Annual Report

July 1, 1985 - June 30, 1986

## Aerial Survey

In early July an aerial survey for insect and disease caused defoliation was carried out across the entire Commonwealth. On 304,524 acres the Gypsy Moth was considered the sole defoliator. On an additional 173,281 acres in south-eastern Massachusetts suffered defoliation from a Gypsy Moth - Oak Leaf Tier - Leaf Roller complex. Sixty percent of this defoliation was attributed to the Gypsy Moth. On another 181,844 acres in the same area the tier - roller complex was considered the major cause of the defoliation.

Other defoliation noted was caused mostly by the Oak Leaf Skeletonizer. This was observed in the southern Connecticut River Valley and totaled 65,952 acres. It is unusual to observe such heavy first generation feeding by this insect. By late September this insect could be found wherever oak trees existed in Massachusetts.

In eastern Franklin County 3,360 acres were defoliated by the Oak Leaf Tier.

In June of 1986 a survey for the tier in Franklin County showed a total of 13,224 acres of heavy defoliation. On the south shore 108,653 acres of light to medium defoliation were attributed to this insect along with the leafroller.

Also noted at this time were 8,470 acres of severe defoliation caused by the Fall Cankerworm in Braintree and Weymouth.

### Red Pine Adelgid - Pineus Boerneri

Samples of red pine from Westhampton were found to have the adelgids present. The identification was confirmed by the U. S. Forest Service. This moves the line for the infested area further west than reported last year.

## Mortality Study

The study of mortality following defoliation has been terminated after completing three years of data collection and plot monitoring on a statewide basis. Eastern Franklin County was excluded due to mortality by insect other than the Gypsy Moth. The average mortality of trees over 5 inches in diameter was found to be 17.3 % under forest conditions.

## Anastatus Disparis

Seventeen sites on Cape Cod were selected for the release of this Gypsy Moth egg parasite. The intent is to re-establish this parasite on all of the cape. These sites received parasitized host egg masses that were collected and refrigerated at the Stow facility. The caterpillars were reared from the masses and disposed of and the masses again refrigerated until time for placement in the field. The average emergence of Anastatus from each host egg mass was sixty seven. In the fall Gypsy Moth egg masses were collected from 13 of the release sites. Anastatus emerged from all the collected masses. This emergence varied from 1.6 per mass to 70.3 per mass. The low figure was from the Hawksnest area and the other from area 7 at Nickerson State Park.

The program is being continued in 1986 with emphasis placed on the upper and outer cape. Host egg masses were collected from Hopkinton, Sutton and Milford. A total of 1,375 masses were collected and will yield 45,597 adult Anastatus when released in July 1986.

## Oak Leaf Tier

The tier is building again in eastern Franklin County. The 3,360 acres of last years defoliation increased to 13,224 acres this year. Of this acreage 757 were in the light catergory,(0-30%) 2,598 medium (31-60%), and 9,872 heavy. The egg counts accurately predicted this increase. Branch samples will be collected in the fall of 1986 to make egg counts and predict the upcoming problem in 1987. The average mortality in red oak stands in eastern Franklin County now stands at 28.7% of the trees in excess of 5 inches in diameter. This figure as October 1985.

On the South Shore from the Blue Hills to the Fall River - Somerset area a total of 108,653 acres of defoliation were observed by the aerial survey in June 1986. It appears that both the extent and severity of the Oak Leaf Tier - Roller complex declined this spring. The final determination of the major defoliator in each area will not be known until each is checked by ground survey. There are two free feeders, the Gypsy Moth and the Fall Cankerworm, and six rollers and the oak leaf tier all feeding in this section of the state.

Collections of the roller larvae and pupa were delivered to the U. S. Forest Service office at Durham, New Hampshire for identification. Two days were spent with Parker Snowden, U.S.F.S. collecting eggs from red and white oaks in the Wrentham area. The eggs found were all Croesia semipurpurana, the Oak Leaf Tier. These eggs were on both oak species. Croesia is not recorded in the available literature as feeding or laying eggs on the white oak. Observation of these trees during the feeding period found the tier feeding on the white oak foliage and later pupating within the oak leaves.

Control of Croesia semipurpurana with Dimilin - 1986

In May 1986 a limited program to determine the effectiveness of a growth regulator for use as a control for oak leaf tier was undertaken. The material used was Dimilin ( diflubenzuron) applied at the rate of 2 oz. and 4 oz. per acre by mist blower. The 2 oz. application produced results equal to the 4 oz. application with good larval reduction and foliage protection.

