

## Selection of Wild Plant Species from Organic Rice Field in Sumberngepoh Village in Malang as Attractant of *Trichogramma* spp. (Hymenoptera, Trichogrammatidae)

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### Abstract

One of the actions in biological control is the use of parasitoid. Some wild plant species can attract those parasitoid. By the fact, the objective of this research are to select some of wild plant species attracting *Trichogramma* spp. These wild plant were belong to Asteraceae (*Eupatorium odoratum*, *Bidens pilosa*, *Crassocephalum crepidioides*) and Mimosaceae (*Parkia speciosa*, *Leucaena glauca*, *Mimosa pudica*). Mass rearing of *Trichogramma* spp. was prepared for those purpose. The selection were conducted by using four armed olfactometer. The percentage of the tested *Trichogramma* spp. attracted to the wild plant species was noted as well as their orientation duration to select the plant species. The difference of the mean of their orientation duration was analyzed statistically by T-Test. Both of plant familia can attract the parasitoid. This were the plant species that attracted *Trichogramma* spp. From the most attractive to the lowest one : *B. pilosa* 22 %, *E. odoratum* 18.6 %, *M. pudica* 18.2 %, *C. crepidioides* 13.8 %, *P. speciosa* 13.6 %, and *L. glauca* 13.6 %. For the orientation duration, this are the plant species that can attract the parasitoid from the fastest one to the slowest one : *P. speciosa* 45.5 seconds, *C. crepidioides* 46.2 seconds, *L. glauca* 49 seconds, *E. odoratum* 50.6 seconds , *B. pilosa* 53.4 seconds, and *M. pudica* 55.2 seconds.

**Keywords** : Asteraceae, Mimosaceae, *Trichogramma* spp.

### INTRODUCTION \*

Agricultural problems in the late decade has attracted many environmentalist. One of them is decreasing of the yield due to the increasing of uncontrolled pest. The fact in South Celebes shows that the is wider rice field suffered from stem bored pest in dry season than that in rainy season [4]. It was reported in 2012 and 2013 that Indonesian agricultural harvest increasing due to less disturbances of both pest, diseases and climate change [1]. It is important to anticipate to the probability outbreak of the pest because of the lack of the natural enemies for the pest.

As it was well known that one of the problem in rice field is stem borer, it is important to enhance its natural enemies (*Trichogramma* spp.) and to conduct mass releasing of the parasitoids [6]. In order to be independent from free releasing of those parasitoid, it is important to enhance the existence of the parasitoid in the rice field.

In this case, *Trichogramma* spp. become the first line to be selected since it was proved that

they were capable to suppress the stem borer pest of rice [6]. Based on the above facts, the objectives of this research were to select some of than wild plant species that can attract *Trichogramma* spp. and to know the orientation duration for those parasitoids to choose the plant species.

### RESEARCH METHODS

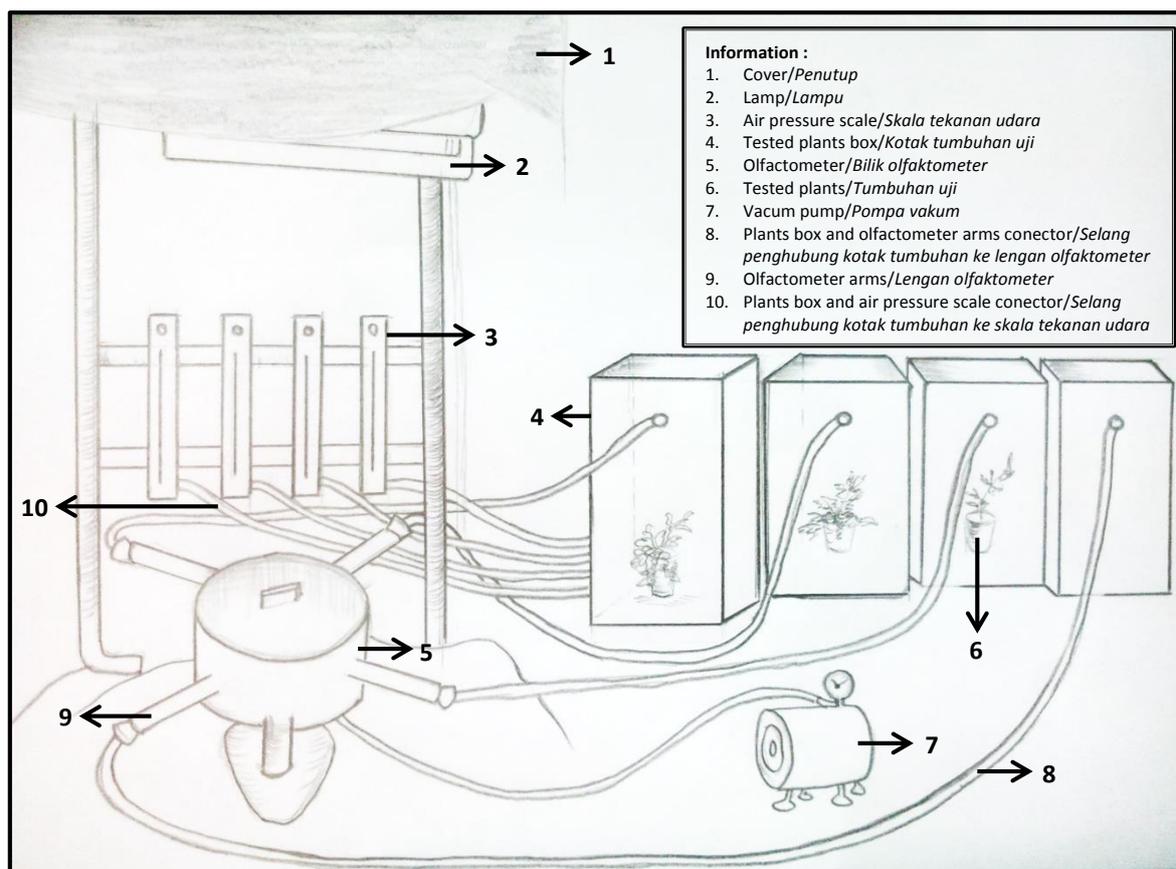
The research was conducted on August - November 2013. The mass rearing of the *Trichogramma* spp. was done in organic farmer of Sumberngepoh village, Lawang district, Malang Indonesia. The selection test was done in Laboratory of Ecology and Animal Diversity, Faculty of Mathematic and Natural Science, University of Brawijaya, Malang Indonesia. In this activity the selection was carried out by using four arm olfactometer (figure 1). The *Trichogramma* spp. were tested individually. There were the plant species that were tested and collected from the surrounding organic rice field as follows : from familia Asteraceae *E. odoratum* L., *B. pilosa* L., and *C. crepidioides* (Benth.); and from familia Mimosaceae *P. speciosa*, *L. glauca*, and *M. Pudica* L.. The total number of *Trichogramma* spp. used in this research were 500 individue. In every step of selection were used 3 different species of plants.

