Wilwater Programme
Update on SRWC cropping

1. Establishing the SRWC crop

Willow grown as a Short Rotation Coppice Short Rotation Coppice (SRWC) crop should be regarded as a crop in its own right. It has few demands but requires a high degree of management in the year of planting.

1.1. Successful planting

Willow grows on all soil types provided that the availability of water is not a limiting factor. The best land for growing SRWC is soil with a large water reserve as SRWC willow is sensitive to water stress, particularly during the year after planting. Planting on uncultivated, wet or unploughable land will result in poor establishment and, consequently, low yields. Although a good water supply is important, it is also essential to avoid planting SRWC on wet land. Mechanised harvesting is carried out during the winter and cannot be undertaken on soil with a poor load-bearing capacity. Furthermore, as for any crop, soil preparation is very important, particularly as a means of weed control.

1.2. Planting: variety selection and spacing

The most common planting method is a turnkey contract with a specialist company. This involves mechanised planting using a special planter (step planter), a large number of cuttings (15,000 per hectare; selected hybrid varieties), the planting specifications (cuttings must not be taken from existing plots) and hire of the machine with trained personnel. This is a satisfactory solution but particular attention must be paid to the standard spacings and the forward speed of the machine. Too high a forward speed may cause problems with establishment (cuttings poorly inserted into the soil).

Step planter

Varieties will have been selected for their yield, their ability to produce long stems without branching, and their resistance to cold and rust. To limit parasite pressure, it is strongly advisable to mix different varieties within the plot. Note that, to date, there is no evidence that hybrids of local varieties would not have given equivalent results.

1.3. Weed control: results for the alternatives to chemicals are more mixed

The weed control method which is widespread in other countries includes chemical treatment after planting (application of a germination inhibitor). This type of treatment has produced some satisfactory results. Supplementary weed control is often necessary because the germination inhibitor remains active for about 2 months only. The weed control Weed control should preferably be mechanical. However, chemical treatment using a localised treatment boom is possible. For cutting the vegetation cover, a prototype machine which is specially adapted to the row spacing has been developed and functions well (cf. photo opposite).

Prototype inter-row rotary cutter

Alternatives to this chemical system were tested and gave mixed results. Hoeing is not an obvious choice because it is not possible to pass along the row of willows. Adventitious weeds develop there and can compete with growth of the willow. This method can be used if cropping conditions are optimal (cultivated previous crop, stale seedbed before planting to exhaust the stock of seeds, etc.). A chain harrow may also be used as a mechanical weed control method.

Planting of a vegetation cover at the time of planting is not currently recommended because the vegetation cover competes too strongly with the willow for the water resources. Regular cutting of the plant cover is not enough to limit competition with the willow. A variety which is low-growing, grows rapidly, and has a low water requirement would be required. Planting willow cuttings on existing grassland was trialled and cannot be completely ruled out. The land needs to be reasonably loose so that the cuttings can establish easily. To stop the grass cover from competing with the willow, it must be cut and its growth restricted during the first few months using a chemical herbicide; this is a disadvantage of this method. Regular cutting is then necessary until the willows are well developed (using the prototype inter-row machine).

Plastic mulching of the double rows of willow is very satisfactory in terms of weed control and willow development but presents problems for mechanisation and planting (manual planting so as not to tear the plastic). We recommend the use of biodegradable plastic.

Plantation with plastic mulching

The chemical system (application of germination inhibitor) gives satisfactory results in terms of weed control for land which is regularly cultivated and well prepared. Overall, over the life of the plantation (20 years), chemical inputs are restricted to the first year, making SRWC a crop with a low input requirement. However, trials must continue in order to develop management methods which require no artificial inputs (notably plastic mulching or hoeing).

1.4. Cutback: an essential stage

Cutback – cutting back the main stem during the first winter – is carried out to allow the willows planted to produce several shoots. A sectional cutter bar is preferable to a forage harvester because it gives a cleaner cut. This method has the disadvantage of leaving stems on the ground which may grow randomly between the rows.

Cutback is not necessary in coppices which are well developed in terms of height and number of stems per stool. This means that additional intervention is not necessary and there is no loss of wood (left on the ground) or random establishment of cuttings.

1.5. Planting costs

The cost of planting cuttings is around 1800€ /ha and the average cost of preparation and crop maintenance is 910€/ha, giving an average planting cost of 2710€/ha. These costs do not include any development work done around the plot.

2. Harvesting methods

The SRWC crop requires agricultural-type mechanical harvesting. Short Rotation Coppice short rotation coppicing cannot be justified if manual or forestry methods are used.

The harvesting method most commonly used in Europe is the forage harvester. This method has the advantage of cutting and chopping at the same time, which optimises the operating costs for the harvest. To date, rod harvesters for harvesting whole stems have proved insufficiently robust for cutting the 3-year stems found in Brittany. A new rod harvester was designed early in 2007 and tested in Brittany. The advantages/disadvantages of the two methods are as follows:

Forage harvester with special harvesting header

Particularly suitable for large plots with good load-bearing capacity

Autumn and winter harvesting must be **outside the growing season**

High forward speed: **0.3-1 ha/hour**

Requires **soil with good load-bearing capacity**

Needs a **trailer area**

Harvest of **wet chips,** so long drying time and **10-15% loss through fermentation**

Investment: **85 000€ for the header, 160 000€ for the forage harvester**

Operating cost: **(estimate for harvesting 50 hectares per year, maintenance, fuel, labour): 250€/ha**

Rod harvester

Particularly suitable for small or damper plots

Flexibility in planning the harvest: **until spring**

Forward speed **0.2- 0.5 ha/h**

May be used on **relatively wet land** (more flexible planning)

Skidding is necessary if the rows are longer than 300m, using a **special telescopic grab** or **skidder** to avoid tangling the rods

Rods can be left to dry on site or in the open air on a platform

Rods are chopped elsewhere

Investment: **170 000€**

Operating costs: **Around 350€/ha (for 50 hectares per year, tractor hire, maintenance, fuel, labour)**

Given the climatic conditions in Brittany, it was considered wiser and more reliable to choose two-stage harvesting. Planning of the harvest is more flexible because work can start once the sap starts to fall and can continue until several weeks after the start of re-growth. Leaves left on the stems will dry and fall before the willow is chopped.This machine can harvest up to 250 hectares in a single winter and can therefore harvest all the SRWC sites in western France.