

Treatment of Lop and Top

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INTRODUCTION

The forest manager faced with the problem of reforestation has a number of options open to him in relation to lop and top. These options are as follows:

- 1 Leave the lop and top undisturbed and plant through it.
- 2 Burn the lop and top *in situ* and pit plant.
- 3 Windrow the lop and top and cultivate the soil by ripping with a ripper or ploughing with a tine plough. Ploughing with Cuthbertson single or double mould board does not seem to have been practised.
- 4 Place mounds on top of the lop and top and plant in these mounds.
- 5 Where the first rotation is unthrifty and has no trees of marketable size the crop can be pushed over by bulldozer and ripped by ripper in one operation.

ASSESSMENT OF OPTIONS

1 *Leave lop and top undisturbed and plant through it.*

I do not propose to discuss whether this method is biologically sound or silviculturally advantageous but I can say that it is generally less costly than other methods. From the point of view of cost reduction, timing of the planting operation is of paramount importance. Ideally it should be undertaken one year after clearance of the previous crop. This seems to allow the second rotation time to beat the inevitable weed invasion of the site and at the same time leave a sufficient interval to enable the lop and top to die back to a point where planting through it can be undertaken without expensive preparation (see Table 1). There are situations however where planting through the lop and top without some preparatory work is not possible. I have seen two examples of this and I am quite sure there are several others.

- (i) At Coolgreaney forest in an area where there had been a

gradual removal of first rotation Douglas fir (*Pseudotsuga menziesii* (Mirb) Franco) there was a simultaneous invasion of the site by weeds, particularly bramble (*Rubus sppx*) with the result that now when all the crop is cleared and the site available for reforestation, the bramble has reached problem proportions. It is proposed, I understand, to use an excavator to create planting strips through the vegetation.

(ii) At Anner forest, Co. Tipperary, a situation similar to the one at Coolgreaney obtained. The gradual invasion of the site by a dense growth of bramble coincided with the gradual removal of transmission poles. Here the forester introduced a rather novel ground preparation system. He had a heavy log dragged by wheeled tractor through the vegetation at 2 metre spacing. This created adequate planting strips. In this connection, it is interesting to note that one of the first attempts at mechanical scarification in Canada was the dragging of a granite boulder rigged to a bulldozer over the ground. This provided a crude drag-type scarifying unit.

The reason for my visit to Coolgreaney forest initially was to see an area at Raheenleigh property which I first saw in 1975, after a crop of unthrifty lodgepole pine age 26 years had been felled. The lop and top here was extremely heavy and I did not think it would have been possible to establish the second rotation without first windrowing the lop and top. To my surprise I found that the area had been reforested in 1976 with little difficulty. Sitka Spruce (*Picea Sitchensis* (Bong.) Carr) was pit planted through the lop and top at a cost of 67 standard man hours per ha. The lop and top has now disappeared almost completely and the second rotation is very promising indeed. Damage by hares has not occurred and sheep trespass is also non-existent. Both animals evidently dislike having their movements impeded by lop and top.

2 *Burn lop and top in situ and pit plant*

This is a method which appears to have been practised on a very limited scale only. The best example of it I have seen is at Kilcash property of Slievenamon forest. Here the lop and top was forked in manually from the perimeter of the area as a safety precaution. The material was then successfully burned, the ground was ripped by ripper and the area planted with Sitka Spruce which is now growing vigorously through *Ulex gallii*.

As very few reforestation areas are isolated from existing plantations there is for them a serious fire risk associated with this method. Burning may also be conducive to the spread in the second rotation of the group dying disease, *Rhizima undulata*.

metre centres and place large mounds of spoil from the drains on the lop and top. Each mound was 0.5 to 0.75 m³ in volume. The cost of this method was only 38% of the cost of the original proposal. Today it would probably be as low as 16% of the original method because machine costs have risen at a much slower rate in recent years than manual costs.

Planting was done into the mounds and the second rotation is quite vigorous today. One wonders, however, if the method of

Table 1 — Cost of lop and top treatment options

Option	Method	Cost range per hectare (£)
1.	Slit Plant in old plough ribbon (gley soil)	78.00 — 96.00
	Notch Plant (gley soil)	102.00 — 115.00
	Pit Plant (dry mineral soil)	150.00 — 180.00
2.	Windrow	55.00 — 120.00
	Rip	40.00 — 150.00
	Plant	80.00 — 130.00
3.	Burn (includes manual forking of material in from perimeter)	36.00 — 125.00
	Rip	40.00 — 150.00
	Plant	80.00 — 130.00
4.	Mound	135.00
	Plant (figures from one forest only)	78.00
5.	Roll and Rip	90.00 — 143.00
	Plant	80.00 — 130.00

3 *Windrow lop and top with dozer and cultivate the soil by ripping or ploughing*

This has been the most widely practised ground preparation method for reforestation although doubts have recently been expressed about the silvicultural advantage and cost-benefit of the method.

