

Project number: 5106

Funding source: COFORD and Teagasc

Date: May, 2013

Project dates: Jan 2002 – July 2010

BROADFORM: Shaping and tending of broadleaves



Key external stakeholders:

Farm-forest owners.

Forestry contractors/consultants.

Policymakers.

Practical implications for stakeholders:

- Formative shaping can improve the stem form of young broadleaf tree species but the improvement diminishes over time since the operation was conducted as new-growth branches form, leading to the conclusion that shaping needs to be carried out frequently.
 - Will result in greater proportion of stems with good form from which to select potential crop trees later in the rotation
- Thinning and pruning ash can increase stem diameter annual increment by 50%
 - Increases the volume of timber produced
 - Timber properties of ash benefit from fast growth rates
 - Reduces rotation length

Main results:

- Formative shaping had no effect on tree height or stem diameter.
- Formative shaping can improve the stem form of young broadleaf tree species but the improvement diminishes over time since the operation was conducted as new-growth branches form, leading to the conclusion that shaping needs to be carried out frequently, possibly biennially.
 - Will result in greater proportion of stems with good form from which to select potential crop trees later in the rotation
- Thinning of ash, in conjunction with artificial pruning, can increase stem diameter annual increment by approximately 50%
 - Increase in volume of quality timber produced
 - Reduced rotation length

Opportunity / Benefit:

Farm forest owners of young broadleaf plantations can formatively shape their trees to increase the proportion of high quality stems. Thinning and high pruning of older ash plantations can increase stem diameter and hence volume.

Collaborating Institutions:

None

Teagasc project team: Dr Ian Short, Jerry Campion, Mike Bulfin, Toddy Radford,
External collaborators: Enda Cullinane, Kirklands Forestry

1. Project background:

The area of broadleaf afforestation has substantially increased over the past two decades, mostly through planting on farms. There has been a fear that the management of many sites is neglected after the 4-year grant has been paid (Bacon). Neglect can lead to poor stem form, leading to reduced volume of quality timber and reduced income from timber sales.

2. Questions addressed by the project:

The objective of the BROADFORM project was to develop some silvicultural methods and protocols for the early management of broadleaved plantations, up to and including pre-commercial thinning, for quality hardwood timber production. The project has investigated formative shaping of young broadleaves and pre-commercial thinning, in conjunction with artificial pruning of ash.

3. The experimental studies:

Experiments to assess the effect of formative shaping of ash (*Fraxinus excelsior*), beech (*Fagus sylvatica*) and oak (*Quercus robur*) were initiated in 2003 and monitored until end 2006. Six experimental sites [one ash, two beech, one oak/Scot's pine (*Pinus sylvestris*) mixture and two oak] at four locations. Six treatments were investigated:

1. Control: No shaping done;
2. Yellow: Shape focusing on the tree leader. Remove up to 50% of the foliage as required;
3. Blue: Remove all branches that interfere with the leader to a maximum of 90% of the canopy;
4. Blue Blue: Remove only disproportionately large branches greater than one-third of the diameter of the main stem;
5. Red: Shape only those trees above mean height; and
6. Red Red: Shape only those trees above mean height and with stem form ≤ 3 i.e. equal to or better than category 3.

Not all the treatments were represented at each trial site. Tree height, stem diameter and stem form were assessed.

An experiment was installed into 10-year old ash plantations at two locations in 2003 and monitored until the completion of the project. There were three treatments:

1. Control: Approximately 850 potential crop trees selected per hectare. No thinning and no pruning carried out;
2. 33% thin: Approximately 850 potential crop trees selected per hectare. Thinning carried out as per recommendation in "Growing Broadleaves" publication (i.e. 33% of stems removed). Pruning of potential crop trees as required;
3. 50% thin: Approximately 850 final crop trees selected per hectare. 50% of stems removed. Pruning of potential crop trees as required.

Tree height, stem diameter, stem form, incidence of live defects and height to first prunable defect were assessed.

4. Main results:

- Formative shaping had no effect on tree height or stem diameter.
- Formative shaping can improve the stem form of young broadleaf tree species but the improvement diminishes over time since the operation was conducted as new-growth branches form, leading to the conclusion that shaping needs to be carried out frequently, possibly biennially.
 - Will result in greater proportion of stems with good form from which to select potential crop trees later in the rotation
- Thinning of ash, in conjunction with artificial pruning, can increase stem diameter annual increment by approximately 50%
 - Increase in volume of quality timber produced
 - Reduced rotation length

5. Opportunity/Benefit:

Teagasc provides advice derived from the project to the forest industry. Formative shaping of broadleaves

became a requirement for payment of the Afforestation Maintenance grant.

