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Parasitoid fruit flies *Bactrocera mcgregori* (*Diptera: Tephritidae*) from Tanah Laut Regency and Banjarbaru South Kalimantan

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ABSTRACT

This study aims to identify and determine the parasitic level of Bactrocera mcgregori parasitoid from melinjo fruit (*Gnetum gnemon*) from Tanah Laut district and Banjarbaru South Kalimatan. The identification results of the three parasitoids showed the characteristics of the Hymenoptera order, the family *Braconidae*. The three parasitoids are *Psytallia flecheri habitus* (Silvestri) parasitoid, *Psytallia lounsburyi* (Silvestri) and *Diachasmimorpha longicaudata* (Cameron).

Keywords: *bactrocera mcgregori*, melinjo, parasitoid, south kalimantan.

1. Introduction

The most common parasitoid found in some Bactrocera species is Biosteres sp. or Opius sp. and Spalangia sp. which are parasitoid eggs and larvae (Serit and Tan 1990; Napompeth, 1990). In some countries, many fruit flies parasites from the Braconidae family are used the potential to paralyze fruit flies larvae by 57% in Malaysia and 80-95% in Italy (Vijaysegaran and Osman 1991). The fruit flies found on the island of Java are Biosteres sp and Opius sp of the braconidae family and the gregarious parasitoid of the eulophidae family, namely Fopius vandenboschi and Diacharismimorpha longicudata (Ibrahim, 1989; Kuswadi 2000; Kuswadi et al., 2007) whereas in South Sumatra the area was found. Three species of parasitoids : Psytallia fijiensis, P. fletcheri and P. incise (Pujiastuti, 2007). Octriana (2010) stated that the parasitoid Opius oophilus, O. longicaudatus, O. vandenboschi, and Tetrastichus giffardianus were found in Bactrocera larvae and pupae on Passion Fruit Plants. These four parasitoids can cause mortality of pupae collected in the field by 50.09% and parasitize larvae in fallen fruit by 31.20%. Whereas Tetrastichus giffardianus is more dominant in gardens with parasitic ability 38.06%, Opius spp. (larva parasitoids), more dominant with 24% parasitic ability.

Parasitoid braconidae found in melinjo that attacked pupae in Malaysia were Fopius arisanus, Diacharismimorpha longicudata and P. cf makii (Yong et al., 2014). Whereas Bactrocera mcgregori parasitoid which attacked melinjo fruit found in Bantul Regency, Psyttalia incisi reached 32.93%; Diachasmimorpha longicaudata reaches 32%; Utetes richmondi reaches 14.06%, and Doryctobracon sp. reached 1.79%. The four species are obligate parasites (Saragih, 2017). Information on the variety and parasitoid level of parasitization in melinjo fruit fly pests in South Kalimantan is rarely reported. Therefore, this study was aimed to determining the type of parasitoid and its paracidity level in melinjo fruit which was attacked by B. mcgregori.

2. Materials and Methods

Materials

Time and place

The study was conducted from May to July 2018, by taking samples in farmers' melinjo garden in Tanah Laut district, and Banjarbaru, South Kalimantan. Identification of the type of parasitoid was carried out at the Entomology Laboratory of the plant protection study program, the faculty of agriculture at the Mangkurat Gastric University.

Implementation of Research

Samples of melinjo fruit and rearing of fruit fly larvae B. Mcgrogeri

Melinjo fruit collection is attacked by fruit flies in two locations, from each location is taken taking as many as 750 fruits which is equivalent to 2 kg.

Pupa observation is carried out every day by recording the number of pupae that hatch, pupae attacked by a parasitoid. The pupa that is attacked by a parasitoid is marked by a hole where the adult parasitoids come out, the pupa that attacked by the fungus is characterized by a fungus that grows on the surface of the pupa's outer skin. For collection and preservation, the adult parasitoids obtained and the attacked pupa are put into bottles containing 70% alcohol. The percentage of mortality/parasitation is calculated using a formula (Oktariana, 2010):

P = n/N x 100%

P = percentage of parasitic fruit flies

n = the number of pupae that parasitized

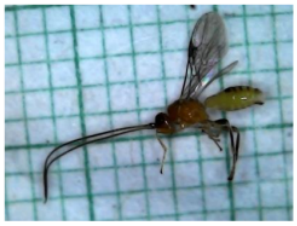
N = the number of pupae maintained

Parasitoid identification

Identification of parasitoids is done by observing adult parasitoids that come out of pupae. Identification of parasitoids is based on the method used by Wharton (2002), by using a reference book Hymenoptera of The World (Goulet dan Huber 1993), Manual of the New World Genera of the Family *Braconidae* (Hymenoptera) (Wharton et al. 1997).

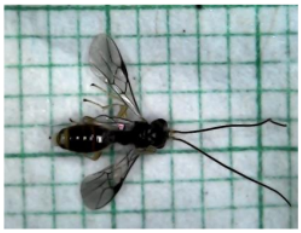
3. Results and Discussion

The results of the identification fruit flies and parasitoids obtained when rearing larvae and pupae of fruit flies attacking melinjo that obtained B. *mcgregori* fruit flies and 3 species of parasitoids, derived from the order Hymenoptera, family *Braconidae*. The three parasitoids are parasitoids *Psytallia flecheri habitus* (Silvestri), *Psytallia lounsburyi* (Silvestri) and *Diachasmimorpha longicaudata (Cameron) (Figure 1). From the two research locations, it is known that the dominant parasitoids are Psytallia flecheri habitus* (Silvestri) from family *Braconidae* (Gambar 2). *Braconidae* are parasitoid larvae and the most species of the order Hymenoptera (Goulet dan Huber 1993), *Braconidae* also do not have climate preferences or specific habitat conditions for breeding (Sharkey and Wahl 1992; Ghahari et al. 2009). In addition, the garden ecosystem with a variety of other vegetation supports this family to breed (Falco-Gari et al. 2014).