Dozing of lop and top into windrows is, even if only temporarily so, quite unaesthetic. There is evidence also that microtopography can be permanently changed through the lifting of submerged boulders to the top of the soil by dozer blade. I would raise the question too as to whether the exposure of the humus layer to drying conditions is desirable.

If it is desirable to have humus and mineral soil mixed together then obviously cultivation is necessary, and if so then some form of soil scarification is necessary. While other countries have a highly mechanised approach to cultivation, and have developed sophisticated scarifiers, our cultivation machinery is limited to rippers and ploughs. To use these pieces of equipment, windrowing of lop and top is usually necessary.

Those who would argue for or against the windrowing of lop and top, and for or against ripping the ground would find much to interest them at Boherboy property of Anner forest, Co. Tipperary, where two adjoining compartments with the same conditions of soil and topography have recently been replanted. The first crop was Douglas fir. One compartment was reforested in 1973 by pit planting through the lop and top. In the second compartment the lop and top was windrowed by dozer, the ground ripped and planted in 1974. The second rotation species is again Douglas fir which is remarkably vigorous in both compartments, but the crop which was planted through the lop and top has I would say a definite edge in vigour on the other crop and it is still very obviously a year older.

In relation to windrowing of lop and top there is some disquieting evidence that damage to the young trees of the second rotation by hares is quite serious in some areas, and sheep trespass is also quite common. The inter-row freedom of movement seems to be quite attractive to both.

4 *Place mounds on lop and top and plant in the mounds*

This method has as far as I am aware been practised only at Tulla Forest, Co. Clare. Here in 1957, 18 ha of Sitka spruce, 25 years old, was blown, and in 1961 a further 33 ha of the same species. Following the disposal of saleable material, the reforestation of the area was undertaken in 1967. The soil is a peaty podzol and it was decided to burn the lop and top and distribute mounds on the area before planting. The cost per ha £154.00 (about £1000 in present-day money terms) was alarmingly high and an alternative method was employed involving the use of an excavator to open drains at 20

reforestation employed has made the second crop more or less stable than the first crop. In complete contrast is the method which has been used in the saturated gleys of Co. Leitrim. Here lop and top from stands which were blown at age 20 to 23 years has been left untouched and planting of the second rotation has been done by slit planting into the plough ribbon which has remained intact during the shortened life span of the first rotation. This method has been practised at Manorhamilton and Drumkeeran forests. At Glenfarne forest where the first crop (Sitka spruce) had reached a more mature stage (38 years) before removal, the lop and top was also left untouched and the second crop was notch planted between the original planting lines. In all those cases the second rotation is showing exceptional promise.

5 *Establishing the second rotation in areas carrying unthrifty crops*
The indications are that where the pioneer crop has been unthrifty due perhaps to the presence of iron pan, or lack of drainage, or to unsuitable species, intensive mechanical preparation has been practised to good effect. The levelling or rolling of the pioneer crop with a dozer simultaneous with ripping of the ground has proved very effective and quite cheap.

GETTING RID OF LOP AND TOP IN OTHER COUNTRIES

Cultivation of the soil prior to establishing a new rotation is general practice in the Nordic countries. However, only in Denmark is it customary to remove logging residue before cultivation. The residue is removed in strips 2.5m. apart which would seem to correspond to our windrows. Cultivation of the cleared strips is done by various implements such as disc plough, disc harrow, wing plough, and disc plough plus harrow. The last method at £170.00 per ha. was three times more costly than using the disc plough only. Site preparation costs in Denmark are considered to be very high compared with the other Nordic countries. Mechanical site preparation without removal of lop and top has been widely practised and is increasing in scale annually (Table 2). This type of mechanical preparation has been made possible by the development of spot scarifiers and the disc ploughs, wing ploughs and harrows to which I have already referred. Spot scarifiers are set so as to provide 2000 to 2500 prepared planting spots per ha.

In Canada, too, the emphasis is on mechanical cultivation prior to artificial regeneration of the next rotation. In 1957 the area cultivated was 27,000ha. In 1968 it was 30,600 and this is expected to rise to 120,000ha in 1982-83. Scarification accounts for 80% of this area while chemical treatment and burning account for 20%.

Table 2 — Mechanical site preparation (ha) 1973 and projected 1980.

	1973	1980
Sweden	101,000	161,000
Finland	78,000	110,000
Denmark	1,600	5,000

CONCLUSION

My impression of the results of the various second rotation site preparation methods that I have seen here, compels me to make the following observation — where a site has produced a good commercial crop of timber and where drainage is unlikely to be a problem following the removal of this crop, excellent results at low cost seem to be possible by pit or notch planting through the lop and top. However, where the pioneer crop has been unthrifty, site cultivation is necessary and until we have some of the sophisticated machines of other countries windrowing of lop and top will be necessary before such site cultivation.

REFERENCES

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