

The Investment Opportunities in Wood energy Plantations in Romania

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Abstract

The aim of the presented study is to evaluate comparatively the quantity and the quality of wood production as well as the economic risks involved for several versions of forestry systems based on black locust short rotation coppice, in the southern part of Romania. The study provides comparative information about the investment opportunities in several cases of black locust coppice plantations under different site conditions and geographic areas. The information within this study may be very useful for government stakeholders and investors to support decision making for better regulation in this sector and to invest in these types of plantations. It can also create useful instruments for calculating public subsidies destined for afforestation of the agricultural land.

Key words: black locust, investments, coppice

Introduction

Black locust (*Robinia pseudoacacia* L.) is one of the most often used tree species in afforestation of degraded or low productivity agricultural land in Romania (Enescu and Danescu 2013). Being introduced in Europe in the 17th century (Keresztesi 1988) the black locust is recognized as one of the most widely cultivated broadleaf tree species in Europe and worldwide (Blujdea et al. 2011). After Hungary (Németh and Molnár 2005; Rédei et al. 2008), Romania has the second largest area of this species (Sofletea and Curtu 2007) with

300 000 ha, almost all the surface being managed in the coppice regime (Enescu and Danescu 2013). The black locust was introduced in Romania around 1850 (Stanescu 1979) for establishing both protective and productive plantations mainly in the southern (Oltenia), south-eastern (Baragan and Dobrogea) and eastern (South Moldova) regions of Romania (Sofletea and Curtu, 2007) (Figure 1).

Black locust is known as a multipurpose tree, being considered especially for land reclamation in forest steppe areas (Enescu and Danescu 2013) but its capacity to produce durable, high density heartwood (Ledgard 1993) as well as other food, biotherapy, apiculture and landscape architecture (Parvu 2006) utilities allows to recommend this species in rural steppe areas since Romania has a small forest coverage in

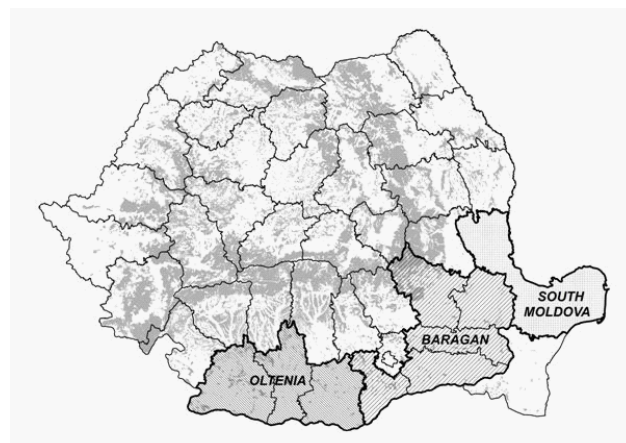


Figure 1. Regions for black locust plantations in Romania

general. In those areas the black locust wood is also a very important resource used for house heating. In the last decade, a very important purpose for black locust plantations was biomass production and carbon fixation, across Europe (Grünwald et al. 2009, Nuta and Niculescu 2009, Piotrowska and Mazurek 2009) and in Romania (Blujdea et al. 2003, Olofsson et al. 2011). In Hungary, for example, there are large areas with black locust plantations for fuel production (Rédei et al. 2002).

In the context of the extended process of land restitution in Romania (Ioras and Abrudan 2006), there

are many small land properties in low altitude areas with an average of 3 ha per a property (INS 2011). As a result of the following socio-economic developments (Fraser and Stringer 2009), significant areas of marginal land appeared creating important economic imbalances at local level especially in the southern part of Romania (Blujdea 2007). This triggered the development of a primary and secondary land markets, as well as increasing interest for using the land resources for economic and environmental benefits (Blujdea 2007, Fraser and Stringer 2009). Ecological conditions in the southern Romania with high aridity are suitable for the development of black locust plantations as means to achieve the above mentioned objectives (Enescu and Danescu 2013). However, black locust has not been widely grown for biomass production to increase investments in agricultural land use (Grünwald et al. 2009). Recently, Romania adopted the legal framework for the liberalization of land transactions (MARD 2013), which in the nearest future is likely to record an increase in the interest of investors looking both for investments return in medium long time as well as in positive cash flow for the land and black locust plantation investments. However, this evolution may be limited by the lack of information that could help investment decisions (Grünwald et al. 2009). Nevertheless, land investments in Romania (both in agriculture and forestry) are perceived as low risk investments due to the recognized economic value (Poynton et al 2000, Popa et al. 2013) and predictable regulatory framework as a result of the end of the restitution process.

