



Timber Measurement of Conifers




Plan for today

10.00am	Session 1 (indoors)
11.30am	Break
11.45pm	Session 2 (indoors)
1.00pm	Lunch
2.00pm	Practical outdoor session
4.00pm	Finish





Thinning



What is thinning?

Phased removal of a proportion of the trees to improve the overall quality and value of the forest over time.








Thinning – from the start

Planning for thinning really starts at planting. The trees are planted at close spacing:

- to suppress weeds quickly
- to encourage competition
- to encourage straight stems
- keep side branches small

Thinning



removal of a proportion of the crop:

- encourages larger diameters for the remaining stems
- thinning produces higher value timber at clearfell by increasing proportion of sawlog

thinning removes:

- weak, diseased, poorly formed, wolves and competing dominants

Thinning gives early and periodic income


Thinning

No thin may be the best option in some cases

- Crop Stability
- Unproductive crops
- Economics

Total volume of timber is the same in a thinned and unthinned crop but...

- Unthinned crop: Large number of small diameter trees
- Thinned crop: Small number of larger diameter trees




Thinning Systems

Two types of thinning:

- **Systematic/Line:** Remove complete lines irrespective of quality. More suited to mechanical thinning
- **Selective:** Remove trees on their relative merits, ensuring even spacing

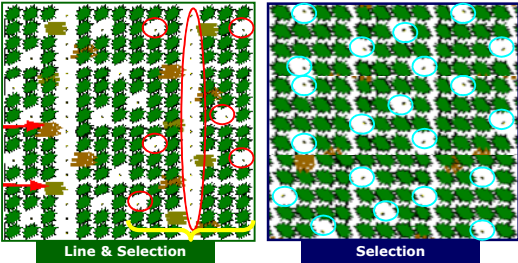
Most first thinnings are a combination of line and selection systems




Thinning Systems

First thinning is normally a combination of both selection and line thinning (normally 1 in 7 plus selection)

- Subsequent thinnings are normally selective



Line & Selection Selection



Harvesting processor




Thinning products

Pulp


- Chipboard use
- Woodchip
 - Energy use
 - Out wintering pads

Fencing Posts


Pallet

- Minimum diameter 14cm

Firewood



Felling by chainsaw




PPE

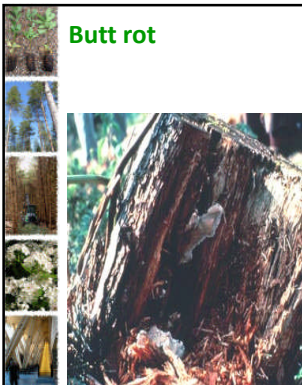
- Safety helmet, eye/ear protection
- Non-slag outer clothing, gloves with protective guarding on the back of the left hand, leg protection incorporating clogging material
- Safety chainsaw boots

First aid kit including large wound dressing

Chainsaw Cutting




Butt rot



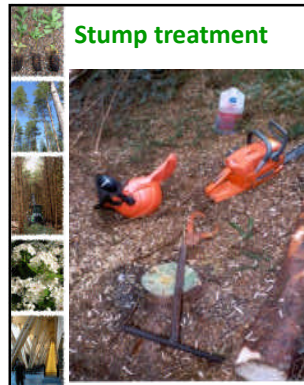
Butt rot is a fungus that invades the freshly cut stumps of conifers

Colonises the stump and infects the roots of adjacent trees through root contact

Causes wood decay in the lower, most valuable portion of the tree stem




Stump treatment



Can prevent by applying liquid urea immediately after cutting

1kg of graded fertiliser Urea to 5 litres of water

Dye applied to Urea to show that stump has been treated



Timber extraction




Other Extraction Methods




Brushing




Brushing

Access within the forest is critical

Cut inspection paths when canopy closes

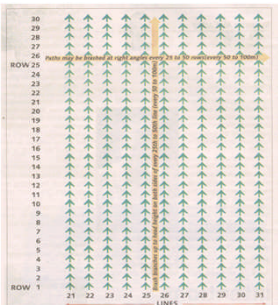
Paths 50 to 100m apart

- 25 to 50 rows apart


Remove branches to head height

Use pruning saw or light chainsaw

Take appropriate safety measures!



* Figure 2: Brushed paths should be in parallel paths 50 to 100 metres apart. Interconnecting rows should also be brushed at right angles as shown. The frequency will depend on size and uniformity of plantation.



