

# Good example of essay on an analysis of the european gypsy moth

[Environment](#), [Plants](#)



## **Abstract**

European Gypsy moths cause severe damage to trees and shrubbery by reducing the ability of the plants to carry out photosynthesis. The moths damage the plants causing the plants to die and/or to become vulnerable to infections. Plants are defoliated forcing the plants to grow new leaves disrupting the natural growing process of the plants. The environmental damage the moths cause results in loss of wooded areas, drought and high economic costs. The carbon cycle is disrupted due to the loss of trees. Gypsy moths are regarded as the worst insect pests in the United States. The infestation started when a Massachusetts professor who was doing research on silk production accidentally released them. The moths spread across the short distances naturally; and then during the caterpillar stage the moth climbs to the top of a tree and spins a silk thread allowing them to be blown by the wind known as ballooning. The moth populations are also spread when the queen lays eggs on household equipment and vehicles enabling them to be carried to far off destinations. These insects cause a large amount of damage to the environment resulting in high economic costs. as the caterpillar stage feeds on various trees and shrubs thus leaving them to die or prone to other infections. *Bacillus Thuringiensis* is the best control of European Gypsy Moth that has so far been found.

Various environmental and economic problems are associated with the European Gypsy Moth therefore research has been undertaken to find the best way to control the spread and to catalogue the effects of their spreading into new ecosystems. *Bacillus Thuringiensis*, a bacteria that lives

in soil, has been found to be the best control of European Gypsy Moth among the alternatives.

European Gypsy Moths damage and kill trees and shrubs because they eat leaves and the needles; the places the plants need in order to process photosynthesis. The metamorphosis stage develops from the egg, larva, and pupae and then the adult emerges. A Massachusetts's professor who was carrying out research on silk production accidentally released moths he was studying; this is the way the insects entered the environment. The insects spread into the Northeast (New England) and then into parts of Virginia, Ohio and Michigan. The spread occurs through a natural process where the caterpillars climb to the top of a tree and spin a silk thread which allows them to be blown off their perch by the wind. They travel on the wind to various locations. This process is known as ballooning. Another way the insects enter new ecosystems is when they are moved over long distances on outdoor household equipment including vehicles, firewood and other possessions. The female moths lay most of their eggs in these types of niches. (Spruce et al, 403)

These insects feed on many kinds of trees and shrubs. The result is defoliation. Infestations leave the plant host dead or prone to other infections and pests. The female moths lay large numbers of eggs which range in size from 500 to 1000 eggs at one time. The mothers covers the eggs with their wings and bodies in order to provide some additional protection during cold seasons. After this process, the eggs develop into larva where the instar larvae feed on the top branches by chewing small holes in them (Resh and Ring 275). The second and third instars feed from

the outer parts of the leaves towards the center when the population is very large because a competition exists for food between large populations. When the population is low, the younger larvae prefer feeding during the day while the older larvae feed at night.

The rate of the spread of the European Gypsy Moth populations is determined by the female moths because the female cannot fly. Therefore the move to ecosystems where the species will flourish is slowed.

Nevertheless, these insects manage to take over areas of the Northeast due to the fact that the female eggs lay a large mass of eggs at one time. The hatched caterpillars are capable of eating over 300 species of trees and shrubs. Research has shown that during the defoliation process, the insects feeding process sounds like moderate rainfall (Resh and Ring 280). The feeding process can successfully defoliate an entire forest. The general negative effects are on the environment and the economy although aesthetics are also negatively impacted. The extent of negative impacts depends on the species of trees, the amount of damage done, the health of the tree and the available soil moisture.

There are several negative impacts on the environmental and economic aspects. European Gypsy Moths kill trees mainly during the larval stage because they eat leaves during the spring season. As much as one square foot of leaves per day can be consumed. Large amounts of fecal matter (frass) are produced. The frass causes the trees to become vulnerable to other infections. Defoliation of about 13 million acres of trees in the United States over one season has been recorded. Trees that provide urban shading are negatively affected. Infestations can lead to severe effects such as

droughts and diseases. Once the trees have been invaded by these insects, the trees use up most of their energy trying to produce new leaves; this ruins the trees natural cycle of growth.

