CENTRAL HARDWOOD NOTES

Using Silviculture To Minimize Gypsy Moth Impacts

Silvicultural treatments can be used to minimize gypsy moth impacts on hardwood stands. There are two major strategies of these treatments: (1) to decrease susceptibility to defoliation by gypsy moth and (2) to strengthen the stand against mortality and encourage growth after defoliation.

The treatments discussed here are based on biological information and concepts rather than long term trials. Some proposed practices would be expensive and might only be practical under the right combination of stand characteristics, location, markets, and product value.

Decreasing Susceptibility

Maximize tree growth and vigor.-Maintain trees and stands in a vigorous, healthy condition to minimize the probability of defoliation. Stressed trees are more disposed to attack by defoliating insects. Treatments that can increase tree vigor include thinnings, fertilization, and irrigation. However, treatments other than commercial thinnings are expensive and difficult to implement in forest stands. Thinning can increase the vigor level of residual trees by increasing both crown and root growing space.

Eliminate gypsy moth habitat.--The best way to reduce stand susceptibility is to decrease the number of trees in stands that are favored food of the gypsy moth. For example, gypsy moths prefer oaks over maples, yellow-poplar, ashes, and most conifers. By reducing the percentage of stand basal area in oaks to 15 to 20 percent or less, the probability of defoliation decreases from moderate to low. This strategy would work best in mixed stands where a variety of species are available and where management goals are flexible. It might also work well in oak-pine mixtures by favoring pine and by reducing oak considerably. On poor site oak stands with pine understories, the oak overstory could be removed. Also, low quality sites could be converted by planting pine and controlling the hardwoods, although this practice is quite expensive. On high quality sites, favor mixed hardwoods over oaks using regeneration cuts and intermediate treatments.

Where conifers are surrounded by highly susceptible stands, cutting an isolation strip about 75 to 150 feet wide around the conifers will reduce damage. The isolation strip reduces the number of late instar (older) larvae that invade the conifers.

You can also reduce the number of hiding places or refuges for gypsy moth larvae and pupae. Older larvae feed at night and seek refuge during the day. Predators can more effectively find larvae and pupae resting low on the bole or on the ground. Reducing natural refuges such as bark flaps, large dead branches, holes or wounds on the bole, dead sprout stubs, and deep bark fissures-especially

those high in the trees-will force the larvae out in the open and downward where predators have a better chance of finding them. Remove artificial refuges such as signs, old wood fences, abandoned buildings, and trash.

Predator habitat can be increased by creating brush piles to provide cover for small mammals, along with retaining snags and cavities or den trees for birds and other cavity dwellers.

Increasing forest diversify.-Right now, the central hardwood forest with its stands of similar age, size, species composition, and stand structure, under low-level management, offers a huge foodbasket favorable for the gypsy moth's rapid expansion. The gypsy moth does not seem to defoliate stands 1 to 15 years old, and we don't know at what age stands become susceptible. By creating more diverse age classes, stand structures, species compositions, and management systems, we may be able to reduce the potential for large gypsy moth outbreaks. Smaller, more limited outbreaks occurring in scattered stands would be less catastrophic and easier to manage.

Strengthening the Stand Against Mortality

Maximize tree growth and vigor.-Maintain trees and stands in a vigorous, healthy condition through thinnings and pest control. Healthy, vigorous trees are more likely to survive and recover from gypsy moth defoliation and resist secondary organisms. Trees under stress from drought, nutrient deficiencies, fire, grazing, defoliation by other insects, and ice storms will have higher mortality rates when gypsy moth defoliation occurs. High value trees at risk may need protection. Aerial spraying is the most cost-effective method.

Remove *high risk* trees.-Remove high risk trees before they are defoliated and die, especially intermediate and suppressed trees. Tree vigor, as measured by crown condition (table 1), is the single most important factor for predicting mortality. Trees with poor crowns are very likely to die after defoliation. Intermediate and suppressed trees are more likely to die than dominant and codominant trees.

Reducing the habitat of secondary organisms.-Defoliation-stressed trees are often invaded by two secondary organisms, the shoestring root rot and the two-lined chestnut borer. By decreasing the habitat of these two organisms, you can reduce tree mortality. Remove unhealthy trees and borer-infested trees before new generations of borers emerge; attract borers by using girdled "trap" trees. Root rot habitat is much more difficult to eliminate. Thinnings may actually increase levels of the fungus by increasing the food base in the stumps and roots of cut trees. Where possible, thin several years ahead of the invading front of the gypsy moth.

Table 1 .--*Guidelines for determining crown condition.*

Crown condition	
Good	Tree with a healthy crown that has (1) less than 25 percent dead branches or dieback in the upper crown, (2) normal foliage density, color, and size, and (3) little or no epicormic branching.
Fair	Tree that has (1) more than 25 percent but less than 50 percent dead branches or dieback in the upper crown, (2) some subnormal foliage density and color, and (3) some epicormic branch sprouting.
Poor	Tree that has (1) more than 50 percent dead branches or dieback in upper crown, (2) subnormal foliage density, color, and size, and (3) heavy epicormic branch sprouting.

Salvage

Despite your efforts some trees will die, mostly within 1 to 3 years after defoliation. The longer a tree has been dead, the lower its utility and the price it brings. Dead veneer-quality trees are usually reduced to sawtimber prices. Sawtimber trees decrease in value at a rate of 10 to 15 percent per year, so the faster dead sawtimber trees can be salvaged, the better. Trees dead longer than 3 to 5 years are difficult to sell. Dead trees are actually better for firewood and pulpwood than live trees and remain so for periods up to 5 years and perhaps longer. In cases of very heavy mortality, you will have to regenerate the stand.

In Conclusion

Although the above suggestions have not been extensively tested, they represent our current knowledge of gypsy moth and its impacts. In spite of past gypsy moth outbreaks or potential outbreaks there are opportunities to manage forests economically without sacrificing management objectives or allowing the insect to dominate management actions. Hopefully the forest, forest managers, and this exotic insect pest will eventually approach a state of tolerable coexistence.

References

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