

# Short Rotation Coppice Scheme 2007

## Guidelines for Establishing Short Rotation Coppice in Northern Ireland

---

Dr Alistair McCracken



# **Guidelines for Establishing Short Rotation Coppice in Northern Ireland**

Dr Alistair McCracken  
AFBI 2007

## **Contents**

	<b>Page</b>
<b>What is SRC</b>	<b>3</b>
<b>Site Selection</b>	<b>3</b>
<b>Site preparation</b>	<b>4</b>
<b>Planting</b>	<b>5</b>
<b>Cutback</b>	<b>6</b>
<b>Harvesting, Drying and Storage</b>	<b>6</b>
<b>End use</b>	<b>7</b>
<b>Bioremediation</b>	<b>8</b>



## What is SRC?

Short Rotation Coppice (SRC) is the practice of planting woody crops, usually willow (*Salix* spp.) or poplar (*Populus* spp.) at high density which is harvested every 2 – 5 years. Willow produces very vigorous juvenile growth when it is coppiced, i.e. cut back to ground level. The coppiced stools that remain following harvest re-sprout to form multiple stems which can potentially grow to a height of 4m in the first year increasing to 6 – 7m by year three. While there are a number of candidate crops, willow is particularly well suited to Northern Ireland conditions and will consistently give dry matter yields in excess of 10 t ha<sup>-1</sup> yr<sup>-1</sup> depending on site and climate.



Two year old willow coppice

## Site Selection

**Soils:** Willow will grow in most agricultural soils with a pH of 4.5 – 7.0. Medium to heavy clay soils with good aeration and moisture retention are ideal although it must be possible to cultivate to a depth of 25cm to enable mechanical planting. Light sandy soils may have a problem with moisture retention and heavily organic soils should be avoided because of difficulties with initial weed control.

**Water:** Willow is a water demanding crop and needs soils with good water retention. Annual rainfall of 900 – 1,100mm is best. Willow will thrive in wet soils but will not tolerate water logged anaerobic soils. Soil moisture and structure may have implications for harvesting machinery.

**Elevation:** The production site should be less than 100m above sea level and have slopes of less than 13 degrees.

**Access:** It is essential to have hard access to the plantation, particularly for the movement of harvesting machinery in the winter. The root systems of the willow will support the harvesters but hard access is vital.

**Area:** A minimum of three hectare blocks is recommended. Smaller blocks make it difficult for planting and harvesting. Furthermore it is expensive to rabbit fence small areas if required.

**Location:** SRC willow will blend into the landscape in most situations. However as it can grow to a height of 6-7m by harvest this needs to be taken into consideration. Neighbours will need to be consulted.

## Site preparation

SRC willow will potentially be in the ground for a minimum of twenty years so thorough and careful site preparation is essential.

**Initial treatment:** In September there should be an application of herbicide while vegetation is still actively growing. If the site has excessively heavy vegetation it should be cut and removed. Allow sufficient time for regrowth to allow herbicide uptake. On grassland and set aside sites an application of insecticide will be needed for leatherjacket control.

**Ploughing:** A minimum of ten days after treatment the site should be ploughed. Ideally this should be carried out in the autumn, although it is important to ensure compliance with the Nitrates Directive. Ploughing should be to a depth of at least 25cm.

**Seed bed:** If the site is suitable it can be ploughed and power harrowed in mid-March, six weeks before planting. Any germinating seed can then be sprayed off using a Glyphosate based herbicide. If the site has a heavy clay soil it will be necessary to power harrowed as close to planting as possible. It may be necessary to lift large stones which have the potential to interfere with the planting machinery.

**Rabbit and hare fencing:** Rabbits and hares can potentially cause significant economic losses, especially during establishment. If there is a rabbit and hare population then the crop needs to be protected using an appropriate method of rabbit fencing.



Prepared site

## Planting

There are two willow breeding programmes in Europe developing new improved varieties for SRC production. The Swedish programme is controlled by Svalof Weibull AB. Commercially available varieties from the Swedish Programme include; Tora, Sven, Torhild, Tordis, Olof, Gudrun and Inger. The European Breeding Programme which is now based at Rothamsted Research in England has released varieties including Nimrod, Resolution, Discovery, Endeavour, Beagle, Terra Nova, Stott, and Parfitt.

It is important to note that all of these varieties are protected by Plant Breeders' Rights which means that it is illegal to produce propagation material for self-use or sale. It is permitted to produce small numbers for gapping up of established crops, from material produced at cutback. Cuttings will therefore have to be obtained from a specialist grower or supplier and will be supplied in the form of one-year old rods for mechanical planting.

For reasons of disease management it is vitally important a mixture of varieties is planted. The mixture should contain at least six components of which at least two should come from either the Swedish or the European Breeding programmes.

Planting should take place from early spring (February/March) to late May depending on weather conditions. Rods of willow are cut into 20cm long cuttings which are planted in double rows (0.75m. apart and 1.5m between double rows). A spacing of 0.5m between plants within rows will give a planting density of approximately 18,000 plants ha<sup>-1</sup>. In most situations there will be an establishment rate of in excess of 90% giving a final plant density of at least 15,000 plants ha<sup>-1</sup>. Where possible the rows should be planted in parallel with the long axis of the field.

