

ENTOMOLOGY

# Air War on Pests

Trees sprayed with DDT from the air to kill the gypsy moth, tussock moth and other insects. "Ground troops" guide the pilots.

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*Written especially for Science Service*

See Front Cover

➤ WAR FROM the air is being waged on enemies within our boundaries—fifth columnists who for years have been destroying American homes even before they could be built. These enemies are insect devourers of our forests—East, West and South—that rank second only to fire in their destructiveness. Swooping planes are distributing death to them in the form of DDT spray. For the first time, defenders of our forests feel that they are not waging a losing battle.

First of these pests to come under attack has been the gypsy moth. This undesired immigrant is a little insect with a devastating appetite for the leaves of oak, apple, maple, and other forest, fruit, and shade trees. It has destroyed millions of feet of timber that we could well have used for houses and furniture and paper and countless other items.

Now, a quarter-century after the insect became one of our worst pests and just a few years after we mounted a full-scale offensive against it, we have a way to prevent such damage.

In New England in 1924 larvae of the gypsy moth stripped leaves off trees on 825 acres. Trees need leaves to make and assimilate food; most of them die after two or three consecutive years of defoliation.

## 800,000 Trees Stripped

In 1945 trees were stripped of their leaves on 800,000 acres in New England, an area of general infestation; in New York, into whose eastern counties the insects were blown by the hurricane of 1939; and in northeastern Pennsylvania, where the infestation covers about 100 square miles.

Against the pest, federal and state agencies, chambers of commerce, local authorities, and property owners joined forces. The first experimental sprayings with DDT were made in 1945. The

next year 54,000 pounds of the insecticide were applied to 80,000 acres of infested timber, three-fourths of it by airplane. Last year twice that acreage was treated. The results have been spectacular: Not one living gypsy moth has been found in the treated areas. The fourth great battle is now in full swing.

In May the caterpillars hatch from the yellow, hair-covered masses of eggs the female moths deposited last July and August on tree trunks, fences, walls, junk piles. The caterpillars commonly crawl no more than 200 feet, but they move by spinning down their silky threads. Sometimes they fall on passing vehicles or are carried by the wind.

First they eat the trees' buds. Then as they grow they devour blossoms and leaves. The best time to fight them is in the spring, beginning about two weeks before the hatching and continuing until the caterpillars are full grown.

In Pennsylvania, where last year pilots treated 45,000 acres, the spraying of 150,000 acres began this year on April 20, to continue into June. In New York, around Albany, 50,000 acres are being sprayed.

## Front Line Fighters

Airplanes are the front-line fighters, but for isolated infestations along roadsides and in villages and out-of-the-way place, the workers use ordinary knapsack sprayers, or high pressure blower units, which are effective up to 300 feet, or sometimes more if the wind is just right.

Before the work is undertaken, entomologists and other trained men carefully survey the infested areas to establish boundaries and priority of treatment. Sometimes they examine a locality tree by tree. Sometimes they make spot surveys at selected points only. In that way in 1946 about 970,000 acres were inspected.

Another way is to set out traps two miles or less apart in districts to be surveyed. The traps are paper cones and sheets of sticky paper, to which the males are lured by a sex-attractant substance obtained from female gypsy moths. If a male is caught, more traps

are put nearby to fix the site of the infestation more exactly. In this way 6,000,000 acres were scouted in 1946. More than 11,000 traps were used; more than a million pupae were collected for the sex-attractant material.

To guide the pilots, white or orange windsocks are attached to the higher trees, spaced closely enough so that one is always in sight. Sometimes gas-filled balloons, operated from the ground, are used to mark the line of flight, especially in mountainous country.

