

# The Ability of Fruit Fly *Bactrocera* spp. (Diptera: Tephritidae) Attack Different Age and Variety of Chili Pepper

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## ABSTRACT

Fruit fly *Bactrocera* spp. (Diptera: Tephritidae) is the very important pest attacks many crop including chili pepper. The amount of injury to chili pepper caused by *Bactrocera* spp. depends on age and variety of plant. The purpose of research is to study the attack intensity of *Bactrocera* spp. to different age and variety of chili pepper. The research was conducted in the Teaching Farm and Pest Laboratory, Department of Plant Pests and Diseases, Faculty of Agriculture, Hasanuddin University Makassar at planting season from February to June. The sample of chili pepper fruit attacked by *Bactrocera* spp. was collected from different plant variety at farm, then counting their injury. After counting, the fruit samples rearing in the laboratory to observation sex ratio of the fruit flies. Based observation the age of plant, the result was showed the highest attack intensity of *Bactrocera* spp. in the 92 days after planting at Laris variety (16.38%), Dewata F1 (11.75%) and Cakra Putih (10.10%), respectively. The lowest result was presented at TM Rawit about 6.64%. The total number attack intensity of *Bactrocera* spp. in the planting season from February to June was showed in Laris (22.17%), Dewata F1 (16.94%) and Sret (10.43%), respectively. The conclusion of research: the resistant variety of chili pepper to *Bactrocera* spp. is TM Rawit, then susceptible variety is Laris and Dewata F1. This is very useful information to farmers in management of chili pepper on the field.

**Keywords:** *Bactrocera* spp., chili pepper, Laris, Dewata F1, TM Rawit

## 1. INTRODUCTION

Chili pepper (*Capsicum frutescens* L.) is the important agricultural commodity with high value and popular spicy plant around the world. Chili pepper as the main ingredient of sambal (hot spicy sauce) and all of the activities related to food. South Sulawesi has two important center of vegetables in Malino and Baroko, including chili pepper. The total production chili pepper from three Regencies in South Sulawesi: Gowa (4.410 tonnes), Takalar (2.272 tonnes) and Jeneponto (2.046 tonnes), respectively [1].

Fruit fly *Bactrocera* spp. (Diptera: Tephritidae) is the very important pest in Indonesia. Besides chili pepper, the dipterous destructive pest are attack a wide range of fruit and vegetables. The amount injury of chili pepper in South Sulawesi caused by *Bactrocera* spp. [2] depend on age and variety of plant [3]. The female of *Bactrocera* spp. playing important roles. It is the main source of laying eggs and sustainability of their offspring in nature. In general, female fruit flies need more nutrition than males. The protein source is used to mature sexually and development of their eggs [4,

5]. Larvae inside the fruit of chili pepper causing quantitative and qualitative losses [6]. In the similar research, [7] reported that commonly fruit fly develops more quickly during warmer temperatures in the tropical areas than winter or less warm temperature.

Many methods available to control the population of *Bactrocera* spp., however farmers used pesticides as effective treatment control presence of the fruit fly. The one alternatives used plant variety inhibit development larvae of *Bactrocera* spp. According to research of [8] reported that the dipterous pest, *Atherigona orientalis* (Schiner) prefer infested *Capsicum annum* than *C. frutescens* in dry and rainy season. In contrast, the relationship between depths of cuticle cracks on fruits and number of eggs laid showed a positive correlation. The strong correlation was showed between number of larvae and percentage fruit loss. In the another findings, [9, 10] reported control of *Bactrocera* spp. used baits in guava and mango. The food baits containing guava pulp with ammonium acetate in guava (5.59 total fruit flies/trap/week) and casein with ammonium acetate, mango pulp and proteinex mixed 5% acetic

acid is the best treatment in mango (4.63 total fruit flies/trap/week). Commonly another methods control of *Bactrocera* spp. used natural enemies of fruit fly, *Fopius arisanus* (Hymenoptera: Braconidae), egg-pupal parasitoid [11]. The purpose of research is to study the attack intensity of *Bactrocera* spp. to different age and variety of chili pepper.

**2. MATERIALS AND METHOD**

**2.1. Time and place of research**

The research activities were held in February through June 2017 at The Agricultural Teaching Farm and Pests Laboratory, Department of Plant Pest and Diseases, Faculty of Agriculture, Hasanuddin University, Makassar.

**2.2. Planting preparation**

The 14<sup>th</sup> days after planting of old chili pepper seedling variety TM Rawit were planted used planting space of 120 cm between rows and 75 cm within a row. A similar treatment used for another variety of chili pepper i. e: Laris, Bara, Sret, Cakra Putih and Dewata F1. The plant maintenance was performed by following the locally recommended practices [12].

