

# Acceptance of Energy Crops by Farmers in Larissa's Regional Unit, Greece: A First Approach

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**Abstract.** The environmental, social and economic consequences of the use of fossil fuels has led to the search for new energy resources, such as energy crops which are expected to contribute in alleviating energy problem while they can lead to the diversification of the agricultural production. This research work investigates the acceptance of energy crops in the Larissa regional unit using questionnaires distributed to a sample of 635 farmers and other landowners (in general farmers) of the area. There is a concern for the establishment of energy crops, as most of the respondents are not willing to cultivate energy plants and also believe that the cultivation of energy crops is very risky.

**Keywords:** energy crops, farmers, investments, acceptance

## 1 Introduction

The role of the countryside in recent decades is changing due to the successive reforms of the Common Agricultural Policy (CAP), the enhancement of the environment as an important component in the production process, the globalization and more generally due to the improvement of living standards in rural residents (Anthopoulou, 2001; Arabatzis et al., 2006a; Andreopoulou et al., 2008; Arabatzis et al., 2010; Arabatzis et al., 2011). In particular, successive reforms of CAP and the measures adopted in the last few years have as a result changes in agricultural land use (Arabatzis 2005; Arabatzis et al., 2006b; Arabatzis 2008; Arabatzis 2010). Afforestation of agricultural land may contribute to the production of both technical wood and wood for energy production (fuelwood). Fuelwood is an important source

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Proceedings of the 7th International Conference on Information and Communication Technologies in Agriculture, Food and Environment (HAICTA 2015), Kavala, Greece, 17-20 September, 2015.

of energy production for both developing countries and Greece in the middle of the economic crisis (Arabatzis and Malesios, 2011; Arabatzis et al., 2012; Arabatzis and Malesios, 2013). At the same time several other agricultural plants cultivated intensively for energy production (Leung and Young, 2012).

The use of crop residues for energy purposes compensates the increasing energy demand by enhancing the production of clean energy. Instead, the economic exploitation of residual biomass was favorable only in cultivations with high performance crop residues (Fazio and Barbanti, 2014). Global bio-energy production forecasts for 2050 amounted to 100-450 EJ / year, with 64.78 EJ of them to be produced in Latin America, 43.6 EJ in Africa, 23.55 EJ in Southeast Asia, 26,3 EJ in the EU, 15.89 EJ in the United States, 2.1 EJ in Great Britain and 0.93-4,56 EJ in India (Li et al., 2006; Yan and Chen, 2007).

Currently, the EU is the largest biodiesel producer worldwide (Flach et al., 2013). Italy is the fourth larger producer in Europe after Germany, France and Spain, investing in 19 biodiesel factories, (Palmieri et al., 2014).

According to Panoutsou, (2007) in Greece, the energy crops can be an attractive, alternative solution only if they integrated properly into the existing agricultural activities. However, in the most recent study (Panoutsou, 2008) it was commented that cotton's farmers are more reluctant to replace the cultivation of cotton with energy crops compared with the cereal's farmers. This differentiation is due to the variability of the grain market prices which significantly affect the competitiveness of energy crops in relation to the production of cereals.

The aim of this study was to investigate the acceptance of energy crops from farmers and other landowners (in general farmers) in Larissa regional unit, Greece.

## **2 Methodology**

Larissa regional unit was chosen to be the research area of this study because agriculture is highly developed. According to 2009 agricultural census, the total number of farms in Larissa regional unit was 31,767 (Hellenic Statistical Authority-EL.STAT.). The choice of farmers and other landowners was based on existing lists of EL.STAT. and 2% of 31,767 farms were selected for the questionnaire survey of this study. The survey was conducted with the use of a questionnaire which includes questions on socio-demographic characteristics and questions relating to energy crops. The survey was accomplished in autumn 2014. Descriptive statistics using the statistical program SPSS 20.0 and Excel 2010 used for data analysis.

## **3 Results**

From the data analysis it was found that 84% (534) of the respondents were male and 16% (101) were female. Among them 4.5% (27) were aged between 18-30 years old, 30% (192) were aged between 31-45 years old and 65.5% (416) was over 45 years old. Furthermore, 157 (24.7%) of the respondents were graduates of elementary school, 252 (39.6%) were gymnasium graduates, 166 respondents (26.1%) were high

school graduates, 56 (8.8%) were holders of a graduate degree and only 4 of them had a postgraduate degree.

