

The Application of Marigold Flower and Pintoi Peanuts on The Natural Enemies of Rice Plant at Antirogo Sub-District Jember Regency

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Abstract

The objective of the research concerning the application of Marigold flower and Pinto peanuts of the natural enemies on Rice plant is to find out the role of refugia. This research was conducted at Antirogo Village, Summersari Sub-District, Jember Regency for 5 months. The research started in November 2017 to March 2018. This research was conducted by using three squares of research area, sized 50 m². The Treatment were, the first square employed marigold flower as the refugia. The second square used pinto peanut as the refugia, while the third square was left without any refugia. The data of this research was analyzed statistically by using the t test. The result of this research revealed that through the utilization of marigold flower and pinto peanut towards the natural enemies of the rice plant, it was founded out that the highest population of the vegetative phase seen on the square where the rice plant is given the pinto peanut refugia, numbering 92. Meanwhile, the square which utilizes marigold flower showed the number 50 unit as opposed to the finding which demonstrates that the square of rice plant without refugia showed the number of natural enemies of 39 unit. The application of marigold flower and pinto peanuts as the refugia played a significant effect to the population of the natural enemies, respectively.

1. INTRODUCTION

The rice plant is a major commodity crops in Indonesia, because rice is a staple food. In Indonesia, most of the population still depend

on rice to fulfill the food needs compared with other commodities on food crops. The population growth followed by the increasing number of food need. The use of chemicals in rice cultivation either chemical fertilizer or

pesticide pest control would negatively affect the crop. Indeed use of total pesticides can increase rice production is quite high, but improper application of pesticide causing an explosion of pests due to imbalance in the system chain of agricultural land so that the pest population increases. In accordance with Nizar (2011), that the negative impact of the use of chemical pesticides such as; pest resistance, emergence of secondary pests, pest resurgence, environmental pollution, and the destruction of natural enemies and pesticide residues on crops.

Solutions that can be used to reduce (or replce) the use of chemicals pesticide in pest control is flowering plants or refugia. Rizka et al., (2013) presented that one of way to defend the biodiversity that is to the existence of flowering plants that grow in rice fields.

These refugia plant is a flowering plant that can be used as a haven as well as a food source for natural enemies, so it presence of should be increased to suppress pest populations. According to Pujiastuti et al., (2015), natural enemy of insects often need temporary shelter before finding a host or prey, these refugia plant serves as a good food source parasitoids and predators and temporary shelter.

The purpose of this study was to determine the population of natural enemies in rice use peanut plant marigolds and pinto peanuts as refugia to increase the population of natural enemies.

2. MATERIALS AND METHODS

The research was conducted in October 2017 until March 2018, located in the village of rice fields Antirogo, Sumber Sari subdistrict, Jember. This study use *three plots* for planting rice plants that use peanut plant marigold flowers and ornamental plants as refugia against arthtropoda population and without treatment plant refugia. A plot with 50 m². Refugia planting marigolds and ornamental beans is done at around the dike. Spacing for

planting marigolds are 50 cm and 15 cm decorative nuts.

Work procedures

The initial activity that is good refugia plant nursery marigold flowers and ornamental nuts. After processing is done refugia plant nursery land. Land management by cleaning up the land earlier and pulled the weeds, then made piracy of land so that the soil becomes loose. Making the plot as well as drainage channels made after the processing of land, map made as many as three to planting rice plants. Seedbed rice seeds soaked first, then further dried deployed in small raised bed nursery rice plants. lanting refugia before planting rice as a staple crop. Rice planting was one with a spacing of 25 cm x 25 cm. The number in each planting hole were 2-3 seeds with a depth of 3-4 cm.

Parameters Research

The parameters used in this study is calculation of the population of natural enemies that are in the refugia plants and rice plant. Counting the number of productive tillers. Perform the test with t test at the plant refugia also rice.

Data analysis

Sampling of insects and find abundance of insects Net and Visual Control Sweep. The purpose of observation in this study was to Identification and Classification Arthropod population. The data collection procedure used was the primary method of data collection. Testing was performed using the t test to compare between terraced rice with refugia and without refugia. So it could be evaluated the effect of the use of plants refugia against arthropod populations.