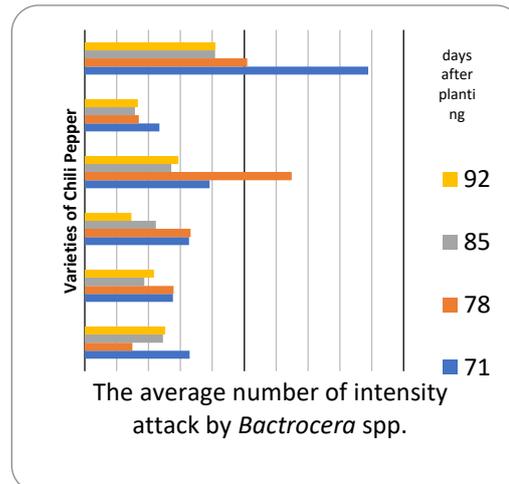
**2.3. Sample collection of fruit fly *Bactrocera* spp.**

There were 24 treatment combinations tested in this experiment and arranged in a Complete Randomized Block Design used four replicates. When the plants started blooming (about 71 days after planting) started collected total 50 chili pepper fruit samples from 5 plants in every varieties. The fruit sample collection contain characteristic symptom of fruit fly. The interval of observation and collected sampel was 7 days. The chili pepper contain fruit fly was reared in the plastic jar in the laboratory. The observation of larvae intensity based plant ages attack from the every variety were recorded.

**3. RESULTS AND DISCUSSION**

The presence of *Bactrocera* spp. in the field caused yield loss up to 100% in the dry condition and absence of any control measures [5]. Based observation the age of plant, the result was showed the highest attack intensity of *Bactrocera* spp. in the 92 days after planting at Laris variety (16.38%), Dewata F1 (11.75%) and Cakra Putih (10.10%), respectively. The lowest result of average number of intensity attacked by *Bactrocera* spp. was presented at TM Rawit about 6.64% (Figure 1).

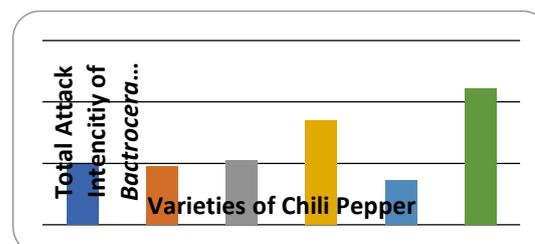
The commonly methods control presence of *Bactrocera* spp. used sticky trap and resistant variety of chilli pepper. Based the Figure 1, in 71 days after planting, the highest number of intensity attack showed at Laris variety (35.5%).



**Figure 1** The Average Number of Intensity Attack by *Bactrocera* spp. in Different Variety and Age of Chili Pepper.

In the similar age, the lowest result was showed at TM Rawit (9.38%). In the development of fruit, plant resulting some fitohormon in the process to be mature. The deposit eggs to be larvae of fruit fly caused damage of development cell. Sometimes find more contamination from secondary pathogen infested. Related to plant activities, [8] state that ethylene on fruit increase many abscising organs prior to abscission and feeding activities of dipterous larvae inside the fruit. Larvae activities caused injury and common problem in the post handling of vegetable products.

The varieties of chilli pepper related to the total attack intensity of *Bactrocera* spp. was showed in Figure 2.



**Figure 2** The Varieties of Chilli Pepper Related to The Total Attack Intensity of *Bactrocera* spp.

Based on Figure 2, the total number attack intensity of *Bactrocera* spp. in the planting season from February until June was showed in Laris (22.17%), Dewata F1 (16.94%) and Sret (10.43%), respectively. The lowest number chilli pepper attacked by *Bactrocera* spp. is TM Rawit (7.29%). Findings of research showed the resistant variety of chili pepper to *Bactrocera* spp. is TM Rawit, then susceptible variety is Laris and Dewata F1. Related to the research of fruit fly, [13] reported that Malaysian fruit fly *Bactrocera latifron* (Hendel) attacked *Capsicum* spp. in Thailand. It seems not to

impact on variety or season to the proportion of fruits attacked by *B. latifrons* per infested fruit. In contrast, the number of dead larvae per infested fruit of the variety was significantly higher.

The finding of an interesting phenomenon in research, some of collected larvae infected by *Fopius arisanus*, an egg-pupal parasitoid family Braconidae order Hymenoptera. Besides *Opius* sp., *F. arisanus* can manage in control of *Bactrocera* spp. larvae in crop [2]. The natural enemies especially predator and parasitoid very easy kill by pesticide application. Lost of biocontrol agents as unadvantages for agricultural sustainability because they are important component in nature [14, 15]. The management habitat by preparing some flowering weeds will improve the number of beneficial insects around the field. The presence natural enemies in control pest in the field will reduce pesticides application and increasing the safe food for consumers. In the future, need more monitoring activities and identify the species of fruit fly from different variety.

