



MISCANTHUS

GREENPOWER

Culture

rentabilité

What is miscanthus?



■ Hybrid species of herbaceous

Hybrid species of herbaceous plant of the family of Poaceae, resulting from a man-made cross between *miscanthus sinensis* and *miscanthus sacchariflorus*.

■ It is a sterile plant

Created by a Japanese in 1936, it is a sterile plant; of increasing interest to industry, and to some agricultural sectors, due to its high productivity and ligneous cellulose content.

■ Non-invasive culture

As a non-invasive culture, Miscanthus rhizomes only requires initial planting and an annual harvest in March, it limits deterioration of the soil structure caused by winter work, and the fields can also provide winter shelter for birds, small mammals and invertebrates, thus contributing to bio diversity.



Introduction



Plant cannot be harvested in its first year

The plant cannot be harvested in its first year during which it requires some care as it is delicate and must be protected from cold, watered if necessary and kept free from weeds. But these early efforts pay off from the second year onwards as the plant can then be harvested for 15 years.

Plant does not need a lot of care

at present it is not subject to any disease nor to attacks by any rodents.

At around 4 m high in moist

rich soil and mild temperatures, it resembles corn for the productivity, bamboo for its fine leaves, and sugar cane for its height.



Introduction



■ **Harvesting must be carried out at the end of winter or in spring**

Miscanthus can grow on agricultural or polluted industrial land.

■ **Yield is between 10 to 20 tons per ha**

It is one of the plants which have a high yield compared to the energy necessary for their production.

■ **CO₂ emissions are low during combustion**



Production



■ **Planting takes place in spring**

■ **Using mechanical planters**
resulting in even sowing rapidly completed.

■ **From year 2, the crop is annual**
and harvested in spring (April).



Canes dry out naturally



Canes dry out naturally during the winter with the following consequences :

[■] The crop therefore requires no fertilizer

as leaves fall, major nutrients return to the soil and are stored in the rhizomes.

[■] The formation of a thick mulch

formed by decomposing leaves prevents the growth of weeds and keeps the soil moist.

[■] Possible to do without any chemical

The very high resistance to disease of Miscanthus, it is possible to do without any chemical input (fertilizer or pesticides).



Harvesting



No special equipment

Apart from planting, Miscanthus requires no special equipment.

Corn cutter-blowers are ideal

Basically corn cutter-blowers are ideal for harvesting and chopping the canes. The chopped straw of Miscanthus has a specific weight of about 100-120 kilograms per cubic meter.

With a Heston press the density is then 180-200 kg/m³

A Heston press can be used to bale the chopped straw and the density of the silage is then 180-200 kg/m³.

Swathes of cut canes can also be bundled with a high density press and packed or packed as shavings, pellets, or bricks. Some processes may require dust removal.



Ecology



■ **Perennial crop requiring no pesticides or fertilizers**

resulting in better energy management than with annual crops:

Growing 1 ha of oilseed rape requires 19.390 GJ and produces 72,000 GJ of energy. (Ratio = 1-4)

Growing 1ha of miscanthus requires 9 GJ and produces 300 GJ of energy. (Ratio = 1-30)

■ **Reducing the emission of Greenhouse Gases**

Miscanthus is a “renewable” energy replacing fossil fuels: 1 ton of petrol produces 3.65t CO₂.

1 ton of miscanthus biomass produces 1.8t CO₂ for the aerial parts of the plant, but confines 2-3t in the underground parts: Net result: -1t CO₂!

Moreover, the fact that the ground does not need to be worked and the long life of the crop, save about 0.5t CO₂.

■ **It limits deterioration of the soil**

As a non-invasive culture, Miscanthus rhizomes only requires initial planting and an annual harvest in March, it limits deterioration of the soil structure caused by winter work.



Ecology



■ Contributing to bio diversity

The fields can also provide winter shelter for birds, small mammals and invertebrates, thus contributing to bio diversity.

■ Develop protected areas

To meet the expectations of local government and to develop protected areas of conventional agriculture in **water catchment areas** (zone A), on river banks and fish farming lakes

■ Can be developed as renewable bio energy

with returns of 1,000 euros/ha ($15T \times 4900 \times 0.02 = 1,500 \text{ €}$).



For the producer



■ **Setting up cost is about 3500 €/ha**

But this investment is good for about 17 years.

■ **With costs spread over 10 years**

this crop is no more expensive than planting corn every year. Its average production cost is 110 to 150 € per ton of energy material sold.

No harvest in Year 1.

■ **Yield obtained vary between 1,000 and 1,500 €/ha**

structural costs are low, no working of the soil and no spraying of pesticides or fertilizers.
The result is perfectly acceptable when compared to conventional cereal production.

■ **EBE: 725 €/ha**



For the consumer



The price of crude is between 18-22 € / MWh

harvesting and farm storage included.

Price less than a third of oil

This price is less than a third of that charged for heating oil at current prices.
The rise in fossil fuel prices tends to make bio fuels much more competitive.

Adapted to the development of bio fuels

The high cellulose content of the plant (48%) is particularly well adapted to the development of **second generation bio fuels** produced using pyrolysis or cellulose fermentation.