A two acre site was chosen in the Warwick State Forest and two one acre sites in southeastern Massachusetts. One site was in the Wrentham State Forest and the other at Borderland State PArk. The Wrentham site was sprayed at the 4 oz. per acre rate and the Borderland site at the 2 oz. rate. The mist blower was a Bean rotomist calibrated to two and one half gallons per minute output.

Four hundred feet of roadside, one hundred feet deep were used for each application.

Check trees were used in the Wrentham area for both southeastern sites. Two check areas were used in Franklin County for the Warwick spray site. One was adjacent to the spray site and one was in the Wendell State Forest.The second check site was chosen to determine if any other factor such as severe frost influenced the tier population.

Spraying in Warwick took place on May 9 and on May 13 in Wrentham and Borderland. Trees were numbered for future collecting and larval counts in all areas. All check trees had egg counts comparable to the sprayed trees.

In the Warwick State Forest both sites were on the west side of Page Rd. Mixed growth ie: red oak, red maple and an occasional hemlock or birch comprised each site. Three red oaks were sampled with a pole pruner in each area and all larvae counted on fifty leaves. Ninety percent of the larvae were in the first instar and ten percent in the second instar. The total larvae from the check trees was 162 on the fifty leaves from each tree counted. In the 2 oz. spray site the total was 180 and in the 4 oz. site the total was 160. Five days later the sites were again sampled and counted. The check trees had 186 larvae, the 2 oz. = 218 and the 4 oz. = 203. On 5/20, eleven days following the spraying and larval molting the check area had 270 larvae, 2 oz. = 7 larvae and 4 oz.= 62. The Wendell check had 202 larvae on 5/15 and 222 on 5/20 and on 5/29 had 99 larvae with pupa and pre-pupae present in the duff under the sampled trees. The Warwick check trees had 60 larvae on 5/29 with pre-pupae and pupae in the duff under the trees. The 2 oz. site had 1 larva and no pre-pupa or pupa present and the 4 oz. site had 5 larvae with no pre-pupa or pupa found. The treated trees were 10-15 % defoliated and all check tree were 100 % defoliated.

In Borderland one acre was sprayed at the 2 Oz. per acre rate on 5/13/86. Both this site and the Wrentham site were 7 - 10 days behind the Warwick site in leaf and larval developement. All larvae at both sites were in first instar when the material was applied as were the check trees. Five trees were sampled at Borderland to compare with the check trees in Wrentham that had comparable egg counts. Ninety seven larvae were counted at Borderland on the spray day and 79 at Wrentham. Two of the check trees still had not broken bud and the counting was difficult. On 5/19, six days after spraying the 2 oz. site had 27 larvae and the check had 79. On 5/27 the treated trees had 15 larvae and the check had 48. On 6/2 no tier were found at the spray site and no pre-pupa or pupa were found in the duff. The check trees had 9 larvae with pre-pupa and pupa present in the leaves and in the duff. No Gypsy Moth caterpillars were seen at the spray site but were in the abutting acreage. They were present at the check site.

The Wrentham site was also treated on 5/13 with 4 oz. per acre. ~~Three~~ Five trees were sampled and 51 larvae found. On 5/19 only 2 larvae were found in the spray area and 79 in the check area. On 5/27 one larva was found and the check had 48. On 6/2 no larva, pre-pupa or pupa present while the check area had 9 larvae and pre-pupa and pupa in the leaves and both in the duff under the sampled trees.

All trees treated hadbroken bud and spray was applied to the foliage with the exception of two sample trees in Warwick which probably explains the disparity in larval counts on 5/20 for the 4 oz. treated area. In some quarters there is feeling that this material may have some contact properties. This may be what is demonstrated on those two trees. A follow-up program of spray application prior to bud break should be undertaken. A very limited time of application for this insect is currently recommended. If there is good control by contact it would extend this narrow window and give better results in controlling this destructive insect.

## Other Items of Interest

Ash Leaf Rust was observed in Essex county on 1,091 acres. The heaviest areas of infection being in the Topsfield,Georgetownand Groveland section of the county. This disease requires an alternate host. The alternate host is salt marsh grass. Maine has recently reported that there may be a fresh water marsh grass that also acts as an alternate host.

The Pine Bark Adelgid ( Pineus strobi ) caused severe yellowing of the needles of white pine in several areas in the fall of 1985. This insect is usually found on the trunk and branches of the host but in this case was found only in the needle sheath. Mortality was observed on young trees and seedlings in Gardner, Winchendon and Stow.

We are also involved in a project entitled Analysis of Stress Symptoms of Massachusetts Forests. We will supply past history of defoliation and disease problems and make field trips to problem areas as needed.

