THE PEAR THRIPS PROBLEM

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As entomologists, we sometimes like to think of an insect pest problem as simply a problem with an insect and its host. Our jobs would be much easier if that were the case, but of course, it is never that simple. There are many other factors besides the insect, and each one must be fully considered to understand the problem and develop effective management solutions. In this case I see many factors facing us besides the pear thrips and the sugar maple tree. (Fig. 1).

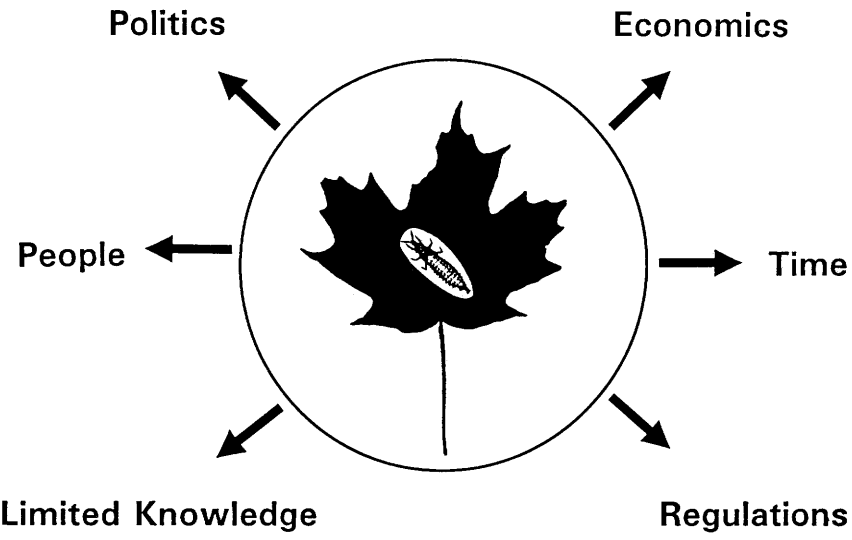


Figure 1. Key factors associated with the pear thrips problem.

There are the ***people*** who are affected both directly and indirectly by damage caused by thrips. To name only a few, there are farmers and sugarmakers who make maple syrup and the industries that supply sugarmakers with their equipment; there are loggers who harvest and mill the maple timber; there are tourists who come to experience the brilliant fall foliage and the many indirect beneficiaries of tourism; and finally, just as important, there are the homeowners who cherish their big old maple in the front yard.

The ***politics*** of pear thrips is also a complex factor that partly governs our research and management activities. Without the power of politics we would often go without the funding needed to conduct essential research. The people mentioned above, who own the trees we are trying to protect, play an important role in communicating their needs, and ours, to the politicians who make the funding decisions. Yet politics, for better and for worse, play a decisive role in the ***regulations*** that are imposed upon our management activities. These regulations, though generated for the greater good, sometimes present major research and management challenges with which we must deal.

Because pear thrips is a relatively new forest pest in New England, I am continually frustrated and at the same time excited by our ***limited knowledge*** about this insect and its bioecology. As an entomologist, it is a unique opportunity to investigate an organism that is so little understood. Everything we learn is new. However, as a forest pest manager, I am frustrated that we have so much to learn before we can answer how best to manage this insect.

Time plays a crucial role in the problem of pear thrips in two respects. First, consider the life cycle of this insect; it is active above ground for such a short period, about two and one-half months. That gives us very little time to carry out the essential research to find the answers needed to develop management strategies. Studying the insect below ground is also needed and presents additional unique complications in accessibility. Secondly, most people, especially those who are worried about something important to them, want answers **now** to their questions about how to protect their trees from this new

pest. It is hard to explain to these people that pest problems are complex, involving many interrelationships, all of which must be investigated and that takes time. There is just no "silver bullet."

