Early summer, 3 a.m. The woods of northern Maine stand quiet in the predawn. Alders squat along streams and lowlands, while young fir and spruce tops arch gracefully in the haze. Moose and deer feed unhurriedly. A young bear pulls apart a rotten stump and gathers ants, grubs, and beetles. A sleek native trout catches a minnow near the stream bank and then glides back into the shadowy depths. Birds stir and call occasionally. Blackflies, mosquitoes, and midges wait for anything warm and breathing.

The problem:
dense stands of spruce and fir that need thinning so badly that they are often called "dog-hair" stands.

The test:
chopper drops of different herbicide mixtures in precise patterns.

The promise:
a cost-effective way to eliminate overstocking and make trees grow vigorously over large acreages.
Max calls, "It's time," and the weary crew moves again. It's not a summer vacation or a fishing trip. We're beginning another day of silvicultural research, the culmination of months of preparation and cooperation among Maine's Cooperative Forestry Research Unit, two herbicide manufacturers, and several of the state's industrial forest owners, foresters, and land managers.

Dr. Maxwell McCormack Jr., leader of the Cooperative Forestry Research Unit (CFRU) and silviculture research professor at the University of Maine, wakes the group: two undergraduate and two graduate forestry students; a helicopter crew boss, the pilot, and three assistants; research foresters; and several chemical-company reps.

Max has studied various aspects of the silvicultural use of herbicides in the Northeast for over two decades. One major focus of his present research involves aerial application of herbicide mixtures, in strips, employing the precise spray techniques used for brush control on rights-of-way. These strip treatments are applied to the thick ("doghair") spruce-fir regeneration that often develops after mature trees are harvested or killed by the spruce budworm. This thick regeneration sometimes reaches a density of 40,000 stems per acre (about one tree per square foot); only 800 to 2,000 stems per acre are needed for optimal growth.

Such overstocking often presents significant problems in spruce-fir forests. Just as gardeners weed and thin their crops, leaving the most valuable plants to mature quickly, the conscientious forester has similar, although longer-term, goals. The silviculturist removes unwanted trees to reduce competition, thin crowded stands, and help maintain vigorous growth of the remaining crop trees. This practice increases the yield of useful timber while improving access to the stand.

Recently, machines such as "hydrotomes" and brush-saws have been used to thin thick spruce-fir stands. In certain situations these machines have been very successful, but they also involve some safety, terrain restriction, and cost problems.

During the last three years, Max has been developing, testing, and perfecting a treatment he calls herbicide "strip-thinning," a technique designed to systematically remove strips of vegetation from the thick spruce-fir regeneration. He believes that strip-thinning will improve crop productivity in these
young, overstocked stands while leaving the soil surface undisturbed. (Soil disturbance can lead to the rapid invasion of undesirable forest weeds, like raspberry.) And he believes he can keep the cost below $40 per acre.

In addition, this technique will allow treatment of large areas during a short period, while suppressing a broad spectrum of hardwood “brush” and forest weeds. The potential for human injury will be minimized because workers will not be using high-speed cutting tools, which can be extremely dangerous on the best terrain, not to mention irregular terrain and the deep slash common after many northern Maine cutting operations.

Early trials evaluated five individual herbicides applied in various combinations and rates. Those trials produced the following preliminary findings: 1) although most of these herbicides controlled hardwood brush and raspberry quite well, conifer removal was best using dicamba (BANVEL®) and picloram (TORDON®); 2) conifer control was improved when 2,4-D was included with these two herbicides; 3) treatments should be applied in mid to late June; 4) as much as 25 gallons per acre should be applied where vegetation is abundant; and 5) treatments should be applied to young stands.

This article gives a firsthand account of the subject of this month’s “At Issue” column (see pages 10-11). However, it is not meant to reinforce either of the opinions presented there. It is intended to give the reader a broader background with which to form his or her own opinion on this important topic.

Boiling water is added to instant coffee as the group struggles to the kitchen. Meals, although essential, are low-priority. We’ve come to spray, and in Maine ideal spray conditions are sometimes limited, so each opportunity must be captured.

The morning is overcast and calm. We’re treating land owned by Great Northern Paper, a division of Great Northern Nekoosa Company. While in the area, we’ve established base camp at Great Northern’s Telos Logging Camp. Two days earlier we treated land near Moosehead Lake owned by Scott Paper Company, and “camp” was a local motel. A small parade of vehicles traverses the maze of logging roads to the study site. Overhead, Gary, the helicopter pilot, makes a pass at the landing area, a road intersection, circles once, and then gently eases the Lama down. A perfect landing.

The Lama, a French helicopter, can carry a pilot and 200 gallons of mixed herbicide. We first saw the Lama in large pieces loaded on a flat-bed trailer and later watched in amazement while the helicopter crew quickly but expertly assembled it at the first spray site.

