

## INTRODUCTION

Short rotation coppice (SRC) is a woody, perennial crop, harvested every two to four years. The rootstock remains in the ground after harvest and new shoots emerge the following spring. The Osier or basket willow, *Salix viminalis*, a shrub form native to the UK, is parental stock to many of the willow varieties planted for use as an energy crop. An SRC plantation should be viable for up to 30 years before re-planting becomes necessary, depending on the productivity of the stools.

Poplar is sometimes considered as an SRC crop but there are numerous problems associated with the varieties currently available. For example: they do not coppice well; the ridged stems block planter mechanisms; an apical bud is necessary near the top of the cutting; and poplars are difficult to remove. Poplar can, however, be grown as a single stem tree crop and harvested after seven years

Energy crops, such as SRC, are defined as being carbon neutral as the plants absorb and store carbon dioxide whilst they are growing. When they are burnt they release an equivalent amount of CO<sub>2</sub>.

## WHERE TO GROW SRC

Commercial SRC has been successfully established on a wide range of soils from heavy clay to sand, including reclaimed land. It will grow best where there is sufficient soil moisture e.g. where the water table is within one metre of the surface or rainfall is more than 600mm / yr. SRC can withstand occasional flooding but cannot withstand being permanently waterlogged.

It is important to consider landscape, ecology, archaeology and public access during site selection. Mature SRC can reach eight metres in height so its visual impact must be considered, particularly if grown close to a footpath or local viewpoint.



Fig 1. Mature SRC

## CROP ESTABLISHMENT

- Thorough site preparation, particularly weed control, is essential to ensure good establishment – this is a long-term crop so efficient establishment helps avoid expensive future problems.
- A mix of at least five willow varieties is randomly planted within each plantation. Mixing varieties helps with disease and pest control.
- The willow is planted in spring at a density of 15,000 cuttings / ha.
- Pre-emergence herbicide is applied within five days of planting.
- Cutback takes place the following February to encourage the development of the true coppice i.e. multiple stems.
- Pre-emergence herbicide is again applied before bud-break.

## HARVESTING

The first harvest is usually three years after cutback, and is taken during the winter (after leaf fall and before bud-break). The crop re-grows in the spring after harvest and, provided that land preparation and establishment have been effective, no further herbicide is required.



Fig 2. Billet harvesting

Yields at first harvest should be 7 to 10 oven dry tonnes (odt) / ha / yr depending on ground conditions and efficiency of establishment. This equates to 21 to 36 odt / ha for a three year harvest cycle. Yields should increase at 2<sup>nd</sup> and 3<sup>rd</sup> harvests, possibly achieving 14 to 15 odt / ha / yr if new varieties have been used.



Fig 3. Planting willow

## MACHINERY REQUIREMENTS

Commercial planting machines plant two pairs of twinned rows set at standard widths. Willow rods (stems) are fed into the planter's mechanism, which cuts the rods into cuttings of set lengths, inserts them into the soil and then firms the soil.

Cutback is carried out using modified grass reapers with reciprocating blades able to cut 2 or 4 rows at a time.

Harvesting can produce whole rods, billets or chips depending on the machinery used, the preferred method of storage or the needs of the end-user. Scandinavian whole-rod harvesters generally produce loose rods that are off-loaded into heaps on the headlands: there may be considerable wastage using this method. Sugar cane harvesters produce billets of 5-20cm length, which are blown into an accompanying trailer: further processing e.g. chipping will be needed prior to end-use. Dedicated SRC headers fitted to forage harvesters are used for direct-chip harvesting, the chips being up to 5cm in size and blown into an accompanying trailer

## WEED CONTROL, PESTS AND DISEASES

SRC is susceptible to a number of insect pests most particularly willow beetles. Both adults and larvae feed on the leaves and can cause considerable damage.

The most important disease affecting SRC is rust. This affects both leaves and stems and can infect an entire crop if appropriate measures are not taken to prevent or at least reduce this. Use of a random mix of at least five willow varieties is the recommended method for controlling rust. An added advantage of mixing varieties is that it can also help to reduce willow beetle damage.

Rabbits can cause significant damage to the young crop and should be fenced out for at least the first 2 years.

## FERTILISER REQUIREMENT

During land preparation, sludge cake can be incorporated into soils prior to ploughing provided it is approved by the local Water Company. **No fertiliser should be applied during the establishment year i.e. from planting to cutback.** Opportunities to apply fertiliser, usually treated sewage sludge, to the growing crop should be taken in year one of the harvest cycle, i.e. after cutback and after harvest. Due to the height of the crop, application can prove difficult in year two and impossible in year three.

## ENVIRONMENT

SRC can significantly improve ecological diversity within the agricultural landscape. High numbers of invertebrates lead to increased numbers of small mammals and bird species with a number of the latter being of high conservation value such as skylark, lapwing, song thrush and breeding migrant warblers. Headlands and rides also provide habitats for a wide range of plants and animals.

### ADVANTAGES

- Agricultural diversification
- Opportunities to develop specialist contracting skills
- Local fuel supply
- Significantly less intensive cultivation than conventional arable crops
- Low agrochemical inputs
- Increased landscape diversity
- Significant ecological benefits and improved game conservation
- A useful crop for marginal and reclaimed land

### DISADVANTAGES

- Long term contracts may tie up land for a number of years
- Large-scale planting may attract landscape criticism
- Consideration must be given to SRC's high water uptake when planting large areas in single catchments
- Specialist machinery needed for planting and harvesting
- Chip storage needs careful handling