

# 10 KEY FACTS AND FIGURES IN FAVOUR OF GROWING MISCANTHUS

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In the previous issue we talked about the unique features of miscanthus (*Miscanthus sinensis* "Giganteus"), which is multi rhizomatous plant of angiosperm division (*Angiospermal*), class monocots (*Monocotyledoneae*), family cereals (*Gramineae*) and with which, probably no other grass cannot compete on the structure, diversity, elegance, adaptability to soil conditions, in particular on the productivity of biomass as a raw material for biofuels.

And only now, the ancient crop of miscanthus giant *Miscanthus X giganteus* (elephant grass) opened to scholars and practitioners who seek bioenergy crops to produce quality and cheap raw material another no less valuable feature that over millennia had been a mystery, but in the XXI century brought it to the international recognition and give it a title of revolutionary bioenergy crop, that is a powerful energy potential allowing it to compete even with powerful fuels like coal and wood plants.

Currently used are four types and over 100 forms and varieties of the crop, among which the most outstanding are the following: Chinese miscanthus (well keeps the shape, well grows); miscanthus sacchariflorus (grows rapidly) and miscanthus giganteus. The main positive aspects that distinguish miscanthus among other energy crops are the following: 1) the crop does not require significant investment, undemanding to soil, including the ability to grow in any soil and provide high performance biomass (after one-time establishing plantation, the crop can grow without special care at the same site for 30 years, to reach 4.5 m in height and annually produce an average yield of 20-25 tons of dry biomass per hectare for 20 and more years. The plant does not deplete the soil, and even improve its humus content in 5-7 without need to spend a large amount of labour. Miscanthus can be harvested started from the second year after establishing plantation in December and February, when workers are not engaged in seasonal agricultural operations and the plant contains the least amount of water. That is, you once make capital investments and then can earn money for about 25 years. A plant of miscanthus gives on average of 100-150 meters of shoots during its lifetime. Besides, miscanthus is a perfect plant in terms of ecology.

The choice of energy crops for industrial production depends on several factors, namely the type of soil, site location, access to water, landscape etc. But the main factors of the plant energy capacity, capacity (the maximum yield of dry matter energy crops), measured under natural climatic characteristics of areas and availability of land, minimum loss of dry substances during harvesting and resistance to lodging, specific location of the site, the nature and quality of the soil, landscape, features of the local agriculture and others. What is the "trump card" of miscanthus?

\* To vegetatively propagate miscanthus plants rhizomes are used. The yield of miscanthus biomass, according to M.Y. Humentyk increases due to early planting rhizomes in terms of the optimum planting depth (8 ... 10 cm). For this purpose often used are three-year miscanthus plantations that have not grown very much. One of the ways to obtain seedlings is cutting underground and aboveground residues of plants after harvesting. The seedlings obtained by dividing the rhizomes must be planted in March and April with typical agricultural machinery (such as semi-automatic machine for planting potatoes or unit for spreading manure) or specially designed planters (10-15 or more thousand of plants per hectare).

\* Machinery-involved planting must be carried out according to 70 x 70 cm or 75 x 75 cm scheme. Seedlings must be ploughed-in to a depth of 15-20 cm, followed by compacting soil and watering if necessary. The best results are obtained when planting the rhizomes 0.1-0.2 kg/m<sup>2</sup> and a length of about 10 cm (data of Zinchenko V.A.).

\* According to research it was found that optimal stand density of plants is 15000/ha, weight of rhizomes 30-60 g. Energy productivity of the biomass increases along with the thickness and weight of rhizomes. It is important to prevent dryness of the collected material and reduce the storage time for seedlings. The most difficult aspect of establishing and maintenance of plantations is effect of low temperatures. The highest vulnerability occurs during the first winter after planting, when freezing plants can reach 90%. This is due to the presence of cold winters without snow cover.

\* For harvesting *Miscanthus* used are heavy rotary mowing and baling or self-propelled forage harvesters machines or special ones. On the first year after planting miscanthus is usually not harvested because of the low yields (dry mass of 8 t/ha). It can be mown and left on the ground as a fertilizer and protective "blanket" against frost. On the second year the plant reaches its maximum height (2.5-3.5 m), and the yield of dry mass rises to 10 t/ha. On the third year the crop provides about 10-15-20 tonnes of dry mass per hectare (the fertile soils yield can reach up to 30 tons). Harvesting is carried out in the spring, usually in March and April when the dry matter content is more than 85%.

\* *Miscanthus* can serve the raw material for producing building materials (lightweight concrete, construction and insulation panels, window and door frames, roofs), packaging products, agricultural needs (compost, pots for seedlings of vegetables and flowers, to prevent erosion in mountainous areas) and biofuels. Notable is that ash content of the fuel pellets made from miscanthus is lower than environmentally hazardous ash from coal (ash content up to 20%) or brown coal (40% ash). Moreover, ash of miscanthus stems is potash. Important characteristics of the fuel pellets are also environmental friendliness and energy safety during storage, minimal emissions of carbon monoxide into the atmosphere by burning and no odour. They do not emit smoke, carbon monoxide and other harmful substances, unlike wood or coal.

\* The term of exploitation of a plantation is about 25 years (commercial cultivation 20 years). Cultivation profitability can be increased if use a part of plants for propagation and selling seedlings.

## Анотація

У статті висвітлено особливості вирощування та основні позитивні сторони мискантусу (*Miscanthus X giganteus*) – унікальної енергетичної рослини відділу покритонасінні (*Angiospermal*), класу однодольні (*Monocotyledoneae*), родини Злакові (*Gramineae*), що в останні роки впроваджується в Україні для виробництва якісної і дешевої біосировини. Окремлено головні фактори, згідно з якими відбувається підбір і визначення потенціалу та комерційного рівня тієї чи іншої культури, зокрема, мискантусу, для промислового плантаційного виробництва в розрізі регіонів.

## Анотация

В статье освещены особенности выращивания и основные положительные стороны мискантуса (*Miscanthus X giganteus*) – уникальной энергетической растения отдела покрытосеменные (*Angiospermal*), класса однодольные (*Monocotyledoneae*), семьи Злаковые (*Gramineae*), что в последние годы внедряется в Украине для производства качественного и дешевого биосырья. Очерчены главные факторы, в соответствии с которыми происходит подбор и определение потенциала и коммерческого уровня той или иной культуры, в частности, мискантуса, для промышленного плантационного производства в разрезе регионов.

## Annotation

In the article the features of growing and major positive sides of miscanthus (*Miscanthus X giganteus*) – unique power plants love angiosperms (*Angiospermal*), class monocots (*Monocotyledoneae*), family Cereals (*Gramineae*), in recent years vprovadzhyetsya in Ukraine to produce quality and cheap biosyrovyny. Outlined the main factors, which is the selection and definition of commercial potential and of a culture, including miscanthus, industrial plantation production in the regions.