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# Decomposers found on a partially decomposed Caimito (*Chrysophyllum cainito*): Example of a log ecosystem

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**ABSTRACT.** Decomposers are integral parts of our ecosystem, breaking down matter and releasing it back into the soil for other living things to utilize instead of remaining unused in the tissues of dead animals and plants. This research focused on identifying the decomposers found in *Chrysophyllum cainito,* commonly known as the star apple. Additionally, it aimed to recognize the non-living elements that influence the small ecosystem within a decomposing log. The study was conducted on August 14, 2017, at the Davao Oriental State College of Science and Technology (DOSCST) main campus, with the observation lasting one day. A total of eight decomposers were discovered, including lichens, mosses, fungi, polychaete worms, earthworms, termites, woodlice, and ants. The study also documented various abiotic factors such as sunlight, soil, oxygen, water, temperature, and the decomposition log itself. These findings indicate that the sampled area displayed a high diversity of decomposers.

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## INTRODUCTION

Decomposers are defined by their characteristic consumption of dead organic matter as their source of energy, and during the process of decomposition, they break down macromolecules into micromolecules and excrete nutrients as their waste product (Hanley and La Pierre, 2015). Through this defining characteristic of decomposers, a wide variety of organisms are encompassed in this classification, ranging from minute animals to fungi. These are classified as saprophytes, including bacteria and fungi that decompose at a microscopic level, and detritivores, including termites, earthworms, and woodlice, which feed on the decomposing wood itself, thus speeding the process of decomposition (Galante and Marcos-Garcia, 2004). Decomposers are an often overlooked aspect of our ecosystem. Despite their relatively small size, the importance of the role they play in the process of nutrient recycling is vital to the normal functioning of an ecosystem. This importance was emphasized by Harwood and Wilkin (2015), who stated that without decomposers to break down matter for other living things to utilize, nutrients would remain unused in the tissues of dead animals and plants and not be released back into the ecosystem. These decomposers are therefore enhancing nutrient availability (Mikola, Bardgett, and Hedlund, 2002; Wardle *et al.*, 2004). These ecological functions thus prove their importance in maintaining the stability of various ecosystems. Although appearing to be of no importance, a decomposing log harbors numerous living organisms, with numbers surpassing those found on a living one. In an endeavor to profile the decomposers present on a decomposing log, specifically that of *Chrysophyllum cainito*, or Star apple, this study would identify the decomposers present to the order level. The abiotic factors would also be identified to provide a clearer image of the decomposing log's miniature ecosystem. This study was conducted on the Davao Oriental State College of Science and Technology main campus on August 14, 2017.

## MATERIALS AND METHODS

For this study, a descriptive analysis was used, which was conducted on August 14, 2017, for one day to facilitate ocular observation. A piece of log in an intermediate stage of decomposition (Figure 1) found near the gymnasium of the campus was investigated for this study. The decomposing log was first identified and then measured in terms of length and diameter with the use of a meter stick. Then, using a trowel, the log was pried open on random parts deemed manageable enough to facilitate the viewing of decomposers living within. An ocular observation was conducted to determine and identify the decomposers present on the decomposing star apple log on the surface and within. Each observed organism was photographed individually for documentation. The abiotic factors affecting the log were identified and listed.

## RESULTS

The log was identified as a star apple (*Chrysophyllum cainito*), locally known as caimito. It was observed to be partly soft in terms of its structural integrity, with the bark appearing to lose its rough texture and giving in easily to pressure. Overall, the decomposing log has maintained its shape. The log was also observed to be light brown in color. Upon measurement, the log was found to have a length of 47 inches and a diameter averaging 7-9 inches.

### Biotic factors

Through ocular observation of the surface and the internal part of the decomposing Star apple log, a total of eight (8) macroscopic decomposers were found and identified (Figure 2). These observed organisms were determined to belong to the kingdoms Animalia, Plantae, and Fungi. These decomposers were lichens and mosses (Plantae), fungi (Fungi), polychaete worms, earthworms, termites, pill woodlice, and ants (Animalia).

**Figure 1**. The decomposing Star apple (*Chrysophyllum cainito*) log was observed.


**Figure 2.** Decomposers found on the Caimito log: lichens and fungi (A), polychaete worms (B), earthworms (C), pill woodlice (D).

### Abiotic factors

The area directly surrounding the decomposing Star apple log was observed for various abiotic factors which could influence the functioning of this decomposing log ecosystem. These abiotic factors in the site were: sunlight, soil, oxygen, water, temperature, and the decomposing log itself.

## DISCUSSION

This simple study investigated the micro-ecosystem present on a decomposing log. In its truest essence, an ecosystem pertains to a complex of interconnected living organisms that inhabit a particular area together with their immediate environment and their relationship with it (Ostroumov, 2002). There are two components to an

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ecosystem: the abiotic and biotic components.

According to Odum (1971), an ecosystem contains biotic and abiotic components. These biotic components are the living members of the system. In the decomposing star apple log ecosystem observed in this study, the biotic component is comprised of lichens, mosses, fungi, polychaete worms, earthworms, termites, woodlice, and ants. On the other hand, the abiotic components are non-living parts of an ecosystem involved in its function. In this particular ecosystem, the abiotic components observed are sunlight, soil, oxygen, water, temperature, and the decomposing log itself.

One of the defining characteristics of an ecosystem is the cycling of nutrients by and between the biotic components. These living components, in turn, rely on the abiotic component for these processes to materialize and sustain themselves. This was demonstrated in the ecosystem observed on the decomposing log; the decomposers, which included all the biotic components, break down certain organic materials, in this case, the log, into another form they or other living organisms could use. These living organisms have been able to survive the adversity of their environment through a mechanism called acclimatization, wherein they adjust by changing their behavior or physiology.

The growth and survival of an ecosystem are influenced mainly by various limiting factors. These limiting factors condition the limits of tolerance and inhibit the growth of an ecosystem to a certain degree. According to Odum (1971), these physical limiting factors include temperature (life can exist only within -200 °C to 100 °C, most species are restricted to a narrower range of temperature, aquatic organisms have narrower range of tolerance than equivalent land animals and organisms which are subjected to temperature variations tend to be depressed, inhibited or slowed down by constant temperature), light (quality of light, the intensity, and the duration, both plants and animals respond to different quality of light. Individual plants, as well as communities, adapt to different light intensities by becoming 'shade adapted' or 'sun adapted'), water (rainfall distribution over the year), humidity has a daily rhythm (high at night, low during the day) and has a special role in modifying the effects of temperature, hence regulates the activities of organisms and in limiting their distribution, evapotranspiratio is also an important limiting factor (desert plants expose only green buds or stems, dew, in areas of low rainfall, is a vital contributor to precipitation), atmospheric gasses (concentration of carbon dioxide and oxygen is limiting to many higher plants), biogenic salts (macronutrients and micronutrients such as nitrogen and phosphorous salts) and currents and pressures (currents in water not only influence the concentration of gases and nutrients but act directly as limiting factors).

## CONCLUSION

There were eight decomposers observed, which included lichens, mosses, fungi, worms, termites, woodlice, and ants. Also, this study determined the abiotic factors present, e.g., sunlight, soil, oxygen, water, and temperature, that were affecting the decomposing log. The results indicate that the area was highly diverse in terms of different decomposers. In addition, the distinct log contributes to the habitat of various organisms. This study could be expanded in the future by examining logs left out in forested areas near rivers and those found in coastal beach areas and comparing the diversity of various organisms found in them.

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