

Research Information Note 286

Issued by the Research Division of the Forestry Commission

WEED CONTROL WHEN ESTABLISHING NEW FARM WOODLANDS BY DIRECT SEEDING

by Ian Willoughby

Summary

Weed control is essential for successful establishment of woodlands by direct seeding. This Note gives preliminary recommendations on ways of achieving this.

Disclaimer

This Research Information Note is not intended as an endorsement or approval of any product or service to the exclusion of others that may be available. The Forestry Commission accepts no responsibility for any loss or damage resulting from following any advice in this Note.

Research trials are by nature on a small scale compared with operational practice. Users are advised to test small areas to gain familiarity with new products and techniques, before engaging in large scale treatments.

Introduction

1. Direct sowing or direct seeding is a method of establishing new woodlands through sowing tree seed onto the site for the proposed woodland. The method can be expensive in seed, and it is not a fully developed or proven system. However, it does have its advocates and some good examples of successful establishment have been achieved. Recent Forestry Commission experimental results and recommendations are described in Forestry Commission Research Information Note 285 (Willoughby *et al.*, 1996); one of the conclusions is that weed control is essential to achieve adequate early tree growth and survival.
2. This Note provides guidance on weed control for direct seeding on former improved grassland or arable sites in the lowlands. It is primarily concerned with the establishment of new farm woodlands on better quality land.

Methods and assumptions

3. Weed control can be achieved through mechanical cultivation, mulching, or the application of herbicides. Due to the large number of irregularly spaced seedlings in direct sown plantations, the use of herbicides is the most practical and cost-effective method.
4. The recommendations in this Note assume the following:
 - Overall mechanised sprays are desirable to minimise costs and utilise farmers' existing machinery and experience.
 - The aim is to maintain a practical level of weed-free conditions (around 80-90% of the site weed free) for the first 2-4 years after sowing, or until trees have become established and mechanised access to the site is no longer possible.

Always read the product label

- Although no damage occurred in any research trials, it is possible that some slight damage may occur in field conditions. Nevertheless the benefits of release from weed competition should still outweigh any possible disadvantages from using herbicides. The large numbers of tree seedlings present following direct seeding and successful germination (over 10 000 per hectare initially) means that occasional damage or death to a proportion of the trees from herbicide applications is not as critical as in low density plantations.
- All the herbicide treatments recommended in this Note can be used as mechanised overall sprays, with little danger of damage or suppression in growth to crop trees.
- Recommendations in Willoughby *et al.* (1996) are to be followed, particularly regarding species choice. This Note refers to the use of ash, sycamore, birch, cherry and Norway maple on fertile lowland ex-agricultural sites. However, the treatments could be used over most commonly used broadleaved species.

Vegetation management recommendations

5. *Site preparation*

- Kill any established weeds on the site with a pre-plant spray of a foliar acting herbicide. Glyphosate at 5 l/ha (see Table 1 for products and rates) applied when all target species are actively growing will give the best control of a wide range of established weeds.
- After at least 1-2 weeks, fully cultivate when site conditions are suitable (not too wet or dry) usually in autumn or spring, to achieve a firm fine tilth.

6. *Post-sowing*

- Tree seed, in particular ash, can suffer from heat-induced secondary dormancy if a hot or dry spell occurs soon after sowing. For this reason, sowing should take place **before the middle of April** in the south of England, although this may be delayed by a week or so further north. Given this sowing date, few annual weeds will be present that can be controlled immediately prior to sowing. There may be opportunities to make post-sowing applications of glyphosate at 2-5 l/ha or glufosinate ammonium at 5 l/ha to control germinating annual weeds or regrowing perennial weeds prior to tree seedling emergence, but extreme care must be taken to avoid spraying when tree cotyledons have emerged.
- No pre-emergence soil acting herbicides can currently be recommended for use over newly sown seed of ash, sycamore, cherry, birch or Norway maple to control germinating annual weeds. However, initial results suggest that napropamide applied at 2.2 l/ha in February/March after sowing may safely control germinating weeds – research is continuing in this area.
- Nursery techniques of repeat low dose applications of herbicides such as napropamide and metazachlor may be safe once tree seedlings have reached the first true leaf stage, but information is very limited, and few established weeds will be controlled.
- It is recommended that for reasons of crop safety, no further overall herbicide applications are made until the end of the first growing season.

