

Why Do We Need to Study Ants

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ABSTRACT

Most of ants seem to be beneficial, whereas some of them are annoying or harmful. Among harmful creatures red imported fire ants have been notorious for not only destroying farm plants and domestic animals but also biting and killing human beings. The red imported fire ants, *Solenopsis invicta* Buren and *Solenopsis richteri* Forel, will feed on the buds and fruits of numerous crop plants. Large nests located in fields interfere with and damage equipment during cultivation and harvesting. They respond rapidly and aggressively to disturbances, and ant attacks inhibit field worker activities. A single fire can sting its target repeatedly. Young and newborn animals as well as humans are especially susceptible to the stings' venom. These pests can damage the environment by displacing native ant species and reducing food sources for wildlife. In Korea *Solenopsis invicta* Buren were found for the first time in Busan Gamman port in 2017. Then they were found in Incheon port, Pyongtaek port, North Daegu, Ansan in 2018 and Gwangyang in 2021. Once they invaded and occupied the terrestrial area, we have no proper solution to prevent them. I can assume that they have been successfully enlarging their colonies toward inland since they can move freely by flight. Therefore, I strongly suggest that we need to study ants in order not only to control harmful ants properly but also to preserve and use beneficial ants in this country.

Keywords: Ants, Korea, Red imported fire ants, *Solenopsis invicta*, *Solenopsis richteri*

Introduction

Ants appeared in the fossil record across the globe in considerable diversity during the latest Early Cretaceous and Late Cretaceous of Mesozoic, suggesting an earlier origin. They are considered to evolve from vespoid wasp ancestors in the Cretaceous period. After that they diversified as soon as flowering plants appeared. More than 13,800 species of an estimated total of 22,000 species

have been classified. Their unique characters for identification are elbowed antennae and distinctive node-like structure that forms their slender waists. They also have colonies that varies in size, some of them have a few dozen predatory individuals living in small natural cavities while other groups have highly organized colonies which may occupy large territories consisting of millions of individuals. Nearly all ant colonies also have some fertile males called "drones" and one or more fertile females called "queens" gynes. The colonies are described as super organisms because they appear to operate as a unified entity, collectively working together to support the colony (Holldobler & Wilson, 1990; 1994; Wikipedia, 2021a). They have colonized almost every terrestrial area on earth. However, we cannot find ants in Antarctica and in some inhospitable islands. They occupy most ecosystems and

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may form 15-25% of the terrestrial animal mass. They can succeed in so many environments thanks to their social organization and their ability to modify habitats, tap resources, and defend themselves. Especially the most beneficial factors are their long coevolution with species to mimetic, commensal, parasitic, and mutualistic relationships. Their societies have division of labour, communication between individuals, and an ability to solve complex problems. Many human cultures make use of ants in cuisine, medication, and rites. Some species are valued in their role as biological pest control agents. Their ability to exploit resources may bring ants into conflict with humans, however, as they can damage crops and invade buildings (Holldobler & Wilson, 1990; 1994; Wikipedia, 2021b).

The red imported fire ants (*Solenopsis invicta*) are regarded invasive species, establishing themselves in areas where they have been introduced by accident. Unfortunately, in this country 1,000 workers of red fire ants were found in a storage container at Busan's Gamman port, September 28, 2017. After that, a queen, 16 larvae and 6,100 workers in Incheon port, June 7, 2018, and 20 workers in Pyongtaek port, June 18, 2018, and a queen with some workers in North Daegu under construction apartment, September 18, 2018, and 1,000 workers in Ansan, October 8, 2018 (Chung, 2018; Jang & Chung, 2018; Korea Gyeonggi Daily, 2021; Korea Joongang Daily, 2017; 2018; Park & Hwang, 2017; Shim, 2018a; 2018b; The Dong-a Ilbo, 2017; USDA, 2021) and 1,000 workers with 2 nests in Gwangyang, June 14-15, 2021 (Lee, 2021).

Ants are not only beneficial but also harmful in many ways. Therefore, I would like to get down in the point of view of both beneficial and harmful.

Are Ants Beneficial?

When we meet ants around us, it may seem like they are nothing but a nuisance. But like almost all other insects, they actually perform many important ecological roles that are beneficial to human. The benefit of having ants all over the planet is not always obvious. However, researchers have discovered that they serve several key functions that help nature prosper. They are not often referred to as "medically important insects" or even just as "pests". Though we hear much about dangerous red fire ants in the news, we view them just as a nuisance. In fact, in many ways, ants are considered to be beneficial for the eco-system as they hunt a lot of other pest insects and contribute to soil fertility (Vulcan Termite and Pest Control, Inc., 2015).

First, they aerate the soil. Most of them dig tunnels through the ground that can get very widespread and intricate. These tunnels help moisture and air work their

way through the soil so that the roots of plants can soak them up more easily (Vulcan Termite and Pest Control, Inc., 2015).

Second, they fertilize plants. They often use decaying foliage to build their nests. As a result, nutrients are added to the soil and nearby plants receive fertilization. Absolutely they take a role of decomposing wood and fallen leaves which became fertilizer. If all the dead wood had not decayed by ant, ecosystem could have had serious problems (Vulcan Termite and Pest Control, Inc., 2015).

