

## Temporal Distribution Of Arthropoda Types On Purslane (*Portulaca Oleracea L.*) In Red Chili Agricultural Land, Afdeling II Village Rantau Prapat, Bilah Barat District, Labuhanbatu Regency

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### Abstract

*The purpose of this study was to analyze and describe the temporal distribution of arthropods on purslane (*Portulaca oleracea L.*) on red chili farms, Afdeling II Village, West Bilah Subdistrict, Labuhanbatu Regency. This research method is descriptive exploratory research with a quantitative approach. This is to describe and analyze the temporal distribution of arthropods in purslane (*Portulaca oleracea L.*). Data was observed from the arrival of arthropods at a predetermined time, namely three 3 observation times, including: time I (07.00-08.00), time II (12.00-13.00), and time III (16.00-17.00) for 10 minutes. Each time the observation was repeated 4 times. The results of this study showed that the daily visits of arthropods at 12.00-13.00 were higher than the daily visits at 07.00-08.00 and 16.00-17.00. Each family of arthropods has a different level of daily visits at each time of arrival which is caused by internal factors (physiological, reproductive ability, life cycle, age) and external factors (physical factors, food, temperature and humidity). The daily visit frequency of this arthropod indicates that purslane (*Portulaca oleracea L.*) is a habitat for arthropods and can be used as a refugia plant.*

**Keywords:** Arthropods, purslane (*Portulaca oleracea L.*), refugia.

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## I. INTRODUCTION

Chili (*Capsicum annum L.*) is one of the horticultural commodities that has good development and marketing prospects because it is widely used by the community. In addition to being consumed as a cooking spice, chili is used as an ingredient in traditional medicinal ingredients, as a mixture in the food and beverage industry. Chili is one of the leading vegetables that has great potential to be developed in Indonesia. Curly chili plants do not require special life requirements so that they can be cultivated in various regions, but generally cultivate these plants conventionally without paying attention to the principles of good farming practices. (Wahyudi, 2018) Pests are animals that damage crops and generally harm farmers from an economic perspective, so humans will always pay attention to them, in order to increase agricultural yields, otherwise the yields will decrease. Some examples of pest attacks on chili plants, for example: pest attacks on the roots of chili plants cause the process of absorption of nutrients, water and others to be disrupted, pest attacks on the stems of chili plants cause transportation of nutrients to be disrupted or stop altogether so the plants wilt. and die, pest attacks on the leaves of chili plants can disrupt the photosynthesis process and pest attacks on chili peppers can cause fruit damage or fall, all of which will affect the decline in economic value. (Cahyono et al., 2018) The abundance of pest populations is influenced by global warming, which has an impact on various aspects of life and the ecobiology of the agricultural sector. Other factors that influence pest populations from internal factors are arthropod activity, such as: ability to reproduce, life cycle, and age of arthropods.

Meanwhile, external factors are influenced by physical, food, and biological factors. Biological factors are one of the growth factors for pest populations because of their role in controlling the pest population, by utilizing natural enemies of these pests. Weeds or grasses and plants that contain pollen can be used for the preservation of parasitoids and predators as a source of food, shelter, and breeding, before the main host or prey is present in the crop. This insect pest control technique with natural enemies can conserve natural enemies themselves, namely by protecting or maintaining natural enemy populations that already exist around the location. (Lestari et al., 2016) In the red chili agricultural land, Afdeling II village, there are many types of arthropods that perch on red chili plants and plants around the red chili plants. According to

(Herlinda, 2014) the plants that are commonly found around red chili plants are mostly arthropods, namely *Portulaca oleracea* L. or purslane plants, which is a type of weed. *Portulaca oleracea* L. can be used as a pest control plant. Based on the survey results, a study was conducted regarding the distribution (distribution) of the arthropod population which in this pest acts as a pest on red chili plants. The research conducted is related to the temporal distribution of pests (arthropods) by taking into account the time of the distribution of arthropods on the plant *Portulaca oleracea* L. The purpose of this study is to analyze and describe the temporal distribution of arthropods on the purslane plant (*Portulaca oleracea* L.) in red chili farms, Afdeling II Village, West Bar District, Labuhanbatu Regency.

## II. RESEARCH METHODS

This research method is descriptive exploratory research with a quantitative approach. This is to describe and analyze the temporal distribution of arthropods on purslane (*Portulaca oleracea* L.) on red chili farms, Afdeling II Village, West Bilah Subdistrict, Labuhanbatu Regency. The pest populations observed in this study were all arthropod populations in the red chili agricultural land area, Afdeling II Village, Bilah Barat District, Labuhanbatu Regency, while the data was observed from the arrival of arthropods at a predetermined time, namely three 3 observation times, including: time I (at 07.00-08.00), time II (12.00-13.00), and time III (16.00-17.00) for 10 minutes each observation time with 4 repetitions.

