

## Weevil Control Trial in Sitka Spruce – FlexCoat and WeeNets Eskdalemuir 2006-2007



### Summary

On sites with moderate weevil pressure the use of FlexCoat with chemical or the use of WeeNets both offer good protection from weevil – both methods of protection should be sufficient to avoid the necessity of further field sprays. The FlexCoat/chemical combination will be cheaper (by about £150 per ha) where losses are low enough for beating up to be eliminated.

On sites with high weevil pressure, losses in the 2<sup>nd</sup> year are likely to be higher in FlexCoat/chemical treated areas compared to WeeNet treated areas. In the absence of a 2<sup>nd</sup> year top-up field spray both areas would likely require beating up – with the WeeNets probably requiring only half the level of replacements compared to FlexCoat. (This assumes that plants which have suffered leader dieback due to weevil feeding will recover and produce acceptable trees).

On sites with high weevil pressure, the combined use of WeeNets with a FlexCoat/chemical overspray may provide sufficient protection to avoid the necessity of beating up. In such cases this would be the cheapest option and minimise management time associated with beating up.

Broad recommendations are given for the treatments tested and at different levels of Weevil pressure.

### Background to trial

In June 2006 a trial was laid out in Eskdalemuir to investigate the efficacy of new methods of weevil protection. All stock used in the trial was cell grown Sitka Spruce, graded to a specification of 20-40cms and a root collar diameter of 4mm. The ground had been ditch mounded. The treatments involved the nursery application of approved chemical (alpha-cypermethrin) bound into a viscous “glue” carrier (trade name FlexCoat); and as a comparison trees were planted in a physical barrier (WeeNet) - alone and with a light chemical/glue overspray. A control strip of un-treated trees was also planted. The objective of the trial was to see if these treatments could provide adequate protection **without additional field sprays** and thereby avoid the environmental impact, expense and associated health and safety risks of such spray operations.

Eskdalemuir was chosen as the felling patterns in the area provide a reliable source of weevil populations, with attack being virtually guaranteed. Weevils were present at the time of planting in June 2006. Weevils were seen on every site visit (6) over the next 16 months – with major activity being noted at the expected times (Autumn 06 and Spring 07).

### The Treatments

3600 trees were planted in total over 3 treatments in 2 adjacent blocks. The treatments consisted of:

- (i) a basal spray (bottom 20cms of the stem) with chemical bound into FlexCoat
- (ii) a full spray with chemical bound into FlexCoat
- (iii) trees fitted with WeeNets and given a light Top Spray with chemical/FlexCoat

The area surrounding the trial area was planted with trees fitted with WeeNets but with no top spray; these provided another “treatment” for comparison.

The control line was introduced to confirm the presence of weevil. It was limited to a single line of 96 plants running the length of the trial area.

### Observations

Weevil activity was present from the time of planting. There was a peak of activity in autumn 2006 but at that time deaths **due to weevil** were undetectable except amongst the control trees where dead or damaged plants amounted to over 80%. In order to verify the continued presence of weevil, the control trees were replaced in April 2007.

In October 2007, 1800 plants were assessed in detail.

The assessment was carried out by walking randomly chosen rows within each plot and allocating each plant to a “damage category” as follows (see photos):

- 0 – no damage visible
- 1 – limited surface damage
- 2 – extensive surface damage but now calloused / died back but growing away \*
- 3 – extensive and deep damage likely to lead to loss or very poor growth
- 4 – death due to weevil damage
- 5 – losses not directly weevil related \*\*

\* Category 2 includes plants which may have been damaged due to weevil but are showing every sign of recovery from side or basal shoots and are deemed likely to survive and unlikely to be replaced in a beat-up operation. This category includes a proportion of trees that could be described as “not pretty”.

\*\* Category 5 includes losses due to drought, poor planting, chafing with sharp stones on the planted mound and any otherwise unexplained losses. At the time of planting (June 2006) the ground was dry and very little rain fell for approximately 3 weeks after planting.