a. Diachasmimorpha longicaudata

b.Psytallia flecheri habitus



c. Psytallia lounsburyi

Figure 1. The results of the identification of parasitoids from the maintenance of B. mcgregori larvae at two study sites

The level of parasitoid parasitization in the first location Damit village, Batu Ampar, Tanah Laut Regency is 105.47% while in Banjarbaru is 38% (Table 1). The level of parasitation in Tanah Laut Regency is higher than in Banjarbaru City. If seen from the number of individuals per species (Figure

2), the highest parasitoid rate at the two study sites above is *Psytallia flecher*i habitus parasitoids and the lowest is *Diachasmimorpha longicaudata*.

Table 1. The abundance of *B. mcgregori* fruit flies and parasitoid level of three parasitoids in melinjo fruit from two sampling locations

Village	Regency/ City	*B. mcgregori* (%)	Parasitoid (%)			Parasitoid level (%)
			Pf	Pl	Dl	
Damit	Tanah Laut	37,07	79,73	18,67	7,07	105,47
Banjarbaru	Banjarbaru	8,40	21,20	14,13	2,67	38,00

Description : *Pf :Psytallia flecheri habitus;Pl : Psyttalia. lounsburyi; Dl: Diachasmimorpha longicaudata*

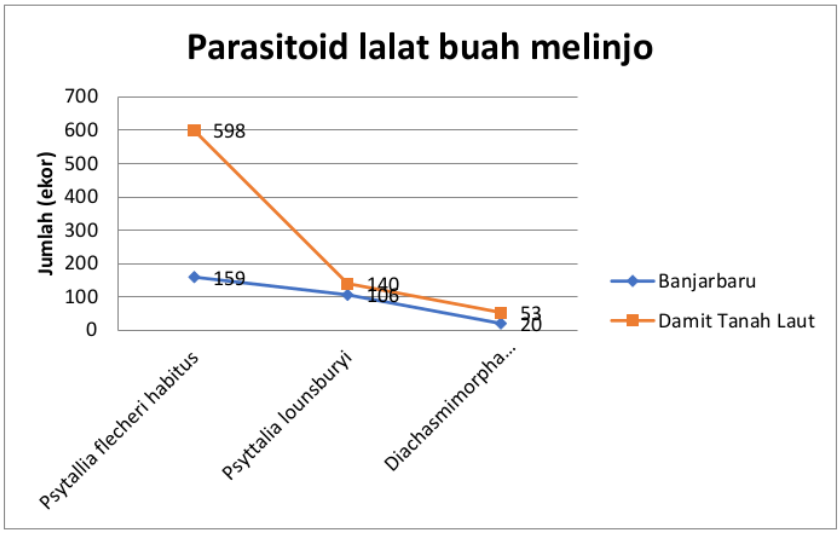


Figure 2. Melinjo fruit fly parasitoids in Damit Tanah Laut village and Banjarbaru City

This may occur due to differences in the geographical location that causes differences in climate, temperature, rainfall, the intensity of sunlight and duration of exposure. This situation will affect the type of flora and fauna that occupy an area. Octariana (2010) states that the effectiveness of parasitoids in controlling pest populations can be measured by the power of its capacity. Based on the parasitic power it can be assessed the ability of natural enemies in regulating the balance of the host population.

The mortality of pupa fruit flies in nature is influenced by biotic factors such as competition between similar individuals, competition with different species to obtain food nutrition, parasitoids, and predators, as well as abiotic factors in the form of environmental temperature and humidity (Octariana, 2010). Laba and Kartohardjono (1998) and Octariana (2010) stated that the increase in fruit flies population in the field was followed by an increase in the number of parasitoids so that the level of parasitism would increase and the number of hatched fruit flies would also decrease until population dynamics occur.

Moningka et al. (2012) stated that the nutrient content factor greatly influenced parasitoid parasitic power. This factor affects aspects of biology, biochemistry, and metabolic functions in the body of insects if sufficiently available it will support the development of parasitoids. Effect of Nutrition on the Amount of Heredity and Gender Ratio The availability of nutrients in the environment is a factor that determines the growth and survival of organisms. In addition, nutrition in food has an important role in developing an optimal immune response (Alaux, et al., 2011).

Host larva size is a major factor affecting the number of gregarious parasitoid cocoons meaning that more than one individual can live together in a single host. The percentage of success in cocoons becoming imago is higher in large hosts (Purnomo, 2006 in Siregar, 2015).

Insect sex ratio is generally 1: 1, but due to certain influences, both internal and external factors such as seasonal conditions and population density, the sex ratio can change (Jumar, 2000).

The success of parasitoid reproduction is influenced by several factors, including the type of parasitoids, age of the parasitoids, sex ratio and availability of a host. proovigenic parasitoids that have mature eggs at the time of the appearance of the imago, oviposition can be carried out immediately after its appearance (Rohmani et al., 2008).

4. Conclusions

The parasitoid species that paralyzes the fruit fly *Bactrocera mcregori* in Damit Village, Tanah Laut and Banjarbaru City, South Kalimantan, originated from the order Hymenoptera, family of Braconidae. The three parasitoids are parasitoids *Psytallia flecheri* habitus (Silvestri), *Psytallia lounsburyi* (Silvestri) and *Diachasmimorpha longicaudata* (Cameron).

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