 2015) about the importance of pomegranate Among the Muslim countries, Afghanistan, Iran, Indonesia, Malaysia, Turkey, Saudi Arabia and the Gulf States are noted producers and exporters of fresh pomegranates. Other major producers are India, China and USA. In Pakistan, Baluchistan is the main producer of pomegranates, although Khyber Pakhtunkhwa and Punjab are also producing pomegranates in isolated areas on a small scale.

In K.P.K Swatis cultivating pomegranate at its initial phases. Swat lies between 30° and 35° N latitude and 72° to 74° 6’ E Longitude is in a Provincially of Administrated Tribal Area (PATA) of Khyber Pakhtunkhwa province of Pakistan. Swat valley is mainly divided in seven different Tehsil namely, Brikot, Khwazakhela, Charbagh, Babozai, Kabal, Madyan and Matta (AED 2012-2013). Many types of fruits and vegetables are grown in Swat valley .in Swat Khyber Pakhtunkhwa 2013-2014 in the area devoted to the cultivation of the fruit was 12465 ha while for vegetable 7245 ha. The total production is 90932 tonns for fruits and 138818 tonns for vegetable. In Swat valley pomegranate is grown in very small area and does not have regular orchards but now some new orchards cultivated in Chakdara (Kota) and Khwaza Khela (Swat) are newly established (AED 2014-2015).

The grower of pomegranate are facing some emerging issues one of which is a pomegranate fruit borer technically called (*Virachola isocrates* Fab). Studies on the bioecology and behavior of the pomegranate fruit borer (*Virachola isocrates* Fab.) revealed that the insect multiplied primarily on pomegranate crop under orchard agro-ecosystem. Guava also served as host crops to certain extent whenever the main host plant pomegranate is wanting or less suited for development of the larvae. Its damage noticed was severe in 30–50 days old fruits of pomegranate and the adults preferred 30–50 days old fruits for egg laying and most of the eggs were laid on the calyx portion of the individual fruits. The severity of damage was noticed between April to August months. Fourth and fifth instar larvae caused the maximum damage to fruits and total rejection of fruits is not uncommon on infestation by these insects. (Murugan et al., 2001). The experiment with the following on *Virachola isocrates* was designed in order to achieve the economic importance.

Objectives

1. To study the infestation level of *Virachola isocrates* in pomegranate.
2. To test different insecticide for effective management of *Virachola isocrates*

Materials and methods

Experimental site

The experiment was conducted at Agriculture Research Institute Mingora Swat in summer 2015.ARI is located 30°40’ to 35°N Latitude and 72’ to 74°6’ E Longitude. The experiment was conducted on chemical control of pomegranate fruit borer.

Experimental design

The experiment was laid out in Randomized Complete Block Design, with three replication. Each replication was assigned with 5 treatments (cypermethrin, limebda silothrin, Methomyl, Bifenthrin and Control). During the visits bsic data before the application of spray was collected and formulation of spray was calculated. The following instruments, chemicals (insecticide) were used during formulation of spray: a) Knapsack Spray; b) Electric Balance; c) Graduated cylinder. During the entire experiment a total of 3 sprays at the interval of 10 days, was applied. Control treatment (no spray) was left undisturbed. Details of treatments are given in Table 1.

Table 1. Details of treatments used in the study.

Treatments	Replications	Application	Doses
T_1	3	Arrive (cypermethrin 10%)	3 ml/liter
T_2	3	Limebda silothrin 25w/v	3 ml/liter
T_3	3	Methomyl 90%	3 gm/liter
T_4	3	Bifenthrin 10%	3 ml/liter
T_5	Control	No chemical were applied	----

Data collection

The data of infestation was collected by observing infested fruits.

Statistical analysis

Collected data was analysed by using Statistics 8.1 version; Means were separated with L.S.D (Least Significance Difference) test.

Results and discussion

Data in Table 2 shows the infestation of pomegranate fruit borer on pre-sprayed was maximum 7.35 and the minimum was 6.98. Data recorded on infestation of pomegranate fruit borer was presented in Table 2 which revealed that during first data after chemical insecticides application all the chemicals proved very effective against the target pest as all the products significantly reduced the insect pest population. The infestation ranged between 2.30 to 3.33 per plot. Significantly highest infestation of 7.99 was recorded in the plot where no chemicals were applied.

Table 2 shows that the data after 20 days chemical application all the chemicals proved very effective against the target pest as all the products significantly reduced the insect pest population. The infestation ranged between 0.66 and 1.88 per plot. Significantly highest infestation of 8.22 was recorded in the plot where no chemicals were applied.

Table 2. Effect of chemical insecticides on the infestation of pomegranate fruit borer.

Treatment	Doses	Pre-spray data	First data after 10 days	Second data after 20 days	Third data after 30 days	Average infestation
Arrive (cypermethrin)	3 ml/L water	7.12	3.33 B	1.88 B	2.53 B	2.58
Karate (limebela silotherin)	3 ml/L water	6.98	2.30 B	1.21 B	1.55 B	1.68
Methomyl (methomyl)	3 g/L water	7.25	2.33 B	0.66 B	2.21 B	1.73
Talstar (bifenthrin)	3 ml/L water	7.30	2.63 B	1.88 B	1.66 B	2.05
Control (No chemical was applied)		7.35	7.99 A	8.22 A	8.22 A	8.14
LSD at 5% Alpha level			3.483	2.097	3.32	2.96
CV			49.74	40.14	54.54	

Data recorded on infestation of pomegranate fruit borer was presented in table 1 which revealed that during third data after 30 days of chemical insecticides application all the chemicals proved very effective against the target pest as all the products significantly reduced the insect pest population. The infestation ranged between 1.55 and 2.53 per plot. Significantly highest infestation of 8.22 was recorded in the plot where no chemicals were applied.