The entire crew is on the site before sunup. The chopper is fueled and spray tanks filled. Peter, an undergraduate student, flags the treatment area. His yellow raincoat moves on the hill about a quarter-mile away. His telescoping fiberglass pole, with strips of yellow and orange plastic at the top, is held high. As the chopper approaches, Peter waves the flag, which Gary uses for accurate spacing. The spray mixture starts to flow—like ribbons of rainwater during a thundershower, except that four individual sheets fall side by side. This pattern is achieved by using a boom fitted with nozzles spaced at three intervals. The nozzle spacing allows the herbicide to “take four and leave eight” across the length of the boom—that is, the herbicide treated four feet of vegetation and then, because the nozzles along the next section of boom are closed off, it leaves eight feet of vegetation untreated, then treats four, leaves...
eight, etc., along the length of the boom.

The pattern stays together well as Gary holds the chopper at a constant height and speed. After a dozen passes the helicopter lifts, cuts across our view of the mountains, and heads back to the pad. The helicopter crew begins to scramble, looking like a combination of the opening scene from M.A.S.H. and a pit crew at the Indy 500. When the Lama settles, they rush in and pump fuel and spray mixture. The pad is checked, then a "thumbs-up" from the crew launches the Lama. Gary is spraying again in less than four minutes.

At camp the contents of small containers are added to water in the top of the batch truck, while 30-gallon drums are pumped in. Next we triple-rinse each container. All rinse water goes into the batch. Then, to achieve the proper dilution and total volume, more water is added.

By noon the containers are cleaned and the new batch is mixed. We are ready to roll. No hurry, however—the wind has come up, and we all settle back to enjoy a leisurely lunch.

During the next two days we spray for a total of about two hours. However, on the third morning the wind is down and much is accomplished. Gradually we manage to spray the strips, either in the early morning or during quiet periods before dark. During midday folks get acquainted with each other and reacquainted with sleep.

The operation progresses slowly. We have been in the field eight days, and some home-cooked meals would sure taste good. The last major trial will test the effectiveness of different herbicides and combinations on low-growing brush in a cutover area prior to replanting with conifers. This "site-preparation" test involves relatively small batches of several herbicides and combinations, which must be prepared individually at the spray site.

The chemicals are moved to the batching area, and I stay with them for security. The batching area is a bug-infested gravel pit, and my only amusement is listening to a French-Canadian radio station.

On the second morning I wake at 3 a.m. and have some juice and a couple of stale doughnuts. It's clear and calm, and in the distance I think I hear the chopper flying. Three hours later Max rolls up.

He checks the equipment and orders a couple of changes. Soon the batch truck pulls up, followed by the fuel truck. Eventually the entire crew is at the site and another scramble is under way. Mixing starts immediately.

The chopper swings in from behind and surveys the site-prep area. The spray boom has been changed to allow complete coverage of target vegetation. No strips here. After his survey, Gary settles the Lama and we pump spray mixture into its tanks.

Everything loose is secured as the Lama lifts and heads to the flagger. We begin mixing a new batch immediately. The sun is bright, the day still windless. The bugs are terrible.

Finally the fifth and last treatment is mixed and pumped into the chopper. The wind has held. Even Max begins to relax. He strolls briskly up the road, shoots some pictures of the helicopter at work, and occasionally turns his camera on the batching crew.

We clean up. It is 10 a.m. The crew is congregating when Gary settles the Lama and shuts her down. The protective gear is removed. Little is said, but the feelings and faces show accomplishment—and satisfaction.

Days turn to weeks, then months. A couple of times during the summer, I swing by the plots to observe early effects of the strip-thinning. After about two months it's clear that the treatments have killed many of the competing hardwood species, such as aspen, pin cherry, birch, red maple, and raspberry, and that the fir and spruce have also been suppressed.

In late August there's a call from the helicopter crew boss. He's flying in the area; would Max like a closer look at the strip-thinning plots from the Lama? Later that night, when Max gets back to the office, he is ecstatic. We've got the combination! Wait till you see these pictures!" he says, patting the camera.

Five days later Max gathers the field crew. The office lights are dimmed; the projector hums and glows. Chairs are filled, and two of us sprawl on the floor. As we examine the slides we begin to realize the significance of our work. The strips are really impressive. Someone says, "Ya know, that looks like a cornfield." Eight-foot rows of green conifers stand between four-foot rows of dead spruce, fir, and "brush.

Not only has strip-thinning accomplished the objective, it seems to be cost-effective and commercially applicable over large acreages.

Although the data will not be quantified until this winter, the pictures speak for themselves. This technique could safely save thousands of dollars for forest industry and private landowners faced with severe overstocking.

As we sit around the office, memories come back—the early mornings; batching; new people; BUGS; "ear-muffs" and "thumbs-up," working near the chopper; the moose, deer, and bear that shared the roadways; the stories; the friendships. AF

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