### Results

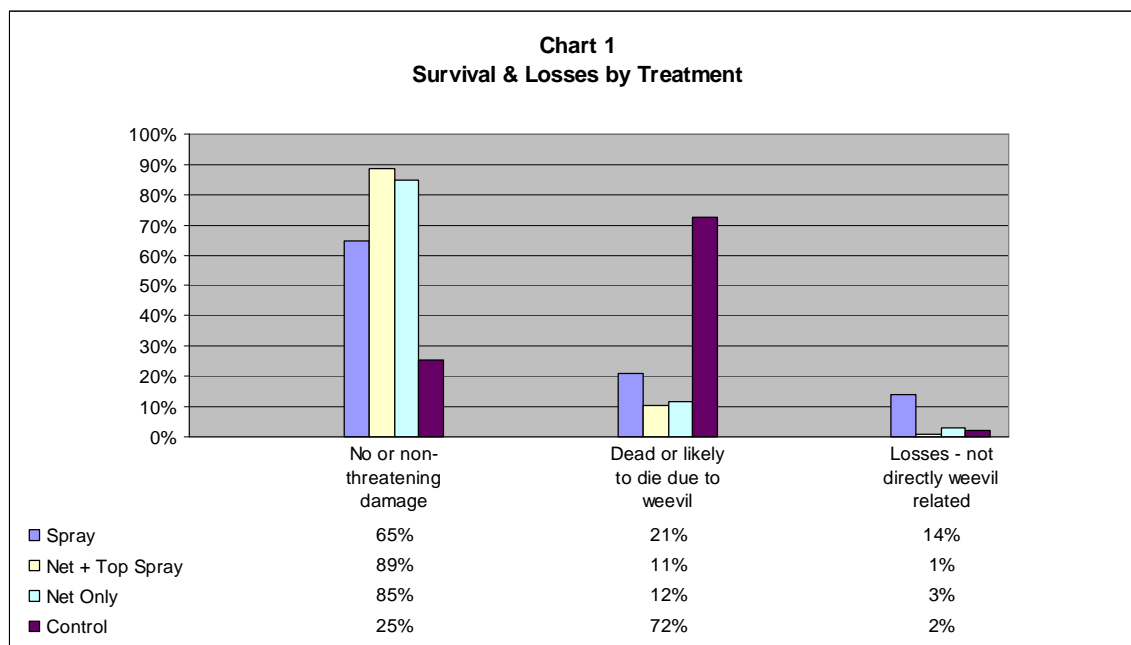
The results for the basal and the full spray showed virtually no difference and for simplicity of presentation purposes the results of these two options have been combined and presented as a single treatment – “Spray”.

A summary of the results by treatment and type of damage is shown in Appendix 1.

To simplify interpretation of the results three groupings were identified:

- i. **Categories 0 - 2** grouped as “No or non-threatening damage”,
- ii. **Categories 3 - 4** grouped as “Dead or likely to die due to weevil”
- iii. **Category 5** standing alone as “Losses not directly weevil related”.

Chart 1 shows the Survival & Losses arising from the 3 groupings.



In the control strip 80% of the trees were replaced in March 2007 to give 100% stocking. By October 2007 only 28% still survived – demonstrating the continued presence and level of weevil activity.

In Autumn 2006, damage due to weevil was undetectable except in the control strip. 16 months after planting the results show survival amongst sprayed trees of around 65%. It is apparent that the spray treatment provided significant protection – especially in the first year. The observed losses due to weevil occurred from summer 2007.

During that same period, trees planted in WeeNets showed survival rates of around 85%, with netted plants receiving a light top-spray showing survival rates of around 90%.

#### Other Observations:

##### *Category 2 damage:*

The higher level of category ‘2’ damage in netted plants would appear to be due to weevils climbing the net and causing damage on new growth just above the net. (In the net + top spray treatment, the new growth would carry no chemical). This has led in most instances to the terminal shoot snapping or dying back and side shoots taking over. In some cases weevils gained access via the top of the net causing damage lower down the stem with re-growth apparent from basal shoots. (Again, the lower parts of the net + top spray treated plants would carry very little, if any, chemical). In the analysis these plants have been considered as likely to survive. It is recognised that some of these may form multiple leaders; the extent to which this may be a problem can only be determined over the next 2 seasons.