6. Dissemination:

Formative shaping protocols were produced by the project and disseminated. Formative shaping of broadleaves is a requirement for payment of 4-year grant. A grant is also available for the second formative shaping of broadleaves. The project had input to the formulation of the protocol for the new Tending and Thinning of Broadleaves grant available under the Forest Service Woodland Improvement Scheme.

Numerous very successful and well-attended demonstration days were held which included active participation from the audience. The objective of these demonstration days was to highlight best practice in thinning of broadleaves and provide farm-forest owners and the industry the procedures for selecting and marking potential crop trees and thinnings.

'Tending and Thinning of Broadleaves' National Demonstration days

- 21st April, 2010. Summerhill, Co. Meath
- 22nd October, 2009. Fourmilehouse, Co. Roscommon
- 20th May, 2009. The Rower, Inistioge, Co. Kilkenny
- 17th September, 2008. Moroe, Cappamore, Co. Limerick
- 9th April, 2008. Crookedwood, Co. Westmeath

Outdoor presentations

- 30th June, 2010. 'Broadleaf Thinning, Marking and Presentation of Felled Timber'. National Small-Scale Harvesting and Extraction Demonstration Day. Mount St. Joseph's Abbey, Roscrea, Co. Tipperary
- 11th May, 2010. Farm Forest Management Walk. Mountmellick, Co. Laois.
- 27th May, 2009. 'Broadleaf Thinning and Marking'. National Small-Scale Harvesting and Extraction Demonstration Day. Teagasc Ballyhaise College, Co. Cavan
- 18th April, 2008. 'Tending and Thinning of Ash'. ITGA/SIF field-day. Teagasc, Johnstown Castle, Co. Wexford.
- 20th June, 2007. 'Ash Tending and Thinning'. Wood Energy Demonstration Day, Stradbally, Co. Laois
- 6th July, 2007. 'Tending and Thinning of Ash'. Morning session of the ITGA/COFORD/FDA/SIF/Teagasc field-day. Kilmeage, Co. Kildare.

Dr Ian Short and Jerry Campion organised the Farm Woodland Forum 2010 Annual Meeting, held at Teagasc Kinsealy, June 21st – 23rd 2010.

- Short, I., Radford, T. and Campion, J. (2010) Broadleaf Thinning and Knowledge Transfer. Presentation at the Farm Woodland Forum Annual Meeting, 21st June 2010, Teagasc Kinsealy
- Short, I. and Radford, T. (2009). Tending and Thinning of Broadleaves. Invited presentation to the IFA, 18th June 2009.

A new five-year project, co-ordinated by Dr Ian Short and in conjunction with Dr Conor O'Reilly (UCD) has been funded by COFORD which builds upon the work carried out by this project.

Main publications:

Short, I. and Radford, T. (2008) *Silvicultural Guidelines for the Tending and Thinning of Broadleaves*. Teagasc. http://www.teagasc.ie/forestry/docs/research/Teagasc_silvicultural_guidelines_Broadleaves.pdf

Example:

Kennedy E., Delaby, L., Rath, M., O'Mara, F.P. and O'Donovan, M. (2007) 'The Effect of Early Lactation Feeding Strategy on the Lactation Performance of Spring Calving Dairy Cows' *Journal of Dairy Science* 90: 3060 – 3070.

Popular publications:

- Anon. (2008) 'Tending and Thinning of Broadleaf Forests'. Factsheet No. 15, *Farm Forestry Series*. Teagasc. http://www.teagasc.ie/forestry/docs/technical_info/leaflets/Teagasc_Tending_Thinning_Broadleaves_15.pdf
- Anon. (2005) 'Shaping Young Broadleaves for Quality Timber'. Factsheet No. 3 (Revised), *Farm Forestry Series*, Teagasc. http://www.teagasc.ie/forestry/docs/technical_info/leaflets/teagascshaping3.pdf
- Short, I., Bulfin, M. and Radford, T. (2006) 'Formative Shaping of Broadleaf Trees'. *Today's Farm*

17(6): 26.

http://www.teagasc.ie/forestry/docs/research/Todays%20Farm%20article,%20Nov_Dec%202006.pdf

- Short, I. (2010) 'Tending and Thinning of Broadleaves'. *Teagasc Forestry Newsletter*, June 2010.
- Short, I. (2009) 'The 2-Stick Method for Marking Trees'.

http://www.teagasc.ie/forestry/docs/research/Teagasc%202-stick%20method%20tending_thinning_-_broadleaves.pdf

7. Compiled by: Dr Ian Short