Regarding professional activity the majority of the respondents 81.2% (516) was professional farmers, 6.4% (41) work in the private sector, 2.4% (15) were employed as freelancers and only 1% (7) work as civil servants. The 8.8% are housewives. Regarding the income of the respondents 44% of them (280 persons) declare income up to 10,000 €, 25.1% (160 persons) declare income from 10,001-15,000 €, 13% and 15.2% (83 and 94 persons) declare income 15,001-20,000 € and 20,001-30,000 € respectively and finally only 2.8% (18 persons) stated an income over 30,000 €. Finally, 82% (520 people) have heard about the concepts of "energy crops" compared with the 18% (115 people) of the respondents which have never heard about energy crops. Energy crops were more familiar to male farmers compared to female.

Regarding the satisfaction of farmers by the price of their agricultural products 23.6% (150 farmers) were "very satisfied" with the prices that their products reach in the market, 38.2% (243 farmers) were "little satisfied", while 36.8% (234 farmers) were "not at all satisfied". Eight farmers refused to answer this question.

Concerning the acceptance of farmers surveyed to cultivate energy crops, 76% of them (482) were "not willing to cultivate energy crops", while 24% (153) would "willing to cultivate energy crops" on their farm.

Only 1.2% (13 farmers) believed that there is "no risk" in cultivating energy crops. However, 11.4% (73 farmers) believed that the establishment of energy crops entails "some" risk, 30.2% (192 farmers) said that cultivation of energy crops has "moderate risk" while 42.2% (268 farmers) agreed that by cultivating energy crops they take "big risk" and finally, 14% (89 farmers) would "avoid the installation" of energy crops.

The 22.2% of the farmers believed that the establishment of energy crops would have an "absolutely positive effect on their income", while 38.1% (242 farmers) agreed with the view that it "might have a positive effect". However, 32, 6% (201 farmers) feel that the impact of energy crops on their income is "indifferent". Finally 8% (51 farmers) believed that the establishment of energy crops would "reduce their income".

Also, 55.4% (352 farmers) "strongly agreed" that the cultivation of energy crops will have a positive possible impact on the environment. Moreover, 32.4% of the respondents "agreed" with the positive effect of the energy crops on the environment while, only 0.4% of the farmers "disagreed" with this effect. Finally, 74 farmers (11.6%) believed that the impact of energy crops to reduce pollution of the environment is "indifferent".

Moreover, on the question "whether energy crops are the most important alternative energy source" 57.4% (365 farmers) "strongly agreed" while only 0.9% did "not agree". Also, important is the percentage (27.7%) of farmers who simply "agreed". Finally, 88 farmers (13.8%) "neither agreed nor disagreed".

Furthermore, on the question of "whether energy crops are an alternative source of energy that does not change or destroy the environment", 3.7% (24 farmers) "strongly agreed", while 16.3% did "not agree". Also, important is the percentage (30%) of the farmers who simply "agreed". Finally, 45.9% of farmers seem not to have a clear view and therefore "neither agreed nor disagreed".

The 17.4% (111 farmers) “fully endorses” the need to increase the areas of energy crops, while 44.2% (281 farmers) “agree”, 6.6% (42 farmers) “disagree” with the increase of land used for energy crops. 31.6% (201 farmers) seem not to have a clear view (neither agreed nor disagreed).

#### **4 Discussion - Conclusions**

The acceptance of energy crops from Larissa’s regional unit farmers as alternative crops is depending on many factors. One of them is the ability of selling their produced agricultural products in acceptable price. Furthermore, factors such as the technological exploitation of domestic industries and their acceptance by consumers (Ulmer et al., 2004) are also important. Similar results have been observed from a study which involved among other things, prospects of job offer increment and the existence of subsidies in terms of State (Delshad et al., 2010; Cacciatore et al., 2012).

The cultivation of energy plants has very little acceptance in Larissa regional unit, Greece. The majority of farmers were male and over 45 years old. Most of the respondents were not willing to cultivate energy plants although energy crops believed to be used as an alternative energy source. The farmers knew the concepts of "energy crops" and "energy plants" and most of them believed that the establishment of energy crops is very risky.

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