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Energy willow - Salix viminalis

Short presentation

Energy willow, a forest species with a short rotation cycle and vegetative regeneration, is a woody plant in the form of a bush with a rapid growth of up to 3 - 3.5 cm / day and a lifespan of 25 - 30 years.

In 2-3 years, it can reach a shoot height of 6-7 cm and a diameter at the base between 6-10 cm. Starting with the 2nd -3rd year from this culture, a minimum of 30 - 40 tons of biomass can be obtained annually, usable as an energy source, in the form of chops, briquettes, pellets.

Currently, there are many varieties and hybrids of high production, created especially in Sweden, with high plasticity and adaptation to different climate and soil conditions. Cuttings produced in REBINA have been adapted to the pedoclimatic conditions of the Pannonian lowlands and Eastern Europe and achieve plantation yields not yet recorded in breeding practice.





Characteristics

- Rapid growth (up to 3 3.5 cm / day)
- High calorific value: 4900 kcal/kg ~ 19 21 Mj/kg ~ 5.5 KWh/kg material with 0% moisture
- Remarkable adaptability to different pedoclimatic conditions
- Important and constant harvest of biomass for 25-30 years. In conditions of advanced technology, over 100 tons of biomass / ha can be obtained.
- Improves very well the lands with excess water, polluted and degraded lands
- Has a high evapotranspiration coefficient of 15-20 I water (m² / day)

Areas of use

- Direct production of thermal and electrical energy
- Pellet production
- Natural treatment purification of sludge and wastewater with which the plantation can be sprinkled
- Methanol production
- In the pharmaceutical industry production of salicylic acid
- In the wood and wood products industry
- In the paper industry and cellulose
- The improvement of the degraded lands and their reintroduction in the productive circuit
- Drying of land with excess water
- Fast-growing protective curtains for field crops, as well as for railways and roads
- Land setting on a slope, anti-erosion culture



Advantages

- It's a renewable source of non-polluting energy
- High calorific value 1 kg dry biomass = 1 kg coal = 0.5 l petroleum = 0.5 m³ methane
- More economical than gas and oil/ petroleum
- Easy to use and store
- Burning it eliminates negligible amounts of noxious substances
- Reduced residues: ash ~ 1.0%
- Does not contain foreign chemicals (heavy metals), it's not harmful to health
- The amount of oxide and carbon dioxide released by combustion is almost 0. These gases are taken up by cultures in the process of photosynthesis.
- The energy consumed for the production of biomass is 5% of the energy resulting from its use as an energy source.
- Positive influence in the conservation and protection of ecosystems, in their restoration, in the recycling of nutrients and soil conservation, through protection against wind and hydraulic erosion
- Positive effects on fauna and flora, which in most cases enriches
- Harvesting is done in late autumn winter when no other agricultural works are carried out, thus increasing and extent use of the equipment

Costs

Costs for setting up 1 ha of willow energy culture vary between 1800 and 2500 eur, depending on several factors:

- Agricultural land category
- Soil type
- The degree of endowment of the agricultural exploitation
- Vlasničkog statusa poljoprivrednog zemljišta
- The way of owning the agricultural land
- The size and shape of the plot







Culture technology Salix viminalis

Climate and soil requirements

Energy willow grows very well in temperate climates, with average annual temperatures of 8-12 ° C and a pluviometric regime between 500 and 900 mm / year.

It does not require much light, as long as the recommended planting density is respected. Withstands frost down to - 30 ° C and moderate drought. It can be grown on different types of soil with pH values between 3.5 and 10. The ideal pH value ranges between 5.5 and 7.5.

The entire Pannonian region has extremely good pedoclimatic conditions for growing energy willow culture. The only soils that do not affect this culture are saline and saline soils.

Selection of field

Wetlands with groundwater are chosen as much as possible.

It is important that the plots are at least 5 ha in size, regular in shape, elongated and with access to the road. The distance from the plots to the end user should be the smallest possible, which provides the lowest cost of energy obtained from biomass. As the harvest is done mainly in winter, it is important that the access roads are passable during that period.

According to the lifespan of 25-30 years and the size of the plant of 6-7 m, the choice of location must take into account possible requirements for bringing the purpose of the wider spatial unit.



Soil preparation

Soil preparation begins in the year preceding the planting of the crop, by removing weeds. This is achieved by using total herbicides.

After cleaning the vegetation, the soil is brought to a loose state, deep plowing, followed by plowing and chopping.

After the preparatory works around the soil, the basic fertilization is carried out. In the spring, the preparation of the soil for planting is completed.

The planting material

When planting, carefully choose between varieties and hybrids, so that they are adapted to climatic conditions and soil type.

Planting material must be authorized and of excellent quality.

The following varieties and hybrids are available: Inger, Tora, Tordis, Doris, Gudrun, Jorr, Karin, Klara, Olof, Sven, Torhild.

