

Economic impact and the traceability costs in the case of banning the cultivation of GM soybean in Romania

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Abstract

With 10 million hectares of arable land, Romania potentially has an important role to play in European Union (EU) agricultural production. Before accession to the EU, genetically modified (GM) soybeans) were cultivated on 137,300 hectares of total 190,800 hectares of soybean crops.

As early as 2003, a monitoring and further production traceability safety system has been implemented. After Romania entered EU (in 2007), a ban has existed on cultivating GM soybean crops. This has created a severe reduction in the area of soybean crops grown, down to 52,000 hectares in 2008.

This paper evaluates the economic impact of the GM crop ban on Romanian farmers and benefits loss, balance account with important trade deficit. We also analysed subsidies granted for conventional soybean and costs of the harvest traceability safety system for 2006.

All data are collected on farmer units, Ministry of Agriculture, Forestry and Rural Development internal papers and the Year Book of National Statistic Institute.

Introduction

Romanian integration into the European Union (EU) starting on the January 1st 2007 had a major impact on agriculture, an important economic sector with about 10% of Romanian GDP and 1/3 people work place.

By the obligations assumed in the Accession Treaty, Romania had to ban GM soybean cultivation following an EU request, even though Romanian farmers had cultivated these crops since 1999. Major consequences were recorded for farmers as the conventional soybean crop is not as economically viable and they have to give up or replace it with other crop or give up farming the land.

A reduction of the soybean crops area has been recorded, to 59.32% in the first year, and to 27.29% in the second year respectively, with severe depletion of the total output of the soybean products, beans, soy meal and soy oils.

There has been an adverse trade balance after the 1st of January 2007 for soybean products attributed to the GM soybean ban from cultivation. The economic impact at the farm and national levels can be calculated and analysed against Romania and EU subsidies made in order to support the conventional soybean crop. This can be extrapolated based on statistic data to the farmer level the effect per hectare estimated.

The farmers' system for authorizing, monitoring and ensuring the traceability introduced by Romanian authorities is referring to the previous authorization, monitoring crops, during harvesting, throughout storage, handling, transportation, processing and marketing. In the second part of this paper we will evaluate costs of the implemented traceability system for the GM soybean yield in 2006 in Romania.

Material and methods

Economic impact of the GM crop ban for Romanian farmers has been assessed on primary data recorded from different farmers and an internal paper from the Ministry of Agriculture, Forestry and Rural Development. We also collected data from Year Book of National Institute for Statistics. All data from farmers were recorded by inquiry method.

The main indicators under assessment were areas cultivated with conventional soybean and GM soybean before and after January 1st, 2007, yields and costs, trade balances registered before and after the banning for three products derived directly from soybean: soy beans, soy meal and soy oils.

Cost analyses comparison between two soybean crops and financial results are computed on farmer's account reports.

Evaluation of the costs for traceability system started since the system put in place is assessing cost as distinct activity process.

Results and Discussion

Effects on the trade balance

Glyphosate resistant (Roundup Ready) soybean, was introduced into cultivation in Romania in 1999. The main benefits in favour of introducing this variety into cultivation were high profits, good weed control and nitrogen soil improved level.

Romania has favourable cultivation conditions for soybean production and the crop has been widely grown. In the period 1980-1985 Romania annually cultivated over 400,000 ha of soybean). The technology is reversible which meant it could be given up if any adverse effects were noticed.