##### *Category 5 damage:*

Category 5 damage levels were 2% in the netted plants and control plants but 14% in plants which had been sprayed.

Sprayed trees would have been subject to the drying wind conditions following planting.

The lower level of category 5 damage in netted plants (see Figure 1) is considered to be principally due to the physical protection offered by the net against desiccation following planting; this is probably due to the mesh reducing the wind-speed as well as holding side shoots in against the stem and reducing transpiration from young growth with a high water requirement.

Early weevil activity on control plants led to almost immediate death and “other agents” did not come into play.



Figure 1

##### *Weevil activity:*

The general level of weevil activity on the trial site was higher than average – and evident on every inspection visit, albeit at varying intensities. As such it can be said that this trial was a very fair test of the applied treatments.

The efficacy of treatments is naturally related to weevil pressure on individual sites. The following broad descriptions are used in this report to describe the levels of weevil attack:

- Low pressure – occasional damage to plants during the first year following replanting; **untreated** plants unlikely to need any replacements (beating up).
- Moderate pressure – seasonal peaks of activity with damage lasting into the second year with **untreated** plants suffering losses in excess of 20% and requiring beating up.

- High pressure – constant weevil presence with peaks of activity; **untreated** plants likely to suffer in excess of 60% losses.

The high weevil pressures found in the UK and Eire are seldom found in Scandinavia where weevil activity is often restricted to one peak of activity which itself is generally at a lower level than in milder climates. Most Scandinavian sites would therefore be described as Moderate pressure sites in the context of this report.

### Cost Comparison

If the assumption is made that a minimum stocking level of 90% is desirable, in this trial replacements would be required in both the sprayed and the netted plants. The net + top spray plants would not need any replacements. An attempt has been made to translate this assumption into costs – see Appendix 2.

Given the assumptions made relating to plant, protection, planting costs and the criteria assumed for beating up, there would appear to be very little difference in the overall cost of each of the 3 alternative methods. The Net & Top Spray option is slightly more expensive – but does have the management advantage of not requiring beating up.

### Conclusion

#### **FlexCoat:**

With moderate weevil pressure (a working definition of this is included in the report) it is considered that FlexCoat/Chemical would probably be sufficient to allow establishment of the crop without additional field sprays. The losses due to weevil activity were 18% - which alone would not have required any replacement planting. In this trial, there was a significant level (14%) of non-weevil deaths in the sprayed plants – principally due to post-planting drought.

With high weevil pressure (a working definition of this is included in the report) the effectiveness of FlexCoat/Chemical cannot be relied upon 18 months after application – in such areas FlexCoat/Chemical should save at least 2 field sprays over the first 12 months; a 2<sup>nd</sup> year field spray may be required.

Where the use of chemicals is acceptable FlexCoat/Chemical should prove the most cost effective solution – especially in areas of moderate weevil pressure.

#### **WeeNets:**

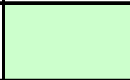


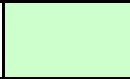





WeeNets are likely to offer early protection against post-planting desiccation and continued protection against weevil into the 2<sup>nd</sup> year and beyond. With moderate weevil pressure (noted on other sites) the nets seem to provide sufficient deterrent to reduce damage to acceptable levels. In high weevil pressure areas a proportion of the trees will suffer damage from weevils climbing to the top of the net. This damage may result in multiple leaders or, where the weevil descends inside the net, damage to the lower stem.




Forest managers wishing to eliminate the use of chemical can look to WeeNets to provide a reasonable degree of protection requiring minimal beating up, but with the possibility of an increase in plants showing multiple leaders.

Ideally the trial should be observed for another 2 seasons in order to allow for assessment of those plants with weevil damaged leaders and determine whether or not they produce acceptable plants.

## Recommendations

The following table is based upon the results presented above and experience gained on other sites where FlexCoat and WeeNets have been used but not in a formal trial layout.