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Douglas V. Trefry

7/22/86

B. Experimental Control of Croesia semipurpurana with Dimilin - 1986

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A two acre site was chosen in the Warwick State Forest and two one acre sites in Southeastern Massachusetts, in the Wrentham State Forest and at Borderland State Park. The Wrentham site was sprayed at the 4 oz. per acre rate and the Borderland site at the 2 oz. rate. The mist blower was a Bean Rotomist calibrated to two and one half gallons per minute output. Four hundred feet of roadside, one hundred feet deep were used for each application. Check trees were used in the Wrentham area for both southeastern sites. Two check areas were used in Franklin County for the Warwick spray site. One was adjacent to the spray site and one was in the Wendell State Forest. The second check site was chosen to determine if any other factor such as severe frost influenced the tier population.

Spraying in Warwick took place on May 9 (Table 1) and on May 13 in Wrentham and Borderland (Table 2). Trees were numbered for future collecting and larval counts in all areas. All check trees had egg counts comparable to the sprayed trees.

In the Warwick State Forest both sites were on the west side of Page Road. Mixed growth i.e. red oak, red maple and an occasional hemlock or birch comprised each site. Three red oaks were sampled with a pole pruner in each area and all larvae counted on fifty leaves. Ninety percent of the larvae were in the first instar and ten percent in the second instar. The total larvae from the check trees was 162 on the fifty leaves from each tree counted. In the 2 oz. spray site the total was 180 and in the 4 oz. site the total was 160. Five days later the sites were again sampled and counted. The check trees had 186 larvae, the 2 oz. had 218 and the 4 oz. had 203. On 5/20, eleven days following the spraying and larval molting the check area had 270 larvae, 2 oz. had 7 larvae and 4 oz. had 62. The Wendell check had 202 larvae on 5/15 and 222 on 5/20 and on 5/29 had 99 larvae with pupa and pre-pupae present in the duff under the sampled trees. The Warwick check trees had 60 larvae on 5/29 with pre-pupa and pupae in the duff under the trees. The 2 oz.site had 1 larva and no pre-pupa or pupa present and the 4 oz. site had 5 larvae with no pre-pupa or pupa found. The treated trees were 10-15% defoliated and all check trees were 100% defoliated.

**WARWICK**

Number of Larvae

| Applic. Date | Spray Day | After 5 days | After 11 days | After 20 days |
|---|---|---|---|---|
| 2 oz. | 180 | 218 | 7 | 1 |
| 4 oz. | 160 | 203 | 62 | 5 |
| check Warwick | 162 | 186 | 220 | 60 |
| check Wendell | | 202 | 222 | 99 |

TABLE 1

In Borderland one acre was sprayed at the 2 oz. per acre rate on 5/13/86. Both this site and the Wrentham site were 7 to 10 days behind the Warwick site in leaf and larval development. All larvae at both sites were in first instar when the material was applied as were the check trees. Five trees were sampled at Borderland to compare with the check trees in Wrentham that had comparable egg counts. 97 larvae were counted at Borderland on the spray day and 79 at Wrentham. Two of the check trees still had not broken bud and the counting was difficult. On 5/19, six days after spraying the 2 oz. site had 27 larvae and the check had 79. On 5/27 the treated trees had 15 larvae and the check had 48. On 6/2 no tier were found at the spray site and no pre-pupa or pupa were found in the duff. The check trees had 9 larvae with pre-pupa and pupa present in the leaves and in the duff. No gypsy moth caterpillars were seen at the spray site but were in the abutting acreage. They were present at the check site.

EASTON - WRENTHAM

Number of Larvae

| Applic. Date | Spray Day | After 6 days | After 14 days | After 20 days* |
|---|---|---|---|---|
| 2 oz. Easton | 97 | 27 | 15 | 0 |
| 4 oz. Wrentham | 51 | 2 | 1 | 0 |
| Check | 79 | 79 | 48 | 9 |

TABLE 2

*most pupation had taken place

The Wrentham site was also treated on 5/13 with 4 oz. per acre. Five trees were sampled and 51 larvae found. On 5/19 only 2 larvae were found in the spray area and 79 in the check area. On 5/27 one larva was found and the check had 48. On 6/2 no larva, pre-pupa and pupa in the leaves and both in the duff under the sampled trees.

All trees treated had broken bud and spray was applied to the foliage with the exception of two sample trees in Warwick which probably explains the disparity in larval counts on 5/20 for the 4 oz. treated area. In some quarters there is feeling that this material may have some contact properties. This may be what is demonstrated on those two trees. A follow-up program of spray application prior to bud break should be undertaken. A very limited time of application for this insect is currently recommended. If there is good control by contact it would extend this narrow window and give better results in controlling this destructive insect.