

## Ant eating behavior

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**Abstract:** This study aims to determine the eating behavior of ants in the context of maintaining decomposer organisms in the ecosystem. The study was conducted using the Scan sampling method, namely recording the behavior of more than one individual per a predetermined time, which is every 10 minutes for 1 hour. The feeding behavior of ants was recorded using the Instantaneous sampling method. The results showed that ants have different eating behavior when consuming liquid and solid textured food. When eating liquid food, ants will make a neat formation, whereas when consuming solid food ants do not form formations.

**Keywords:** Ant, decomposer organisms, eating behavior

**Abstrak:** Penelitian ini bertujuan untuk mengetahui perilaku makan semut dalam rangka pemeliharaan organisme dekomposer dalam ekosistem. Penelitian dilakukan menggunakan metode Scan sampling yaitu mencatat perilaku lebih dari satu individu per waktu yang telah ditentukan, yaitu tiap 10 menit selama 1 jam. Perilaku makan semut dicatat menggunakan metode Instantaneous sampling. Hasil penelitian menunjukkan bahwa semut memiliki perilaku makan yang berbeda ketika mengkonsumsi makanan bertekstur cair dan padat. Ketika memakan makanan cair, semut akan membuat formasi yang rapi, sedangkan saat mengkonsumsi makanan padat semut tak membentuk formasi.

**Kata kunci:** Semut, organisme dekomposer, perilaku makan

## INTRODUCTION

Ants are insects belonging to the Formicidae tribe and the Hymenoptera nation. Ants are pest organisms that are spread in most tropical and sub-tropical regions (Wetterer, 2009). Ants are known as social insects because their colonies and nests are regularly composed of thousands of ants. Ant colonies are divided into 3 castes namely male ants, queen ants, and worker ants. The most common ant species in everyday life are those that are small in size, red-brown in color, and often gnaw on sweet foodstuffs, and can appear quickly when we store sweet-tasting foods. Ants are an invasive species. The food is a variety of foods that have a sweet taste like sugar, even the sweet taste of fruit. So that ants are often called kitchen pests (Sutikno et al., 2020). Ants are also known as the most dominant terrestrial organisms, namely 1.27% of the world's 9,500 insect species (Abdul-Rassoul et al., 2013; Putra et al., 2021).

Ants can live in several places such as old plant branches, dry grass, damp places, kitchens, and others. In the United States and Argentina ants are considered household pests, agricultural pests, urban to suburban (Suiter et al., 2021; Vega, 2001). In China, ants are

considered as household and plant pests (Zheng et al., 2018). In Indonesia, ants are often considered as household pests, because they can quickly find various types of sweet food that we store. Behind their function as pests, ants also have benefits in the ecosystem, as decomposers (Meilin & ., 2016). Research on ants is generally only about habitat distribution, diversity, and genetics, while eating behavior is rarely done. Eating behavior is a description of the behavior of living things towards how to eat, eating frequency, eating patterns, food preferences, and food selection (Rahman et al., 2016). According to Hasan et al. (2021), there are several sequences of ant behavior when eating, namely stalking behavior when detecting food ingredients, behavior approaching food ingredients, communicating with other members of the ants to flock to the food ingredients obtained. There are two factors that influence ants to find food, namely internal factors characterized by hunger, and external factors or changes in temperature and humidity in the habitat (Burford et al., 2018; Howard & Tschinkel, 1980; Porter & Tschinkel, 1987). This research was conducted aiming to analyze the feeding behavior of ants.

## **METHOD**

The study was conducted using the Scan sampling method, namely recording the behavior of more than one individual per predetermined time, ie every 10 minutes for 1 hour. The observed behavior is eating behavior. Ant activity while eating was recorded using the Instantaneous sampling method, namely recording behavior within a certain period of time. The tools and materials used include, camera (for documentation), stopwatch (to see the time it takes for the ants to get the food provided), stationery (to record activity in the form of an etogram), tissue and plastic for placing food ingredients, as well as food ingredients which tastes sweet. The ingredients used are granulated sugar, dates, honey, and syrup. The treatment begins by determining the time when the ants are most frequently encountered, then preparing the food, and observing the behavior and eating patterns of the ants. Containers for placing food ingredients using tissue except for those with a liquid texture, each food ingredient is in a separate container. Liquid textured ingredients (honey and syrup) are placed on plastic, while solid ingredients such as granulated sugar and dates are placed on paper towels. The four foodstuffs are placed in the locations most frequently encountered by ants. The trial was carried out once a day, for a period of 3 consecutive days with the position where the ingredients were kept the same from day 1 to day 3.

