The effectivity trap based plastic waste in monitoring of insects pests

Sri Nur Aminah¹, Mansur², Salim³ and Suyono⁴

¹ Department of Plant Pests and Diseases, Faculty of Agriculture, Hasanuddin University Jalan Perintis Kemerdekaan KM. 10 Tamalanrea, Makassar 90245, Indonesia
² Centre Research of Tungro Diseases, Jalan Buli No. 101 Lanrang, Sidrap 91651, South Sulawesi, Indonesia
³ Assessment Institute for Agriculture Technology (AIAT) South Sulawesi Jalan Perintis Kemerdekaan KM. 17.5 Makassar 90245 Indonesia
⁴ Agrotechnology, Faculty of Agriculture and Forestry, West Sulawesi University Jalan Prof. Dr. Baharuddin Lopa, SH, Talumung, Majene 91412, South Sulawesi, Indonesia

E-mail: srifirnas@gmail.com

Abstract. The plastic waste around us such as: plastic bottle and glass from drinking water very useful modified as tools for monitoring insect pests in agricultural ecosystem. The presence of insect pest in farmer plantation need more attention such as monitoring for exactly management effort. The purpose of research is to re-use plastic waste became yellow trap and pitfall trap for monitoring of insect pests attack the popular vegetables. The advantages of research as new information for community used plastic waste as tools of monitoring insects.

The observation was held in kangkong and spinach plantation used pitfall trap and yellow trap for monitoring presence arthropods in the planting season. The results was showed: the effectivity of pitfall trap from plastic waste used for arthropods monitoring especially predator in kangkong field about 45% and insect pests 37.5%. As the comparing data, the effectivity of pitfall trapped predator in spinach plantation about 99.2%, the lowest number in insect pests and decomposer about 0.4%, respectively. The result of yellow trap made from plastic bottle in kangkong field trapped insect pests about 43.7% and decomposer 41.1%. The trapped of insect pests used yellow trap in spinach plantation 63.4% and predator 26.6%. The conclusion of research: plastic giving more benefit as yellow and pitfall trap for monitoring insects. The effectivities of tools depend on arthropods habit and roles as important part of ecosystem. Plastic waste has potential as monitoring tools presence insects in agroecosystem.

1. Introduction

Plastic is a popular product in use during modern life for every activities. More household based plastic to be favourite of housewifes because very simple, beautiful with attractive colour. Beside the positive impact, plastic waste main caused of water and air pollution. Plastic known as difficult material degradable by microbes. Plastic waste such as: bottle, bag, glass of drinking water has potential drift away in the river and trigger a flooding  [1]. In the few year, many effort reduce plastic used and maintain the plastic waste to be artificial flowers, wallet and more artistic hand made. Innovation in the agricultural field, the familiar plastic waste around us such as: plastic bottle and glass from drinking water very useful modified as tools in monitoring of insect pests.
South Sulawesi as the centre of vegetables at the eastern part of Indonesia, very crucial increasing the productivity of spinach and kangkong. The benefit farmers planting annual vegetables because they are easy grown and harvest fast [2]. The crops such as spinach and kangkong is the very popular vegetables. They are easier find in traditional market and supermarket. The important thing in management of crops is presence of insect pests and need more attention such as monitoring before control treatment. The importance of insects pest such as Spodoptera sp. and Thrips sp. caused heavy injury of the spinach and another vegetables such as kangkong [2, 3]. Commonly the presence of insect pests in spinach and kangkong generally determined by farmers cropping patterns and migration from other fields. Continuous monoculture planting of vegetables will reduce the diversity of organisms and trigger a population explosion of pests. Certain environmental conditions will change the physiological processes of vegetables which further affect plant nutrients absorbed by phytophagous insects [4, 5, 6]. Many treatments controlled presence insect pest in vegetables including biological control with natural enemies. Natural enemies must supporting with flowering plant as nectar sources. This will reduce pesticide application and safety for the environment [7]. Related pastic waste and presence of insects in vegetables as monitoring tools know number of arthropods before control treatment.

The purpose of the research is to re-use of plastic waste as yellow trap and pitfall trap for monitoring of insect pests attack the vegetable (spinach and kangkong). The advantages of research as new information for community used plastic waste in the monitoring activities of arthropods in agricultural plantation.

2. Methodology

2.1 Research site
The research was conducted with field trial at spinach and kangkong plantation in Maros Regency, South Sulawesi, Indonesia in January to April 2020.

2.2 Presence pest insects and beneficial arthropods
The plantation of spinach and kangkong was separated in distance 300 m. The plot measure (length= 3 m, width= 2 m, height 30 cm) available for spinach and kangkong, respectively. The spinach and kangkong seeds coming from farmers own plant. Farmer mixed well the seeds of spinach with ash and sown followed the longitudinal path on the plot. Kangkong was sown used fingers in the longitudinal line of the plot. Research used total eight plots in different plantation.

The observation of arthropods caught used pitfall trap and yellow trap was held in spinach and kangkong plantation at 10 days after planting with interval seven days. Pitfall trap used plastic glass (diameter 5 cm, height= 9 cm), filling half of glass with water and biodegradable detergent (2:1). The pitfall trap was planted parallel with soil surface for 24 hours. The yellow trap made from plastic bottle filling with yellow colour and upper surface contain insect adhesive. They are put in the centre of the plot and keep for 24 hours. The observation was held in kangkong and spinach plantation until the harvest. The insects collection counting used Shannon-Wiener index diversity [7].

3. Results and discussion
The effectivity of pitfall trap made from waste product then applied in spinach and kangkong was showed in figure 1.
Figure 1. Effectivity of Pitfall Trap Made from Waste Product in Spinach and Kangkong Plantation.

Figure 1 showed the effectivity of pitfall trapped predator in spinach plantation about 99.2%, the lowest number in insect pests about 0.4%, respectively. The predator species in spinach plantation is Carabidae family and Formicidae (ant). The pests insects more catched used pitfall trap as grasshopper. As the comparing data of effectiveness, pitfall trap made from plastic waste used monitoring showed predators in kangkong field 45% and insect pests 37.5%. The predator population in kangkong plantation coming from Formicidae and Carabidae. The pests insects is grasshopper (Orthoptera: Acrididae), Chrysomelidae caused leaves injury and termites as decomposer (Isoptera) According to [8] state pitfall trap very effective in monitoring of pests insect in the soil surface. Formicidae such as ant action as decomposer and predators more trapped in in pitfall. The higher number of predators was showed they are very mobile in searching capacity of prey. Research from [9] reported predator population following population pests insect as their preys. The fluctuation of pests and predators often find in the agriculturan plantation. This is caused by synthetic pesticides as main control of insect.

The effectivity of yellow trap made from waste product then applied in spinach and kangkong field was showed in figure 2.

Figure 2. Effectivity of yellow trap made from waste product in spinach and kangkong field.

The result of yellow trap made from plastic bottle in The trapped of insect pests used yellow trap in spinach plantation 63.4% and predator 26.6%. The yellow trap applied in kangkong field trapped insect pests about 43.7% and predators 41.1%. Opinion of [8, 11] reported yellow trap is very effective for flying insects on the stem and upper surface of leaves. Based the result of research, we conclude
that pitfall trap effective caught insect on the surface, and yellow trapped flying insects especially insect in the upper surfaces of plant.

4. Conclusion

We concluded that plastic is a more beneficial as yellow and pit-fall trap for monitoring insects. The effectivity of tools depend on arthropods habit and roles as important part of ecosystem. Plastic waste has potential as monitoring tools presence insects in agroecosystem.

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