Possible large savings for industries subject to carbon quotas



Technical informations



- **Calorific value is approx. 4,700 kWh/t as against 3,300 for wood chippings**
- **Can be shredded and pressed into briquettes or pellets**

Like wood shaving, miscanthus can be shredded and pressed into briquettes or pellets. It is in pellet form that Miscanthus can best replace wood with no need to alter heating installations.
- **Miscanthus emits less CO₂ than it has stored**

because part of the CO₂ is stocked in its rhizomes.



Bio-energy



- **Growing 1ha of miscanthus requires 9 GJ**
- **It produces 300 GJ of energy. (Ratio = 1-30)**
- **Miscanthus can be used as raw material for bio kerosene**

Miscanthus can also be used as raw material for the production of bio kerosene through the Fischer-Tropschprocess.

The **Fischer-Tropsch process** is a chemical process involving catalysis of carbon monoxide and hydrogen, to convert them into hydrocarbon.

The most common catalysts are iron or cobalt. The point of this conversion process is to produce Syncrude (synthetic crude oil named like that in the industry. This is a registered trademark) from coal or gas.

- **This is a very efficient process in terms of yield**



Which partner?

Miscanthus Greenpower



is the commercial expression of the Hubert Falzberger work, an Austrian pioneer farmer. This company works one hand, for industry and buyers; and other hand for the farmers.



Energie Ecofertile

is a division of Miscanthus Green Power and works in varietals multiplication of the miscanthus. It produced on nurseries in Europe; in Bretagne, in Austria and in Jura.



Farmers who buy from us get:



Rhizomes sorted by hands

Our rhizomes are hand-sorted for the first time in the fields and again during packaging. Our trained staff picks out the best rhizomes in terms of number of buds and likely germination. Our rhizomes come exclusively from young mother plants, ensuring vitality and good germination.

Our experience guarantees your success

You benefit from our expertise and eighteen years' experience in growing miscanthus. We put our knowledge and skills at your service during planting but also in subsequent years.

A 9 row planter

Our Planter is available with a staff for large sites (planting capacity of 12 ha/day).



Farmers who buy from us get:

A long-term outlet

So Miscanthus Green Power provides the plants and a long-term outlet for the straw produced.

- A guaranteed outlet
- A retell price fixed by contract

A contract for 15 years

Miscanthus Green Power buys back straw at a price fixed by contract for 15 years:

- A long-term partnership
- A contract signed and sealed

Additional services offered:

- We do the planting
- We harvest and pack the straw
- We transport it

Evidence of an orientation of agricultural production

The agriculture will be in overproduction

With the enlargement of the European Union, the level of agricultural production of the new countries will considerably increase and on the whole agriculture will be in overproduction. The current decline in agricultural prices will continue and accelerate.

Experts predict a surplus of 30 million hectares of agricultural

After enlargement to the East, experts predict a surplus of 30 million hectares of agricultural land which are not necessary for food production not for the production of milk and meat.

In France it could help to fight again overproduction

The FAO suggests to remove 600 to 1 million hectares of land from conventional agriculture. The use of a large part of this surplus land for energy production would help to fight against overproduction and declining farm revenues.



Orientation of agricultural production

■ **Energy production would help to fight against overproduction**

■ **Allow bio energetic agriculture on permanent grassland**

The only limiting factor is the Common Agricultural Policy which, for the moment, only allows the use of cultivated land or temporary pasture. It would be a good thing if the governing bodies would allow bio energetic agriculture on permanent grassland.

■ **Valorisation energetic of permanent grassland**

Many people, like us, want a moratorium on the valorisation energetic of permanent grassland.



Evidence of this orientation



Miscanthus is ecological and economical

For its ecological and economical qualities, Miscanthus is a first rate energy crop; it is the most productive in dry matter /ha.

Dry matter yield can reach 15 to 20 tons

In good soil in an intensive agricultural area, dry matter yield can reach 15 to 20 tons.

That gives 5,500 to 8,000 litres of heating oil per hectare - a huge source of potential energy that we could grow close to our homes.

Biogas: 80,000 kWh/ha of energy

Miscanthus is perfectly appropriate for the production of biogas. Harvested green in autumn, yields per hectare can reach 25 tons DM for approximately 500 l / kg DM of methane. These yields are higher than for a conventional harvest of miscanthus in spring, because all the leaves are also used and produce approximately 80,000 kWh of energy per hectare.



Why choose this plant?



■ Surplus space from fallow

or pasture land can be used to good effect

■ The production chain of Miscanthus is completely mechanized

Can be performed with standard agricultural machinery.

■ The financial risk to farmers is minimal

If setting up is carried out by the farmer himself, the cost of cultivation will be low. With traditional farm implements, miscanthus roots can be easily and quickly removed. There are no high costs for permanently removing the crop.



■ Provides a heat yield 2-3 times higher than fast growing woody plants

With a moisture of only 10 to 15%, harvested miscanthus provides a heat yield 2-3 times higher than fast growing woody plants (cf. TCR). Planting of miscanthus therefore offers an economic incentive to farmers.



Environmental benefits significant



■ Clear decrease in nitrate content on land

Scientists from the BOKU (Agricultural University of Vienna) confirm a clear decrease in nitrate content on land where miscanthus is cultivated. Des scientifiques de la BOKU (Université Agronomique de Vienne) confirment une nette diminution de la teneur en nitrate sur des surfaces cultivées en miscanthus.

■ Protection and food in winter for birds and wildlife

■ Embellishment of the landscape

especially in winter.

