

NOT ON OUR TURF: MANAGING TENT CATERPILLAR POPULATIONS AT SAINT JOHN'S UNIVERSITY

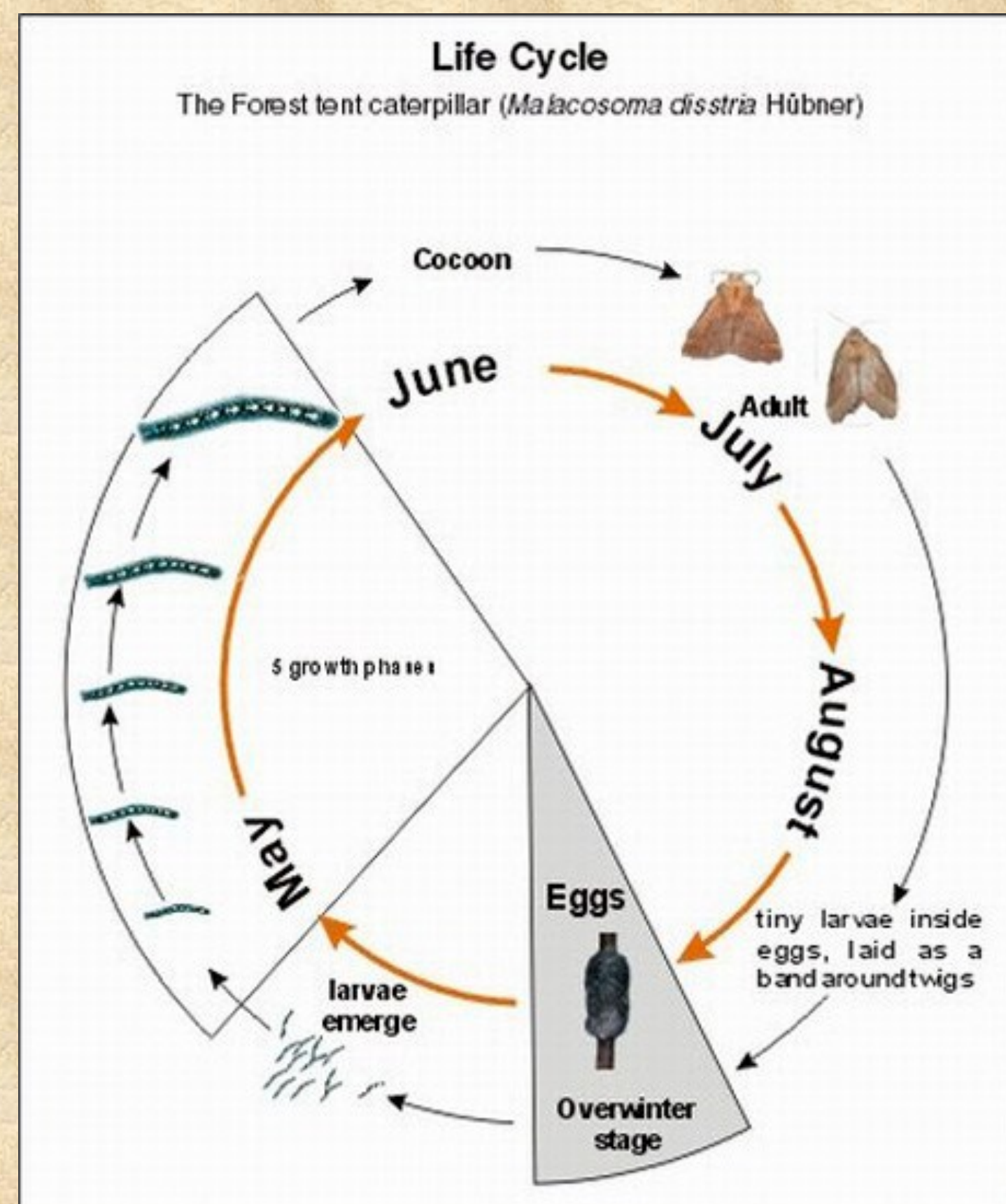
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Abstract:

The tent caterpillar is a native pest species on the campus of Saint John's University and in Minnesota. Tent caterpillars create an aesthetic disturbance with their presence in large populations and defoliate broad-leaf trees during periods of intense feeding. This defoliation slows the growth rate of trees, and during periods of peak populations the defoliation can kill branches and even entire trees. This problem is exacerbated by the growing threat of climate change. As summers in Minnesota continue to become warmer and drier, trees on campus become stressed due to a lack of precipitation and become more prone to damage caused by tent caterpillar defoliation. Additionally, it is hypothesized that tent caterpillar populations in Minnesota will increase because of climate change since tent caterpillar offspring survival rates may rise as a response to abnormally warm winters. Fortunately, there are actions that can be taken to manage tent caterpillar populations and to decrease the effect of their damage, including spraying, physical removal, and the use of natural predators. By conducting a literature review and by working with the Saint John's University Grounds Department, I have evaluated these possible actions. With the best interest of the Grounds Department in mind, I have come up with a plan of action for managing tent caterpillar populations on campus.

