

a chance and it'll grow on you.

AERIAL WAR ON TUSSOCK AND



TWO FRONTS: GYPSY MOTHS



TWO of the forest's most destructive enemies attacked on two fronts last year, as if in a planned alliance. Proliferating rapidly, both the tussock moth in the West and the gypsy moth in the East had forest experts in doubt about the future's balance of power in private woodlands and national forests and parks.

In Washington, Oregon and parts of Idaho, the tussocks seemed able to time the start of their biggest offensive in 1973, when the traditional and most effective weapon against them, DDT, had been banned by the National Environmental Protection Agency.

Gypsy moth invasions were causing the most damage in northeastern states, but like the tussocks, gypsies readily disperse themselves by the wind, so other parts of the East, Southeast and even Midwest may be in for trouble. Particularly vulnerable will be the oak forests of the Appalachian and Ozark Mountains and Southern oak-pine stands, all containing high concentrations of favorite gypsy moth edibles.

New Tactics

Federal and state forest agencies adopted some new tactics against both infestations for 1974. In the western states, Forest Service officials were faced with the defoliation and loss of an estimated 400,000 acres of Douglas fir and other conifers. That would be compounded by the threat of great fires which often result in the dry-dead stands defoliated by the tussock. Public pressures to end what promised to be catastrophic losses in timber grew beyond the earlier pressures to halt the use of DDT.

The eastern gypsies, until 1963 controlled by DDT spraying, were also becoming the subject of public outcry for action. In those states, limited spraying with DDT alternatives had been going on for several years, but had failed to check the rapid spread of moth populations.

The new battle plans drawn for both sides of the nation bore some interesting resemblances to one another. Long-range, foresters worked toward basic biological control programs. Gypsy and tussock moth infestations, after causing severe defoliation in a given area, do tend to collapse after a two to three-year period, having eaten themselves out of business. It is hoped that the introduction of parasites, natural predators and/or treatments with virus, bacillus and sex attractants will, if all goes well, eventually cause earlier collapses and thus reduce the acres destroyed each year.

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In the meantime, action was urgently needed to head off the disaster in the West and to at least buy more time in the East where the gypsy population explosions were far outpacing the collapses. It was obvious that 1974 would be crucial on both coasts. Tussock blights were affecting up to a million acres in huge blocks of prime timber. In an era of rising timber economics, one of the large private landowners was reporting timber destroyed or damaged in stands worth over \$10 million. This was all the more frustrating because it was generally known that just one application of DDT could probably halt losses until natural solutions could be established.

Tussock Control Solution

To combat the tussock moth crisis, a temporary return to DDT for one year's application was approved for the summer of 1974, getting support from some of the same elected officials and others who had pushed for the DDT ban earlier. In

the worst infestations it was agreed that only a kill of from 95 to 99 percent would stop the tussock, and only DDT could do it.

The time frame was critical for that kind of result. Over 400,000 acres in southeastern Washington, northeastern Oregon and western Idaho had to be sprayed within a few days of the insect's hatching, which occurs at varying times depending on elevation and temperatures in each area.

Helicopter Fleet

Teamed with the DDT emergency weapon, a fleet of larger, faster helicopters than had previously been conventional in aerial application was chosen by the Forest Service. Charter aircraft operator Evergreen Helicopters, Inc. headquartered in McMinnville, Oregon had been refining the use of spray equipment on its Bell 205 turbine ships, carrying a 400-gallon internal spray tank, and capable of speeds above 90 mph.

Five of these Evergreen 205's, working in concert with three light

helicopters were programmed and re-programmed by the company's application specialists according to the hatching periods in each stand.

Elaborate control systems governed the project throughout, and following its completion on July 21, the more than 150 monitors were unable to find one fish, fowl, rodent or other wildlife casualty. In order to determine exact chemical concentrations in the wildlife biologists did, however, kill 500 specimens before and after the project.

