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Guidelines to Forest Weed Control

R E Crowther

FRONT COVER

Top left: Ultra low-volume spraying, a chemical method.
Top right: Machine weeding with a rotating flail outfit. (Wilder Rainthorpe Chopper.)
Bottom: Hand weeding.

Photos are from the Forestry Commission collection.

GUIDELINES TO FOREST WEED CONTROL

by R. E. Crowther, B.Sc., M.I.For.

Forestry Commission

INTRODUCTION

1 The forest manager is faced with a somewhat daunting prospect of selecting the best method of weed control from several recent publications listed on the last page. The purpose of this leaflet is to present a summary of this information in a concise form that will enable him to choose the method best suited to his circumstances and to guide him to the detailed information he requires to implement it.

2 Weed control in young plantations is an expensive business; on the more fertile sites each weeding can cost as much as the plants and will have to be repeated over several seasons. The Forestry Commission bill for weeding approaches £1 million per annum for a planting programme of 22,000 hectares. (1974-75 figures).

3 The number of different weed types encountered is considerable, varying from some situations where little or no weeding is necessary to those where failure to weed even in the year of planting can put the crop at risk. Generally the harm done by weed growth is to smother the young crop, an effect that may not take place until winter rain and snow flatten the vegetation. Failure to weed in these circumstances can mean large losses. In the forest situation the benefits obtained by completely eliminating weed vegetation do not usually cover the costs and young trees are generally quite capable of surviving some weed competition. The skill of the forester lies in knowing when it is necessary to intervene and when he can save expense by letting well alone.

WEED TYPES

4 For weed control purposes weed growth can be classified into six main weed types—this number is necessary to accommodate the characteristics of various herbicides and to a lesser extent machines.

(a) Soft and Fine Grasses
Agrostis, Deschampsia, Festuca, Holcus, Poa.

(b) Herbaceous Broadleaves and Grasses

(c) Coarse Grasses
Arrhenatherum, Calamogrostis, Dactylis, Molinia, Juncus (a rush).

(d) Bracken

(e) Heather

(f) Woody Broadleaves
Either trees or shrubs; coppice or seedling regrowth.

WEEDING METHODS

5 There are three main techniques for forest weed control:—

Hand
Machine
Chemical

Hand

6 This involves the forest worker using an edge tool, usually a hook, cutting back the vegetation round each tree. The technique is simple to learn but the timing is restricted to the growing season and with some weed species may have to be repeated more than once in a season. Thus weeding by hand creates a peak demand for labour, and it is more expensive than most other methods. Its advantages are that it is simple, equipment and training are minimal and it is versatile both in weed type and terrain.

Machine

7 There are several mechanical cutting principles employed:—

Rotating saw blades

Rotating flails and chains
Reciprocating cutter
Crushing roller

8 These can be employed on several different types of machine:—

Tractor
Pedestrian-controlled machine
Hand-held machine

9 The larger, more powerful of these (the tractor) fitted with the appropriate tool has the capacity to deal with substantial woody growth or has a high output and low cost on easier weed types (eg, with roller on grass). But terrain is a limiting factor and tractors cannot operate in the weeding role on steep slopes or rough ground. The pedestrian-controlled machines (for instance the Autoscythe) have slightly better versatility as far as terrain is concerned but outputs are lower and costs high. The hand-held machines like the brushcutter can be used on steep and rough terrain and are effective on woody weeds but costs are high.

10 In general, machine methods can be most effective and cheap on easy terrain. Capital expenditure is involved and training in operation and maintenance is essential.

Chemical

11 These have developed in the last twenty years to a stage where there are safe and effective herbicides for the majority of weed situations. In many cases herbicides offer the cheapest and most effective method, often because one application will have a longer lasting effect than hand or machine weeding (grass rolling is an exception).

12 There are a number of factors that make the effective use of herbicides rather difficult.

(a) Most herbicides are selective, killing some weeds and only weakening others and often leaving some unharmed. In many situations in lowland plantations no single chemical will control all the weeds on a site.

(b) Many herbicides can be used safely in relation to the crop only over a relatively limited period. Few can be used in the period May-July. This means that weed control by herbicides must be planned well in advance.

(c) The number of possible chemicals is large, and successful treatment depends on the application of the appropriate chemical to the weed type and crops at the right time at the right dosage. Mistakes can result in not only failure to control weeds but in damage to the trees.

(d) Although herbicides have been used extensively in forestry in this country for some 15 years, both chemicals and methods of application continue to develop rapidly. There is a marked trend towards application techniques that involve the minimum quantity of herbicide and diluent. This reduces the volume and weight of material that has to be carried into the forest and thus makes the work easier, improves output and reduces costs.

(e) It is very easy to make objections to the use of herbicides on environmental grounds but those recommended for forestry are well tested and when properly applied the risks are minimal. However the misuse of herbicides can have serious consequences and the importance of following instructions on the labels and not storing herbicides in unlabelled containers cannot be over-emphasised.

13 The selectivity of herbicides (the ability to kill weeds and not crop trees) depends on various factors—cessation of height growth in July of many conifers being an important one. In other cases trees are as susceptible as weeds and the herbicides have to be 'placed' so that trees are not affected.

Herbicides act in different ways:—

(a) Directly on foliage, eg, paraquat

(b) By absorption and translocation through stems and foliage, eg, 2,4,5-T; 2,4-D.

(c) By absorption through the root system, eg, chlorthiamid.