Purpose of the study

In the above described context the authors identified the need for information that can support the investment in land acquisition and management in the southern part of Romania. Studies available on public sources (e.g. Rédei 2002, Barret et al. 2004, Rédei and Veperdi 2009, Turcu et al. 2011, Ciuvat et al. 2013) do not provide enough information, which is needed for the investment assessment, such as: i) production and quality of biomass; ii) costs for the establishment of plantations and other expenses involved; iii) distance from plantation sites (ecologically suited) and processing facilities; iv) diverse site conditions affecting plantation costs and development; and v) socio-economic conditions in each of the geographic regions that are affecting the wood market. With that, we are trying to address the identified information gaps through an assessment of the opportunity for black locust plantation investments in Romania by evaluating basic investment assessments indicators.

Material and Methods

The working hypothesis of this study is as follows: While the value added of the black locust plantation investments in the southern part of Romania may be low, it has a certain long term value which, if coupled with the reduced investment risks, may lead to an increased interest for certain categories of investment funds (e.g. pension funds).

There are two assumptions in this study: (1) the biomass accumulation for black locust in Romania on various stand conditions can be estimated using the biometry of regular forest plantation conditions and management; (2) the plantations are raised in natural conditions, with minimal maintenance works applied (Giurgiu et al 1972). The second assumption is due to the absence of more comprehensive studies regarding biomass accumulation of black locust plantations in intensive systems (improved site conditions and elaborated stand management measures). The following investment calculations indicators were used: (1) Internal Rate of Return (IRR) taking into consideration the land acquisition in the first year; (2) Land Expected Value (LEV) – without taking the land acquiring value and starting from the premise that the land will be used for these investments for several production cycles; and (3) Annual Equivalent Value (AEV) (Freeman 1993).

Data collected/calculated for the basic scenario were as follows:

- *Costs for acquiring the land* - the prices were assessed basing on market studies that are publicly available (DTZ 2012) as well as interviews with representatives of several major attorney companies assisting land investors in Romania.

- *The plantation establishment costs* were evaluated based on the wages and other costs for afforestation of agricultural lands, which are now used by the main Forest Administrator in Romania (National Forest Administration – NFA – Romsilva), both for own operations and outsourced operations (outsourcing is object to public services acquisition). Two versions of site quality were considered basing on the quality of the soil from black locust ecological demands perspective: good quality conditions – soils with sandy texture and high water permeability and medium site quality conditions – soils having medium clay texture and increased water permeability. Those two correspond to below 60 favorability points for good conditions and between 20-40 favorability points for medium conditions, based on the favorability classes established by Teaci (1970) for agricultural land, widely used in Romania, including for land value estimation. The establishment technology is described in the

present Romanian technical norms for afforestation (Anon. 1986) those include land preparation – plowing and disking; planting small seedlings – 5000 seedlings /ha; cutting the seedlings; plantation maintenance – three times in the first year, twice in the second year and once in the third year; replacing dead seedlings in the second and third year; maintenance against different diseases.

- *Maintenance and administration costs* – were collected from the records of NFA – Romsilva (NFA 2012) and includes: plantation guarding; GIS registering; periodic acquisition of satellite images; monitoring health status of the plantations; establishing the optimal time for maintenance works (i.e. thinning); design and costs estimation; acquisition of goods and services required; volume evaluation; reports for investors; market studies for determining the best-selling moment for the wood; tendering costs.

- *Costs for restarting the production cycle* – After covering a whole production cycle, and harvesting the wood, the land has to be prepared for restarting the production cycle. For black locust, the regeneration is vegetative, and therefore needs only deep disking of the land in order to stimulate vegetative regeneration. The data regarding those costs were provided by NFA – Romsilva.

- *Revenues* – are based on estimating the biomass accumulation and also on level of prices that were obtained by NFA county branches for standing black locust wood (NFA 2012).

Starting from the basic version described above, calculations were made for another 3 versions: i) 10% bigger prices for standing wood; ii) 10% bigger prices for land acquisition; iii) 10% bigger establishment costs. The considered exchange rate is 4,2 RON / EUR. Inflation was not considered as well as the selling option at the end of the 25 years.

Results

The used market studies (DTZ 2012) as well as interviews with stakeholders in the real estate consultancy sectors indicate a certain differentiation of prices both for renting and buying agricultural land along the main regions in the southern Romania, the variable factors being soil quality and geographical area (Table 1).

