

ENVIRONMENTAL PROTECTION

EFFECTS OF AGRICULTURAL MACHINES ON THE ENVIRONMENT

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***Abstract:** Our topic is about the polluting effect of agricultural machines. We have chosen this topic because this theme is the closest to us. I am managing a little family company, which produces agricultural products under greenhouses. These products are, for example: green peppers, potatoes, and lots of type of brassica. I know the effects of the machines on the environment, our point of view is to use these machines the least we can. In our opinion, the size of our company is not too big to produce many harmful effects, but we need to cut as much as we can, because many little companies can effect the same as the „big fishes” on the fields. As we can see the present, everything is about strategy planning and maximizing the profit. In our view, we should think about the future and manage our works on the highest level and this way we could minimize the pollution effect of agricultural machines.*

***Keywords:** agricultural machines, environmental protection, agriculture, social impact*

1. INTRODUCTION

We have chosen this topic to be discussed because we thought it highly important to find answers to the following problem: how could it be possible to reduce the harmful effects caused by the agricultural production? This topic is very close to us since one of the authors has his own agricultural company, though not in a big area and not with big machines. We think that even small gardens like his have to pay attention to the efficient organization of the use of machines, since even smaller ones can cause similar effects as the big arable crop producers. We find it the greatest difficulty that in many cases producers do not plan the works ahead but they try to execute a certain task with immediate, ad hoc solutions which may result later that the task either has to be done again because of the inappropriate effect, or it has to be substituted with another operation that increases the pollutant emission. In our essay we are planning to show according to our experiences or by means of the specialized literature that how much it is important to pay attention and how a solution to the agricultural production which pollutes the environment less could be found. By all means, focusing only on the profit and the increase in the quantity of production should be avoided. It would be very important to find a balance between the harmful effects caused by production and positive production

results. In our study, basically we are describing the effect of the agricultural production on the atmosphere.

2. LITERATURE REVIEW

Let us have a look at the phases of how the Hungarian agriculture became motorized. Basically, the country's machine production and - in parallel with it - the trade and use of machines started to boom from the beginning of the 20th century. First, steam engines got replaced by machines operated with gas and paraffin, which seemed to be more cost-effective for agricultural producers. Later, it was the diesel oil, which took over. Professors at illustrious universities of agriculture calculated the expenses of these machines, and it assisted in the process of replacement (Király, 2013). Up to the World War I significant agricultural investments were accomplished by the country's landholders, which was due to the increase in the population working in agriculture, first, and to the foreign purchasing power, second. This period was followed by stagnation and with the introduction of Forint in 1946, the price gap between agricultural and industrial products widened, which was very disadvantageous for motorization (Internet 1, 2016). Until the restructuration in agricultural co-operatives, smallholders and individual producers contributed mostly to the emissions, but from 1961 it was taken over by the big agricultural co-operatives characterized by a higher level of motorization. Practically, most of the arable plants were produced in these collective farms that clearly had effect on the proportion of machine usage, too (Internet 2, 2016). The intense upward trend beginning in the 1960s is usually regarded as the golden age of the Hungarian agriculture (Szabó, 2010). Both the intensive use of chemical fertilizers and soil cultivation done with machines contributed to the sudden growth of the production, however, the polluting effect on the environment started here, too, which was ignored that time, though. The non-optimized and inconsiderate use of chemical fertilizers resulted in soil acidification and contributed to the increase of NO_x quantity in the atmosphere. Moreover, the machines emitted a horrible amount of pollutants. Although the cultivated plants take a certain percentage of the CO₂ content of the atmosphere during photosynthesis, the proportions have drastically changed. The intense chemicalization made an impact on the society, too, since a large amount of people living in the countryside did not have a system of pipes that time which meant that the wells became unfit for human consumption and as a result, people had to commute for the safe drinking water. After the change of the political system, a new structure of landholders developed which formed a stabile system up to recently when there was a change caused by selling the state lands (Fenyő, 2010).

Since the change of the political system, farms in private hands have performed an intensive motorization to increase their efficiency, focusing on the profit.

Actually, machines distributed in the European Union have to meet the norms, which regulate the carbon-dioxide emission. To fulfil this requirement the engines are categorized into EURO ratings, that make their monitoring and restriction possible. Mixing additives to the fuel is highlighted which absorbs the harmful substances in the atmosphere, thus reducing the pollution (Figure 1).