Planting

The usual time for planting is in the spring, as early as possible, as long as there is enough moisture in the soil. Planting is done in rows with different distances between rows depending on the purpose of the biomass. - to provide access to machinery for crop maintenance, but also for harvesting and transportation. Harvesting can be done manually and mechanized.

Planting in the winter months, during November, December and January also gave outstanding results.







Culture maintenance

Weed control is an extremely important operation that contributes to the success of plantations, because these plants fight for food - water and light - with energy willow.

Weed removal in the first year after the establishment of the crop is essential, having an effect on its entire existence.

In the following years, after two years to be precise, when the plant or plant is consolidating, no interventions in the field of weed control are needed.

Fertilization

During the first two years since the establishment of the culture, the implementation and management of fertilization is very important, both for the development of culture and for the production of biomass. Chemical or organic fertilizers can be used in moderation, usually after harvest.



Diseases and pests

As willow contains a lot of salicylic acid and has an unpleasant taste, animals do not like it. Nevertheless, they can do less damage at the edges of the plot.

In principle, willow varieties and hybrids are resistant and / or tolerant to pests and diseases.

Od The disease causes leaf rust (Melampsora sp.), While pests include Phratora vulgatissima (blue willow beetle) and Locmea caprea (yellow-brown willow leaf beetle).



Harvest

Prior to harvest, the shoots must reach a diameter of at least 5-6 cm and a height of 6-7 m, the plantation should give the amount of biomass that justifies the harvest.

Usually, the first harvest is made in year II - III, when the wood mass production exceeds 25 - 30 to/ha, and in the following years, annually. In the region of Central and Eastern Europe, especially the Pannonian plains, the annual frequency of harvest is achieved.

Harvesting is done when the plant sheds its leaves, during the period of vegetative dormancy, from November to March.

Depending on the planned purpose of the biomass, the ways of harvesting also differ:

- Specialized silo harvesters for biomass cut the shoots, chop them in the form of "chops" of adjustable size, which are collected in a trailer and driven for drying. Wood "chopper" can also be used directly as fuel for heating in power plants, or it can be used for pelleting.
- For baling the harvested willow in a bale ~ 400 kg with a diameter of 1.5 m and a length of about 1.8 m, the so-called BioBalers, and bales are stored outdoors or (not necessarily) indoors. The humidity of the stored biomass of humidity of approximately 50% at harvest, after a period of 2-3 months, due to wind and sun decreases to 10-15%, thanks to the small cross section of the branches and the large surface of the mantle. As there are no leaves and soft plant parts in Bali, there is no process of decay, nor degradation of the quality of biomass. This is a convenient way for long-term storage of biomass.
- Harvest, which produces straight cut branches that are arranged on chambers and dried, is used when you want to get the so-called. Salix Pellet, ie when dried straight branches are cut into 25 mm pieces and used in pellet stoves instead of significantly more expensive industrial pellets. Equal weight units of Salix Pellet and industrially obtained pellet from Salix biomass have identical energy value.



The usual annual yield of biomass without special agro-technical measures is 30-40 t / ha of naturally moist mass. If the necessary agro-technical care measures are applied and enough water is provided, the yield can be drastically higher, to 60 and more t / ha in case of irrigation year, natural humidity at harvest.





Removal of willow plantations

When a plantation becomes non-profit - usually after 25-27 years, it is removed.

For removal, after the last harvest, willows are allowed to form new shoots and then treated with herbicide.

After drying, the stumps and roots are removed, and the land is returned to agricultural rotation, in an improved soil category.



REBINA Group

REBINA Group Austria, REBINA Agrar s.r.l. Romania, REBINA Agrar d.o.o. Serbia (hereinafter: REBINA) operates in the field of production of renewable energy sources, specifically biomass, by growing energy willow with a short rotation period, Salix Viminalis. REBINA has the exclusive right to produce and distribute planting material of this plant species of the Swedish principal SalixEnergi Europa AB Svalöv, Sweden (www.salixenergi.se), for the territory of the Republic of Serbia. REBINA with 130 ha owns the largest plantation for the production of planting material Salix Viminalis in Europe. At the same time, the cuttings of the Inger variety (the most suitable for the pedoclimatic conditions of the Pannonian basin) from this plantation are justifiably considered the best in Europe.

In Serbia, the REBINA Group achieves business presence through REBINA Agrar d.o.o.

The scope of REBINA's business offer includes delivery of planting material, preparation of investment feasibility studies, preparation of project documentation for plantation construction, purchase of produced biomass, as well as advisory services in the field of energy, energy efficiency, soil phytoremediation, reclamation of ash and landfills, windbreaks and barrier and breeding technologies Salix Viminalis.

Regenerative. Biologically. Sustainable.



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