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**Figure 1.** The olfactometer used in the research

#### Data Analysis

The data noted were the percentage of the individu of *Trichogramma* spp. that were interested toward the land species and the mean of orientation duration of the parasitoid to choose the plant species they preferred. The differences of their orientation duration was tested statistically by using T-test.

#### RESULT AND DISCUSSION

##### Preferences of *Trichogramma* spp. to Test Plants

The preference of *Trichogramma* spp. to plant species tested and their orientation duration to select these plants can be showed in figure 2 and 3. Based on those result, it seem had *B. pilosa* can be considered as the most interesting species for the parasitoid tested. The other plants species that attract the parasitoids from the most interesting are : *E. odoratum*, *M. pudica*, *C. crepidioides*, *P. speciosa*, and *L. glauca*. Figure 2 showed that the percentation of *Trichogramma* spp. attracted to tested plants were 22 % for *B. pilosa*, 18.6 % *E. odoratum*, *M. pudica* 18.2 %, *C. crepidioides* 13.8 %, *P. speciosa*

13.6 %, and *L. glauca* 13.6 %. Mean of orientation duration of *Trichogramma* spp. toward (figure 3) *P. speciosa* were 45.5 second, *C. crepidioides* 46.2 second, *L. glauca* 49 second, *E. odoratum* 50.6 second, *B. pilosa* 53.4 second, and *M. pudica* 55.2 second.

Another result show the fastest orientation duration of the *Trichogramma* spp. to select the tested plants was toward *P. speciosa* and the slowest one is *M. pudica*. Statistically there were no differences among their orientation duration in chosing between the plant species from both familia Asteraceae and Mimosaceae. It showed that all of tested plant species have a good potency to be selected as plant attractant for the *Trichogramma* spp.

The differences of their orientation duration maybe caused by the differences of kind and amount of volatile chemical substances produced by each species of the plant. Bahagiawati (2005) stated that *P. speciosa* has four volatile chemical substances i.e. hydrogen sulfide, ethanol, 1,2,4-trithiolane and acetaldehyde. The other research result show that *C. crepidioides* produced volatile