Third, they help with pollination. As they march around finding foods, they pick up pollens. During their travels they distribute the pollen and inadvertently pollinate plants. Even though butterflies and bees are important pollinators, some plants prefer ants as their pollinators (Vulcan Termite and Pest Control, Inc., 2015).

Fourth, they help control other insects. Most of them prefer to eat food, but some like to prey on other insects. The appetite of ants has been known to help decrease the number of numerous insects that wreak havoc on lawns and gardens. They are also highly territorial and will fight off other insects and animals that get too close to their nests. For example, in Africa scientists discovered that ants play a pivotal role in protecting acacia trees from other insects and animals (Vulcan Termite and Pest Control, Inc., 2015).

Are Ants Harmful to Animal and Human Beings?

In some way they carry disease risks, and we can get ant allergy from their bites and stings. The fact of the matter is that while many other insects are significantly more dangerous than them, some ant species can have rather negative effects on our wellbeing. Sometimes to a disastrous degree.

First, some ants are dangerous to human health. Most of the 16,000+ species of ants around the world don't pose much health risks for humans. In fact, more often than not it's a good idea to tolerate them in your garden to a certain extent as they can have quite a few beneficial qualities. Sometimes, however, ants can be an outright health hazard. As they are neither at the bottom nor at the top of most food chains, different ant species have lots of weapons for both attack and self-defense. Almost all ants have powerful mandibles which they use for anything from nibbling on leaves and fungi, through carrying food chunks back to their nests, to crushing their prey and biting things they perceive as potential predators. Most ant's bites on human skin can feel harmless but some ants have such powerful jaws that they can be quite painful. In fact, the bites of the red fire ant, in particular, consist of mostly alkaloids and are known to cause anaphylaxis in a lot of people. Anaphylaxis is an allergic

reaction with potentially deadly consequences that it requires emergency injections of epinephrine (adrenaline) if the victim is to be out of danger. Other ants have wasp-like stings that they can use to inject venom with, while other species don't even inject the venom but spray it in the air around their victim or predator. Approximately 71% of the 16,000+ species of ants have such stings and venom that consists of primarily formic acid. Formic acid, especially when injected through a sting, can cause pain, severe allergic reactions, and symptoms such as chest pains, loss of breath, sweating, swelling, outright fever, slurred speech, dizziness, and more (Yordan, 2020).

Second, some ants are dangerous to our property. The most famous property pests in the ant family are the carpenter ants. They are often confused with termites, but they actually prey on termites. Unlike them, carpenter ants don't really consume the wood they dig through and don't cause as much damage to it. However, they still do dig extensive tunnel systems and nests through wood and can cause quite significant structural damage to any wooden buildings. Fortunately, carpenter ant infestations are much easier to spot than termite infestations as they leave small wood dust piles outside of their holes. Nevertheless, if left unchecked for long enough, carpenter ants can quite literally bring a building down. That, in turn, can not only be viewed as property damage but can cause collateral human health damage as well. Aside from carpenter ants, most other species are not as harmful to our property, although a lot of garden ants can be pest insects as much as they can be "beneficial insects". And while such types of property damage are not directly dangerous to our health and well-being, they can still be highly damaging as they can doom entire crops to go to waste (Yordan, 2020).

Third, some ants are harmful to other animals. As predatory animals, ants can naturally be quite damaging to other animals. In fact, in many regions, especially in the tropics, they are near the top of their respective food chains with only certain bird and lizard species preying on them. Ants in such regions are known to hunt and kill other insects, crabs, and other invertebrates, small adolescent mammals and birds, and more. Of course, the ants that we are likely to meet in rural or city regions are not as dangerous – your garden colony isn't going to attack your new-born puppies. Nevertheless, just as they can cause human's physical harm through their venomous bites and stings, they can do the same to a farm animal or a pet (Yordan, 2020).

Fourth, some ants carry diseases. If you are looking for an "ant disease" then there is no such thing, however, they can carry certain harmful diseases. For example, pharaoh ants are famous for spreading organisms such as *Salmonella*, *Staphylococcus*, *Clostridium*, and *Streptococcus* in medical treatment and food facilities. They are

especially dangerous pests in burnt victim treatment units as they are attracted to the fluids from burn wounds. Many other ant species can spread food borne disease organisms such as *Escherichia coli*, *Shigella*, and *Salmonella*. Such diseases may not be that commonly spread by ants, but even simpler things such as food poisonings can be caused by the dirt, excrements, and other mild contaminants that ants often carry with them (Yordan, 2020).

Conclusion

Based on ant's biology we can sort them out into two groups, one is beneficial and the other is harmful. We have to preserve beneficial ants carefully and persistently while we must prevent or control harmful ants like red imported fire ants. We need to study their ecology, ethology, and genetics to use useful genetic resources of them and preserve useful ants as well as manage and control harmful ants. In order to control harmful ants like red imported fire ants efficiently we also need to cooperate with specialists of other fields like virologists (EDIS, 2012; Pest World, 2021). Anyhow now the most important thing is to study how to control the red imported fire ants that invaded South Korea. We also should not be negligent classifying ants.

Conflict of Interest

The author declares that (s)he has no competing interests.

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