3. DISCUSSION

Refugia plants used can be used as natural pest control for utilizing the natural enemies that stop at the refugiaBecause it benefits from refugia plants such as transiting or

microhabitat for natural enemies (Ningrum, 2018), Refugia plants used in this study, there were two kinds of Marigold flowers and plants Ornamental Nuts. Plant marigolds used has a bright yellow color that has a distinctive scent that can attract pests and natural enemies and decorative nuts which also has a yellow color but smaller and grow creeper. So that the utilization of refugia plants can be used as an integrated pest management to increase the population of natural enemies.

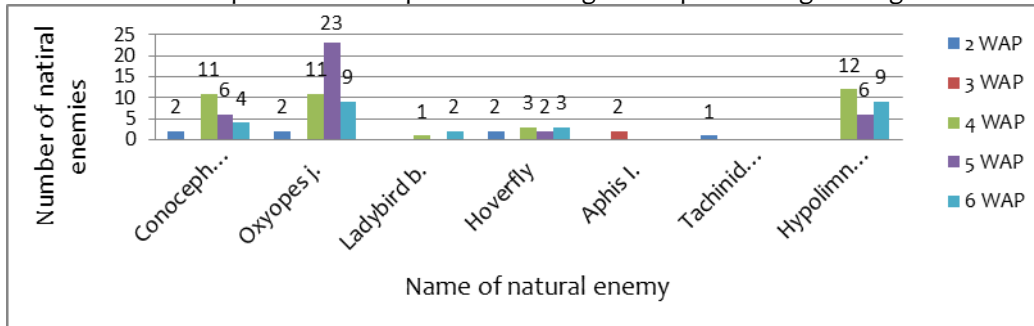
Results of research have been some natural enemies of insects caught in the form of both predators and parasitoids and also insects which become pests on the plant itself and that refugia contained in rice plants and pollinators that on the plant refugia.

The difference between predators and parasitoids lies. Predator is generally active

and have a body bigger and stronger than insect prey Meilin et al., (2016), Several natural enemies found on all three plots both the treatment plant and also without treatment refugia there are 10 species of natural enemies belonging to 8 orders and 10 families. Predatory insects or parasitoids of the class Insecta identified as *Conocephalus longipenis*, *Mantis religiosa*, *Hoverfly*, *Slender skimmer*, *Ladybug beetles*, flies *Tachinid*, while the arachnid class is four jawed spider and *Oxyopes javanus*. Insects that act as pollinator or insect pollinators in areas identified rice plants of the Class Insecta Order Hymenoptera is *Honeybees / Aphis indica*, and Order *Lepidoptera*, *Hypolimnas Bolina*.

The development of natural enemy populations can be seen from the figure as follows:

Figure 1. Natural Enemies Population development in the vegetative phase refugia Marigold Flowers.

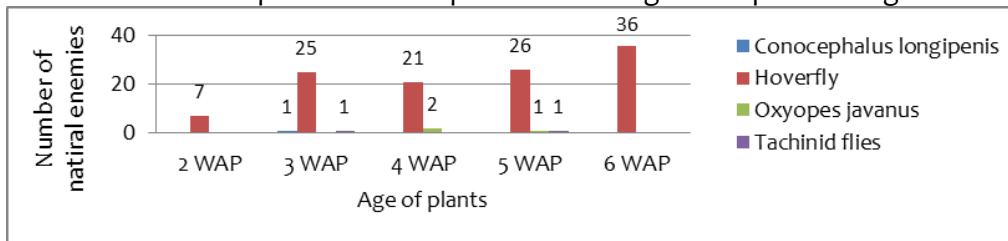


the description of the WAP is weeks after planting

Observations on the vegetative phase obtained predatory insects or parasitoids and pollinators also on Marigold flower crops as much as 114 insects. The population of natural enemies were higher due to plant marigolds as refugia to attract natural enemies because of the color and the distinctive aroma of the

flowers and useful as microhabitat. As presented by Wardana et al., (2017), that plants are commonly grown refugia have tended striking color and has a distinctive flavor that causes the insect prefers the flower color, because this color can affect the spectrum of insect vision.

