Foreword


In this issue, much of the 30,000 hectares of broadleaf which was planted is underperforming in terms of achieving sawlog wood of a good standard which will give a decent return. Dr. Ian Short and Jerry Campion look at the various scenarios and outline ways to improve the wood being produced.

Torrefaction.....The process has been around for a long time. It is now at a stage that improved technology is making it viable to remove the moisture and the weight involved as well as having a fuel that is not subject to dampness and thus can be stored more easily.

Forest Inventories: As the industry becomes more international and a wider variety of users are interested in the finished product it becomes important to have a uniform and reliable basis of measurement of Forestry stock across Europe. The team involved includes Charles Harper of UCD. Marie Doyle of UCD provides an overview of the project.

Miscanthus: For quite a few people their venture into miscanthus was not a happy outing. However Paddy O Toole and David Tyrrell of Quinn’s of Baltinglass argue that if the crop is well-managed, protected and properly fertilised an excellent return can be made from good ground.

This edition also includes a selection of features and profiles including: John Deere Forestry, LB Gremo, Wood-Mizer and Oakleaf Forestry, Logosol and others.

We trust you enjoy reading this publication which will continue to provide a voice for the Forestry and Energy sectors.

Until the next time.........

The Publishers
Forestry & Energy Review
In comparison with previous decades, the last two decades have seen a substantial increase in broadleaf afforestation in Ireland with about 30,000 ha planted during this period, predominantly in green-field sites on agricultural land. Some of the resultant stands haven’t performed as well as was hoped when planted. Whilst mistaken species or provenance choice can sometimes be a reason for poor stem form or poor growth rates, a host of other factors can also be a causal or contributing factor. Exposure, frost, insect and pest damage, amongst others, can all influence the quality and growth of trees.

The severity of the poor quality can impact the potential for producing a fully stocked stand of high quality sawlog in the future. If the production of sawlog is an objective of such a stand, some alternative silvicultural techniques may be required to increase the potential of fulfilling that objective.

The type of silviculture to be carried out will be influenced by the cause of the poor quality and the number of potential crop trees (PCTs) that are available. (For more information regarding PCTs, see Forestry & Energy Review 1[2]).

If the species or provenance selection is the cause of the poor quality, replanting with more suitable planting stock will be required. If other factors are the cause, replanting may not be necessary but an alternative system may be suitable. The 5-year CoFoRD-funded B-SilvRD project (Broadleaf Silviculture Research and Development) has been investigating, on a pilot basis, a number of alternative silvicultural options for poorly performing pole-stage broadleaves. One such system, coppice-with-standards, was outlined in a previous article (see Forestry & Energy Review 4[1]). This article will outline another system: systematic thinning with underplanting and/or coppice.

**SYSTEMATIC THINNING WITH COPPICING**

As part of the B-SilvRD project, two pilot studies were initiated. One was in a 17-year-old poorly performing stand of sycamore (Acer pseudoplatanus). It was planted in 1996 at 2 m x 2 m spacing (2,500 stems ha⁻¹). Elevation is 125 m and at the time of planting the site was exposed.

Possible causes for the poor performance included exposure, inappropriate species/provenance choice, mineral soil rooting depth limited to around 30 cm, and lack of early maintenance.

With the agreement of the owner, it was decided to carry out line thinning in three treatments (Figure 1):

1. remove 50 % canopy cover by removing alternate lines (Treatment 1:1);
2. remove 50 % canopy cover by removing 2:2 lines (Treatment 2:2); and
3. remove 75 % canopy cover by removing 3:1 lines (Treatment 3:1).
The thinning was carried out manually in February 2011 with low impact quad. Any viable firewood cords were extracted with a timber arch. Top height of the stand was approx. 8 m. The growing season after the intervention resulted in strong coppice regrowth from the cut stools; much stronger than had been anticipated. They were clearly benefiting from improved sheltered conditions than had been the case at the time of initial establishment.

The site was now being surrounded by well-established conifer stands on three sides and an overgrown hedgerow on the west side, together with more intimate shelter from the remaining sycamore crop.

Three growing seasons after the intervention and the coppice regrowth was particularly strong in the 3:1 treatment (Figure 2). This provided an opportunity to examine the potential to reconstitute the sycamore crop, potentially as a two-tier, single species woodland, via singling of the resultant coppice in the 3:1 treatment. Singling is a practice whereby the best coppice shoot is selected and retained whilst the other shoots are removed. Selection is done on the basis of vigour, stem form, and strength of connection to the original stump. A singling operation was carried out in the 3:1 treatment in January 2014.