7. *End of the first growing season*

- At the end of the first growing season, when trees are fully dormant – leaves shed, buds tightly closed, leader growth hardened and stem elongation has ceased – established weeds can be controlled by an overall application of glufosinate ammonium at 5 l/ha. Under the current Approval this compound can only be applied between 1 March and 31 October. Aim to make the application as soon as possible after the 1 March, as long as weeds are green and actively growing, and trees have not yet started to grow.

- Alternatively, glyphosate may be sprayed over dormant trees at 1.5 l/ha. This allows greater flexibility with timing since applications can be made throughout the winter, however tree tolerance is sometimes variable (Willoughby, 1996).
- The above two recommendations are based upon trials involving ½ u ½ and 1 u 1 transplants, and 2-year-old direct sown seedlings, where no damage was recorded. Weed stressed 1-year-old direct sown seedlings may be more susceptible, although as long as the trees are fully dormant (no young green fleshy growth visible on stems) spray damage is unlikely.
- For added tree safety either product could be used through hand-held directed sprayers such as guarded knapsacks, dribble bars or weedwipers. However, such applications are likely to be costly and difficult to achieve with dense, irregularly spaced seedlings.

8. *Pre-emergence applications, year 2 onwards*

- Once the established weeds have been controlled, residual soil acting herbicides should be applied to the weed free site to control germinating weeds.
- Tank mixes may be used; the precise composition of soil acting herbicides will depend on the anticipated weed problems. Forestry Commission Field Book 8 *The use of herbicides in the forest* (Willoughby and Dewar, 1995) and Forestry Commission Field Book 14 *Herbicides for farm woodlands and short rotation coppice* (Willoughby and Clay, 1996) give further details of weed susceptibilities and tree tolerance.
- Commonly used mixes are propyzamide and pendimethalin or isoxaben, metazachlor and pendimethalin or isoxaben, and atrazine and cyanazine.
- Apply soil acting herbicides to cover all soil, prior to weed emergence. Maximum efficacy is achieved through applications to moist soil, with rainfall following soon after treatment.
- If grasses form the dominant weed cover on the site then propyzamide can be used as an alternative to glufosinate ammonium or glyphosate followed by soil acting herbicides. Propyzamide will not only control the established grass, but will also provide residual control of germinating grasses and some herbaceous weeds later in the growing season. Add pendimethalin or isoxaben to the mix to give better control of subsequent herbaceous weed germination.

9. *In-season applications, year 2 onwards*

- There is only a limited range of products that can be safely sprayed over actively growing trees to control established weeds.
- Propaquizafop, or fluazifop-p-butyl can be safely sprayed over trees and will control some established grasses.
- Clopyralid can be safely sprayed over trees and will control thistles and a limited range of other herbaceous weeds such as mayweed and bindweed.
- Asulam can be safely sprayed over trees and will control docks and bracken.
- Metazachlor is safe to use, but will only control very small established weeds.
- Application of any of these products, in particular asulam and metazachlor, should only be made when very tender early tree growth has started to harden.
- Research is continuing into in-season herbaceous weedkillers.

- An alternative regime would be to use directed sprays of broad spectrum products such as glyphosate or glufosinate ammonium, through hand-held directed sprayers such as guarded knapsacks, dribble bars or weedwipers. However, such applications are likely to be costly and difficult to achieve with dense, irregularly spaced seedlings.

10. **Subsequent treatment**

- Steps described in paragraphs 7-9 should be repeated as necessary for 2-4 years after sowing, until the trees have become established and dominate the weed cover, or when mechanised access becomes impractical.
- Table 1 summarises the herbicide weed control options.

