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### 1. ENERGY WILLOW



The energy willow varieties produced and distributed by SC KONTRASTWEGE SRL have been developed and registered by the Swedish company Lantamannen Agroenergi during the last 30 years. Our company, an authorized cuttings producer in Romania, imports the cuttings from Sweden, but also runs a nursery in Romania since 2007.

#### General aspects

Energy willow is a fast growing species (3- 3,5 cm/ daily). In the first year it develops 1-3 stems and reaches to 2-3 m height.

The maintenance of the plantation is very simple, the majority of the operations being performed before planting and at the beginning of the vegetation period: herbicide application, ploughing, soil disinfection, planting and chemical and mechanical weed control. Afterwards the willow grows quickly. In the second year the plants develop between 10 - 15 stems and almost a half reach 6-7 m height and 3-4 cm in diameter. It has a high calorific value: 18.000 – 19.000 Kj/kg.

Beside those aspects, growing energy willow has also others advantages, that justifies the spread in the UE countries and due to which it was nominated as subsidized energy species.

#### Advantages of an energy willow crop

- Grows very good on lands which are unsuitable for other crops, for example in the flood plains meadows. Due to a high



evapotranspiration capacity (15- 20 l/m<sup>2</sup>) it is used successfully for wastewater treatment.

- Due to high level of salicyl content, the willow wood chips don't need covered storage. In a few months the water content decreases to 14 - 16 %, which permits the production of briquettes without artificial drying.
- The harvest is performed with special machines of different capacities (and prices) depending on the size of plantation. For small areas farm machines (tractor, trailer) can be used. For bigger plantation the best option is the use of harvesters equipped with special adapters, with a productivity of 1 ha/hour. The harvest can be performed between November and March.
- Energy willow crops guarantee a sure and clean source of energy and also protects the forests from the massive deforestation caused by the need of cheap firewood.
- It is a source of renewable energy! The crop's lifetime is about 20-25 years. During this period (beginning with the third year) the only needed activity is to harvest. (Optionally you can fertilize for a higher yield).



### The yield

So far the experience confirms a yield of 30 t/ha at 40% harvest moisture. The value varies depending on the soil, water supply and variety. A simple calculation demonstrates that a plantation of 20.000 hectares can ensure the heating for 145.000 apartments. Let's not forget that this result is obtained from a land that is unsuitable for other crops, with a low volume of work, and it represents a guaranteed income for a 20-25 years period.

### Use

Beside the energetic purpose, the energy willow is also used for:

- Obtaining cellulose
- Pharmaceutical industry
- Obtaining methyl alcohol
- Paper industry
- Furniture and wood for construction
- Temporary constructions (temporary roads, protecting water banks)

### Economical Aspects

Establishing an energy willow crop is not a cheap investment, but starting with the second year the investment is fast recovered. It is important to mention that in the EU countries energy willow is a subsidized crop. The subsidies may vary: ex. 50 % from the establishing costs or an annual



subsidy or mixed subsidies. In Romania energy willow short rotation coppice is subsidized since 2010.



### Key facts of the investment

- Establishing costs: 1.640- 2.557 EUR/ ha
- Yield: about 20t/ha/year dry matter (30-35 t/ha at 35-40% harvesting moisture)
- Wood chips' sale price: around 55 EUR/t dry matter
- Payback period: 4 years
- Operating profit (from the third year): 2.200-2.800 EUR/2 years cycle
- Economic lifetime of the plantation: 20- 25 years

## 2. OFFER

Our offer consists of six varieties of Swedish provenience, registered at UPOV.

### 1. Tordis (EU 9288)

The variety Tordis is a cross between Tora and Ulv varieties. It has a very good developing from the first year (over 4 m height). It has a **high resistance to leaf rust, drought and high temperatures**. In Romania it is recommended for extracarpathian areas.

### 2. Inger (EU 11635)

The variety Inger is a cross between Russian species *Salix triandra* (from Novosibirsk area) and the variety Jorr. **It develops better on dry soils than other varieties**. It has a high resistance to leaf rust and a medium resistance to leaf beetles.