Not mentioning the machines using bio-diesel. Naturally, in this case it is about the most modern machines, which can be used only by big producers, since smaller farming branches or smallholders lacking the capital cannot afford the new investments so they are still working in their lands with machines of older types. That is why we mentioned at the beginning of our essay that although it is true for producers in the gardening sector to cause emissions of a smaller level individually, they may cause pollution of similar level as their bigger 'brothers' because of their number and less modern machines. This situation is very typical of the new member states of the EU which did not have the opportunity or the capital to carry out developments and investments. (Zsótér et al. 2014) The European Union have tried to find a solution to this problem. Due to the grant opportunities between 2014-2020 it is possible to use the sources for purchasing new gardening machines, which makes modernization possible (Figure 2). The problem before that was that farmers in the gardening sector could not apply for the grant efficiently since the bigger producers grabbed hold of the sources to invest in big machines, therefore the development became unipolar again. The grant structure introduced in the new period helped this situation because it divided the sources to the gardening and to plough lands making the opportunities equal for the applicants.

Figure 2 A modern gardening machine



Source: http://www.agroinform.com/data/cikk/2/2498/cikk_22498/AuditkerGepbemutato_0001_e.jpg 22.03.2017

Apart from these, if we consider the whole world, agricultural producers cultivating the largest lands work with the most precise technologies possible in order to reach the maximum yield so that meanwhile, they can reduce their

effect on the environment, leaving the smallest possible ecological footprint. The future strategies should be formed according to this way in order to start the sustainable development and the agriculture can develop in harmony with nature not ruining it. Since, if we destroy nature, there will be nothing to left to cultivate (Téglásy, é.n.).

3.1. IMPACT ON THE SOCIETY

This chapter is about the effects of the agricultural chemicalization, which concerns the rural population of Hungary in many cases, even today. The intense use of chemical fertilizers in the 1960s significantly contributed to the destruction of ground water layers. Since the excessive use of chemical fertilizers and plant protection agents eventuated that residues washed down by the rain infiltrated into the ground water layer making the wells in farmsteads and in rural areas non-usable for human consumption. The EU policy regulates the use of these wells, since they contain a higher arsenic level in Hungary, though it is true that these wells have always been used for drinking water. Actually, the main problem is still the negative effect of chemical fertilizers. Even today they make impact on a lot of people, since they do not have the opportunity to drink clean water, therefore they can count only on the wells in farmsteads. Getting wise to this fact, the government and local councils have started drinking water programs in many cases thus contributing to the clean water supply for this population, however, these initiatives were not cost-effective and did not have a great success. However, they managed to reduce somehow this effect due to the precision farming (Figure 3), and it is necessary to follow their moderate use in the future, too, in order to prevent a pollution of this scale because it risks not only human lives but it can effect other creatures of nature, too.

Figure 3 Precision plant protection



Source: http://www.labbulletin.com/custom/dev_images/MAL%20JOB%202539_web.jpg 22.03.2017

3.2. OPPORTUNITIES FOR THE AGRICULTURE

After revising the specialized literature and having these experiences, it can be seen that a farm is not able to change its activities with environmental load without capital. The only solution is that it organizes each farming phases in a precisional way but to stop the loading effect it definitely needs modern equipment which can be purchased on a high price for the enterprise. The European Union swung the developments of our country's agriculture to a good direction, the different grant opportunities have contributed to modernization, and however, it is necessary to sustain them continuously to give each farmer the chance of developments they can choose. The EU regulations fix the norms of emission relating to the new equipment in laws, so this way it is not possible officially to purchase a machine, which would load the environment more than the average (Dikán, 2014). In the near future the Union will emphasise the production of bio-fuels because this way people working in the agriculture can produce for themselves a big amount of fuel to be used. It is definitely necessary to focus on the sustainable development since it would be very harmful to think only of our lives.

4. SUMMARY

As a summary, it can be said that the last century faced an upward stage of the environment-loading effect of the agriculture, but by means of the modern technologies, we were able to limit this effect and to reduce it in the future. We had to realize that if we carry on this tendency, which started in the 1960s, the future will not lead us to the right direction. We can reach a level with more and more modern solutions and regulations where farming becomes possible without damaging the nature. Since, in case of the gradual load of nature we will have negative answers, which will influence productivity and our lives both directly and indirectly. The parallel, which ensures the balance, has to be formed. The agrarian policy of the EU perfectly ensures the focus on natural values. Furthermore, motorization will be carried on by the technology, which does not overload the nature, either. It is essential that even the underdeveloped farms can have the same opportunity of development as their bigger rivals. This way the smaller farms can be modernized, too, and they can have step forward in case of environmental-friendlier solutions, too.

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