Brash or inspection path

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Felling Licences

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Felling Licences

Illegal to cut down any tree without a licence

- Forest Service

Some exceptions

- "Exempted Trees"

Two Types of Licence

- Limited - once off
- General - lasts for longer period and is based on a plan

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Limited Felling Licence

Felling notice – Garda Station

Prohibition order: 21 days

Licence

Replanting conditions

Preservation condition

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General Felling Licence

Carry out thinning/felling with a view to replanting

Based on Management Plan

Last for a period of time –

- Up to 6 years
- May cover a number of thinning cycles


Recommended licence for thinning in farm forestry

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Forest Roads

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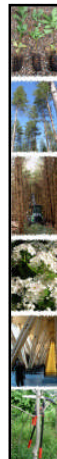


Roading/access

Adequate access and timber loading area is essential for thinning.

Delays in issuing of road grant approval

Management road grant unavailable at establishment



Harvesting Road Grants

Applications will be approved solely on a “just-in-time, just-enough” basis

- i.e. approvals will be restricted to applications for roads in plantations where thinning/harvesting is imminent and will take place within the next two years.

Roading density will be limited – only the minimum amount of roadway required, not necessarily the current maximum of 25m per hectare.

The maximum forwarding distance should normally not be less than 400m





Harvesting Roads 2

Harvesting road grant


- Upgrading existing roads is also grant aided
- New entrances etc. will require planning permission
- Difficult sites and area over 20ha - must have engineer

Type	m/ha	€/lin m
Harvesting	25	€45
Bellmouth <small>(Minimum needed for forests if adjoining public road)</small>	30	€45




High Pruning


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Silviculture

The objective is produce trees that has 6 metres of branch/knot free stems. This will in turn increase the value and quality of the crop

- Prune a minimum of 500 stems/ha (lodgepole pine 600)
- First lift is to 3.5 metres
- Second lift should be carried out 2-4 yrs later when the pruned height is brought to 6 metres
- Prune a inspection path every 100m




Assessing your plantation


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Sample Plots

As one cannot physically count all trees in the plantation we can measure sample areas, these are known as sample plots

Plots are usually a portion of a hectare:



- 0.01 ha is a 100th part of a hectare
- 0.02 ha is a 50th part of a hectare



Sample Plots

Plots are used to get the volume of a crop
Plot stocking levels can then be build up to a hectare and stand level


Uneven crops will require more plots for accuracy

Sample plots

Number of plots to be taken depends on the variability of the crop but in general the more plots taken the more accurate the assessment

Area of plantation	Number of sample plots required	
	Uniform crop	Variable crop
0.5 – 2 ha	2 – 6	3 – 8
2 – 10 ha	3 - 8	4 – 12
Over 10 ha	4-10	4 - 12



Measuring Stocking density

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Stocking density


The number of live trees per hectare

Overstocking

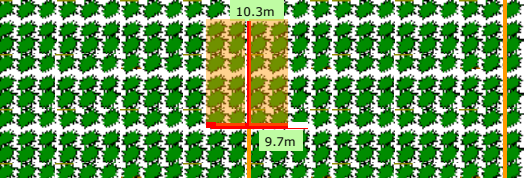
- Thinner, taller and more than likely straighter trees with lighter branches

Understocking

- Shorter, fatter trees with larger branches and poorer quality timber



Calculate stocking density



Calculate stocking - 0.01 ha plot


Measure the distance between 5 rows of trees _____

Divide this figure into 100 (0.01ha plot) $100/9.7=10.3m$

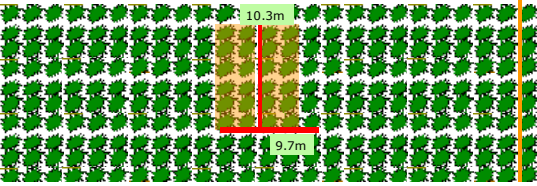
Mark your start point (usually mid point)

As you measure out the calculated distance:

- count the number of trees in the 2 rows either side



Calculate stocking density




10.3m
9.7m

Calculate stocking - 0.01 ha plot

Multiply your answer by 100 and it will give you the stocking level per hectare

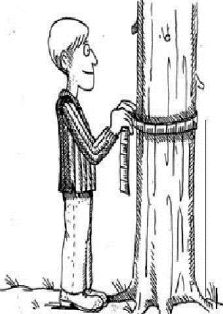
Example: If 24 trees counted in the plot, then multiply 24 by 100 => stocking level of 2,400 stems / hectare