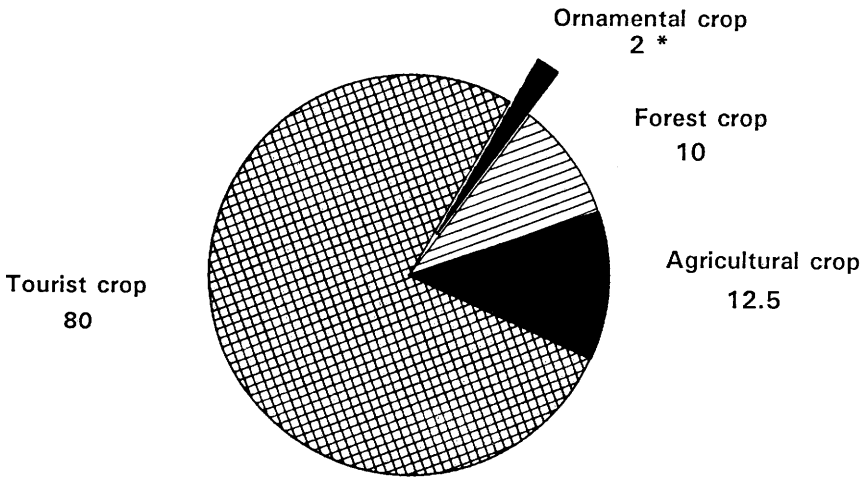
Finally, there is ***economics***. I mentioned economics as it relates to people and politics, but one must also consider economics relative to the Vermont environment and the actual dollars involved. The magnitude of a pest problem is usually assessed by the abundance of the threatened crop and the economic impact it imposes. In 1983 there were about 405 million trees in Vermont, and about 124 million of them were sugar maple; one out of every three hardwoods was a sugar maple (Department of Forests, Parks and Recreation 1988). This represents an almost inexhaustible food source for this pest as well as an important source of revenue for Vermont and other northeastern states. It also presents a massive area that could potentially require protection.

Though the sugar maple is generally considered a hardwood forest tree, it also falls within the agriculture system by virtue of maple syrup production (Parker et al. 1977). Therefore management strategies that are developed for pear thrips must address issues associated with this host as a widespread forest tree species as well as a food crop, requiring adherence to food tolerance restrictions associated with pesticide use. This is very different from other forest pest problems, such as the gypsy moth, *Lymantria dispar*, or spruce budworm, *Christoneura fumiferana*, which primarily attack forest tree species.

It is extremely difficult to place an exact value on the sugar maple resource in Vermont and the eastern United States. The high attendance at this conference attests to the concern we have for this cherished tree, but an attempt to assess the value of sugar maple must be made to justify the worth of investing in its protection.

The sugar maple resource in Vermont can be divided into four general economic categories (Fig. 2). First there is the revenue from maple syrup. In 1989 over 12.5 million dollars were made in Vermont

from the sale of maple syrup alone, and exceeds 40 million dollars regionally. This does not include revenue generated indirectly from maple syrup products, such as maple candy, or from industries that supply sugaring equipment and supplies.



* Millions of dollars

Figure 2. The value of sugar maple in Vermont in 1988.

There is also the sugar maple forest crop. In 1989 about 32 million board ft of sugar maple timber was harvested in Vermont. This has a value of about 2.6 million dollars on the stump, and over 7.3 million at mill delivery (H. B. Teillon, personal communication). This value is again increased following milling.

Probably the largest industry that pear thrips damage could impact, though indirectly, is the tourist industry. This industry is highly dependent on the condition and duration of fall foliage colors. Pear thrips damaged leaves, rather than turning a brilliant red or orange, turn brown and fall prematurely. In addition, tourism associated with forest recreation, such as hiking, camping and hunting, could be negatively

affected by the reduced forest health resulting from thrips damage. Tourism is estimated to bring about 80 million dollars annually into Vermont (H. B. Teillon, personal communication).

The one other segment of the pie I call the ornamental crop. This is the shade tree crop and includes your backyard tree. It is difficult to assign a dollar value to that yard tree, but considering the time and money expended to protect these trees from gypsy moth defoliation, the value is significant. When revenues from these four industries are combined we get a total of over $100 million dollars raised annually from the sugar maple in Vermont. This represents a significant portion of Vermont's overall annual revenue. Considering the contribution sugar maple gives to this State's income, one can appreciate our great concern for its well being.

