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Miscanthus Factsheet

Miscanthus species originate in Asia and they are perennial, rhizomatous grasses with lignified stems resembling bamboo. Once the plants are established (typically requires 2 years) it has the potential for very high rates of growth growing stems that are <3m within a single growing season.

Miscanthus is planted in spring. Above ground growth in the first 2 years is slow as most of the crop development takes place in the ground. Above ground production accelerates from year 3, and from year 4 onwards, the crop realises its full potential. Current experience indicates that the crop remains productive for up to 20 years. The Miscanthus leaves fall off in the winter, contributing to the development of soil humus and nutrient recycling. Miscanthus produces bamboo-like canes during late spring and summer which are harvested in late winter or early spring. This growth pattern is repeated every year for the lifetime of the crop. Miscanthus spreads naturally by means of underground storage organs known as rhizomes. However, their spread is slow and there is little risk of uncontrolled invasion of hedges or fields. These rhizomes can be split and the pieces re-planted to produce new plants. All propagation, maintenance and harvest operations can be done with conventional farm machinery. In the UK, long-term average harvestable yields from a mature crop (i.e. excluding the first 3 years – have exceeded 15 dry tonnes per hectare per year at the most productive experimental sites. These high yields suggest that the crop has the potential to make an important contribution to Ireland's commitment to energy generation from renewable energy sources.

Wexgen have recently put in place a state of the art briquetting plant in Enniscorthy and will begin to manufacture in excess of 5,000 tonne of briquettes per annum under the trademark GreenFlame Biomass Briquettes. We also have some very large projects in the pipeline which include the supply to a large combined heat and power plant in Wexford and industrial heating systems across the south east

Other markets for Miscanthus exist apart from that for the energy market. Other end uses include high value equine bedding and sustainable composite materials for markets such as the production of biodegradable plastics and fibres for car parts. Alternative end uses are not eligible for funding under the Bioenergy Scheme.

ANNUAL GROWING CYCLE:

The growth pattern of the crop is simple. It produces new shoots annually and these usually emerge from the soil during April and continue to emerge throughout the year until the first hard frost. These shoots develop into erect, robust stems, which reach 1 - 2 m in height by late August of the year of planting, with a diameter of 10 mm.

The stems, which have an appearance similar to bamboo canes, are usually un-branched and contain spongy pith. From late July the lower leaves senescence as canopy closure prevents sufficient light penetration. Following the first air frost in autumn, senescence accelerates and nutrients move back to the rhizome. Leaves then fall and a deep leaf litter develops. Any remaining foliage dies and the stems dry to a relatively low moisture content (< 20%) during winter. By February, free standing, almost leafless, canes remain and it is these are cut and baled with conventional machinery and the bales removed from the field. The rhizomes

begin to produce new shoots once spring-time temperatures increase again and this is repeated every year. From the second season onwards the crop can be expected to achieve a maximum height of 2.5 - 3.5 m.

CROP REQUIREMENTS:

Miscanthus has been reported growing, and producing high or reasonable yields on a wide range of soils, from sands to high organic matter soils. The crop needs to establish a deep rhizomatous rooting system and is therefore sensitive to compaction. Best results are from soils that can be well tilled in the spring. It is also tolerant to a wide range of pH values, but the optimum is between pH is between 5.5 and 7.5. Miscanthus is harvested in early spring and therefore it is essential that the site does not get excessively waterlogged during this period, as this may limit accessibility for harvesting machinery and cause damage to the soil structure. The potential cropping zones for miscanthus are quite widespread. Miscanthus does not grow at low temperatures below a threshold of 6^{o}C. This is considerably lower than for maize and therefore the potential growing season is longer. Late spring frosts which destroy early spring foliage and effectively reduce the duration of the growing season are the major constraint to long season growth.

Annual rainfall and soil water retention will strongly influence the yield of miscanthus at any site. Miscanthus possesses good water use efficiency when considered on the basis of the amount of water required per unit of biomass and miscanthus roots can penetrate and extract water to a depth of around 2m. However, to achieve high yields the crop may need more water than the crops that it may replace. In addition, a dense canopy means that 20-30 % of rainfall is intercepted by, and evaporates off, the leaves and never reaches and infiltrates into the soil. Limited soil water availability during a growing season will prevent the crop from reaching full potential yield in that yea but irrigation is not justified by the value of increased biomass obtained.

GUIDE TO PROJECTED RETURNS:

Returns are based on base price of €65 per tonne at < 20% DM. Returns also include the energy crops premium payable over the first 3 years.

Cost of second year herbicide and subsequent years mowing, baling and moving and stacking bales included. Returns are based on 2010 cost projections and there is no allowance for inflation. The base price for Miscanthus will rise in price as energy cost rise

YIELDS:

The yield from the first season's growth is not worth harvesting. The stems do not need to be cut and so the stems may be left in the field until the following season. From the second year onwards the crop is harvested annually. The second year harvestable yields may range from 6-10 t/ha (occasionally up to 13 t/ha), and those in the third year would be between 12-17 t/ha or more. Harvestable yields reach a plateau after 3-5 years, sometimes in excess of 20 t/ha/yr.

ENERGY VALUE:

Miscanthus has a net calorific value, on a dry basis, of 17 MJ/kg, with a 2.7% ash content. The energy value of 20 t of dry miscanthus would be equivalent to that of 8 t of coal. Growing miscanthus as a fuel is very energy efficient. A UK lifecycle energy analysis determined an energy ratio of over 30 for miscanthus i.e. for every unit of energy expended in producing the crop over 30 units of energy are obtained. Miscanthus can be used for large-scale electricity power stations or for small scale heat production.

GETTING ESTABLISHED – TURN YOUR FIELDS INTO CARBON NEUTRAL FUEL:

Wexgen is a farmer owned private limited company wholly owned by growers. We offer farmers a complete support package from first field inspection, agronomy, establishment, supply of rhizomes, contracting services and the purchase of biomass. The end use for Wexgen growers is the manufacture of GreenFlame Biomass Briquettes. Wexgen can sign off on contracts for Department of Agriculture Miscanthus Establishment grants.

For further information, please contact Wexgen Agri Services on 053 9234700, or email info@greenflame.ie.