METHODS OF APPLYING HERBICIDES

14 There are the following methods of applying herbicides:—

(a) Knapsack sprayer
This comprises a plastic container with hand operated pump. It is used for MV (medium volume) applications to control foliage and to cut stumps to prevent coppice regrowth.

(b) ULV (Ultra low volume)
Herbicide is distributed by a rotating disc operated by a small electric motor and batteries. Jet size and speed of disc control the droplet size within fine limits thus ensuring that the spray falls at a constant rate and unwanted drift is controlled.

(c) Granules
Several herbicides can now be supplied in granular form and simple manual distributors used. Motorised applicators are also available.

(d) Injection
Tree injectors are available for injecting herbicide into unwanted trees.

PREPARATORY WORK BEFORE PLANTING

15 There are a number of operations that can be carried out before planting that will facilitate subsequent weeding operations.

(a) Before felling previous crop.
  (i) Control unwanted broadleaf trees by injection with 2,4,5-T.
  (ii) Control bramble by ULV application of 2,4,5-T.

(b) After felling—before planting.
  (i) Remove or break-up large lop and top.
  (ii) Cut high stumps, and unmarketable trees.
  } On tractor terrain
  (iii) Clear enough to provide access on foot.
  (iv) Treat broadleaf stumps with 2,4,5-T applied by knapsack sprayer to prevent coppice regrowth.
  (v) Minimise nearby sources of weed seed, eg, birch, sallow.

(c) Bare ground.
Treat bracken with asulam ULV application.

(d) Selection of species for planting.
Weeding may be eliminated or reduced by correct choice of species, for instance pines can withstand heather competition better than other species.

(e) Plant size.
Larger plants will be easier to locate in weedy situations and should grow out of the weeding stage more quickly than small plants.

(f) Spacing should be designed to permit tractors between rows where ground conditions are suitable for tractors.

CHOICE OF METHOD

16 The main factors to take account of in selecting the best method are:—

(a) **Cost.** The relative costs of various methods are shown in Table 1. These include machine, materials and labour including oncost—all at July 1975 prices. Each cost is for a single application so in fact many hand methods are less competitive than they appear because they have to be repeated. Chemical methods are usually effective for a whole season and even longer.

(b) **Weed Type.** The recommended methods for the various weed types is given in Table 2, these take into account not only the cost of single treatments but the overall effectiveness. Control of one weed type will in some cases lead to the dominance of another, for instance removal of bracken or bramble is likely to be followed by grass. This nowadays is no disadvantage as control of grass by herbicide is usually less expensive than control of bracken by hand or herbicide.

(c) **Topography.** Level ground or gentle slopes and smooth terrain are essential for tractor work. Where this occurs tractor and roller is likely to be the most effective and cheapest method for

grasses, herbaceous weeds and bracken.

(d) **Timing.** Several of the herbicide treatments are most effective when applied outside the growing season and this means the weeding treatment must be planned well ahead. Winter weed control has the advantage that the peak summer weeding workload can be spread.

CONCLUSION

17 There now exists a good range of proven weed control techniques using machines or herbicides that are both cheaper and more effective than the man with a hook. The problem now is to get these techniques more fully used.

TABLE 1

COMPARISON OF WEEDING COSTS

Weed Type	Hand	Chemical			Machine	
	Cost £/hectare	Herbicide	Method of Application	Cost £/hectare	Machine	Cost £/hectare
Soft grasses	25	Atrazine	ULV (Ultra low volume)	12·0	Roller	7·50
Herbaceous broadleaves and grasses	25	Chlorthiamid	Granules	14·0	Autoscythe	15·0
		Paraquat	MV knapsack	11·0		
Coarse grasses	30—40	Fydulan	Granules	20·0	Roller	7·50
		Propyzamide	Granules	13·0		
		Paraquat	MV knapsack	11·0		
Bracken	25—35	Asulam	ULV	18·0	Autoscythe	15·0
Woody broadleaves	50—80	2,4,5-T	ULV	13·0	Tractor + machine	9·50
					Pedestrian + machine	25·0
					Portable brushcutter	28·50—60
Heather	—	2,4-D	ULV	14·0	—	—

Notes: 1. Costs at July 1975.
2. Costs are for single treatments.
3. Machine methods are restricted by the terrain more than herbicide methods.

Fydulan = Dichlorbenil + Dalapon.

TABLE 2

CHOICE OF WEEDING METHOD

Weed Type	Hand	Chemical				Machine		
	Hand Tool	Knapsack MV	ULV	Granules	Injection or Stump Treatment	Tractor Mounted Machine	Pedestrian Controlled Machine	Hand Held Machine
Soft grasses	* Hook	** Paraquat	*** Atrazine			*** Roller ** Rotating cutter	* Autoscythe	
Herbaceous broadleaves and grasses	* Hook	** Paraquat		*** Chlorthiamid		*** Roller	* Rotating cutter	
Coarse grasses	* Hook	** Paraquat		*** Propyzamide Fydulan ** Chlorthiamid		*** Roller	* Autoscythe	
Bracken	* Hook		*** Asulam			* Rotating cutter *** Roller	* Autoscythe	
Heather	—	* 2,4-D	*** 2,4-D		—	—	—	—
Woody broadleaves	* Hook		*** 2,4,5-T		*** 2,4,5-T	*** Rotating cutter	—	* Brush cutter

*** Best method.

** Good method of limited application.

* Feasible method but with severe limitations (usually costly).

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Enquiries regarding unpublished papers may be directed to Publications Section, Forest Research Station, Alice Holt Lodge, Wrecclesham, Farnham, Surrey, GU10 4LH.

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