## III. TOOLS AND MATERIALS

The tools and materials used in data collection in this study included: digital cameras (for research documentation), stationery (to record research results), nets (to catch arthropods), plastic bags (to store captured arthropods), mobile phones (to measure temperature) a watch (to determine the duration of observation), and as a support, a determination book for insects is also used (The Pest of Crops in Indonesian)

### Observation Analysis Method

Arthropod pests that came to the purslane plant (*Portulaca oleracea* L.) were observed by direct observation using the visual control method at a predetermined time. The observed arthropod pests were then recorded, caught using nets, put in plastic bags, and then their families and ecological roles were determined based on their characteristics and morphology using the determination book for insects (The Pest of Crops in Indonesian).

## IV. RESULTS AND DISCUSSION

### Research result

Observational data in the form of temporal distribution of Arthropoda pests on wild purslane (*Portulaca oleracea* L.) are presented in Table 1.

No.	Family	Waktu	Ulangan				jumlah	Rata-rata
			1	2	3	4		
1	Scarabaeidae (kumbang tinja)	07.30-08.30	0	0	0	0	0	0
		12.30-13.30	2	0	0	0	2	0,5
		16.30-17.30	0	0	0	0	0	0
2	Coccinellidae (kumbang koksi)	07.30-08.30	3	0	1	0	4	1
		12.30-13.30	2	1	0	0	3	0,75
		16.30-17.30	1	3	0	1	5	1,25
3	Staphylinidae (kumbang rove)	07.30-08.30	2	0	0	1	3	0,75
		12.30-13.30	1	0	0	0	1	0,25
		16.30-17.30	0	0	0	0	0	0
4	Alydidae (walang sangit)	07.30-08.30	6	4	3	3	16	4
		12.30-13.30	2	5	7	1	15	3,75
		16.30-17.30	1	2	2	1	6	1,5

5	Formicidae (semut)	07.30-08.30	5	4	5	5	19	4,75
		12.30-13.30	8	8	8	7	31	7,75
		16.30-17.30	2	0	1	1	4	1
		Jumlah					109	27,25

Based on Table 1 above, it is known that there are 5 families of arthropods, namely Formicidae, Alydidae, Coccinellidae, Staphylinidae, and Scarabaeidae, with varying temporal distributions, which include 07.00-08.00 (I time), 12.00-13.00 (II time), and 16.00-17.00 (time III). The results showed that the Formicidae family could be found in purslane (*Portulaca oleracea* L.) at all periods. At time I (19) tails, time II (31) tails, and time III found (4) tails. Family Alydidae can also be found at all times (time I, II, and III), as many as 16 tails, 15 individuals, and 6 individuals, respectively. Likewise the Coccinellidae family which can be found at all times, when I found (4) tails, when II found (3) tails, and period III found (5) individuals. The Staphylinidae family can be found at time I as many as (3) tails, at time II (1) tails, while at time III they were not found. Family Scarabaeidae which can only be found in period II as many as (2) tails. The data in the table shows that the total number of the five families found in purslane (*Portulaca oleracea* L.) based on a predetermined time is 109 individuals.

In table 1. above, it is known that the most common number of families found is the Formicidae family, which can be found in all periods, with the highest number found in time II (12.00-13.00). Other families that are also found throughout the period are the Alydidae and Coccinellidae families. For the Alydidae family, the highest number was found at time I (07.00-08.00), while for the Coccinellidae family, the highest number was found at time III (16.00-17.00). Other families, such as Staphylinidae were not found in time III, while the family Scarabeidae was only found in time II. This shows that the distribution of each family varies in each specified time

## V. DISCUSSION

The results showed that the purslane plant (*Portulaca oleracea* L.) every day there were arthropods that perched on the plant. The frequency of arrival of arthropods on purslane (*Portulaca oleracea* L.) is different and indicates that purslane is an arthropod habitat plant and can be used as a refugia plant. The purslane plant (*Portulaca oleracea* L.) has a function as a pest insect trap plant so as not to visit red chili plants which can harm farmers' production. This plant is visited a lot because it has an attraction to the part of the plant. The purslane plant as a weed plant that is visited by many insects, namely the purslane plant has flowers at the ends of the branches, in groups, consisting of 2-6 flowers, five crown leaves, small yellow, starting to bloom in the morning between 08.00 - 11.00, and began to wither towards the afternoon. The fruit is oval in shape, has many seeds, shiny black brown. many insects that infest this plant because of the many seeds and flowers that bloom since the morning as a source of nectar for insects. The number of insects that visit this is proven based on the results of observations made, many insects that infest this plant. (Alanin et al., 2010)



**Fig 2.** The purslane plant part, where the seeds are, which are often infested by insects

Based on observations, it is shown that the frequency of insect arrivals based on the temporal distribution or time starting at time I (7.00 -08.00), time II (12.00-13.00), and time III (16.00-17.00) has a different frequency each time. of every insect. It can be seen that the most visiting times of each insect are at 07:00-08:00 and 12:00-13:00 this is because it is influenced by several things, that the diversity and abundance of insects in general in a habitat is not only determined by their ability to reproduce but also by the available resources. , either prey or host. In addition, it is influenced by environmental temperature conditions as well. (Efendi, 2013) The results of observations made at 07.00-08.00 and 12.00-13.00 showed a temperature of 270C-300C, which is a suitable condition for groups of insects, especially Formicidae (ants). The air temperature range in the soil mesofauna, including insects, is between 29.60C to 32.10C (Habibullah, 2020). In addition, insects also need water content in the air or a certain humidity for activities. Based on the measurement of humidity on red chili agricultural land at 07.00- 08.00 and 12.00-13.00 the humidity is in the range of 55-60%. This condition can be said to be ideal because environmental humidity is related to the amount of water content in the air, so that this time is a suitable time for insects to visit purslane plants as hosts. In the afternoon period (between 13.00-17.00 hours), the presence of insects is decreasing, this is because the environmental conditions at that time no longer support the activities of insects.