The History of Pear Thrips Damage in Pennsylvania and Vermont

Pear thrips was first positively identified causing damage to maple in Pennsylvania in 1979 (Laudermilch 1988). For a number of years forest managers had noticed what we now know to be characteristic thrips damage (Fig. 3 & 4), but called it "Maple Malady" because they didn't know the cause. This seems to be a common trend; even in California when pear thrips were first introduced, it took about 4 years before they were actually identified as the causal agent (Bailey 1944).

The Pennsylvanians began mapping thrips damage in 1979 (Fig. 5). Thrips damage fluctuated greatly from year to year, gradually increasing over time. Even in the years when defoliation did not warrant mapping there was generally at least light thrips damage in some areas (G. Laudermilch, personal communication). The heaviest damage in Pennsylvania occurred in 1988 when a dramatic increase in the area of defoliation was observed, over 400 thousand hectares (one million acres).

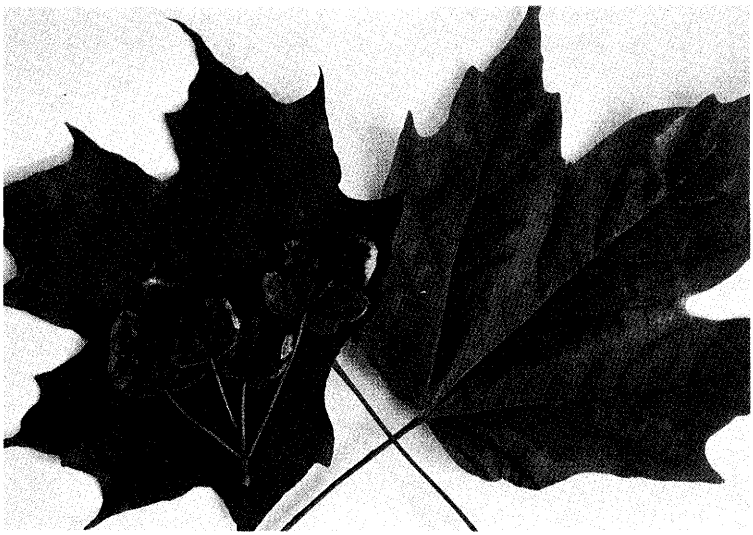


Figure 3. Healthy and pear thrips-damaged maple leaves.

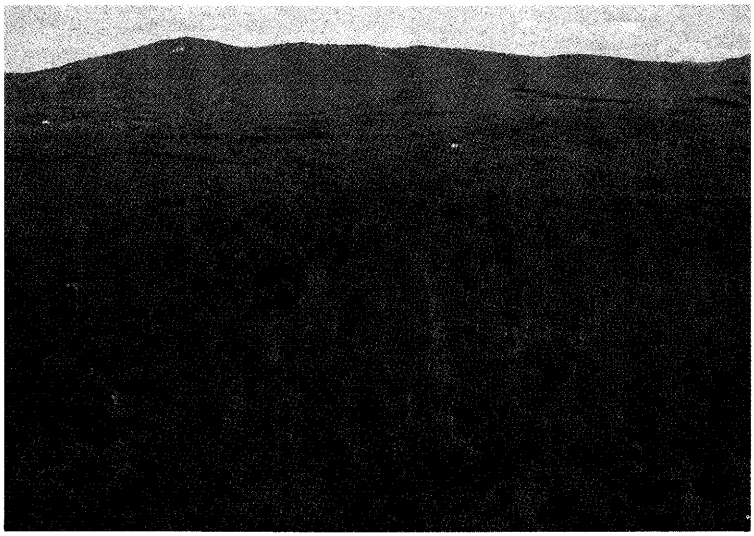


Figure 4. Aerial view of severe pear thrips damage in southern Vermont, June 1988.

