THE ANALISYS OF THE WOOD PRODUCTION FOR SALIX HIBRID USED FOR LIGHTERS FOR THE SUSTAINABLE DEVELOPMENT

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***Abstract**: Substituting biomass for fossil fuels in the generation of energy is an important strategy for the EU in order to mitigate climate change. Fo this purpose bioenergy is being promote through several EU Directives, which aims to increase the use of renewable energy sources to 22% in 2010. Biofuels are also promoted in the Biofuel Transportation Directive which set out to increase the share of biofuels or other alternative fuels in transportation fuels to 2%by 2005 and 5,75% in 2013. A number of crops have been investigated with regard to their suitability for biomass production in Europe. These analyses show that perennial energy crops such as willow perform much better in terms of energy than annual food crops. In order for the average farmers to adopt a new crop such as willow perform much better in terms of energy that annual crops. Willow production has a high net energy output compared, for example to grain and oil seed production and its biomass yield is relativly high. Salix hibrid is used in other countries because of their heigh grow for material to product lighters. The productivity of this plantation is about 30-40 tones/hectars, and this plantation we can exploit 20-25 years. This paper offer a solution to develop energy crops in the areas where the forests are not so good represented. The objective of this study was to present the advanteges of growing willow in comparison with traditional crops and also to present an economic perspectiv to cultivate willow for biomass which will be use to product lighters. The economics of growing willow, wheat and barley was analysed on farm level using a model presented by Rosenqvist. This model was developed for analysis of the annual ecomomics of growing willow, aperennial crop comparable tot hat of wheat and berley, which are annual crop. The model employs a total step calculation method in which all disbursements and revenues are discounted.*

***Key words*:** *biomass, energy, production, willow, crop, lighters*

INTRODUCTION

Substituting biomass for fossil fuels in the generation of energy is an important strategy for the EU in order to mitigate climate change. Fo this purpose bioenergy is being promote through several EU Directives, which aims to increase the use of renewable energy sources to 22% in 2010.

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MATERIAL AND METHODS

Willow traditionally was grown for wattle during the period of Second World War. In Poland for example after 1960s there were about 8000 ha of willow plantations for wattle production. As demand for wattle subsequently decreased, so did the area of willow plantations.

One of the purpose of growing willow crops that the plantation has an ability to take up nutrients. Being used along the rivers, lakes and river banks, willow plantation decrease the chemicals substances in watercourses. Also these plantation can be used in the land affected with heavy metals, because of their good plasticity for restoring contaminated land.

In the few years willow plantations are an important energy source, using wood as biomass production. In EU are estimated about 1000-2000 ha with willow plantations, most of this part is located in Poland. In Romania there are 12 hectars along Olt river near Miercurea Ciuc.

The analysis of growing willow was compared with wheat and barley crops with mode presented by Rosenqvist. This model was developed to analysis the annual economics of growing willow comparable with wheat and barley annual crops (Rosenqvist, 1997). The equation of this model is:

$$\text{Annual gross margin} = \frac{r}{\left(1-(1+r)^{-n}\right)} \times \sum\nolimits_{T1-n} (1+r)^{-1} A_t \quad \text{where}$$

n in the lengh of the calculation period in years;

r is the discount rate;

t the time at which a payment is made or received;

T the time period during which payments are made or received;

A_t the size of payment.

The firt harvest of the plantation will take place in the fourth year with 21t/ha. Subsequently harvest occurs every third year with an yield of 25t/ha. Yield are generally lower during the first rotation due to the plants need to develop a root system. In order to achieve the assumed yields the plantation must be located on soils of average quality. A Swedish study has shown that willow is predominantly grown in countries with average cereal yield and less often in countries with the lowest yield. Willow plantation is seldom grown on the best soils where wheat is more profitable crop.

Weath and barley crops products 5-3,5 tones/hectar. Based on these yields we can say that willow, wheat and barley are linearly correlated, the willow yield being 180% of the wheat yield and 257% of the barley yield. Their correlationis more likely to vary with location due to the fact that the productivity of willow seems to be more strongly related to the water supply than that of cereal crops.

Cost related to the establishment of a willow plantation account for 27% of the total which are a significant effect on the farmer's liquidity. The cost of fertilization and weed control is low for willow compared with wheat and barley. The road transportation for wood

chips willow is relatively high compared with wheat and barley. The first income, subsidies excluded is not obtained until the fourth year.

RESULTS AND DISCUSSIONS

Given the assumption of the main calculation, willow is a competitive choice of crop in relation to wheat and barley from a Polish farmer's perspective. The annual cost distribution (Euro/Ha) for cultivation winter wheat and spring barley and for set-aside land are showed in the following table:

Table 1

Annual cost distribution (Euro/Ha) for cultivation winter wheat and spring barley and for set-aside land (by Karin Ericsson et. al.)

Characteristics/Cost	Wheat	Barley	Set-aside land
Seed	58	31	3
Fertilization	108	78	-
Ca, Mg every forth year	16	16	-
Weed, fungus and pest control	43	13	3
Drying	12	9	-
Machines	192	176	14
Stubble harrowing	11	11	-
Ploughing	39	39	-
Harrowing, ploughing, sowing	34	34	2
Fertilizer Ca and Mg spreading	13	8	-
Spraying	21	14	-
Threshing	62	62	-
Transport	15	11	-
Topping weeds	-	-	13
Interest	9	3	-
Labour	6	6	1
Total	639	511	36

This study shows that willow could indeed be a viable alternative to wheat and barley. An important barrier that willow is facing is the perceived high economic risk that farmers ascribe to this crop. In order for farmers to gain experience and achieve economics of scale in growing willow there is a need to disseminate experience gained in field trials to pioneer growers and then further on to the agricultural comunity as a whole.

For cultivating willow we must reduce the risk creating stable terms for energy crops in the commun agricultural policy and providing incentives for bioenergy in energy policy. In the commun agricultural policy enery crops enjoy the same subsidy per hectare as cereal crops and may contrary to food crops, be grown on set-aside land.

Both of these commun agricultural policy create a positive environment for willow, thus the willow will be adopted by a few farmers because this plantation is a long term investment.

Comparison of the costs of planting and harvesting in countries of different areas of established willow coppice can show a clear connection between the level activity in the sector and the costs of growing. For example in Sweden planting activity costs was reduced with 23% improving tehnology.

The farmers willow cultivation would be affect by the evolution of economy because of the variation of the prices that includ costs of the management cultivation and the prices of the chips wood production. This price could be lower when the production is big and the industry could give lower prices for the production in which situation the farmers would have low benefit or without benefit. The economics of cereal production suffers when farmers plant

willow on part of their arable land instead of cereal crops, since the total area for cereal cultivation at the farm is reduced.

CONCLUSIONS

This paper shows that with gross margins excluding subsidies for suckler cows and for lowland sheep, willow coppice can be competitive with or better then other grassland-based enterprises depending on the individual circumstances on each farm.

The calculation indicate that cost of the production willow is lower in Poland than in western Europe. The main reason of this lower cost are the lower prices of the fertilization, labour and diesel.

The return landowners can receive from willow biomass crops is probably the single largest factor determining the amount of willow that will be planted. Current prices for wood chips for energy allow land owners to break even or make a small profit growing willow biomass crop. For making good profit we can have a large willow production system.

The amount of woody biomass that is technically available from forests in this assessment is much greater then what has been reported.

In our country we can used this kind of plantation in large farms where the land is not verry good for cereal cultivation and particulary in region with wood deficit, because we can used wood chips (lighters) for heating.

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