



# ***miscanthus***

## *(Miscanthus x giganteus)*

The Renewable Energy Strategy (RES) sets a target for 15% renewable energy in the UK by 2020 across heat, power and transport fuel sectors. Miscanthus has been grown in the UK for a number of years as an energy crop. The harvested material can currently be used to generate heat and power and in the future may be used as a feedstock for advanced biofuels.



### Production cycle

Miscanthus is a perennial C4 rhizomatous grass originating from Asia. Stems emerge from the rhizome annually through March and April. In the first year of growth stems reach up to 1-2 metres in height by late August.

The cooler temperatures in autumn trigger senescence and translocation of nutrients to below ground parts of the plant. By February only dry leafless canes remain; the fallen leaf material recycles nutrients and returns organic matter to the soil providing a mulch layer which helps to suppress weeds in spring.

In the first year of growth the yield is limited and the stems often remain uncut. Annual harvesting takes place from the second year, during which the crop can be expected to reach a maximum height of 3-3.5 metres. The crop has a useful life of 15-20 years.

### Where can miscanthus be grown?

Miscanthus will grow on a wide range of soil types, however higher yields are achieved on moisture retentive soils which warm up quickly in spring to enable the longest possible growing season.

Historically, recommendations have suggested that south of a line between the River Severn and The Wash, suits the optimum environmental requirements but lowland sites north of this line can also be suitable. Miscanthus is now grown successfully in Yorkshire. Site selection should take account of the need to harvest the crop in winter, so fields prone to waterlogging may be unsuitable.

### Establishment

Propagation from rhizomes is the current preferred method of establishment in the UK. Miscanthus is planted during March and April using modified machinery or specially designed fully automated precision planters, with a work rate of 10-20 hectares per day.

A planting depth of 5-10 cm is recommended, ideally following autumn ploughing and rotary cultivations in spring.



propagation from rhizomes



annual harvesting of the dry canes takes place from the second year



## Crop Fact Sheet

Establishment costs are high; typically around £2,000 per hectare, primarily due to the purchase costs of rhizomes. However, the Energy Crops Scheme, administered by Natural England, offers 50% of actual planting costs to aid establishment of the crop and the current scheme is in place until 2013.

### Planting density

The dry matter yield profile of miscanthus can be divided into two phases, a yield building phase lasting 2-5 years (depending on site and growing conditions) followed by a yield plateau phase.

Experimental data comparing planting densities of 10,000 plants/ha and 40,000 plants/ha demonstrates that additional yield achieved in the yield building phase from the higher plant density, did not justify the additional establishment costs. Accordingly it is recommended on a commercial scale, to plant at a density of around 15,000 plants/ha.

### Key points

- Perennial, suited to wide range of soil types
- Annual yield for 20 years once established
- Planting grants available for 50% of establishment costs
- Low inputs required once established
- Good weed control required in establishment years
- Harvested in winter after leaf fall allowing nutrients to be returned to the soil

## Pests & diseases

Pests including the common rustic moth (*Mesapamea secalis*) and ghost moth (*Hepialus humuli*) larvae have been reported feeding on miscanthus but control measures are not necessary.

To date no serious pathogens have been reported to affect yield or productivity; therefore no fungicide treatments will be required.

Rabbits can cause damage to emerging and immature crops; appropriate fencing may be necessary to prevent serious damage.

## Weeds

An autumn application of a broad-spectrum herbicide is recommended prior to planting to remove perennial weeds, followed by a further application the first spring if necessary.

Weeds may become competitive with young shoots during establishment and further control may be necessary. From the end of year two, leaf litter and canopy closure will give effective suppression of most weeds.

## Nutrients

Fertiliser demands for the crop are low; the plant is able to recycle nutrients into the rhizome in the latter part of the growing season. As a result, nutrient off-take at harvest is low.

Up to 85 kgN/ha from 20:10:10 product should be applied at establishment. Occasional maintenance applications up to 40 kgN/ha may be necessary to maximise yield.

## Harvesting

Harvesting is carried out from February to April. The crop is generally cut using a mower conditioner or modified forage harvester and then allowed to dry in the field before baling into 500-600 kg heston bales for storage.

The lower the moisture content the higher the energy yield and bale value. Moisture content of harvested material, at the optimum harvest date, is typically 18-20%. Material harvested at a higher moisture content would incur significant drying costs or penalties at point of sale. The bales should preferably be stored under cover or securely sheeted to protect them from wet weather.

## Crop productivity

Current yields are approximately 12-15 oven dried tonnes (odt) per annum, equating to 15-18 fresh tonnes per hectare. Prices range from £50-60 per odt for large scale energy generation. Payments are typically dependent on moisture content or energy value.

In addition, small-scale boilers have been developed to generate heat on-farm; it is estimated that 20 ha of miscanthus would provide all the heat necessary for an average farm and this could be valued around £75 per tonne.

Defra have produced a series of maps illustrating likely yields of miscanthus at regional level across England, as well as showing where current plantings are sited. These maps are a useful guide to likely productivity and can be accessed via;

[www.naturalengland.org.uk/ourwork/farming/funding/ecs/default.aspx](http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/default.aspx)

## Future outlook

The outlook for bioenergy looks positive. In order to meet the Renewable Energy Strategy (RES) targets in 2020, significant volumes of biomass will be required; some of which will come from energy crops. Generators are encouraged and incentivised to use dedicated energy crops and from 2011, the Renewable Heat Incentive will support small and medium-scale heat generation from biomass. Advanced biofuel technologies are also being developed, which will in turn increase demand further.

## Agronomy

- Plant rhizomes March/April
- Up to 85 kgN/ha required at planting
- Need for pest and disease control is unlikely
- Harvest February to April, annually from year 2
- Cut using mower conditioner or forager and big square baled
- Yield of 15-18 fresh tonnes per hectare is possible on most sites
- Ideally store undercover or securely sheet until required

## Further Information

NNFCC Energy Crops Gross Margin Calculator: [www.powerplants2020.co.uk](http://www.powerplants2020.co.uk)

Miscanthus Growers Guide & Site Selection Maps: [www.naturalengland.org.uk/ourwork/farming/funding/ecs/default.aspx](http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/default.aspx)

International Energy Crops Ltd. [www.energycrops.com](http://www.energycrops.com)

Renewable Energy Crops: [www.recrops.com](http://www.recrops.com)

New Energy Farms: [www.newenergyfarms.com](http://www.newenergyfarms.com)

Miscanthus Growers Limited: [www.miscanthusgrowers.org](http://www.miscanthusgrowers.org)