The risk of gene transfer through pollen from the GM soybeans is low because on the soybean is cleistogamous and it also has no close relatives in the indigenous Romanian flora. The risk of infesting the human food chain with GM soybean is also low because the main destination of the production is animal feed, mainly poultry and swine, as protein supplements to meal or more rarely, as beans and in the form of soy oil as an energy source. Soy oil could get directly into the human food chain but, in comparison to other vegetable oils, the consumers perceived it as being of low quality, for which reason is a low level of consumption. Soy oil could also get into human food supply chain when processed as margarine. Soy oil contains no DNA and there are no labelling requirements

During the period leading up to 1999, over 15% of the arable land in Romania was not cultivated. The main crops, maize, wheat and sunflower accounted for more than 80% of the production area and conventional soybean area was only on 63,100 ha. Efforts had been made to diversify the crop' production and alternatives were sought to counteract the tendency to abandon the cultivation of the land. In the case of the GM soybean crop technology using a broad spectrum herbicide provides an important benefit where a high level of weeds infestation is a real problem, such as the alluvial plain areas of Romania,.

The area cultivated with conventional soybean and yields (Figure 1) fluctuated over time. During the previous socialist economy the surfaces increased from 79,100 ha and 90,500 tonnes in 1970 to 318,800 ha and 307.500 tonnes in 1985 and 512,200ha in 1989. Beginning in 1990, under free market circumstances, soybean crops decreased such that between 1990 and 2002, except 1998 and 2000, areas were less than 100,000 ha and yields obtained were also lower than 140,000 tons.

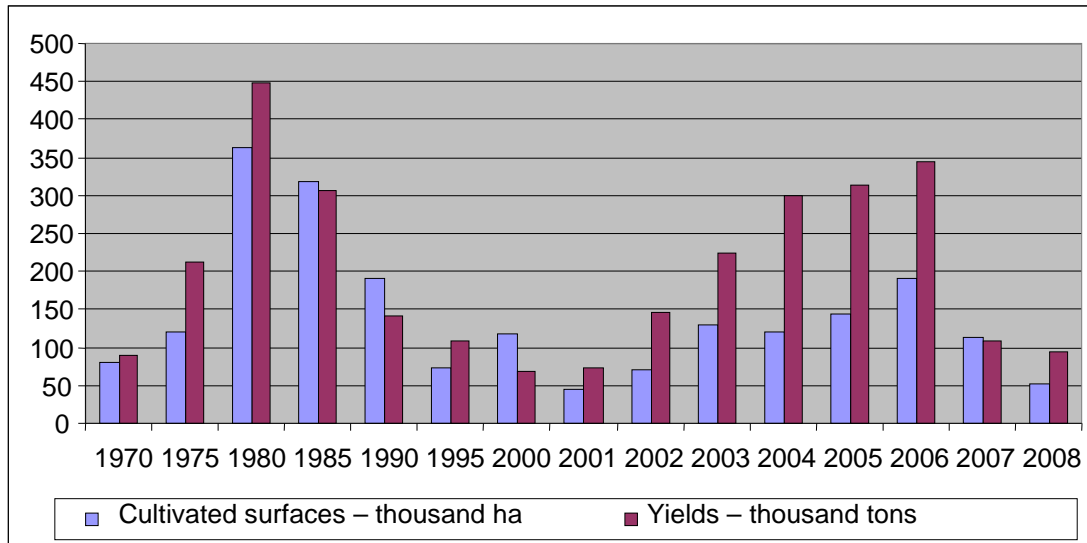


Figure 1. The evolution of soybean areas and yields in Romania. Source: Ministry of Agriculture and Rural Development internal paper.

Since year 2002 the soybean crop areas increased constantly (Figure 2) following the introduction of GM technology, due to several benefits offered by this crop. The positive impact of the technology was widely publicised by Lucian Buzdugan, an important farmer of the largest agriculture unit in Romania ([1] and [2]) as:

- Yields increase up to 30%;
- Good control of weeds *Phragmites communis* and *Sorghum halepense* for which the degree of weed problem dropped by 67% and 89% in a four year cropping system with GM soybean;
- Total control of weed, *Solanum nigrum*, for which there is no soybean selective herbicide, with a high occurrence in the cultivation area of soybean and which important damages by degrading the soy beans upon harvesting is not any more problem;
- Reducing by 85% of weed elimination costs for the initial crop and for the following crops;
- Reducing the fuel consumption for the total crop system due to the minimum tillage system;
- Increasing the nitrogen level in soil by about 30 to 40 kg of nitrogen active substance as compared to any other crop, following the more intense activity of the symbiotic bacteria;
- Higher incomes due to the surplus in production and the quality of the beans which attract higher selling prices.