A pilot study of singling is being carried out in which some of the coppice shoots have been removed to leave either 1 or 3 shoots per stump (Figure 3). Those that have 3 shoots remaining will be further singled in a later operation. Any good quality stems in the overstorey have been selected and high-pruned. In later years the overstorey will require thinning to maximise their potential and to ensure that the understorey sycamore receive sufficient light to continue their growth. Over time the understorey will also require thinning and high-pruning to maintain sufficient stem quality for sawlog production.

SYSTEMATIC THINNING WITH UNDERPLANTING AND COPPICING

The second pilot study was initiated in a poorly performing stand of ash (Fraxinus excelsior). Stem form and growth rate were both unsatisfactory. The cause of the poor performance was incorrect species choice and incidence of frost. The stand is on wet organic soils beside a river and at the bottom of a hill.

In early 2011, when the trees were 19 years old, they were assessed to be Yield Class 4 and in need of a remedial intervention to replace the ash with a more suitable species. Rather than clearfelling and replanting, a systematic thinning and underplanting operation was carried out. This consisted of either felling 2:4 or 3:4 lines of ash, and planting alder (Alnus glutinosa) within the felled lines between the stumps.

The standing ash trees that remain modify the microclimate relative to that when the plantation was first planted. They provide shelter and protection from frost. The felled ash have subsequently coppiced and are growing well. Both the ash coppice and the alders are now growing strongly.

Figure 2. Sycamore coppice understorey three growing seasons after maidens were cut to three intensities: a) 1:1; b) 2:2; c) 3:1
and the young alder are encouraged to grow upright as they reach for the available light above (Figure 4).

Three growing seasons after felling, the coppice shoots were singled, resulting in one good quality shoot remaining per stump. Future thinnings of the remaining standing ash should ensure that sufficient light is available for the singled ash and for the alder in the understorey to continue their growth. These will also require thinning in later years to ensure that they do not impede each other.

In the meantime, the alder and ash coppice should be formatively shaped and pruned as required. This will make for easy selection of potential crop trees when the trees have reached 8 m height. Alder is a nitrogen-fixing species. Some of the fixed nitrogen will become available to the ash and could have beneficial effects on its growth rate.

The remedial silviculture intervention has resulted in a two-tier forest system that has greater potential than the original stand had but will still require further management to ensure that the potential is realised.

Figure 4. Twenty-three-year-old poorly performing ash overstorey with four-year-old singled ash coppice and planted alder understorey.

**A FORGOTTEN PRACTICE?**

The silviculture that we are carrying out in the pilot trials is not new but may have been forgotten. A book about oak silviculture, written by Billington and published in 1825, has a chapter specific to “reclaiming and bringing woods and plantations that have been neglected, or got into a ruinous stunted state for want of thinning, &c. into a healthy and profitable condition.” In which he says:

"...I would begin to head some of them down (the weakest and those with the fewest branches on) to different heights from the ground, and perhaps cut some close to the soil, according to circumstances... Trees of 20, 30, or even more years' growth, might probably be renovated, and set in a growing vigorous state again, which would be of immense importance."

Heading down of trees is synonymous with stumping back of young broadleaves: the act of cutting down a young tree at, or a few years after, planting to near ground level to encourage coppice shoots. The usual reason for doing so is to improve stem form and/or vigour. In his Memorial on the Culture of Woods to the French Government in 1742, de Buffon of the Royal Academy of Paris said this about young trees that had been stumped back:

"... they shoot out with vigour the superabundance of their nutriment, and produce, the very first year, a shoot more vigorous and higher than the old trunk was after three years. I have repeated this experiment so often, that I can give it as a certain fact, and the most useful practice that I know in the culture of woods"

Two hundred years later, in 1945, Madden reported his delight at the result of stumping back a partially cleared stand of ash in Ireland:

"... extensive patches of crooked, deformed and diseased natural ash—neither a straight nor a healthy plant in the lot. There they stood, ten or twelve feet high, and, for all their deformity, their cutting back on the morrow afforded me no satisfaction. After one short year, however, this cutting back of natural ash has proved a definite success. What sturdy, straight shoots! No doubt of where they are going—the sky is the limit. Each stump has sent out from two to six shoots... The secateurs in my hand are itching for the work. Selection from such a pick will be easy and agreeable work."

Normally stumping back of trees is done within the first few years after planting when a concern with stem form or vigour first becomes apparent. The situation described by Billington, and those being investigated in the pilot trials, is a little unusual because the trees are older, but the practice could still be useful in their management.

**HISTORY REPEATING ITSELF?**

Over 200 years after Billington wrote about managing a poor quality broadleaf stand, here we are again in a similar situation looking for answers.

The interventions carried out thus far in the pilot trial areas appear to provide an alternative management strategy for poorly performing broadleaf stands. With the continued management of the stands in the future, their full potential may hopefully be realised and good quality sawlog be produced.

We hope that, 200 years from now, there will be no need for the answers to be rediscovered once more.