A place for eucalyptus?

The impact of two recent hard winters has deterred some people experimenting with eucalyptus. Kevin Lindegaard gives another point of view.

The Renewable Heat Incentive is certain to bring about a dash for biomass which is great news for boiler installers and woodland owners. FC's new Woodfuel Woodland Improvement Grant will initially help meet the burgeoning demand by increasing woodfuel production from undermanaged woodlands. But even with an extra 2m tonnes of woodfuel, there is still likely to be a significant shortfall in only a few years. Fast-growing eucalyptus species, grown as short rotation forestry (SRF) could help meet the future gap. If planted in 2012, then plantations could be ready to harvest by the end of the decade.

Results from FC's SRF trials will not become available for several years, so in the meantime, what should a prospective SRF grower consider before committing themselves to this crop?

Variety choice

There are numerous species available and *Eucalyptus nitens* has the most eye-catching yields: a trial planted in Kent, by John Purse of Prima Bio, yielded over 150 oven dry tonnes in eight years. The downside of this particular species is that it is one of the least hardy.

The last two harsh winters have provided a stern test for recently established plantations and several have been critically hit. You could dismiss this as a rare event, but establishing eucalyptus is expensive and in England there are no grants. Hence, it pays to weigh up the risk versus the reward and consider widening the species choice to include some good all-rounders. For instance, *E glaucescens* might yield around 30% less than *E nitens*, but is hardy to -16°C (four degrees lower). It demonstrates excellent form and exceptional browsing resistance to deer and rabbits, but has the added benefit of good coppicing ability.

Suitable sites

Most eucalypts should do well on fertile, well drained, lowland soils such as sandy/clay loams and have a preference for neutral or slight acidity. SRF is suitable for grade 4-5 agricultural land, but should also do well on forestry sites that have been clearfelled due to *Phytophora ramorum* and red band needle blight outbreaks.

Establishment

Eucalyptus seedlings currently cost around £0.35 each, plus delivery. Establishment costs can be reduced by planting at a stocking rate of 2000-2500/ha, but excellent weed control is critical in the first couple of years, before canopy closure is >>

How SRF eucalyptus compares to other energy crop options

Production costs

Crop	*Management*	*Fuel produced*	*8 year yield**	*Production costs***
SRF Eucalyptus	Fenced	Chip	104	52.00
	Unfenced	Chip		43.30
	Fenced	Logs		73.00
	Unfenced	Log		66.30
SRC willow	Fenced	Chip	70	37.50
Miscanthus	Unfenced	Chip	91	43.35

* odt
** £/odt

Pros and cons

Crop	*Pros*	*Cons*
SRF	High yields Good quality woodfuel Conventional forestry machinery	Long lead-in times No grants in England Low biodiversity value
SRC	Low input crop High biodiversity value Yields boosted by nitrogen-rich wastes	High moisture content at harvest Low bulk density Specialised machinery required
Miscanthus	High yields Conventional agricultural machinery Harvested annually	Very low bulk density Problematic fuel (higher chlorine content, low ash melting point, higher ash content) Low biodiversity value

>> achieved. Typically, eucalyptus plantations are fenced, but this expense could be avoided by using browse-resistant varieties.

To restock or coppice?

The coppicing ability of eucalyptus is very important, as it provides flexibility to growers. *E glaucescens* and *E dalrympleana* produce good coppice, with two to three co-dominant stems, but *E nitens* and *E gunnii* are less suitable for this option. The woodfuel quality of coppiced eucalyptus will be slightly inferior, due to the higher bark:wood ratio. In addition, the harvesting and extraction will be more involved and expensive. However, overall woodfuel production costs would be lowered by avoiding re-establishing the area.

Woodfuel quality

There is little information available to growers on the woodfuel characteristics of different eucalyptus species. The received wisdom on the web suggests that eucalyptus logs are quite difficult to split, dry well, burn fast without spitting and have a pleasant smell. Eucalyptus has a relatively low bulk density for a hardwood, but more information is required for different species, as this will impact on transport costs and storage requirements. Similarly, more analysis is required on the quality aspects of the woodfuel produced (for example, ash percentage, ash melting point, chlorine content) as these factors will ultimately dictate the price paid by the consumer.

Potential income

The best current price available for supplying biomass to power stations is around £57/odt, ex grower. With RPI running at around 4%, it is possible to predict a price of £81/odt in 2020. With production costs of £52/odt and a modest yield of 104odt over eight years, this would provide a profit (excluding interest rates) of £3016/ha or £377/year.

Better prices could be achieved by selling into heat markets. By generating your own customers, for example, a local school, you could currently get an ex-farm price of £85/odt, or £60/tonne at 30% moisture content). However, delivering the woodchip would require additional equipment and hassle so you might wish to sell direct to a woodfuel broker for a lower price. Of course, it would be a brave person who predicted the going rate for eight years' time, but one hopes that prices will continue to rise with increased demand.

Grow your own options

Nevertheless, using your own woodchips is the real way to make money out of your crop. Oil at 60p/litre is equivalent to a heat price of 5.66p/kWh, whereas using your own eucalyptus woodchips, with production costs of £52/odt, would be around 1p/kWh. So you will make savings on the fuel and get RHI payments on top. A farm using 10 000 litres of heating oil per year (~100 000 kWh) in an old, inefficient boiler would require about 27 tonnes (at 30% moisture content) of woodfuel per annum. This could be produced by growing 1.5-2ha of eucalyptus planted in small blocks, to allow for successive harvesting. Although the crop will be ready to fell from year eight onwards, you could thin after four years to keep the home fires burning.

Crops for Energy can assist landowners in making the right choices for woodfuel growing, supply and use through feasibility studies, turn-key management options and training courses. www.crops4energy.co.uk

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Where now for SRF?

Grant Murray of Alba Trees has a different point of view

With SRF in a mental hiatus, many foresters are deciding to stick with growing the best hardwoods available. The severity of the last two winters destroyed many eucalyptus trial plots across the UK and the length of the frost even managed to kill some mature stands. While researchers investigate exactly what killed the trees at a cellular level, the experience has been stark enough to discourage many foresters from planting any more.

So what now? The biomass demand continues to gather momentum and appears to demonstrate a market for all which the UK can grow. As a nursery, there are few clear indications of which species the UK intends growing for this market. We should perhaps learn a lesson from our brethren in New Zealand, who in broad terms focus on selective breeding from species which have already proven their suitability to the climate. With our long history of forestry, the lesson that many are taking from the eucalyptus experience is that perhaps we are unlikely to discover a new species for SRF.

So what is the best of what we have presently? Provenance selection may help refine suitability, particularly if chosen with a view to climate change predictions. Research developing hybrids may also prove fruitful, as Forest Research hybrid aspen plots are beginning to indicate. But the real capability gap is a strategic hardwood breeding programme akin to that done with Sitka spruce. BIHIP has been working on hardwood selection and improved birch, cherry and ash are all now becoming available.

The most interesting data to consider is not just the growth rate, but the harvestable energy available, per hectare, per year. Data from FR suggests a hierarchy of species suitability for biomass based on density, calorific value, yield class and rotation length and perhaps this is a starting point for a post-eucalyptus Britain. If this data were matched to suitability for site and end-user, then we could gain a strategic view on how to resurrect the SRF programme.