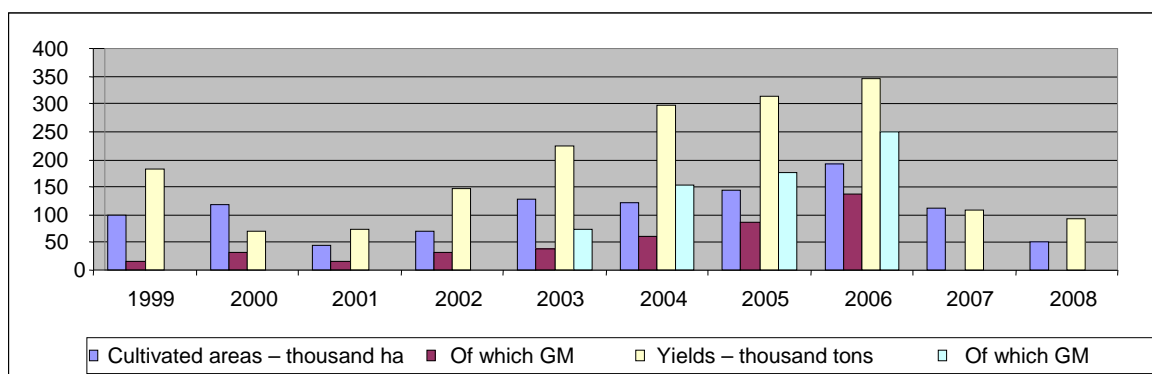


Figure 2. The evolution of GM soybean area and yields. Source: [5]

All these benefits made GM soybean one of the most attractive crops for farmers. In fact, the Romanian farmers' choice was not especially for a genetically modified plant, but for a herbicide tolerant crop, for fields free of weeds. As such, in 2006 190,800ha of soybean, were produced out of which 137,300 were declared GM by 1438 farmers in the National registry for genetically modified plants. The yield amounted 345,000 tonnes, out of which 250,000 were GM.

In the negotiation process of the European Union, by accepting and signing, the Accession Treaty, Romania committed to uphold the European legislation in all fields, including in agriculture. GM soybean was deemed accepted in consumption but not authorised for cultivation in the European Union. In order to respect the obligations assumed by signing the Accession Treaty, GM soybean production was banned and the immediate impact was the drastic decrease of the areas cultivated with soybean from 190,200 ha in 2006 to 52,000 ha in 2008.

Following the ban, Romanian farmers gave up soybean cultivation, considering that the subsidised payment system was not enough to compensate the lack of competitiveness of the conventional soybean crop. The decrease of cultivated areas and reduced yields from conventional crops resulted in a need for an increase in soybean and soybean meal imports (Figure3).

