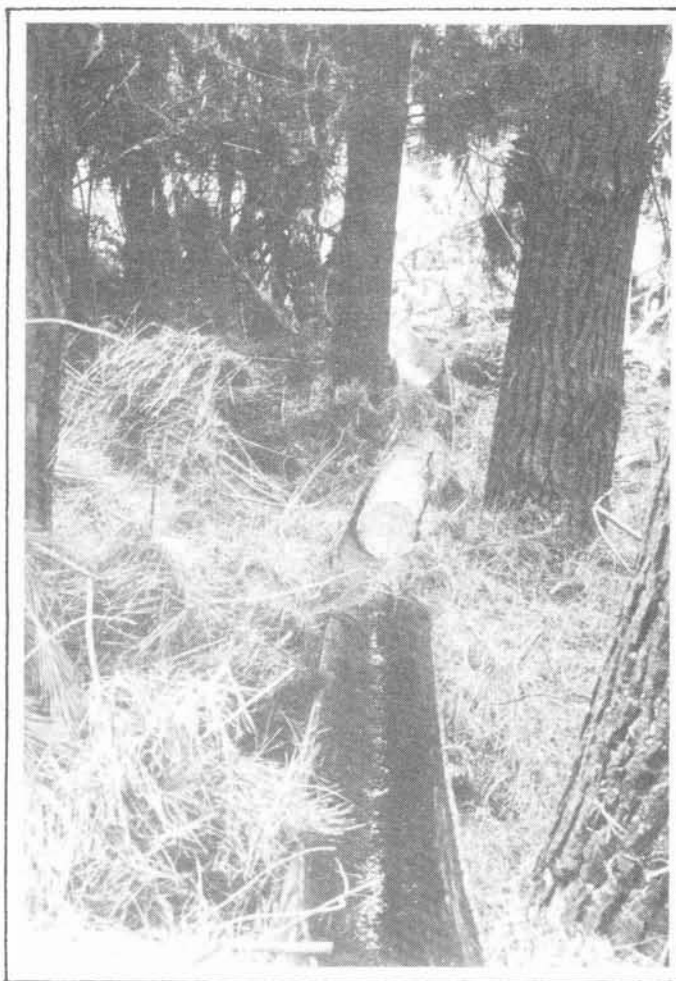


THINNING STEEP COUNTRY USING PLASTIC CHUTES

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INTRODUCTION



NZFP PHOTO

Short pulp moving down chute

The use of chutes for extracting thinnings from steep country is not a new idea; in N.Z. Forest Products Limited operations, wooden chutes were used at Pinedale and Matahina in the 1950's.

In recent years the use of high density polyethylene (commonly known as alkathene) as chute material has been developed in Austria. This material is characterised by its high strength/weight ratio and low friction resistance. Quotes received from an Austrian supplier in early 1979, however, indicated a cost of approx. \$4,500 for 60 m of chutes.

As a cheaper alternative, 30 m of 380 mm diameter alkathene pipe in stock lengths of 6 m were purchased from A.D. Prebensen Industrial Plastics Co., of Hastings, at a cost of approx. \$1,000. These, split lengthwise by skill saw, yielded 60 m of semi-circular chutes, which could be fitted together by using coach bolts with a flat washer and home made wing nuts. These chutes were used for trials in NZFP forests.

Chute Specification

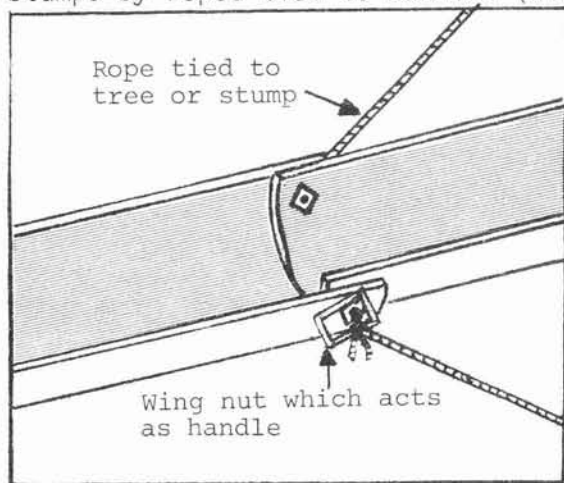
High density polyethylene
380 mm outside diameter
12 mm wall thickness
42 kg per 6 m chute length

METHOD DEVELOPMENT TRIALS

The initial trials were thinning from a 15 year old radiata stand and chuting pieces onto an unused roadway. The maximum extraction distance was approx. 100 m with a variable slope from 29° to 46° and very little undergrowth. The Logging Industry Research Association assisted in the technical development of these trials.

(1) The first method employed two NZFP company men, who thinned an area by normal selection thinning, trimming and cutting to 2 m lengths, leaving the short pulp clear of slash but virtually where it fell after being cut. After the area was completely thinned, they carried up the chute sections, bolted them together,

and to prevent the chute sliding down the slope, secured them to trees or high stumps by ropes tied to handles (wing nuts) where necessary.