Measuring DBH



DBH



Diameter at Breast Height


1.3 m from ground level
Fork below 1.3 m = 2 separate stems

Measure

Don't count trees below 7 cm DBH from upper side of slope

Mean dbh

- take many samples along brush path



Mean DBH & Gate System – Example 1

DBH	No. of trees counted
7	
8	
9	II (2)
10	
11	III (4)
12	
13	III (3)
14	
15	III (3)
16	III (3)
17	
18	
19	IIII (5)
20	
21	
20 trees counted in total	

To calculate mean dbh multiply:


- 9 by 2 = 18
- 11 by 4 = 44
- 13 by 3 = 39
- 15 by 3 = 45
- 16 by 3 = 48
- 19 by 5 = 95

Sum of above = 289

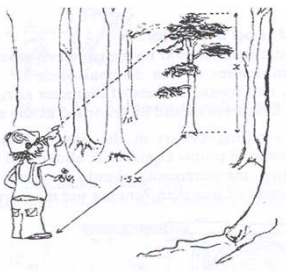
289 divided by 20 = 14.45

Mean DBH = 14


- Rounded down



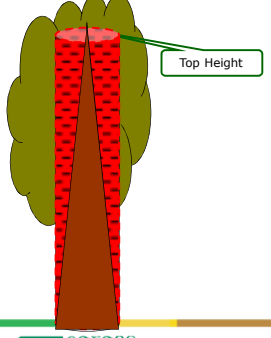
Top height



Top height = the height of the tree with the largest dbh in a 0.01 ha plot




Form height



Top Height


Using top height you read off your form height from the table supplied

Form height takes into consideration the taper of a tree



Form Height

Species	Top Height	Form Height
Sitka spruce	8m	2.83
Sitka spruce	12m	4.56
Sitka spruce	17.5m	6.95
Lodgepole pine	13.5m	5.00
Norway Spruce	21m	8.38
European Larch	18.5m	7.44
Western Red Cedar	17m	6.07




Thinning volume assessment - steps

Walk the boundaries & look at your map

Take the number of plots required

- Measure stems per ha
- Measure DBH
- Measure top height
- Form height - from table

Start to calculate the volume



Example - Sitka spruce

Plot details (0.01ha)

Step 1. Stems per ha (18 X 100) = 1800

Step 2. Measure mean DBH = 16cm

Step 3. Measure top height = 11m

Calculate

Step 4. Thin diameter (16 - 2) = 14cm
To get the thin Diameter always minus 2 from mDBH for 1st thinning

Step 5. Form height = 4.13

Step 6. Thin mean volume = 0.064m³


Thin mean vol = Thin DBH² X .00007854 X form height

Step 7. Thin stems/ha = 540

Thin stems per ha = stems per ha X (0.25 to 0.33)
(i.e. 1/4 to 1/3 of the stems)

Step 8. Thin volume/ha = 35m³

Thin vol/ha = thin stems X thin mean volume

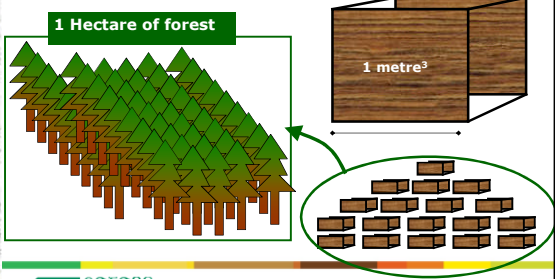



Yield Class

Yield Class:

- Is the average volume production of a crop in M3 per year

1 Hectare of forest

Yield Class

It is measured


- in cubic metres / hectare / year
- in multiples of 2 (even number)
 - i.e. 12, 14, 16, etc.

Example:

- a crop of yield class 14 is capable of growing an average of 14 m³/ha/year over its lifetime

Crops should be at least 12 - 15 years old before assessment

- as all site factors will have come in to play



Yield Class

Sitka spruce

- YC varies from 14 – 24
- Greater yields have been achieved
- Sites that are not considered able to achieve YC 14 with Sitka spruce are not grant-aided

Lodgepole pine

- YC varies from 8 – 16

Broadleaves

- YC varies from 4 - 12