### 3. Sven (EU 5285)

Sven is a cross between Jorun and Bjorn. This variety has lance shaped leaves, a straight stem and few shots, similar to Tora. **Is very resistant to leaf rust and has a high yield**.

### 4. Jorr (EU 0626)

Jorr is a selection from the species *Salix viminalis*. The variety is characterized by a fast development in the first year after planting. The principal stem has a dark green color. The resistance to leaf rust and to leaf beetles is medium. **Jorr is used in wastewater treatment**.

### 5. Gudrun (EU 9312)

Gudrun is a cross between Russian variety Helga and the variety Linga-Veka Röd. It has a **high resistance to frost and to leaf rust**. It has a high yield. The moisture at the harvest is lower comparing with other





varieties. In the first year after planting it shows a low development so the weed control is very important. The young shoots are preferred by browsing animals.



### 6. Tora (EU 627)

Tora is a cross between *Salix schwerinii* and the variety Orm. From the Swedish researcher's point of view, Tora is **one of the most productive varieties**, which develops very well in different conditions, excepting very hot areas.

**OBS:** The varieties produced and distributed by our company are not preferred by browsing animals, except the young shoots of Gudrun.

### Price offer

Planting material (18 cm long cuttings) can be achieved from our company at the price **0,08 EUR+ VAT/cutting**. 14.000 cuttings are needed for one hectare. The delivery contracts are accompanied by energy willow culture technology.



### Important!

- Orders for planting material can be done until the end of October. We register the order after the client pays an advance of 30%. The rest is paid at delivery of the material. The cuttings are delivered with 2-3 days before planting.
- For the first time in Romania, the planting material sold by KWG – Energy Willow is stored until the distribution process in a cold room, at -4 degrees Celsius and at optimum humidity. These conditions maintain the viability of cuttings until the planting period. The period between the removal of the cuttings from the cold room and planting should not exceed 2-3 days. During this period the cuttings will be stored in cool places, with temperatures less than 15 degrees Celsius and the expose to sun will be avoided.
- In the case of planting large surfaces (with planting period exceeding 2-3 days) cuttings will be stored in a fridge during the transportation and also during the planting period. If the cuttings are not stored properly the viability can go down with 60% (regarding Department for Environment Food and Rural Affairs – DEFRA)



### 3. FREQUENTLY ASKED QUESTIONS

#### 1. Where can I grow energy willow?

Energy willow is more like an agricultural crop than a forest, and it can be planted on any type of soil, but the best results have been achieved on soils with a high moisture content. The most important advantage of growing energy willow is that it can be planted on land that is unsuitable for other crops.



#### 2. What about the yield?

The yield varies due to:

- Soil quality and soil moisture
- Respecting the recommended technology
- Fertilization (optional) after harvesting. Fertilization is recommended every two years.

The experiences confirm a yield of 20-25 t/ha dry matter if the optimum conditions are respected. In other case the yield is lower.

#### 3. How to set up an energy willow plantation?

Steps:

- Land acquisition (own propriety or rented)
- Site preparation (very important)
- Planting material order
- Planting
  - Planting period varies from March to May depending on the area. It is recommended to perform the planting as soon as possible. The planting can be done manually (for areas between 5-10 hectares or smaller) or mechanically (with special machines).
  - You can contract the planting machine from our company for the next spring if you order the cuttings until 30<sup>th</sup> of October. Planting cost is about 200 EUR/ha, and you have to provide a tractor of 150 CP
- Weed control (chemical or mechanical)
- If the plantation will be set up on an unused site, is it necessary to perform the actions below, in the year before planting:
  - Applying an glyphosate based systemic herbicide until August (glyphosate 4-6l/ha in 200 l water)
  - Sub soiling at 55-60 cm depth
  - Ploughing in autumn at 30-35 cm depth
- If the plantation will be set up on a site that has been cultivated in the last years:
  - Ploughing in autumn at 30-35 cm depth





#### **4. How can I harvest?**

Harvesting can be performed manually with a brush cutter or mechanically with special machines, according to the surfaces size: simple (and cheaper) machines which can harvest up to 50 ha/season or with complex (and also more expensive) equipment which can harvest up to 300-350 ha/season or even special harvesters with special adapters for energy willow. The last option is more rentable for large areas (800 – 1.000 ha/season)

#### **5. Which is the recommended size for a plantation?**

Energy willow can be planted on smaller plots (for testing) but in order to reach maximum efficiency, the optimum size for a plantation is at least 5-10 ha. In Sweden there are farmers with energy willow plantations of 150-200 ha.