References

- Willoughby, I. (1996). Dormant season application of broad spectrum herbicides in forestry. *Aspects of Applied Biology* **44** – *Vegetation management in forestry, amenity and conservation areas: managing for multiple objectives*, 55-62. Association of Applied Biologists, Horticultural Research International, Wellesbourne, Warwick.
- Willoughby, I. and Clay, D. (1996). *Herbicides for farm woodlands and short rotation coppice*. Forestry Commission Field Book 14. HMSO, London.
- Willoughby, I. and Dewar, J. (1995). *The use of herbicides in the forest*. Forestry Commission Field Book 8. HMSO, London.
- Willoughby, I., Kerr, G., Jinks, R. and Gosling, P. (1996). *Establishing new woodlands by direct sowing*. Forestry Commission Research Information Note 285. Forestry Commission, Edinburgh.

Table 1 Herbicide options for the establishment of woodland by direct sowing

Active ingredient	Example product	Formulation	Manufacturer	SITUATION				Weeds controlled	Approval status	Rate	Cost per treated hectare (£)
				Pre-plant	Dormant season clean up established weeds end	Spring residual herbicides (trees dormant) for control of germinating weeds	In season clean up established weeds				
Asulam	Asulox	400g/l	Rhone Poulenc	✓			✓	Established bracken and docks	Forestry label	5-10 l/ha	45-90
Atrazine	Unicrop Flowable Atrazine	500g/l	Unicrop			✓		Some established grasses, pre-emergent grasses and some herbaceous weeds	Forestry label	5 l/ha*	15
Clotyralid	Dow Shield	200g/l	DowElanco				✓	Established thistles and some other herbaceous weeds	Forestry off-label	0.5-1.0 l/ha	33-65
Cyanazine	Fortrol	500g/l	Cyanamid			✓		Some established grasses, pre-emergent grasses and some herbaceous weeds	Farm forestry off-label	4.0 l/ha*	65
Fluazifop-p-butyl	Fusilade	250g/l	Zeneca				✓	Some established grasses	Farm forestry label	1.5 l/ha	135
Glufosinate ammonium	Challenge	150g/l	AgroEvo	✓	✓			Most established weeds - deeply rooted species require repeat applications	Forestry label	5.0 l/ha	55
Glyphosate	Roundup Pro Biactive	360g/l	Monsanto	✓	✓			Most established weeds	Forestry label	1.5-5.0 l/ha	10.50-70
Isoxaben	Flexidor	125g/l	DowElanco			✓		Some herbaceous weeds pre-emergence	Forestry label	2.0 l/ha	102
Metazachlor	Butisan	500g/l	BASF			✓		Some grasses and herbaceous weeds pre-emergence	Farm Forestry off-label	2.5 l/ha	75
Pendimethalin	Stomp	400g/l	Cyanamid			✓		Some grass and herbaceous weeds pre-emergence	Farm forestry off-label	5.0 l/ha	45
Propaquizatop	Falcon	100g/l	Cyanamid				✓	Some established grasses	Farm forestry label	0.7-1.5 l/ha	34-72
Propyzamide	Kerb Flowable	400g/l	PBI		✓	✓		Most grasses, pre-emergence and established, some herbaceous weeds pre-emergence	Forestry label	3.75 l/ha	90

Notes: ✓ = Suitable for use in indicated situation

* = Use a mixture 5 l/ha atrazine with 4 l/ha cyanazine.

All products are safe to use as overall sprays over broadleaved trees only in the situations listed.

In small scale trials glufosinate ammonium has been safe over fully dormant broadleaves in early March – i.e. leaves shed, buds tightly closed, stem elongation ceased. Applications of glyphosate of 1.5 l/ha was also shown to be safe, but results were more variable in other trials, so glufosinate ammonium may be a safer option.

Asulam is likely to cause chlorosis and slight check in growth if applied directly to actively growing trees.

Products recommended for use in the spring, must be applied while trees are still dormant.

Products recommended for use during the growing season are generally safe, but may cause some transient damage.

This table lists example products; other approved products may be available containing the same active ingredient.

This table gives a **SUMMARY ONLY** of candidate herbicides for use in direct seeding situations. Users **MUST** refer to further guidance on usage and crop tolerance given in product labels, and Forestry Commission Field Books 8 and 14.

Enquiries to:
Research Communications Officer
Forestry Commission Research Division
Alice Holt Lodge, Wrecclesham
Farnham, Surrey GU10 4LH

September 1996

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ISSN 0267 2375

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