For the large, widespread plots of the tussock application, the larger helicopter used by Evergreen was not only more effective but also economically competitive with small ships with much lower per-hour operating costs. Able to reach production rates of between 1000 to 1400 acres per hour depending on conditions, the Bell 205 could handle the work of five smaller helicopters, and at the same time permit a drastic reduction in the cost of chase ships required; there were simply fewer application aircraft to chase.

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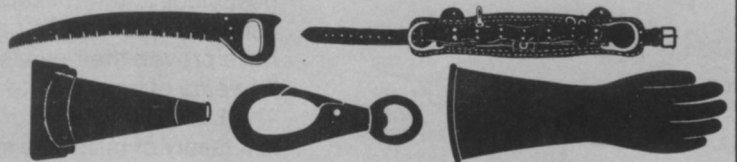
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The Eastern Front

"Limited warfare" is the proper analogy to describe the gypsy moth application in Pennsylvania as carried out by the Department of Environmental Resources. In that area where the hopes and the needs for ultimate biological control are higher, a non-DDT application confined to populated and high-use recreational areas seemed the only answer again in 1974. Unlike the tussock, gypsy moths came to this country from abroad, so their primary natural enemies were not present to keep it under some control. To develop and establish these enemies in the U. S. is now government's number one objective.

Ruled out even temporarily was the treatment of massive areas with the chemical sprays legally registered for use in this eastern sector. They would provide only a 90 percent or less kill with one application, and when large, contiguous land areas are treated, the surviving gypsies will re-populate to destructive levels in two to three years. With plenty of food to eat, the gypsy

population wouldn't collapse, and today's one "natural" control — that collapse cycle — might be lost.

Experience showed, however, that if smaller areas were sprayed with an organic phosphate (Dylox), residents and trees of each block would get relief from the moth without collapse interference.

Spraying highly populated small blocks, often widely dispersed throughout Pennsylvania, required a multi-talented team of county, state and federal experts working with a list of realistic controls and a plan of responsiveness to varying public interests.

And, as in the western tussock program, it favored a fleet of big, fast spray helicopters. Helicopters this large had never operated as applicators in the East, but their advantages were evident as the State contemplated doubling 1973's treatment area. Although the blocks to be sprayed varied from large to small, the distance between them was often extensive. Thus ferry speed and the Evergreen 205's 400-gallon tank capacity were important, while its maneuverability and precision for the carefully delineated blocks were essential.

Two Evergreen 205's, and one of the company's small Hiller 12E's for flexibility made the team. These ships treated with Dylox some 71,000 acres in Pennsylvania. Evergreen also provided two fixed wing airplanes for application of the bacteriological spray Bt (*Bacillus thuringiensis*), which was used around infested reservoir sites in the sections of the State. The Bt was carried by two Grumman TBM's and a Piper Pawnee, and was applied in two treatments for each of 48,000 acres.

Although the Dylox was proven harmless to every form of wildlife except the gypsy moth and a few other insect species, care was taken by the Department of Environmental Resources to both inform the public and to restrict spraying to closely specified and approved boundaries. The Dylox used was a special Chemagro formulation to assure a perfect balance between kill and avoidance of damage to such surfaces as car paint, etc. To monitor this balance result, company representatives were stationed there most of the time.

Before activating the large 205

helicopter program, Evergreen engineers and application specialists who had developed the up-size spray gear had conducted extensive tests of its accuracy and effectiveness in Corvallis, Oregon. Established in that pre-Pennsylvania test program were the optimum number of nozzles needed, the flow rate of each, and the size of droplet for minimum effect from drift, thermals and evaporation. Refined also were the right combination of pump pressures, angle of the nozzles into the flight direction to obtain proper "shear," and optimum airspeed. The criteria were to be compatible with an application of two-thirds of a gallon per acre.

The success of the DER's helicopter operation was seen after 21 flight days in late May and early June. The average kill in the single Dylox application achieved or exceeded expectations. Unlike the western tussock suppression, where control was complete and widespread enough to preclude major spray programs in the foreseeable future, the gypsy battle will continue this year and until the ultimate biological weapon is established. In the meantime, it's evident that an interim control strategy has been updated and refined which can be depended upon for temporary relief of local congestion. □

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