The tent caterpillar life cycle has five basic stages: Adulthood (moths), overwintering (eggs laid in egg masses) larvae emergence, larvae growth (feeding), and cocoon.



The best time to manage tent caterpillar populations is during the overwintering stage, during the cocoon stage, or before the larvae grow to one inch, or half their full size.

Source: "Tree Killers." New York State: Department of Transportation. 2012. Accessed November 14, 2012. <https://www.dot.ny.gov/divisions/engineering/design/landscape/trees/is-pests>.

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The Forest Tent Caterpillar larvae and moth (left) look strikingly similar to the Eastern Tent Caterpillar larvae and moth. Both can be found in central Minnesota and both defoliate similar types of trees. The main difference between the two is that Eastern Tent Caterpillars construct and group together within a tent-like structure for safety, making them easier to manage. The Forest Tent Caterpillar constructs no such tent.

Sources: "Defoliators," City of Saskatoon, <http://www.saskatoon.ca/DEPARTMENTS/Infrastructure%20Services/Parks/PestManagement/Pages/Defoliators.aspx>. (Upper left). "Caterpillars of Northern Illinois," <http://www.richard-seaman.com/Arthropods/Usa/Caterpillars/NorthernIllinois/index.html> (Upper Right). Steve Nanz, "Macro Moths - Part 3," [http://www.stevenanz.com/Main_Directory/Plants_Animals/Invertebrates/Insects/Lepidoptera/Macros/3_Other_Macros/index.htm.\(moths\)](http://www.stevenanz.com/Main_Directory/Plants_Animals/Invertebrates/Insects/Lepidoptera/Macros/3_Other_Macros/index.htm.(moths)).

Methods/Analysis:

I focused on determining the best possible action for managing tent caterpillar populations in different situations, based on a small set of criteria:

- Tent caterpillar populations are cyclical. Outbreak cycles generally last three to six years and occur at eight to thirteen year intervals. Treatment should take place during outbreaks since trees normally tolerate defoliation during periods of lower populations.
- Young, un-established trees are more susceptible to damage done by defoliation. Healthy, mature trees can withstand severe defoliation even during peak population periods. Therefore, it is more important to protect un-established and high-value trees.
- Treatment should depend on what stage of the life cycle the species is in. The species is easiest to control in the dormant stages (egg masses, cocoons) but is hardest to locate in these stages. In the larval stage, treatment should take place only if the larvae are less than or equal to one inch long, since larvae larger than one inch long are nearing the end of their feeding phase and most damage has already been done.

Using this criteria, I was able to recommend a plan of action for managing tent caterpillar populations by the Saint John's University Grounds Department.

Potential Actions	Method	Effective-ness	External effects/Challenges	External Costs	Labor Required
Spraying	Insecticides	High	-Possible public opposition to insecticide use -Potentially harmful to the environment -Requires equipment for large-scale projects	Moderate	Relatively Extensive
	Water/ Liquid Soap Solution	Moderate	-Must be strongly mixed to be effective -Requires equipment for large-scale projects	Inexpensive	Relatively Extensive
Physical Removal	Removing Larvae from trees	Low	Requires an unfeasible amount of labor for large scale projects	None	Extensive
	Destroying Cocoons/ egg masses	Moderate	Nearly impossible in large settings such as a college campus	None	Extensive
Using Natural Parasitic Species	Large Grey Fly	Dependent on parasite performance	-Would require specialists to introduce the parasite -Species already helps naturally control tent caterpillar populations	Expensive	None, except introduction
Using Natural Predator Species	Birds, Small mammals, other insects	Dependent on predator performance	-Would require specialist to introduce the predator species -Predators already help naturally control tent caterpillar populations	Expensive	None, except introduction
Taking No Action	No treatment besides monitoring tree health	No direct treatment takes place	Could potentially increase risk of tree mortality	None	None

Conclusions:

Based on treatment criteria and tent caterpillar population cycles, I conclude that the best option for the Saint John's Grounds Department is to take a case-by-case approach each year based on local and regional tent caterpillar population trends.

- During periods of lower populations, the Grounds Department should not consider control methods such as insecticides. Since defoliation is not always guaranteed to cause extreme damage, spraying tent caterpillars in periods of lower populations is not an efficient use of time and resources. Instead, the Grounds Department should monitor tree health during defoliation and should maintain tree health with extra irrigation during these periods.
- During periods of outbreak populations, the Grounds Department should use insecticides as needed due to their high effectiveness and moderate costs. Doing so will help to prevent tree mortality caused by defoliation and to mitigate the aesthetic disturbance caused by tent caterpillars.
- Since tent caterpillar populations are expected to begin reaching outbreak levels over the next few years, the Grounds Department should continue to efficiently use insecticides for spraying tent caterpillars on campus for the next few summers.
- Further research should be conducted to monitor tent caterpillar population trends on campus on a yearly basis. If it is believed that outbreak level populations are going to continue, the Grounds Department should continue to use insecticides until populations are expected to fall to lower levels.