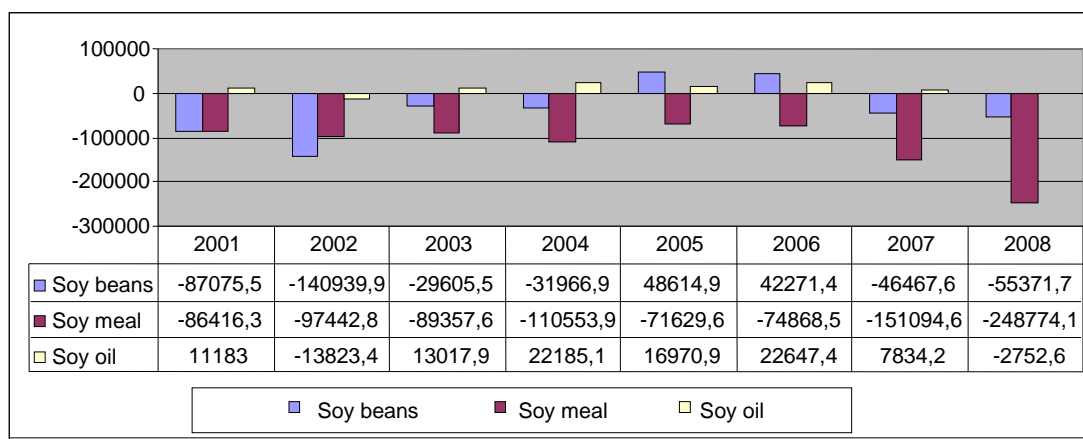


Figure 3. The balance account of the trade in soybean and derived products, thousand tons, [5]

From the analysis of the balance of the trade in soybean and derived products in the interval 2001-2008, we notice that, except for 2002, Romania was self-sufficient in soybean oil with a maximum surplus of 22,647.4 tonnes in 2006 and managed to export over 42,000 tonnes of soybeans in 2005 and 2006 after a long period in which it was a net importer of this product. In 2008, Romania again became an importer, due to the deficit for soybean oil, the imports exceeding exports by 2,752.6 tonnes.

For the analysed period, Romania was a net importer of soybean meal. Between 2001 and 2004 the quantitative balance account of the trade in this product is negative and varies between 86,000 tonnes and 110,000 tonnes, decreases to 70,000 tonnes in 2005 and 2006 and increases in 2007 to 151,094 tons and then to 248,774.1 tons in 2008.

In value terms, the balance account of the trade for all three products is negative and in 2007 it amounted to €94.483 million, €72 million of which was due to the soybean meal and €22 million to the soybeans. If we compare the years 2007 and 2006 at the level of the difference between the balance account for the trade for all soybean products, we notice that in 2007 the processing industry in Romania had to spend foreign currency up to €60.5 million to compensate the lack of these products from local farmers, €30 million of which was for soy beans, almost €20 million for meal and about €10 million for the soy oil it did not export.

For 2008, the value deficit of the balance of the trade for all three products is increased and the difference between the trade accounts in 2008 as compared to 2006 reaches €117.353 million of which €58.084 million is due to imports of soy meal, €39.322 million, for the soybeans and €19.947 million for the soy oil. In real terms, the major part of this trade deficit is an indirect loss of farmers' revenue who did not cultivate soybean, but especially those who had to give up the GM technology.

The subsidised system for conventional soybean

The subsidy payments granted to farmers in 2007 and 2008 for conventional soybean were of two types:

a) Standard EU support payments related to the cultivated area, and is similar for all crops. The value amounted to €97/ha and €107/ha in 2007 and 2008 respectively. In the two years, the total amount available for conventional soybean was of €10.98 million and €5.56 million in 2007 and 2008 respectively.

b) A specific compensation payment for conventional soybean granted as a state support in order to cover the lack of competitiveness of this crop and to avoid the complete abandonment of this crop. The amount for the two years are RON34 million (€9.7 million) and RON30 million (€8.3 million) in 2007 and 2008 respectively.

Effects on farmers

In his public statements, Lucian Buzdugan (estimated the GM soybean net income advantage as between €100 and €187/ha, according to the yield obtained [2]. If we accept the average value of the GM soybean crop profits of €143/ha, then by giving up GM soybeans the indirect potential profit losses at the farmers level are added amounting over €11.1 million in 2007 respectively €19.85 million in 2008. The farmers' indirect losses are difficult to assess, but estimates can be made by accepting the working hypotheses.

As such, for the lack of nitrogen resulting from the activity of the symbiotic bacteria (30 kg nitrogen active substance/ha according to the farmer questionnaire, €15/ha) we can estimate the level of losses at €1.16 million in 2007 and €2.08 million in 2008. The cost of increased mechanical cultivation was calculated as about €30/ha which means losses of €2.32 million in 2007 and €4.16 million in 2008.