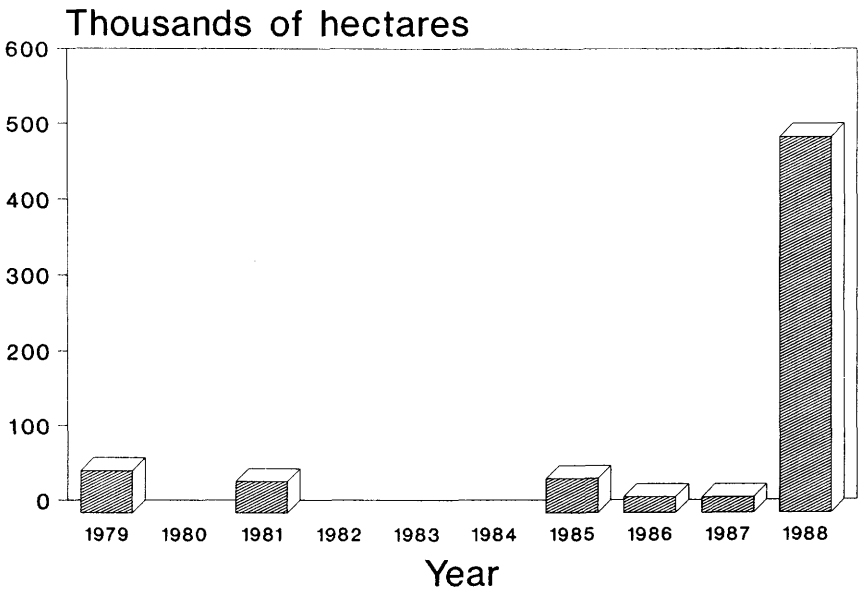


Figure 5. Pear thrips damage in Pennsylvania, based on aerial sketch mapping.

In Vermont, a similar pattern occurred. Pear thrips were positively identified here in 1985 (Teillon et al. 1985). However, many sugarmakers recall observing thrips-like damage as early as 1978, but they diagnosed it as frost injury (J. Vinton, personal communication). Mapping of damage was initiated in 1985 as a result of widespread thrips defoliation (Fig. 6). In 1986 there was no visible defoliation, but in 1987 thrips were again evident with about about 9,000 hectares (22,000 acres) of noticeable damage (Teillon et al. 1986, 1987). It was the severe damage of 1988, however, that alerted forest managers, entomologists, sugarmakers and the general public to the serious threat pear thrips posed to the Vermont maple.

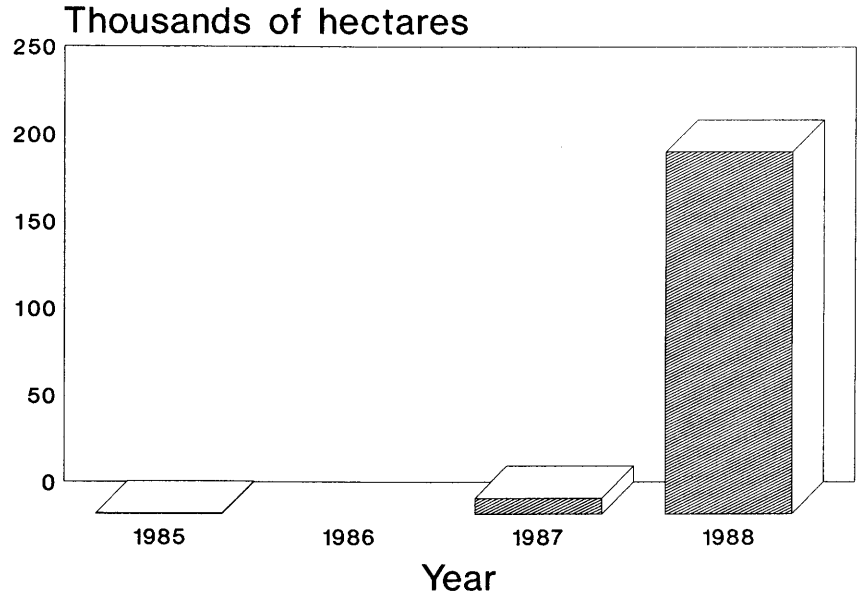


Figure 6. Pear thrips damage in Vermont, based on aerial sketch mapping.