## **RESULTS AND DISCUSSION**

Experiments in this study were carried out for 3 consecutive days, at the same time every day, namely 16.30-17.30. The timing of the research was adjusted according to the results of the preliminary trials to see when the ants were most commonly found. Preliminary trials were carried out for 2 consecutive days, namely in the morning, afternoon and evening. Morning 08.00–09.00, afternoon 11.00–12.00, and evening 16.30 – 17.30. The results of the preliminary trials obtained were that the most common ants were found in the afternoon, so

the research time used was in the afternoon at 16.30 - 17.30. Ants are often found in the afternoon at 16.30 - 17.30, possibly because ants are nocturnal insects or insects that are active at night. According to research by Ramadhanita et al. (2019), regarding the types of nocturnal insects in the village area of Deudap (Pulo Nasi), Pulo Aceh District, 161 species of nocturnal insects were found, most of which came from the Hymenoptera order. Ants are a type of insect that comes from the order Hymenoptera and the family Formicidae (Putra et al., 2018). Table 1. The following are the results of the experiment from day 1 to day 3.

**Table 1.** Results of the 1st day experiment

Time/ Minute	Number and Activity of Ants in Foodstuffs			
	Honey	Sugar	Syrup	Dates
First 10 Minutes	2 ants begin to circle the honey.	No ants have come yet.	No ants have come yet	No ants have come yet.
Second 10 Minutes	3 ants suck honey and 1 tail goes around honey.	No ants have come yet.	2 ants suck syrup.	No ants have come yet.
Third 10 Minutes	35 ants suck honey.	1 ant circumvents the sugar.	9 ants suck the syrup.	2 ants circle the date palm.
Fourth 10 Minutes	20 ants suck honey.	4 ants feed on sugar.	13 ants suck the syrup.	There are no Ants on the Dates.
10 Fifth Minutes	± 37 ants suck honey, 4 ants round honey	5 ants feed on sugar.	30 ants suck the syrup.	1 ant eats a date palm.
10 Sixth Minute	± 38 ants suck honey, 5 are stuck in the middle of honey.	6 ants feed on sugar.	17 ants suck the syrup.	There are no Ants on the Dates.

Based on the exposure to the experimental results in Tables 1 to 3, it can be seen that the foodstuffs that are most surrounded by ants are honey and syrup. Meanwhile, the foodstuffs that have a dense texture, namely sugar and dates, only a few ants come and eat them. This happens because it is easier for ants to consume food in liquid form, while solid foods such as sugar will be brought to their nest. Honey is the food most preferred by ants, because it contains high sugar, namely fructose (41%), glucose (35%), sucrose (1.5%) and other ingredients (Sakri, 2015). In Latumahina (2020), concerning the distribution of ants in forest areas on Saparua Island, explained that ants generally like food that has a sweet taste because there are glucose and fructose which are members of the energy source components in living things. The number of ants in each experimental result also varies every ten minutes.

The experiment was carried out for 3 consecutive days to ensure that the data obtained was valid. Before eating, the average ants circle the food first to see the situation and conditions around the food. You can see a few ants coming then leaving again and returning with more ants. The first ants to arrive are thought to be worker ants who mark the location of the food using pheromones. According to Li et al. (2014), after getting the location of food, worker ants will mark it using pheromones then return to the nest to recruit other colony members. This event can be seen in the results of the first 10 minute experiment

in Tables 1, 2 and 3 on liquid textured food, on average the ants are still circling the food. This behavior shows that ants are insects that have social characteristics (Trettin et al., 2014). The social characteristics of ants are marked by ants that seem to greet each other when they pass each other and also when eating. The number of ants while circling the food was less than the number of ants in the next 10 minutes. This increase is related to the behavior of foraging in ants by using their long-term memory which continues to accumulate, this is also related to the behavior of recognizing the environment in ants (Li et al., 2014).