The expenses on weed control are difficult to estimate since they depend directly on the crop and control method in use.

The total losses of farmers in the two years since the banning of GM soybeans, amount to €14.58 million in 2007 and €26.09 million in 2008. This does not take into account the losses caused by increasing costs for weeds control.

Evaluating the traceability costs

In order to evaluate the costs of the authorisation, monitoring and safety system of the traceability of GM soybean production, we identified the supplementary activities required by the implementation of the GM soybean and derived products traceability safety system imposed in 2006.

The authorization system of farmers assumes that every farmer announces his intention to cultivate GM soybean by filing an authorisation request to the county authorities, in which the location and the area to be sown are indicated. After receiving the authorization to cultivate and sow the GM crop the farmer notifies the authorities of the final sown area, if any changes regarding the authorisation occurred. During the production, the farmer is monitored by the authorities, including at harvesting and the storage, transportation and processing are also monitored.

The authority for GM soybean traceability, at the production level, including on-farm storage is with the Ministry of Agriculture, Forestry and Rural Development and of its regional structures. For transportation, handling, storage and processing the responsibility is taken by the National Sanitary Veterinary Authority.

In 2006 there were 1,214 initially authorised farmers of GM soybeans and 224 initially unauthorised ones, but which were later subject to the authorisation system. There was a cultivated total of 13,300 ha of GM soybeans with a total yield of 249,900tonnes. .

In order to file the authorisation request and to obtain permission to cultivate the farmer must fill in the form and go to the county authority headquarters office. After harvesting, the farmer needs to go back at least once or more times to file the form

regarding the destination of the harvest. For large farms (over 500 ha) more trips are required as every location of the GM crop needs an authorisation request. The territory authorisation representative also pays at least two visits to the farmer to monitor the crop in the field vegetation and to at harvest.

The farmers' cost

The average cost of the farmers' visits to the authorities has been assessed (on the basis of farmers' questionnaire) at €16/farmer/trip, meaning a total of €58,272 for authorised farmers and another €10,752 for unauthorised farmers. Under our evaluation, on average, per farmer, the costs for visits to the authority's headquarters have been €48.

The average cost of harvesting and separate storage was assessed to be €1.2/ton. This induces total supplementary costs of €299,880 the assembly of farmers paying an extra €368,904 which means average supplementary costs for a farmer of €256.53.

The authorities' cost

The cost of management by authorities can be evaluated on the same basis of farmer's questionnaire. The authorities spend €46,016 for the trips to the farmers (€32 in average per farmer) and €66,148 (€46 in average per farmer) for the payment of the authorities' representatives. We assume the hypothesis that for every farmer the official worked on average a day.

In total, the costs for authorities to manage the monitoring and safety system of the GM soybean traceability in 2006 weres €112,164.

Conclusions

1. The area cultivated with soybean in Romania decreased drastically down to 52,000 hectares after the GM crop was banned, with a direct impact on soybean production.
2. The decreased production forced Romania to revert to a position of a net soybean importer. The soy meal imports increased significantly in 2007 and 2008. The supplementary foreign currency impact for 2007 was €60.5 million and for 2008 it reached €117.353 million.
3. The potential profit reduction at the farmer level amounted to €11.1 million and €19.85 million in 2007 and 2008 respectively.
4. The farmers' indirect losses reached €3.48 million in 2007 and €6.24 million in 2008, without taking into account the supplementary efforts to control problem weeds.
5. Although the state directly supported the conventional soybean production with amounts of about €9.7 million in 2007 and €8.3 million in 2008, this support was not enough to cover the lack of competitiveness of the conventional crop and did not make it attractive for farmers.

6. The authorisation, monitoring and safety system of the traceability introduced by the Romanian authorities created supplementary costs both for farmers and for the authorities.
7. The average cost of the traceability for a farmer is €256.53. The total impact on the farming sector was €368,904.
8. The management costs of traceability for the authorities in 2006 was €112,164.

Acknowledgments

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