#### **6. How can I market the woodchips?**

Energy willow can be used as heating woodchips (in special boilers or in power plants) or as raw material for pellets and briquettes factories. Due to a high demand for biomass, the market of the woodchips is guaranteed.



#### **7. Can I increase the plantation with cuttings from my own plantation?**

**ABSOLUTELY NOT**

The varieties (registered in UE) are the result of a research of over 30 years, conducted by Swedish researchers. Those varieties are the intellectual property of the researchers and the unauthorized reproducing falls under Criminal Cod. Only cuttings from an authorized nursery can be used to increase a plantation.

#### **8. What about crop removal?**

At the moment when the crop is not economically efficient anymore, the decision of removal can be taken. This operation is very simple. After the last harvest the stools should be left to shoot in the following spring. When the shoots are at least 15 cm long, they should be sprayed over with a glyphosate-based contact herbicide to kill the willow. When the shoots have died back a soil operation is sufficient to remove the roots. For using the land for another crop it is enough to perform the usual works for site preparation.





#### 4. ABOUT KWG – ENERGY WILLOW

KWG – Energy Willow (SC Kontrastwege SRL) is a company located in Miercurea-Ciuc, Harghita County. Our activities consist in promoting and presenting energy willow crops and also in production and distribution of planting material of energy willow, a species that is not yet very well known in Romania. We also offer consultancy for power plants and pellets and briquettes factories. In 2007 we started our collaboration with the Swedish Institute Lantmännen Agroenergi. Since then KWG – Energy Willow is an authorized cuttings producer for Romania and Republic of Moldavia.



Under this agreement our company became an authorized cuttings producer and we establish our own nursery for planting material. We have also created over 150 test plantations (in different areas of Romania) for studying the behavior of the energy willow in different climates and soil conditions. In present our company owns the largest experience in this sector and we can offer our clients recommendations and solutions about energy willow varieties, about requirements of this species and about culture technology.



##### We offer our clients

- Information about the adaptability of energy willow in different areas
- A complete culture technology (site preparation, planting, maintenance in the first year and also in the next years, harvest)
- Information (type, manufacturer, prices) about special equipments: planting equipment, harvesters.
- Information about wood chips marketing
- Consultancy sessions at our location in Miercurea Ciuc or via e-mail
- Cuttings needed for setting up plantations (planting material), delivered together with documents attesting their origin
- Information about obtaining EU funds

##### Testimonials

“I want to congratulate your company’s team for the professionalism showed in promoting the energy willow in Romania. Thank you for your support in solving problems regarding my plantation, considering that 2012 (the year when we established our salix crop) wasn’t exactly a very good year, regarding the climate conditions.”

**Ing.Dan Spăntulescu, Technical Director, SC Mayobioenergy SRL, Focșani, 10 hectares**

“Close collaboration between the companies Biagro-Invest and KWG-Energy Willow, professional consultancy from the KWG specialists, the support in terms of documents about testing energy willow in other



countries and in Romania, led to success in 2013, by registering energy willow in the Republic of Moldavia. The company proved an outstanding professionalism and honesty.”

**Vladimir Brăgaru, Director SC Biagro-Invest SRL, Republic of Moldavia, 6 hectares**

“I want to thank to the collaborators of KWG– Energy Willow from Miercurea Ciuc, to general director Mr. Benko Alexandru and to Ms. Racu Cristina, both for collaboration and for ensuring some necessary study materials for my doctorate thesis.”

**Cristina Elena Iurciuc, PhD, Technical University “Gheorghe Asachi”, Iași, Romania**