Average data recorded after the insecticide application is shown in Table 2. All the chemicals proved very effective against the target pest as all the chemicals significantly reduce the insect population. Most effective was limebda silothrin which reduced the infestation level from 7.42 to 1.68 followed by methomyl 1.68, bifenthrin 2.05 and cypermethrin 2.58 . Infestation in the control remained constant due to no chemical application.

Conclusion and Recommendation

All the chemical application proved significantly from each other. Most effective was methomyl which reduced the infestation level from (6.66) to (3.85) followed by biferthrin (4.67), lambda-calothrin (10.91). Infestation in the control remains increased due to no chemical application. Therefore it is recommended that by chemical application of limebda silothrin and methomyl control the infestation of pomegranate fruit borer.

Conflict of interest statement

Authors declare that they have no conflict of interest.

References

Aslam, M. N., Lansky, E. P., Varani, J., 2006. Pomegranate as a cosmeceutical source: Pomegranate fractions promote proliferation and procollagen synthesis and inhibit matrix metalloproteinase-1 production in human skin cells. J. Ethnopharmacol. 103, 311-318.

Çam, M., Hısıl, Y., Durmaz, G., 2009. Classification of eight pomegranate juices based on antioxidant capacity measured by four methods. Food Chem. 112, 721-726.

Celik, I., Temur, A., Isik, I., 2009. Hepatoprotective role and antioxidant capacity of pomegranate (*Punica granatum*) flowers infusion against trichloroacetic acid-exposed rats. Food Chem. Toxicol. 47(1), 145-149.

Davidson, M. H., Maki, K. C., Dicklin, M. R., Feinstein, S. B., Witchger, M. S., Bell, M., McGuire, D. K., Provos, J.C., Liker, H., Aviram, M., 2009. Effects of consumption of pomegranate juice on carotid intima-media thickness in men and women at moderate risk for coronary heart disease. Am. J. Cardiol. 104(7), 936-942.

Di Silvestro, R.A., Di Silvestro, D. J., Di Silvestro, D. J., 2009. Pomegranate extract mouth rinsing effects on saliva measures relevant to gingivitis risk. Phytother. Res. 23, 1123-1127.

Duman, A. D., Ozgen, M., Dayisoylu, K. S., Erbil, N., Durgac, C., 2009. Antimicrobial activity of six pomegranate (*Punica granatum* L.) varieties and their relation to some of their pomological and phytonutrient characteristics. Molecules 14, 1808–1817.

Forest, C.P., Padma-Nathan, H., Liker, H. R., 2007. Efficacy and safety of pomegranate juice on improvement of erectile dysfunction in male patients with mild to moderate erectile dysfunction: A randomized, placebo-controlled, double-blind crossover study. Int. J. Impot. Res. 19(6), 564-567.

Haidari, M., Ali, M., Casscells, S.W., Madjid, M., 2009. Pomegranate (*Punica granatum*) purified polyphenol extract inhibits influenza virus and has a synergistic effect with oseltamivir. Phytomedicine, 16(12), 1127-1136.

Hamad, A.W., Al-Momene, W., 2009. Separation and purification of crude ellagic acid from white flesh of pomegranate fruits as a potent anti-carcinogenic. New Biotechnol. 25(1), 286.

LaRue, James, H., 1980. Growing Pomegranates in California. California Agriculture and Natural Resources. Retrieved on 25-10-2007.

Lee, C. J., Chen, L. G., Liang, W. L., Wanga, C. C., 2010. Anti-inflammatory effects of *Punica granatum* Linne *in vitro* and *in vivo*. Food Chem. 118, 315-322.

Morton, J. F., 1987. Pomegranate, *Punica granatum* L. Fruits of Warm Climates. Purdue New Crops Profile. pp.352-355.

Murugan, M., Thirumurugan, A., 2001. Ecobehaviour of pomegranate fruit borer, *Deudorix isocrates* (Fab.) [Lycaenidae: Lepidoptera] under orchard ecosystem. Indian J. Plant Prot. 29(1&2), 121-126.

Singh, M., Arseneault, M., Sanderson, T., Morthy, V., Ramassamy, C., 2008. Challenges for research on polyphenols from foods in Alzheimer's disease: bioavailability metabolism and cellular and molecular mechanism. J. Agric. Food Chem. 56, 4855-4873.

Türk, G., Sönmez, M., Aydin, M., Yüce, A., Gür, S., Yüksel, M., Aksu, E. H., Aksoy, H., 2008. Effects of pomegranate juice consumption on sperm quality, spermatogenic cell density, antioxidant activity and testosterone level in male rats. Clin. Nutr. 27(2), 289-296.

Xu, K.Z.Y., Zhu, C., Kim, M. S., Yamahara, J., Li, Y., 2009. Pomegranate flower ameliorates fatty liver in an animal model of type 2 diabetes and obesity. J. Ethnopharmacol. 123(2), 280-287.

How to cite this article:
Author, B., Author, A., 2016. Study on the infestation level and effective chemical control of pomegranate fruit borer (*Virachola isocrates*). Int. J. Curr. Trend. Pharmacobiol. Med. Sci. 1(5), 15-18.