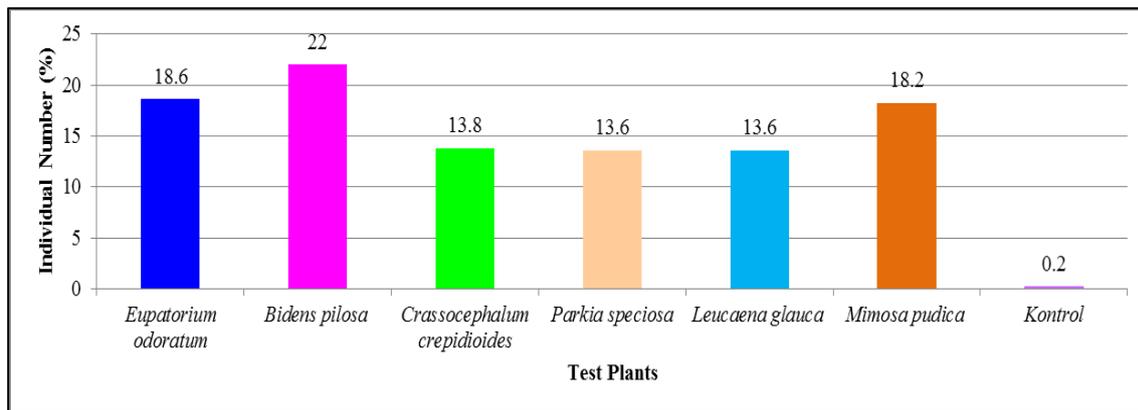


Figure 2. The percentage of interested *Trichogramma* spp. to tested plant

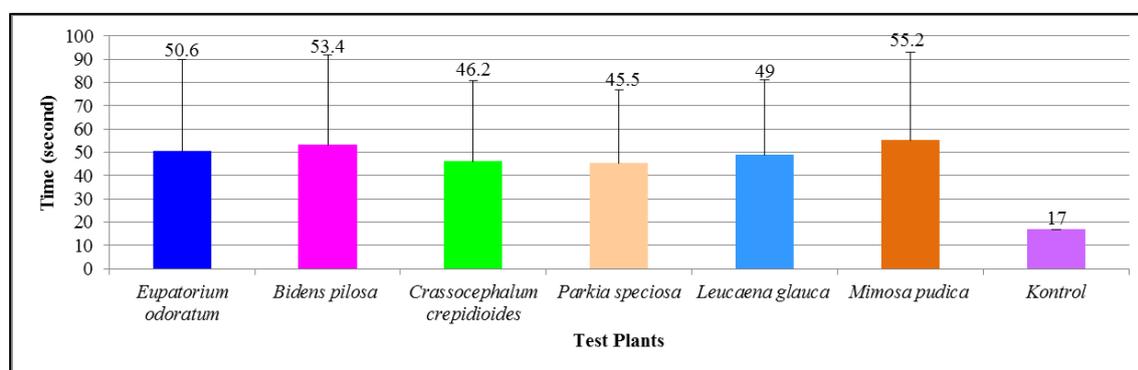


Figure 3. Mean of orientation duration of *Trichogramma* spp. to tested plants

chemical as follow monoterpene hydrocarbon, myrcene, dan  $\beta$ -phellandrene [5], [8]. The volatile chemical substance of *B. pilosa* germacrene-D and  $\beta$ -caryophyllene [9]. This substance will attract Arthropods toward them for their inhabiting [11]. The process of selecting of the plants was determinate by morphological and physiological character that played an important role as the main stimulus [10].

Based on the facts above, it is considerable that the plant species chosen in this research by the *Trichogramma* spp. is also desired by them in the real live. Atkins (1980) stated that in the field, those volatile chemical substances can be detected by the Insects from several meters distances of the source of the volatile chemical substances.

The mechanism of kairomone that can be detected there Arthropoda include same steps. The stimuli accepted by receptor of Arthropod would be changes as impuls and than it would be transferred by axon to ganglion in the central nervous system. In the in this central nervous system, it would be processed as understanding.

This understanding resulted an certain action that would be transferred by axon in the axon in the nervous system to lead some certain organs to make action [7]. In this result there were one individu of tested parasitoid that did not choose the offered plant. It showed that those individue had an anomaly behavior, since the other replication experiment show there preference to choose the offered plants they like.

In this research, sixth wild plants species can support habitat for those *Trichogramma* spp.. *P. speciosa* have to function as canopy plants, while *E. odoratum*, *B. pilosa*, *C. crepidioides*, *L. glauca*, and *M. pudica* can be planted in the edge of rice field. The existence of the wild plants can attract *Trichogramma* spp. or other natural enemies naturally, so it can suppress the stem borer pest of rice or other pest.

## CONCLUSION

Wild plants spesies from family Asteraceae and Mimosaceae have good potential to attract *Trichogramma* spp.. The following results show the level of attractivity of *Trichogramma* spp. toward the following plants species from the highest level to the lowest one : *B. pilosa* 22 %, *E.*

*odoratum* 18.6 %, *M. pudica* 18.2 %, *C. crepidioides* 13.8 %, *P. speciosa* 13.6 %, and *L. glauca* 13.6 %. For the orientation duration needed by the parasitoid to choose the offered plants species from the fastest duration to the slowest one were *P. speciosa* 45.5 second, *C. crepidioides* 46.2 second, *L. glauca* 49 second, *E. odoratum* 50.6 second, *B. pilosa* 53.4 second, and *M. pudica* 55.2 second.

#### ACKNOWLEDGEMENTS

Special thank you for those who contributed to the research activities in environmental conservation working group of Biology Departement, Faculty of Sciences, Brawijaya University i.e Amin Setyo L., S.Si., M.Si., Ph.D, Nia Kurniawan, S.Si, MP., DSc, Siti Asnah, Kholifah, Hamdani Prasetyo, Purnomo, and Muhammad Qoiz. With whole hearted this result were dedicated for my mother, sister and brother (Indah Dwi Wijayanti, Widya Kristiyanti Putri and Maulana Ainul Yaqin).

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