Wild animals are negatively impacted because they feed from the trees while others live in or under trees. The habitats of wild animals are also negatively impacted (Spruce et al., 423). Defoliation brings about severe effects when animals are left with no food or dwelling places. Once an infestation begins, whole forests have been damaged causing a lack plants, food, shelter and shades for species that are naturally occurring in the area. The ecological cycle is damaged because the destruction of forests upsets the natural carbon cycle. Trees are essential for absorbing some of the carbon dioxide produced by humans and animals. Rainfall patterns are altered and finally drought is a result. Animals become more prone to respiratory diseases because trees are not cleaning the air; increased levels of air pollution are made (Spruce et al., 433).

Gypsy moths have had significant negative impacts on the economy in the timber, tourism and recreational industries. Timber production is decreased. Timber is harvested from healthy and strong trees that have grown properly. The gypsy moths damage the growth of trees causing negative effects on timber production which negatively impacts the profits from building furniture and other items. The tourism industry has experienced decreased income because wild animals have had to migrate to other places where they can get food and shelter; reserves and game parks have reduced in numbers as there are no animals to watch. The tourism industry is a big contributor to the country's economy but the moths have badly affected this

source of revenue. Recreation facilities have also been negatively affected in places where people lack places to relax under shade trees or play. When the trees around these areas have all dried up or died they are no longer suitable for people.

The government as well as research companies have invested millions of dollars trying to curb the infestation and the resulting plant diseases. Larger and larger amounts of money funneled to control the spread of these insects leaves smaller amounts in budgets for other purposes. The drought that arises due to defoliation has forced the government to spend (and lose money) providing support for areas heavily struck by the disaster. Urban forestry in the United States has been allocated about \$300, 000 for tree maintenance and to initiate the European Gypsy Control program this year (Whitmire, 235).

*Bacillus Thuringiensis* Kurstaki has been used as a pesticide to control the gypsy moth populations. This is a naturally occurring bacteria found in the soil that is used as a pesticide to fight infestations of the gypsy moths. The bacterium was first found to be useful for this purpose in 1911 and it has been in use ever since. The bacterium form spores that produce crystal proteins; the crystal proteins are poisonous to many species of insects. The bacteria is easily available as it can be found almost everywhere in the world because it is distributed in the soil. It is largely used in agriculture mostly in organic farming and in urban aerial spraying programs.

The bacteria must be eaten in order to cause mortality. During digestion the toxin dissolves in the high pH of an insect's gut; that is how the toxin is activated. The toxin attacks the gut cells of the insect rupturing holes the

lining. The spores of the bacteria spill out of the gut and germinate in the insect thus causing death within a couple of days. Insects do not eat from toxin treated parts of the plant. The main advantage of the bacterium is that they do not cause disease outbreaks. They are not harmful to the environment when sprayed on the plants in a 99% dilution with water. The bacteria are naturally sticky so they stick to plant leaves thus offering protection to the leaf. Residues on food crops can act as preservatives and have been approved by researchers for use on food (Sansinenea, 376). The major disadvantage of this bacterium is its ability to cause allergic reactions such as skin rashes, irritation of the eyes, nose and throat. Respiratory diseases can be caused by exposure to *Bacillus Thuringiensis* especially when people are ill with leukemia, AIDS or other immune system deficient diseases. Therefore, the *Bacillus Thurindiensis* bacterium is not an appropriate control of gypsy moths because of the negative effects on the health of human beings.

An alternative method of controlling gypsy moths is mass trapping. Mass trapping involves setting up pheromone traps at high levels in the forests, groves and other wooded areas that are infested. The male moths will be prevented from mating with the female because the female moths are at the low level of the ecosystem; the female moths are on the ground. The method has been shown to reduce the population of gypsy moths by monitoring and comparing annually. The number of male moths caught each year and the number or proportion of unfertilized egg masses found in a treated the treated area are counted. An advantage of this process is that it does not involve any spraying; trapping results even if the egg masses have been

fertilized. The gypsy moth population has been successfully reduced using this (Resh and Ring 395). A highly accurate delimitation has been observed in moth populations resulting in a reduction in potential treatment areas. A disadvantage is that the process has not been proven to eradicate all the moths. It is also limited in that all male moths must be captured before they reach a female for the method to be successful (Resh and Ring 400).

European gypsy moths have caused large negative impacts on the environment and the economy. Critical steps must be taken to curb the situation. Research needs to focus on the best way to reduce gypsy moth populations without causing negative effects in the environment. The solution also needs to be economically feasible so that the costs are not high. Prevention of the spread of European gypsy moths and controlling the amount of damages they create need to be prioritized.

## **Works Cited**

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