Damage caused by this insect was centered in the central and southern areas of Vermont, and in these areas the damage was extensive (Fig. 7). Hardly a maple was spared, and in many cases all of the leaves on individual maple trees were destroyed, requiring complete refoliation. From the air the forest floor in severely damaged sites was visible through the canopy as if it were winter. The actual impact to the sugar maple of this severe defoliation early in the growing season is still unknown (Houston et al. 1988). Research is needed to answer this basic question. Until this answer is found we can only hypothesize as to the potential impact, but repeated thrips damage year after year must take its toll on tree health, and pear thrips damage in the spring followed by a late-season defoliator such as saddled prominent, *Heterocampa guttivitta*, or forest tent caterpillar, *Malacosoma disstria*, could be devastating.

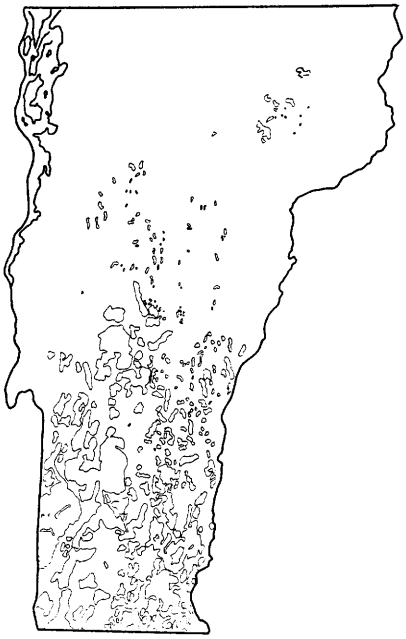


Figure 7. Areas of severe pear thrips damage in Vermont determined from aerial sketch mapping in 1988 (Teillon et al. 1988).

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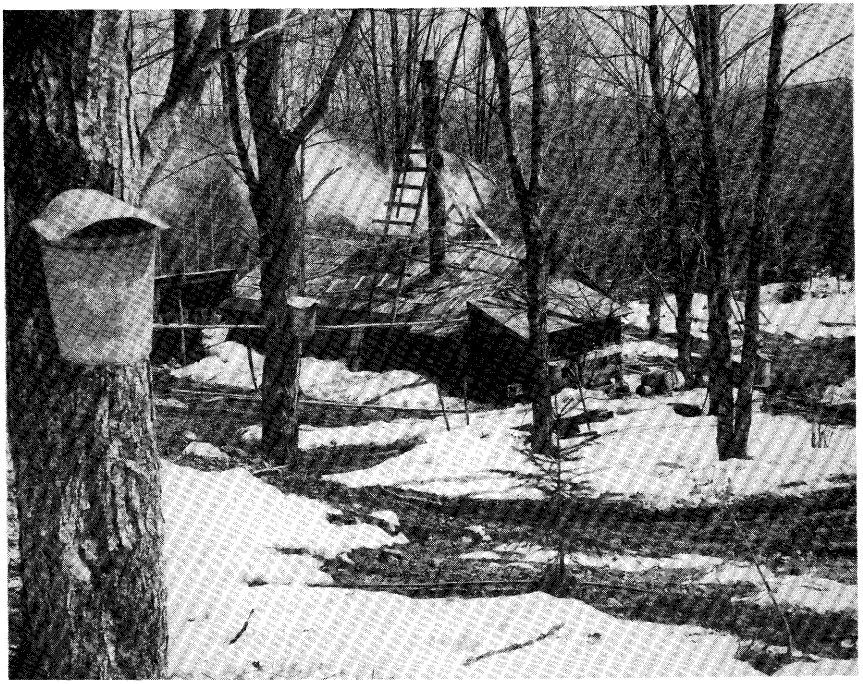

Sugaring in Vermont
(photo from Vt. Development Dept.)