Heli-Applicator Trial

Shawnigan Lake - Blk. 141

Interim Report on Field Test - Sept. 24, 1985

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October, 1985

Ministry of Forests
Silviculture Branch
Victoria, B.C.
During the latter part of 1984 and early 1985, several meetings were held with Engineering and Silviculture Branches, to discuss future development of the Heli-Applicator. As a result of these meetings, modifications of the Heli-Applicator were carried out, primarily to improve the sprayer delivery system.

Subsequent field test (Nov./84 and March/85) indicated that the desired delivery was achieved and requirements for achieving optimum droplet distribution were defined.

The final stage of the Proof of Concept phase is the field test using actual chemical. It was decided that this would be carried out during August/85 on a total of 2.6 hectares. The majority of the area was to be broadcast treated, with the remaining 1.0 hectares receiving spot treatment.

An 'Application for Pesticide Use' was submitted by mid June, yet approval to commence was not received till mid September. As this would not allow for treatment to be carried out during Sept./85, due to advertising requirements, a request was made to perform limited testing on 0.5 ha during 1985. Permission for such testing was granted by the Pesticide Control Branch and treatment was carried out on 85-09-24.

The following people were on-site for the Sept/85 field test:

John Nissen - Pilot
Ken Nelson - Engineering Branch
Gord Ackerman - Silviculture Branch
Robin Mullet - Pesticide Control Branch

The 0.5 ha portion of the area selected for treatment lies adjacent to the entrance road to the block (Figure 1). Boundaries of treatment area were flagged and 4 lines, to monitor drift, were established, at right angles to the boundaries and kromakate cards were placed on the lines. Cards were also located within the treatment area to monitor droplet size and distribution. Location of sample cards is shown in Figure 2.
Figure 1: Location of treatment block
Shawnigan Lake
Block 141

Figure 2: Location of sample cards within the treatment block.
Treatment

On the morning of Sept. 24th the boundary of the 0.5 ha treatment block was established and flagged while the pilot test flew the Heli-Applicator. Prior to any actual spraying, it was noted that several teeth were missing from the main (nylon) drive gear. Replacement of this part by J. Nissen, with the assistance of R. Mullet, took approximately 1 hour.

A second major problem was encountered at the beginning of the second flight. After the Heli-Applicator was loaded and flying for less than 1 minute the machine suddenly lost power. Unfortunately, the pilot was unable to return the machine to a safe landing spot. As a result the main rotors were damaged. Replacement at this part took approximately 1 hour, including the time required to set up the tracking. A similar incident of sudden lost power was also noted on the fourth flight of the day but no damage occurred as the pilot was able to bring the craft to a safe landing. In both cases, the specific cause of the loss of power could not be determined.

During the time spent on the site, a total of 4 flights were made. During each flight a total of 1 litre of spray solution was applied, in a period of approximately 8.5 minutes. To achieve the optimum distribution required by Silviculture Branch, the pilot was required to make approximately 4 passes over the same area. As each flight consumed approximately a half tank of fuel, this was also topped up prior to each flight. Details of the treatment are given in Table 1.

Due to weather conditions in the afternoon and the unexplained power loss situation with the Heli-Applicator only 4 flights were made. This resulted in only 0.41 ha of the 0.5 ha block being treated.

Table 1: Treatment Data

| Herbicide - Roundup (glyphosate) | Diluent - Water and Rodamine Dye |
| Solution Mix - 33% product (11.75% a.i.) | Total Area Treated - 0.41 ha |
| Total Solution Applied - 4 l (0.475 kg a.i.) | Rate of Application - 9.75 l solution/ha |
| - 1.16 kg a.i./ha | Number of flights - 4 for 0.41 ha |
| (estimate: 10 flights/ha) | Actual Spray Time - 8.5 minutes/litre |
| - 83 minutes/ha |
Discussion

Excluding the unexpected mechanical problems which occurred during the treatment, it was felt that reasonable production was achieved. Projections of 83 minutes actual spray time per hectare indicate that the equipment has some merit for broadcast treatment, especially when considering problems with terrain would result in only a minor decrease in production. With the repeated passes over the site excellent coverage was achieved and it was noted that the turbulence, created by the main rotor resulted in good penetration of the target plants. Treatment time could be further reduced if acceptable results can be achieved with fewer passes over the area. Results of droplet size and distribution within the treatment block are shown in Figure 3.

As a condition of the Pesticide Permit, kromakote cards were placed outside of the treatment block, to monitor drift. Four cards placed at 5 metre intervals, with the first card on the border, were used for each line. Results of this drift monitoring is shown Figure 4. Sample cards for Line C indicate that some droplets can be noted for a distance of 15 metres from the treatment block. It is believed that this is a result of the operator making a single pass outside of the treatment block rather than drift.

During the majority of the treatment, it was felt that the pilot maintained excellent control, with an average flying height of 4 metres above the vegetation. In addition the pilot was capable of making slow passes and reasonably sharp turnarounds.
Figure 3: Sample Cards showing droplet size and distribution within the treatment block.
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Figure 4: Sample cards to monitor drift (for location refer to map, Figure 2).
**Recommendations**

Indications are that the Heli-Applicator has some merit as a broadcast application technique, although the most productive use may exist for spot treatment.

To date, numerous mechanical problems have been noted with the existing model. In addition, previous tests carried out using actual herbicide have not achieved the desired efficacy. It is believed that this was a result of poor timing and lack of coverage, problems not noted on the Sept. 24/85 treatment.

To determine if this application technique can achieve acceptable efficacy, a visual assessment is scheduled for Oct. 11/85, at which time results should be evident.

If acceptable results are noted at 17 days post treatment plans should be initiated for the purchase of a larger and better model. Over the winter of 85/86 the new Heli-Applicator could be assembled and modifications (incorporation of spraying gear) can be made. This can be followed, during the spring and early summer/86, with field tests to determine delivery rate, swath width, droplet size and distribution. Actual application, in conjunction with time studies, could then commence as early as mid August 86 to investigate productivity for broadcast and spot application.

The purchase of a new Heli-Applicator would allow the existing model to be used as a back-up unit in the event of mechanical problems.