#### 4. CONCLUSION

The conclusion of research: the resistant variety of chili pepper to *Bactrocera* spp. is TM Rawit, then susceptible variety is Laris and Dewata F1. This is very useful information to farmers in the management of chili pepper on the field.

#### ACKNOWLEDGMENT

The researchers would like to say thank you very much to Arman Jamaluddin and his farmer for more help collected data in chili pepper field.

#### REFERENCES

- [1] Biro Pusat Statistik (Agency for Central Statistic Services), Production of Vegetables by Regency/City and Vegetables the Province of South Sulawesim 2013. Accessed: Aug. 2, 2020. [\[Online\]](#).
- [2] A. E. Said, Fatahuddin, Asman, and A. Nasruddin, 'Effect of sticky trap color and height on the capture of adult Oriental Fruit Fly, *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) on Chili Pepper', *American Journal of Agricultural and Biological Sciences*, vol. 12, no. 1, pp. 13-17, 2017.
- [3] J. V. Hasinu, J. A. Patty and G. N. C. Tuhumury, 'Morphological identification and population of fruit fly (*Bactrocera* sp.) (Diptera: Tephritidae) in chili fields, Savanajaya village Buru district', *JHPT Tropika*, vol. 20, no. 2, pp. 123-129, 2020.
- [4] A. Hasyim, Muryatia and W. J. de Kogel, 'Population fluctuation of adult males of fruit fly *Bactrocera tau* Walker (Diptera: Tephritidae) in passion fruit orchards in relation to abiotic factors and sanitation', *Indonesian Journal of Agricultural Science*, vol. 9, no. 1, pp. 29-33, 2008.
- [5] R. I. Vargas, J. C., Pinero, and L. Leblanc, 'An overview of pest species of *Bactrocera* fruit flies (Diptera: Tephritidae) and the integration of biopesticides with other biological approaches for their management with a focus on the Pacific region', *J Insects*, vol. 6, pp. 297-318, 2015.
- [6] R. Drew, K. Tsuruta, and I. White, 'A new species of pest fruit fly (Diptera: Tephritidae) from Sri Lanka and Africa', *Afr. Entomol.*, vol. 13, pp. 149-154, 2005.
- [7] A. R. Clarke, K. F. Armstrong, A. E., Carmichael, J. R. Milne, S. Raghu, G. K. Roderick and D. K. Yeates, 'Invasive phytophagous pest arising through a recent tropical evolutionary radiation: The *Bactrocera dorsalis* complex of fruit flies', *Annual Review Entomology*, vol. 50, pp. 293-319, 2005.
- [8] O. O. Kasiemobi, and R. B. Bob Manuel, 'Abscission of pepper fruits by dipterous pest, *Atherigona orientalis* (Schiner) in traditional and mono-crop farms in Port Harcourt, Niger Delta, Nigeria', *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, vol. 7, no. 7, pp. 31-36, 2014.
- [9] P. Ravikumar, and S. Viraktamath, 'Attraction of female fruit flies to different protein food baits in guava and mango orchards', *Karnataka J. Agric. Sci.*, vol. 20, no. 4, pp. 745-748, 2007.
- [10] N. K. Budiyan and I. W. Sukasana, 'Control of fruit flies towards the damage intensity of cayenne pepper (*Capsicum frutescens* L.) with petrogenol substance', *AGRICA*, vol. 13, no. 1, pp. 15-27, 2020.
- [11] P. Rousse, E. J. Harris, and S. Quilici, '*Fopius arisanus*, an egg-pupal parasitoid of Tephritidae. Overview. *Biocontrol News and Information*', vol. 26, no. 2, pp. 59N-69N, 2005.
- [12] T. Abdullah, A. E. Said, S. N. Aminah, and A. Nasruddin, 'Attractiveness of trap size and direction to adult oriental fruit fly *Bactrocera dorsalis* (Hendel) (Diptera: Tephritidae) in chili pepper', *Research Journal of Pharmaceutical, Biological and Chemical Sciences*, vol. 8, no. 2, pp. 1082-1085, 2017.
- [13] A. Wingsanoi, N. Siri, and J. N. McNeil, 'The susceptibility of different pepper varieties to infestation by *Bactrocera latifrons* (Diptera: Tephritidae)', *J. Econ Entomol.*, vol. 106, no. 4, pp. 1648-1652, 2013.
- [14] P. Barberi, G. Burgio, G. Dinelli, A. C., Moonen, S. Otto, C. Vazzana and G. Zanin, 'Functional biodiversity in the agricultural landscape: relationship between weeds and arthropod fauna', *Weed Research*, vol. 50, pp. 388-401, 2010.
- [15] S. N. Aminah and A. Nasruddin, 'Comparison of insects biodiversity in green spinach using farmer and commercial seeds', *Trends Applied Sci. Res.*, vol. 14, pp. 210-214, 2019.