## Test With Glass Plates

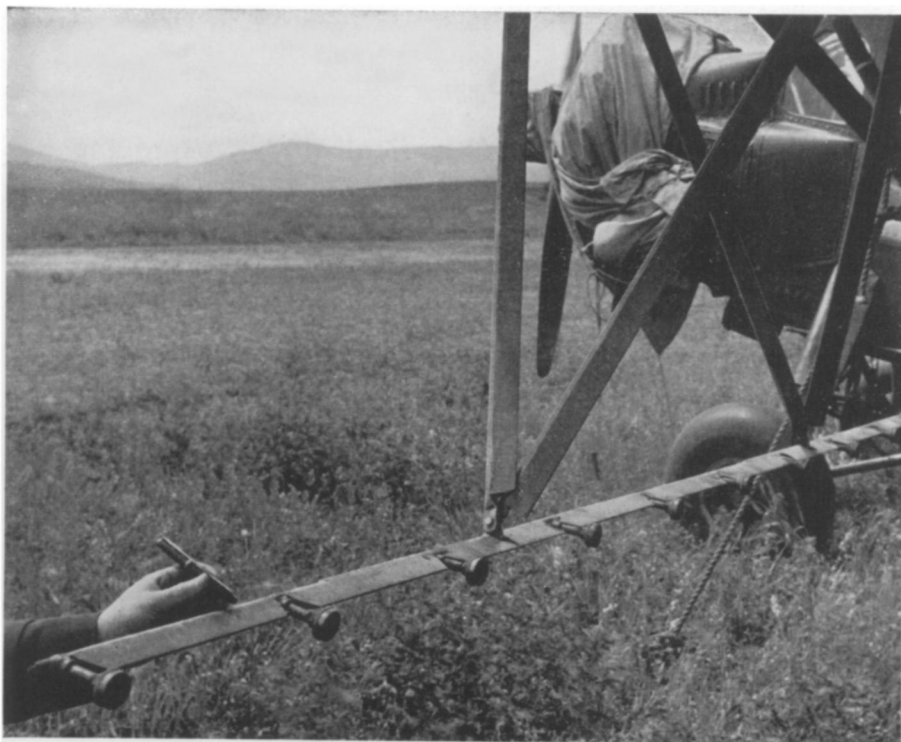
To make sure of good coverage, glass plates are placed 25 to 50 feet apart on the ground along the line of flight. The coverage is measured by the deposit of atomized particles on them. Not often does a pilot have to repeat, so careful are the plans and performance.

The record for a day's work was set last May 15, a still, clear day and ideal for low flying, when four planes covered 4,605 acres in Pennsylvania. Early morning or late afternoon are considered the best times for spraying.

Technicians assigned to observe the effects on wildlife found no indications of injury to bees, birds, fish or other wildlife—except to crayfish and some



**EFFECTIVE TEST**—Glass plates set at right angles to the path of the spraying plane pick up samples of droplets and thus give an idea of effectiveness of the attack.



**TO SPREAD DEATH**—Close-up of the multiple-nozzle DDT armament of a single-motored plane. Ranger's hand with fountain pen gives an idea of size.

fish in one shallow pool over which the plane, whose shut-off device was not working properly, had to fly several times in making turns. Nevertheless, as a precaution, pilots avoid flying directly over streams and ponds when spraying.

Some of the infested areas had 4,000 egg clusters to the acre before treatment; after spraying, 39,500 acres were carefully examined, and only 12 clusters were found. On the basis of this evidence, state and federal entomologists believe that the next few years will bring the eradication of the gypsy moth in many areas where it has been most destructive. In the operations this year they expect to cover all areas known to be infested in Pennsylvania. Next year the major control operation will be in New York.

#### Against Tussock Moth

Equal success attended the campaign against the Douglas-fir tussock moth, a relative of the gypsy moth, last year in northern Idaho, Oregon, and Washington. That battle by workers in the Bureau of Entomology and Plant Quarantine and the Forest Service of the Department of Agriculture, State and regional foresters, and forest owners was the largest forest-insect spraying project of its kind ever undertaken. In

two weeks 390,881 gallons of DDT solution were sprayed in 2,120 flights over 413,469 acres, nearly all mountainous.

A view of the spraying is shown on the front cover of this SCIENCE NEWS LETTER.

A few days after the spraying few living caterpillars could be found anywhere in the sprayed area.

Some work has been going on on the white-fringed beetle in Georgia, the Carolinas, Florida, the Gulf Coast area as far west as Louisiana. This beetle was introduced several years ago and has been a problem since 1937.

#### Use DDT Entirely Now

In the past two years, spraying has been entirely with DDT—airplanes and ground equipment were used. About 200,000 acres were infested, in Georgia, Alabama, Florida, Louisiana, Mississippi and North and South Carolina.

This year about 37,000 acres are being treated. The work centers are at Gulfport, Miss., and in Macon, Ga. The heaviest infestation is the Alabama and Georgia area, narrowing off farther west and farther east. DDT is being used for the adult beetles, but also has been found effective for eliminating the larval stages from the soil. About 10 pounds of DDT are used per acre in

tillable areas. This amount is effective for at least four years. Entomologists are especially interested in the fact.

The unbalance that has permitted epidemics of defoliating moths is still with us. Why these occasional upsets in the natural balance among native organisms, parasites, and predators that, in virgin wilderness, keep in check certain dangers is not fully understood. No doubt they are man-made to some extent.

Cooperative big-scale action is needed against other insects in our forests—the white pine weevils in the North-eastern and Lake States; the spruce budworm, which is becoming serious in New England; the pink bark beetle, which has caused heavy losses in the West and the larch sawfly, which has killed many mature stands of larch in the Lake States.

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"Forty-Niner" is the name of a relatively new hybrid tea rose which is a rich yellow outside and vivid red inside.

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