The most distribution of insects comes from the Formicidae family or group of ants. This Formicidae family has the most distribution, or has the greatest arrival value for purslane plants (*Portulaca oleracea* L.). Formicidae are the animals that have the highest level of adaptation to the environment so that their numbers are very large, reaching 70% of the total soil fauna (Resti, 2015). The second largest distribution after the Formicidae is the family Alydidae or the insect of the walang sangit group which has a foul smelling characteristic, which is spread based on the time of visit from morning to evening. The Alydidae group is an insect that visits wild plants, this is a group of insects that is quite common on the leaves of weeds and shrubs along the sides of roads in forest areas (Samba et al., 2015). Furthermore, the insects that visit this purslane plant are the Coccinellidae family. This family is an insect group of ladybugs, insects of this group are also often encountered in plants, the family Coccinellidae is a family of the order Coleoptera which is the largest order of insects and contains about 40% of the well-known types of hexapods. And the distribution of the last arrival is the Staphylinidae family, this family is an insect with one of the well-known types, namely tomat. The presence of this last family in visiting purslane plants did not have a greater frequency than the previous three families. The rove beetle is ineffective as a predator due to its polyphagous nature. This beetle population increases rapidly during the last month of the rainy season (March and April) and will decrease after entering the dry season.

## VI. CONCLUSION

The conclusion that we can get from this research is that the daily visits of arthropods at 12.00-13.00 are higher than the daily visits at 07.00-08.00 and 16.00-17.00. Each family of arthropods has a different level of daily visits at each time of arrival which is caused by internal factors (physiological, reproductive ability, life cycle, age) and external factors (physical factors, food, temperature and humidity). The daily visit frequency of this arthropod indicates that purslane (*Portulaca oleracea* L.) is a habitat for arthropods and can be used as a refugia plant.

## REFERENCES

- [1] Alanin, K., Alt, T., & White, T. (2010). effect of purslane leaf extract (*Portulaca oleracea* L.) on alanine transaminase (alt) levels of white rats (*Rattus norvegicus*) given deep frying cooking oil. Alanine, K.
- [2] Cahyono, D. B., Ahmad, H., & Tolangara, A. R. (2018). Pests on Red Chili. Techno: *Research Journal*, 6(02), 18. <https://doi.org/10.33387/tk.v6i02.565>
- [3] Efendi, S. (2013). Bioecology Coccinellidae Predator as Biological Control Agent Aphididae Spp. on Chili Planting Ecosystems in West Sumatra. *Angewandte Chemie International Edition*, 6(11), 951–952., 5–24.
- [4] Habibullah. (2020). Arthropod ecology in former nests of the Sumatran orangutan (*Pongo abelii*) in Gunung

Leuser National Park, Sei Betung Resort, Besitang District, Langkat Regency, North Sumatra. *Agroprimitech*, 4(1), 42–50. <https://doi.org/10.34012/agroprimitech.v4i1.1326>

- [5] Herlinda, S. (2014). Types of Host Plants, Population and Damage by Leaf Miner, *Liriomyza huidobrensis* (Blanchard) on Cabbage (*Brassica oleracea* L.). *Journal of Tropical Plants*, 7(1), 59–68.
- [6] Lestari, I., Tyas, M., Putri, A., Sari, P., Saefi, M., Widi, D., & Adi, C. (2016). Temporal Distribution Of Arthropods In Wild Plants (*Portulaca Oleracea* L.) In Tomato Farming Land Karangwedoro Village, Dau District, Malang Regency. Arthropods Temporal Distribution On *Portulaca Oleracea* L. Wild Plants In Tomato Farm Of Karangbesuki. Proceedings of the Year II National Seminar, 2011, 755–763.
- [7] Resti, V. D. A. (2015). temporal distribution of arthropods in the wild plant *Centella asiatica* l. in the biology garden of the Faculty of Mathematics and Natural Sciences, Malang State University. Bioexperiments: *Journal of Biological Research*, 1(2), 1–8.
- [8] Samba, N., Pelealu, J., Salaki, C., & Makal, H. V. G. (2015). insect populations in chili plants (*capsicum annum varlongum*) using organic and inorganic fertilizers in Tonsewer village, Tompasso Dua subdistrict insect populations in chilli plants (*capsicum annum varlongum*) using organic and inorganic fertilizers. 43–50.
- [9] Wahyudi, E. (2018). growth and production of curly chili (*Capsicum annum* L.) at various doses of arbuscular mycorrhizae and concentrations of liquid organic fertilizer. *Journal of Agriculture*, 51(1), 51.