	Weevil Pressure		
	Low	Moderate	High
FlexCoat			
WeeNet			
WeeNet + FlexCoat			

 Slight damage only  
 Moderate damage but not worth beating up  
 Some severe damage after 16 months  
- may need additional spray

The Weevil Pressure categories given above are subjective and are intended as a simple guide based upon the experience to date.

Alba Trees Plc  
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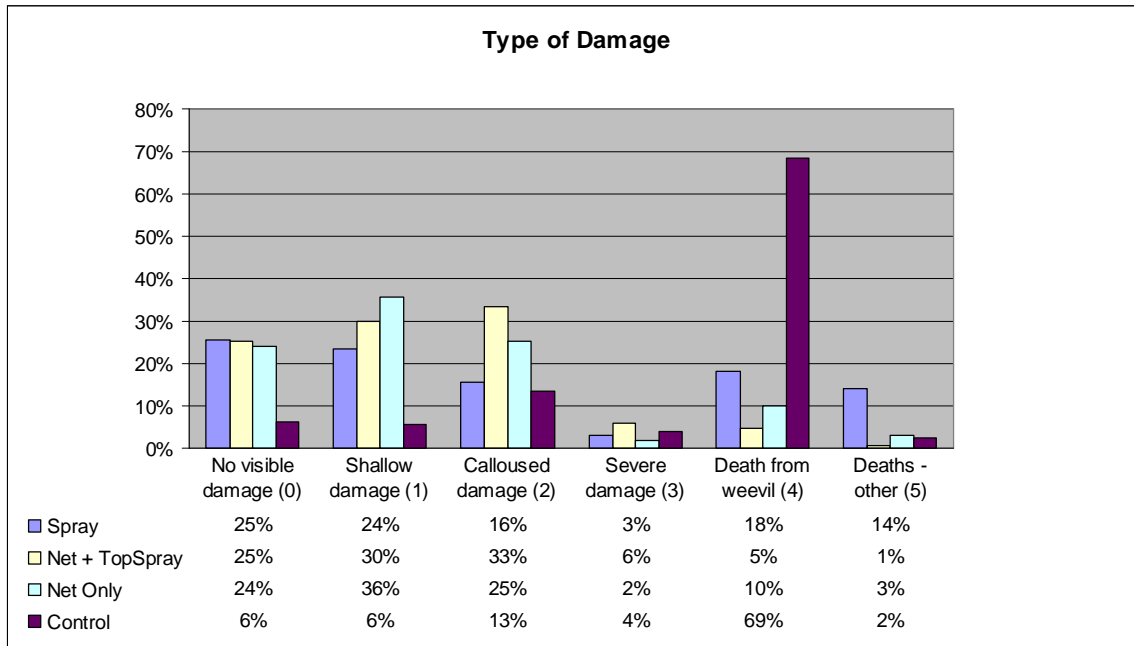
## Liability

This report has been prepared in good faith by the staff of Alba Trees Plc. No warranties are given or implied for any of the above treatments.

## Acknowledgement

Thanks are due to Bell Ingram and their client for allowing the trial to be conducted on their property in Eskdalemuir.

## Appendix 1



(Figures have been rounded for legibility)

## Appendix 2

### Cost Comparison

(Predicted prices 2008/9)

#### Assumptions

Plants (p each)	19	Protection Costs (p per plant)	
Plants / ha	2700	Spray only	5.5
Labour:		WeeNet Only	11
Planting cost per k	75	WeeNet & Spray	14

	Spray	Net & top spray	Net
<b>Planting</b>			
Plants	513	513	513
Protection	149	378	297
Planting	203	203	203
<b>Beatup</b>	30%	0%	15% (to achieve 100%)
<i>Plants required</i>	810	0	405
<i>Labour £/k</i>	100	0	120
Cost of Plants	154	0	77
Nursery Spray	45	0	
WeeNet			45
Planting	81	0	49
<b>Total cost (Planting + Beating up)</b>	<b>1143</b>	<b>1094</b>	<b>1183</b>