Figure 2. Natural Enemies Population development in the vegetative phase refugia Decorative Nuts

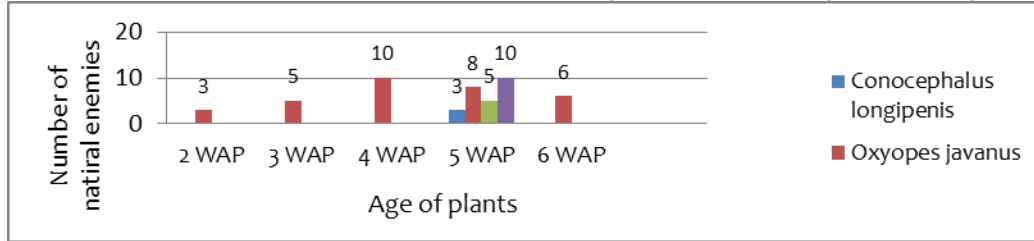


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Predators and parasitoids in plants Ornamental beans as much as 124 insects. Observations on ornamental pea plant refugia known if the population is higher than the natural enemies of the pest population. This decorative nut has a striking flower color and small size which can attract insects, especially

natural enemies. It is as it was delivered by Kurniawati *et al.*, (2015) that most insects prefer flowers with small size, tend to be open, and has a long flowering period, flowers with traits - traits that are usually found in the interest of the family Compositae or Asteraceae.

Figure 3. Natural Enemies Population development in the vegetative phase refugia Rice Marigold Flowers

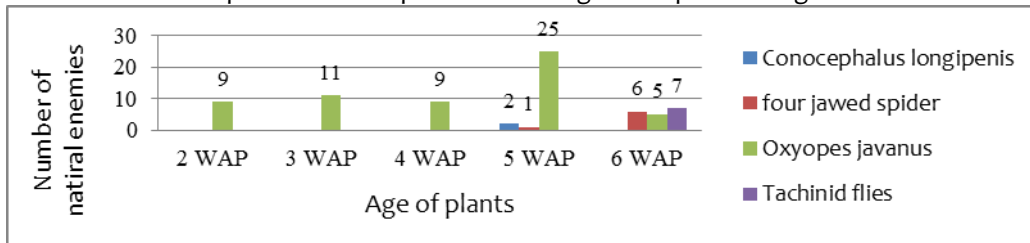


the description of the WAP is weeks after planting

The observation of the vegetative phase of several predators were identified using insect nets and visual as much as 50 insects predators and parasitoids. The population of natural enemies in marigolds still low because the

flowers have not bloomed as a whole. As presented by (Erdiansyah & Putri, 2017), that when the plant is still young refugia or not flowered then insect pests, predators and parasitoids few were interested.

Figure 4. Natural Enemies Population development in the vegetative phase refugia Rice Beans Domesticated

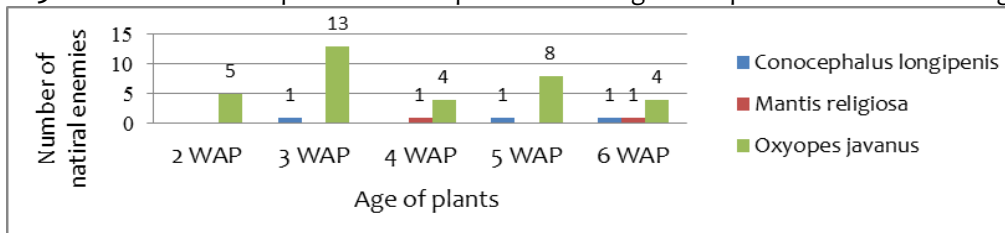


the description of the WAP is weeks after planting

Insect natural enemies identified in rice with beans refugia Ornamental plants were 92 insects both insect predators and parasitoids. Although the population of natural enemies on rice plant plots with ornamental pea refugia higher than the refugia marigolds, but the number of pest identified the higher this is

because when the young age of ornamental pea plant has not yet appeared evenly. As presented by (Erdiansyah & Putri, 2017), that when the plant is still young refugia or not flowered then predators and parasitoids few were interested.

Figure 5. Natural Enemies Population development in the vegetative phase Rice without refugia (Control)



the description of the WAP is weeks after planting

Observations on the vegetative phase use several predators were identified as many as 39 insect predators.