There are a number of types of planting machines but the industry standard has become the Step Planter designed in Sweden by Salix Maskiner. In ideal conditions and large fields a planting rate of 6 – 8 ha day<sup>-1</sup> can be achieved.



Step planter

## **Cutback**

During the winter following planting the SRC is cutback to within 10cm of ground level to encourage the development of the multi-stemmed coppice. The work should be carried out as late as possible in the winter but before bud-break, generally late February.

The most effective machines are modified mowers/reapers as these give a clean cut to the stems. A contact herbicide should be applied after cutback to control those weeds that have grown during the establishment year. It is important that the herbicide is applied before coppice bud-break otherwise the crop will be damaged.

Each cutback stool should produce 5-20 shoots depending on the variety. Within 3 months of cutback, canopy closure will have occurred providing natural weed control due to reduced light at ground level.

## **Harvesting, Drying and Storage**

Harvesting occurs during the dormant season following leaf fall and normally takes place from December to Mid-March. This is the period of the year when the ground can be very wet and so hard access is absolutely essential. If harvesting is left too late and the plants have started to burst bud damage can be done to the stools, significantly weakening them delaying flushing and leading to increased weed competition.

There are two primary approaches to willow harvesting

### **Cut and Chip:**

The crop is cut in a single pass and the resulting chip blown into trailers. This chip is normally around 50% moisture content and needs to be dried almost immediately to prevent a rise in temperature leading to composting.

Ventilated grain drying floors have been used successfully to dry large volumes of fresh wood chip and since willow is carried out after grain drying has occurred this use fits in well.

It is estimated that it requires approximately 14% of the overall cost to dry chip in this way. However this is regarded as the most energy efficient method of drying and produces a wood fuel of high quality.

### **Whole stem harvesting:**

Complete rods are harvested and removed to a storage area close to the field where they can be stacked. Over a period of time (6 – 12 months) the rods will dry naturally to a moisture content of approximately 28 – 32%. When required the dried rods can be chipped. The wood chip may be of an inferior quality due to a wider range of particle size. Furthermore, although whole rod handling requires double handling this approach to harvesting may suit growers with smaller plantations or fields who do not have access to expensive grain drying facilities.

## End Use

Willow wood chip is a high volume low density fuel so it is very important economically that the production site is close to chip utilisation – normally no more than 20 miles.

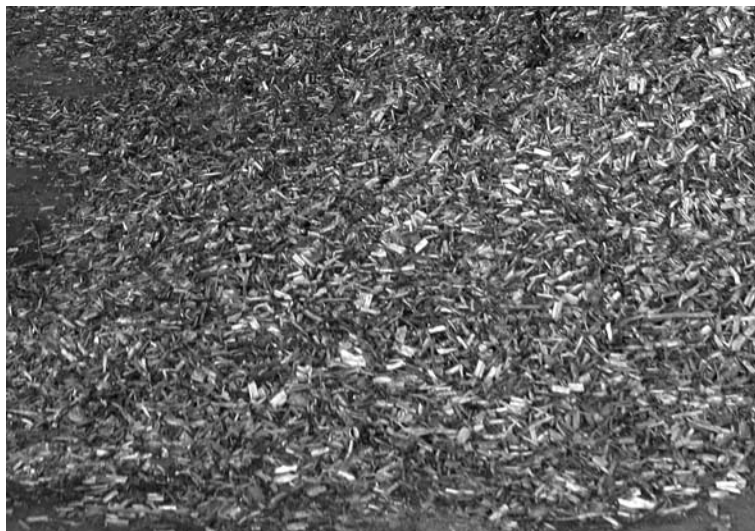
There are three thermo-chemical processes that can be used to convert energy stored in the wood chip into usable energy i.e. heat and/ or electricity.

The simplest and most convenient is combustion to produce heat. A wide range of boilers are available at a range of outputs to match every requirement.

At the present initial stages of the development of the industry it is essential to have established possible end use for the wood chip before planting.



Large boiler



Dried woodchips

## Bioremediation

SRC willow has the potential for the bioremediation or biofiltration of both solid and liquid effluent wastes. Willow can take up large volumes of water and is efficient in the use of nitrogen, but to a much lesser extent phosphorous. The use of a plantation for the treatment of sewage sludges and effluents could significantly improve the economics of growing SRC willow. However caution is required when considering bioremediation:

- It is essential to have a full soil analysis to determine whether or not the site is suitable to receive the sludge / effluent.
- A full analysis of the sludge / effluent is required in order to ensure that its application complies with all waste treatment legislation such as the Nitrates Directive and the Safe Sludge Matrix.
- Sludge will have to be pre-treated before application in order to bring about a pathogen kill.
- **Approval must be obtained from the Department of the Environment before any waste material can be applied to the land.**
- Sites where sludge / effluent is being applied need to be carefully monitored.



Perforated pipe for biofiltration of liquid effluent waste



FS 04/07 5C ??