Method of joining chutes

The two men then moved by hand the short pulp to and into the chutes, until all pulp in the vicinity of up to 10 m either side was removed. They then dismantled the chute, shifted one section at a time laterally across the slope, reassembled and continued until the area was cleared. The time taken to disassemble, shift, and reassemble the chute was approx. 45 to 60 minutes.

The disadvantage of this method was the difficulty of carrying the chute sections through the slash when shifting lines. However, under some conditions, e.g. pruned stands and no undergrowth, this method could be satisfactory.

(2) The second method involved three men. The complete chute line was assembled first, then trees felled across the chute, trimmed, cut to length, and chuted. Trees were felled in the same direction to keep all slash behind the chutes. This avoided having to carry the sections of chute through the slash when shifting lines.

Of the three men, one would fall, trim, and cut to length, the second would help trim, cut to length, and skid to and into the chutes, and the third would hand skid to and into the chutes only. The men would alternate with each other to ease work load, and all three would shift the chute to the next position before felling recommenced. The average time for shifting chutes was 38 mins. A disadvantage was that the third man was not fully employed except when shifting the chutes.

(3) The third method consisted of a two-man gang. While one man was opening the area, (i.e. felling all trees that could reach the road, cutting to length, stacking, and clearing the road of slash) the other was assembling the chute. By the time the chute was completely set up, the roadside clearing had been finished. One man then started felling and chuting from the bottom, while the other man felled and chuted from the top of the line, felling trees across the chute as in the second method.

A two-man gang seemed most efficient, the only disadvantage being that the gang could not afford absenteeism. With all three systems, roadside stacking of the short pulp was done prior to smoko breaks if necessary, or prior to knock-off, and loaded out later by self-loading trucks.

DISCUSSION

Following the successful trial it was decided to develop the chute extraction method further by starting a two-man contract gang. The \$/tonne rate for pulpwood stacked onto a road was assessed on slope and undergrowth conditions, and compared favourably with hauler produced thinnings.

The gang commenced production thinning in both 15 and 12 year old radiata stands. Output to date shows an average daily production of 14.75 tonnes/day, with a maximum daily output of 17.2 tonnes. Method (3), as explained, was used with the only variation being the method of shifting. After the area has been opened up and the first line completed, both men shift the bottom two sections across the slope. One man starts cutting and chuting. The second man then moves across the remaining chutes, assembles them, and starts felling and cutting up the slope.

The distance between lines, with all three methods, varies depending on the stand stocking, piece size, and undergrowth.

Points to note:

Felling

Trees should be directionally felled across the slope as it makes the delimbing and carrying of pulp to the chute easier. All efforts should be made to fell the heads of trees behind the chutes, (i.e. into the thinned stand). Slash lying ahead of the chutes makes shifting the sections across the slope very difficult.

Carrying Distance

It is important to keep the carrying distance of pulpwood to a minimum. The trials conducted indicate that the chutes should be set up every 4 or 6 rows, with an equal number of rows on both sides of the chute. The rows ahead are felled across the chutes so that the tree heads are behind.

Crew Size

Two, three, and four-man combinations were tried, however, there was not a significant increase in production with 3 or 4 men. A two-man crew is ideal although problems can occur if one man is absent.

Stacking

Stacking of pulpwood at the bottom of the chute lines usually takes two men approximately 1 hour per day.

Setting Up and Handling the Chutes

The chutes should be set up so there are no sharp corners or sudden changes in gradient. The pulpwood travels at high speed down the chute (depending on slope) and can leave the chute at these points.

The chutes will lie on the slope without tie-backs, however, for stability ropes anchoring each section of chute reduce twisting and warping.

The bottom chute section should be set so that the pulpwood lands directly onto the road. Double handling, due to over or under chuting, is non-productive.

The sections of chute can be easily transported between localities on the back of a small pick-up truck or car roof rack.



Short pulp thinning using chute extraction has many options and is not restricted to chuting onto existing roads. It can be used in conjunction with normal short pulp operations, where slopes not accessible to a skidder can be chuted, stacked, and skidder-extracted with other short pulp.

A further option, where no road exists, is to clearfell an extraction strip around the base of a hill, chute onto it and extract the

Stacking the pulpwood at the bottom of the chute lines

short pulp by skidder or forwarder.

The first chutes purchased for trial have produced in excess of 560 tonnes of short pulp, and apart from slight wearing of the joining holes, there has been no noticable wear on the sections. Some deformation occurred when the chutes were placed over extremely rough ground or exposed to hot sunlight, but they tended to straighten again during use.

CONCLUSIONS

At an early stage in the trial the advantages of using chute extraction in favour of other thinning options became aparent. There was very minimal bark damage to residual trees, and very few dominant trees were felled. The area was not selection marked prior to thinning and the men were selecting smaller trees in favour of man-handling the larger pieces into the chutes. One area checked on completion of thinning was stocked slightly over the prescription as a result of this selection.

Productivity is influenced by slope, undergrowth, and to a lesser extent, the stand stocking. The effect of stem size has not yet been qualified, but the reduction in stem size from age 15 (approx. 0.20 m³ per piece) to age 12 (approx. 0.15 m³ per piece) has had no noticable effect on productivity.

In summary, chute thinning appears a very flexible, low capital cost operation, is cost competitive with cable thinning, and has considerable silvicultural advantages.



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