**Table 2.** Day 2 trial results

<b>Time/ Minute</b>	<b>Amount and Activity of Ants on Foodstuffs</b>			
	<b>Honey</b>	<b>Sugar</b>	<b>Syrup</b>	<b>Date</b>
First 10 Minutes	9 ants circling honey	1 ant circling sugar.	2 ants suck the syrup, and 2 tails go around the syrup.	No ants have come yet.
Second 10 Minutes	6 ants suck honey.	2 ants circling sugar	3 ants suck the syrup.	1 ant circling the date palm
Third 10 Minutes	17 ants suck honey.	1 ant begins to feed on sugar.	6 ants suck the syrup, and 2 tails just circle.	2 ants circling the date palm
Fourth 10 Minutes	28 ants suck honey.	2 ants feed on sugar, 3 go around.	10 ants suck the syrup.	There are no Ants on the Dates.
10 Fifth Minutes	± 38 ants suck honey, 2 ants just wait like waiting for their turn.	2 ants feed on sugar.	15 ants suck the syrup.	1 ant eats a date palm.
10 Sixth Minute	± 43 ants suck honey.	1 ant eats sugar.	19 ants suck the syrup.	There are no Ants on the Dates.

**Table 3.** Day 3 trial results

<b>Time/ Minute</b>	<b>Amount and Activity of Ants on Foodstuffs</b>			
	<b>Honey</b>	<b>Sugar</b>	<b>Syrup</b>	<b>Date</b>
First 10 Minutes	1 ant tail begins to suck honey.	1 ant circumvents the sugar.	1 ant tail begins to suck the syrup.	1 ant circling the date.
Second 10 Minutes	4 ants suck honey.	2 ants round the sugar.	3 ants suck the syrup.	There are no ants on the dates.
Third 10 Minutes	20 ants suck honey.	There are no ants in the sugar.	9 ants suck the syrup.	1 ant eats a date palm.
Fourth 10 Minutes	25 ants suck honey.	2 ants feed on sugar.	16 ants suck syrup.	There are no Ants on the Dates.
10 Fifth Minutes	37 ants suck honey, 3 ants circle.	2 ants feed on sugar.	17 ants suck the syrup.	1 ant eats a date palm.
10 Sixth Minute	46 ants suck honey, 2 tails circle.	1 ant eats sugar.	19 ants suck the syrup.	1 ant eats a date palm.

When getting food, ants will recruit a maximum of 25 to 59 individuals to the location, and only about 9-19 individuals are tasked with taking food (Holldobler, 1983). According to Bradshaw et al. (1979) the behavior of ants when eating always begins with

stalking behavior, for example circling the food which will be followed by communication, and agonistic. The agonistic behavior of ants can be seen in the red circle in Figure 1a, due to the large number of ants that are attracted to consuming honey, causing competition. The large number of ants that come to consume honey is caused by the secretion of compounds that activate pheromones to communicate to attract other ants to the food location found by scout ants.



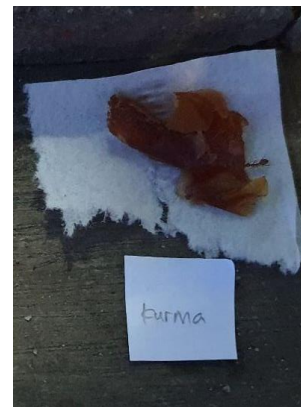
(a)



(b)



(c)



(d)

**Figure 1.** (a) behavior of ants when consuming honey; (b) the behavior of ants when consuming sugar; (c) the behavior of ants when consuming the syrup; (d) the behavior of ants when consuming dates.

The eating behavior of ants can be seen in Figure 1, where it can be seen that ants have different eating behavior when consuming liquid and solid textured foods. When consuming liquid food, the ants will form a neat formation, whereas when consuming solid food the ants do not form formations, for example when sucking honey, the ants form a neat circle according to the shape of the honey when it is in the container. Ants that don't get an empty space will queue up waiting for the other ants in the formation to leave. In liquid-textured food, the ants form a neat circular formation because they can only consume it from a side position, so the ant formation is formed according to the shape of the food

container. In contrast, solid-textured food, ants can consume it from the edge of the food or the middle, this causes the ants not to form a neat formation.

## CONCLUSION

The eating behavior of ants has characteristics according to the texture of the food. When consuming food with a liquid texture, ants will make a neat formation on the edge of the food. Meanwhile, when consuming solid food, ants do not form formations. For example, when sucking honey, ants form a neat circle according to the shape of the honey in the container. Ants that don't get an empty space will queue up waiting for the other ants in the formation to leave. The foodstuffs that the ants were most interested in in this study were honey and syrup, this was evidenced by an increase in the number of ants in honey and syrup from day 1 to day 3.

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