Plantation establishment costs calculation revealed values varying between 1165 EUR and 1048

Table 1. Prices for land acquisition

Geographical area		Oltenia	Baragan	South Moldova / Danube Delta
Land proper for black locust	Good site quality	1000 €	1400 €	1100 €
	Medium site quality	800 €	1200 €	900 €

EUR/year in the first year depending on the site conditions (Table 2). No geographic differences were accounted for plantation establishment costs. The resulted average cost for vegetative regeneration for stimulating regeneration was 150 EUR/ha (NFA 2012).

Table 2. Plantation establishment costs – centralized results

Year	1	2	3
Black locust / medium conditions	1165.47 €	876.19 €	492.85 €
Black locust / good conditions	1048.81 €	746.42 €	414.28 €

The future volumes to be harvested are dependent on the site conditions (Table 3) while the average prices for standing biomass vary within wide limits showing the differences in demand between different areas (Table 4). It was considered that the transportation prices are an important barrier against uniformity of prices.

Table 3. Estimated volumes to be harvested

Year	9	18	25
Black locust / medium conditions	15(m ³)	25(m ³)	330(m ³)
Black locust / good conditions	20(m ³)	30(m ³)	450(m ³)

Table 4. Average prices for standing wood

Geographical area	Oltenia	Baragan	South Moldova / Danube Delta
Black locust	Thinning 24 €	24 €	17 €
	Final cut 36 €	43 €	29 €

The summarized results of IRR, LEV and AEV are presented in Tables 5 and 6. The calculated IRR is between 5 and 10% with significant differences from one region to another and the biggest investment opportunities can be found in Baragan and Oltenia (Figure 1).

Conclusions and Discussion

Based on the outcomes of this study, the following areas for discussions and policy improvements have been identified:

- Black locust plantations in dry conditions of the southern Romania can give certain investment opportunities even if the initial investment for acquiring the land and establishing the plantations are rather high and the cash flow during the years is limited, when compare with agriculture activities; thus, funds with long maturation period (pension funds rather than private equity funds) can be seriously interested. It is to be noted that the average prices for agricultural land is still around 8 times lower than the EU average (DTZ 2012). The profitability of the investment can

Table 5. Financial analysis results for 3.5% discount rate

Black locust good site conditions				Black locust medium site conditions			
Versions	IRR	LEV	AEV	Versions	IRR	LEV	AEV
Basic version				Basic versions			
Oltenia	7.41%	8,767.59 €	248.24 €	Oltenia	5.73%	4,833.05 €	122.26 €
Baragan	7.64%	6,562.12 €	159.33 €	Baragan	6.00%	6,562.12 €	159.33 €
South Moldova	6.06%	6,028.07 €	146.50 €	South Moldova	4.41%	2,801.05 €	45.28 €
Version I – standing wood price is bigger				Version I – standing wood price is bigger			
10%				10%			
Oltenia	7.90%	10,073.73 €	293.96 €	Oltenia	6.21%	5,798.57 €	156.05 €
Baragan	8.12%	12,667.33 €	361.29 €	Baragan	6.47%	7,700.54 €	199.17 €
South Moldova	6.53%	7,060.26 €	182.62 €	South Moldova	4.88%	3,563.36 €	71.96 €
Version II land price is bigger				Version II land price is bigger			
10%				10%			
Oltenia	7.26%	8,767.59 €	242.38 €	Oltenia	5.62%	4,833.05 €	117.57 €
Baragan	7.46%	11,125.41 €	299.11 €	Baragan	5.85%	6,562.12 €	152.29 €
South Moldova	5.90%	6,028.07 €	140.05 €	South Moldova	4.29%	2,801.05 €	40.00 €
Version III – establishment costs are bigger				Version III – establishment costs are bigger			
10%				10%			
Oltenia	7.10%	8,406.35 €	235.60 €	Oltenia	5.40%	4,418.99 €	107.77 €
Baragan	7.37%	10,764.17 €	294.67 €	Baragan	5.70%	6,148.06 €	144.84 €
South Moldova	5.77%	5,666.84 €	133.85 €	South Moldova	4.10%	2,386.99 €	30.78 €

