DECISION-MAKING SKILLS

- ● Define the Issue
- ○ Identify Alternatives
- ● Research
- ◎ Analyze the Issue
- ◎ Defend a Decision
- ○ Evaluate

Should We Use Pesticides to Control Pests?

For years, Ontario's tent caterpillar population will be fairly low; so low that the caterpillars can go virtually unnoticed. Then suddenly it seems that every other tree contains a caterpillar nest, and that the trees are being stripped of all their leaves (defoliated) (**Figure 1**).

The caterpillars are an example of a common phenomenon. Some species can reproduce so rapidly that they are capable of exceeding the carrying capacity of their ecosystem. Sudden spurts in one population can disturb even the most stable ecosystems. Such disturbances favour some species and hamper others (even to the point of completely eliminating them, at least temporarily). However, forces in the environment eventually cause the population to decline. A scarcity of food, an increased incidence of disease, or an increase in the predator population brings the population back into line.

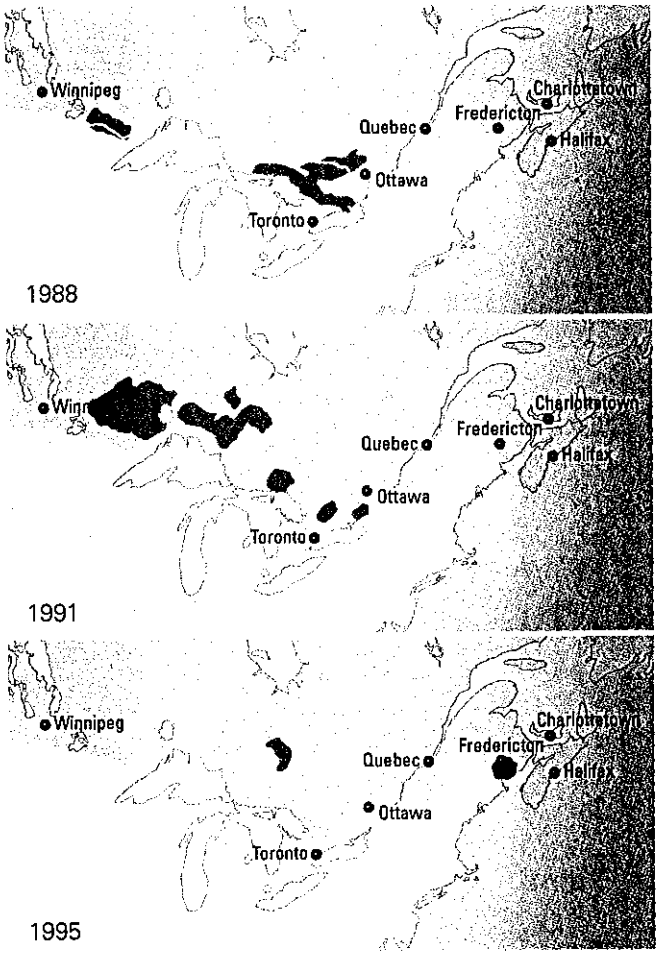


Figure 1
Brown areas indicate where tent caterpillars have completely defoliated trees. Trees that have lost their leaves in spring can grow new leaves later in the year, but the loss of time to gather food and the cost of growing new leaves weaken the tree.

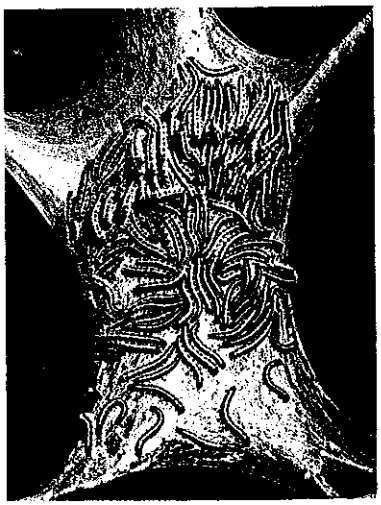
The Caterpillar Problem

Tent caterpillars have one generation per year. They hatch in spring, about the same time as trees come into leaf, and begin to eat (**Figure 2**). The caterpillars reach maximum size by mid-July, at which point each one forms a pupa and begins its metamorphosis into the adult form. The adult moth emerges 10 days later and mates. Soon after mating the adults die, but not before the females lay their eggs. The life cycle continues the following spring.

Although their principal food is poplar leaves, tent caterpillars also eat the leaves of many other trees, including fruit trees. By eating a tree's leaves, the caterpillars prevent the tree from making and storing food. As a result the tree may be so badly weakened that it cannot reproduce (produce fruit). Most trees survive, but can make fewer leaves the following year.

If there is plenty of food for the caterpillars and if predators are few, many of the caterpillars become moths and reproduce. The result is a population explosion the following year. However, high populations of caterpillars mean plenty of food for predators, so the population of predators increases rapidly — their numbers will be high the following year. In addition, if there are many caterpillars,

Figure 2
Tent caterpillars spread out and eat the leaves of a tree during the day. In the evening, they all crawl into the web they make lower on the branch, where they are protected from predators.



damage to trees results in less food being available the following year. Both developments result in a dramatic drop in the caterpillar population in subsequent years (Figure 3).

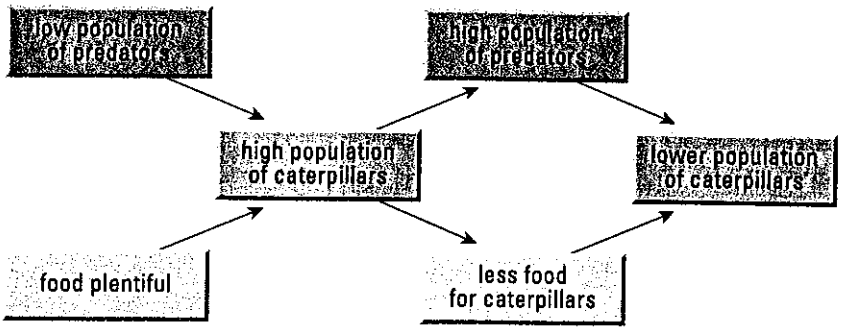


Figure 3
Factors that affect the population of tent caterpillars

Work the Web

To research tent caterpillars, visit www.science.nelson.com and follow the links from Science 10, 2.11.

Understanding the Issue

1. What factors control the population of tent caterpillars?
2. Make a list of individuals, communities, companies, and other organizations that would consider tent caterpillars a pest.

]DEBATE[Pesticides and the Tent Caterpillar

Proposition

Caterpillar infestations are part of a natural cycle of events. Pesticides are not required to control the caterpillars. We should allow nature to take its course.

Point

Counterpoint