Observations on rice plants without these refugia natural enemy populations use flower than the population of natural enemies in the plot by using refugia. As perceived by Wardana *et al.*, (2017) that refugia are plants (both flowers and weeds) that grow around staple crops or cultivated plants. These refugia could be potentially as microhabitat for natural enemies (both predators and parasites) which must of course with the aim of preserving the natural enemies created properly.

From the figure 5 can be seen if the development of the population of natural enemies found in each plot is different. Observations on the vegetative phase was conducted for five times and starting from the age of 2 weeks after planting (WAP) to the rice crop was 6 WAP observation time interval one week. Total natural enemies identified during the observation of the plots of rice plants using refugia marigold flowers and ornamental nut 142 insects while the rice crop plots without refugia only 39 insects during the observation in the vegetative phase. Natural enemies identified in the vegetative phase is dominated by *Oxyopes javanus* / Spider sharp eye.

Some flowering plants can be used as a plant refugia. Flowering plants that can be used one of them is the marigold flowers and ornamental pea plant. These refugia could be useful as a microhabitat for the main insect natural enemies. As presented by Mustakim *et al.*, (2014), that by creating microhabitat in the area of agriculture can be used as a business that can be done to increase the diversity of natural enemies, so that later on the way to reduce the level of environmental pollution due to pesticides can be reduced and can increase agricultural production by microhabitat.

Total Productive Tillers

Observations on the plots of rice plants without treatment plant refugia known if the pests with the highest population. Due to the absence of natural enemies of plant refugia presence was reduced. This will also affect the population of pests that can affect the number of productive tillers of rice from each plot.

Results obtained by the number of productive tillers between terraced rice with marigold refugia and without treatment as well as the number of productive tillers between terraced rice with beans refugia ornamental and without treatment the results were not significantly different. While between terraced rice with beans refugia marigold and decorative result is very significant Show hat the number of productive tillers contained in the treated plots Peanut Garnish with Marigold flowers has real differences, because in both these plots fewer pest population. This is in accordance with the opinion Wardani *et al.*, 2013 at plant refugia around agricultural land can be used as an alternative habitat for many insects such as predators and parasitoids.

Testing Results Testing T against the population of arthropods

Based on the results of t test analysis the population of natural enemies population spider sharp eye Among refugia marigold plants with ornamental peanut refugia were significantly different. In accordance with the opinion Kurniawati *et al.*, (2015), that mostly insects prefer flowers with small size, tend to be open, and has a long flowering time, flowers are usually found on the interest of the family Compositae or Asteraceae.

Based on t test analysis that have been made known that the population of natural enemies population contained in rice plants with marigold and without refugia refugia were not significantly In accordance with the opinion of Erdiansyah *et al.*, (2017), that when the plant is still young refugia or not flowered then insect pests, predators and parasitoids

few were interested in and perch on rice plants.

Based on the t test analysis the population of natural enemies spider's sharp eyes contained between terraced rice with beans refugia ornamental and without refugia were not significantly. That is because the vegetative stage of plant refugia still does not appear evenly interest so natural enemies still a little interested. In accordance with the submitted Erdiansyah *et al.*, (2017), that when the plant is still young refugia or not flowered then insect pests, predators and parasitoids few were interested in and perch on rice plants.

Based on the results of t test analysis that have been made known if the population natural enemies spider's sharp eye that exists between terraced rice with beans refugia marigolds ornamental and refugia were not significantly. This is because the population of pests and natural enemies in paddy crop plots with refugia treatment does not differ much so that the t test results showed no significant difference. In accordance with the opinion Ratmawati (2016), that refugia is a plant that can serve as microhabitat for insect natural enemies.

4. CONCLUSION

The refugia plants marigolds and nuts as microhabitat natural enemies, in rice cultivation influence on natural enemy populations. Seen from the identification of the natural enemy of the three plots of rice plants, the highest population of natural enemies on rice plant plots with Nuts Ornamental refugia as many as 92 insects with refugia Marigold natural enemy populations as much as 50 insects while the lowest population of natural enemies present in rice crops without refugia plots were 39 insects, So the application of plant refugia as microhabitat natural enemies to suppress pest populations in rice plants more effective use of ornamental pea plant, as refugia with a longer flowering period will affect populations natural enemies.

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