Table 6. Financial analysis results for 5% discount rate

Black locust good site conditions				Black locust medium site conditions			
Versions	IRR	LEV	AEV	Versions	IRR	LEV	AEV
Basic version				Basic version			
Oltenia	7.41%	4,242.60 €	144.56 €	Oltenia	5.73%	1,846.57 €	38.27
Baragan	7.64%	2,834.33 €	60.63 €	Baragan	6.00%	2,834.33 €	60.63
South Moldova	6.06%	2,638.62 €	57.60 €	South Moldova	4.41%	655.51 €	-28.0
Version I – standing wood price is bigger				Version I – standing wood price is bigger			
10%				10%			
Oltenia	7.90%	5,001.74 €	182.51 €	Oltenia	6.21%	2,408.22 €	66.35
Baragan	8.12%	6,483.38 €	229.57 €	Baragan	6.47%	3,494.75 €	93.65
South Moldova	6.53%	3,237.37 €	87.54 €	South Moldova	4.88%	1,098.05 €	-5.91
Version II land price is bigger				Version II land price is bigger			
10%				10%			
Oltenia	7.26%	4,242.60 €	137.80 €	Oltenia	5.62%	1,846.57 €	32.86
Baragan	7.46%	5,589.54 €	175.41 €	Baragan	5.85%	2,834.33 €	52.52
South Moldova	5.90%	2,638.62 €	50.17 €	South Moldova	4.29%	655.51 €	-34.1
Version III – establishment costs are bigger				Version III – establishment costs are bigger			
10%				10%			
Oltenia	7.10%	3,953.99 €	130.13 €	Oltenia	5.40%	1,515.87 €	21.73
Baragan	7.37%	5,300.94 €	170.44 €	Baragan	5.70%	2,503.63 €	44.09
South Moldova	5.77%	2,350.02 €	43.17 €	South Moldova	4.10%	324.81 €	-44.5

significantly increase if increased land prices are taken into consideration, this being another argument for the conservative approach in this study. Nevertheless, the price for land acquisition at present levels do not influence the investment opportunity as much as the revenues.

- Risks associated with the studied type of investment can be considered as low; from the perspective of possible regulatory framework as well as socio-economic development of the region the risks are considered as very low, while some risks can come from natural calamities or bad works for establishment of the plantations, risks that can be avoided through

insurance services as well as through professional monitoring of the works;

- Higher investment indicators value were calculated for Oltenia and Baragan meaning the south and west parts of Romania. The differences may be explained by the fact that, due to lower coverage with forests (WB 2013), the wood prices are higher. Also distances from industrial centers that may be able to develop facilities for biomass utilization are smaller; this may also influence the present higher prices for land acquisition.

- At the moment there are no state subvention for landowners willing to change the category of their

land from agriculture land to forest land. Such subsidies are envisaged for the next programming period for National Rural Development Plan (NRDP 2013) and this may also increase the investment opportunity.

• Anyway, the Government should try to develop a subsidizing policy for encouraging those investments, with or without using the tool of European Funds. There is a room for more policy improvements to increase interest for the envisaged investments, starting with better regulating the cadastre elaboration (missing in some remote areas), and continuing with reducing taxes associated with land transactions or encouraging the whole chain of using biomass for energy purposes.

Strengths and weaknesses of this study

Volumes to be harvested considered in this study were calculated in non-intensive plantation system. If special measures (as land improvement, special management cuttings, etc.) are applied, the quantity and/or the quality of the harvested volumes may increase, having a significant impact on the investment indicators values. This is a strength of this study because it can be considered as conservative.

In the same time, the values considered for calculating the cash flows for plantations on different considered site conditions were based on average values (due to the lack of data availability). This fact can limit the applicability of the results for particular conditions, the conclusions being useful rather in the initial phase of the investment analysis.

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ИНВЕСТИЦИОННЫЕ ВОЗМОЖНОСТИ ЭНЕРГЕТИЧЕСКИХ ПЛАНТАЦИЙ ДРЕВЕСНЫХ КУЛЬТУР В РУМЫНИИ

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Резюме

Целью настоящего исследования является сравнительная оценка количества и качества производства древесины, а также экономические риски, связанные с выращиванием робинии ложноакациевой в лесохозяйственных системах короткого цикла в южной части Румынии. В статье представлена сравнительная информация об инвестиционных возможностях при выращивании плантаций робинии ложноакациевой в различных растительных условиях и географических районах. Результаты данного исследования могут оказаться полезными для государственных организаций и инвесторов для поддержки принятия решений. Они также могут создать полезные инструменты для расчёта государственных субсидий, направляемых на облесение земель сельскохозяйственного назначения.

Ключевые слова: робиния ложноакациевая, инвестиционные возможности, плантация