IMPROVEMENT OF SALTED SOILS, A PARTICULAR NEED IN LAND IMPROVEMENT WORKS FOR THE ARRANGEMENT OF A HAZELNUT PLANTATION

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Abstract. *Under current conditions marked by significant effects of changing climatic conditions due to global warming, first of all, the increase in the demand for agricultural products and the change of mentality regarding the way of interaction with nature, the specialists are looking for solutions for the full rethinking of performance agriculture. Given the growing demand for agricultural products and the global warming that is already making its presence felt, makes it increasingly difficult to produce them, it is important to find solutions for expanding cultivated areas, in an environmentally friendly way and respecting the concept of biodiversity, also ensuring the best development conditions for crops. In addition to new discoveries and technological innovations (equipment, seed varieties, fertilizers), the way to make an environmentally friendly agriculture is defining in the new thinking in the field. Finally, it is our duty to find solutions. The paper presents a method of approaching the problem of improving saline soils, present insular in a soil to be prepared by land improvement works, to be planted with hazelnuts. Land improvement works can also contribute to the improvement of saline-affected soils, through specific actions. The case study reveals the problems encountered that determined these works, their solution, the agrotechnology used (stages, equipment, materials) and the land improvement works executed as support, as well as the results, one and two years after the execution.*

Keywords*: saline soils,land improvement,hazelnuts,global warming,agriculture agronomy*

INTRODUCTION

For farmers, land preparation often means the beginning of a new life cycle of a crop, the provision of a germination bed to provide shelter, food and support for the plants to be grown and each of those who practice agriculture (whether they are agronomists or simple peasants working their land), know that these works are of vital importance.

Those who work in agriculture in the field of land improvements are those who create, repair or develop the land's ability to be more productive, safer in terms of the action of natural factors that contribute to soil erosion, salting, desertification, depletion of cultivated land, by extending the invasive plants on the arable surface and last but not least, they are the ones who, through their construction and unclogging of the drainage and irrigation canals, help in a definite way to ensure an optimal water management, indispensable in the current conditions of demand. growing agricultural products coupled with the already visible effects of global warming.

The current challenge is to find new feasible, environmentally friendly solutions that contribute to biodiversity (as defining principles), but that also bring added value, expand valuable land area and make less productive land profitable." Drainage practices have therefore evolved from removal of water for increased crop productivity, to a method of environmental control. Consequently, much effort over recent years has been in designing and installing drainage systems, which have multiple objectives"[2,2007].

The importance of agriculture no longer needs to be demonstrated. It results from the immediate need, from the growing demand for food products, in the conditions in which the

population is growing, the industrial-urban expansion follows its evolutionary course change and transformation.

MATERIAL AND METHODS

Case Study

The area of interest is located in Timis County, in the southwestern part and is an integral part of an agricultural farm that has chosen to work in an organic system, which raises certain issues of agro-technical nature, first of all, of development strategy and not Lastly, to be a pioneer in sustaining biodiversity, another basic principle of farm management (Figure 1).

It also implies the obligation to use only organic fertilizers to support and improve the soil microfauna and microflora.

The goal of sustainable agricultural practices is to control pests (weeds, parasites, and pathogens) and maintain soil fertility and crop yields, while minimizing or eliminating synthetic chemical inputs. The application of organic amendments to soils (e.g., cover crops, manures, plant biomass) is an integral tool for sustainable agriculture, as evidenced by the increasing interest in optimizing this strategy (Lu et al., 2000). Organic amendment has been shown to enhance soil organic matter and fertility, as well as prevent erosion (Snapp et al., 2005). Less understood, however, are the effects of organic amendments on soil food webs, which contain the biotic assemblages responsible for decomposition and generation of soluble nutrients for plant uptake. Soil food webs also contain parasitic organisms, such as plant-parasitic nematodes, whose densities are influenced by the presence of host plants, the soil environment, and regulation by predators and pathogens (all factors that are potentially influenced by organic amendments).The addition of organic amendments to soil contributes to organic matter and has great potential for influencing the structure and function of the soil food web.[1, 2010].

Moreover, the Farm has a complex strategy regarding the reorganization and systematization of the land, this area being included as a continuation of another new project of drainage and irrigation, on an area of approximately 600ha, with supply from the Bega Canal, both gravitational , by existing socket, as well as by pumping.

For the diversification of the company's product portfolio, as well as for the efficiency of the resources of the owned land, it was decided to set up a hazelnut plantation in this area, on an area of 240ha.

Given that such an agricultural crop is totally different from the usual (annual) ones, due to the duration of the exploitation time, and will produce long years, the preparation and systematization works have a vital importance and every detail must be researched to ensure sustainability investment.

Figure 1-location(Google capture)

Halomorphic soils, also called saline and alkaline soils, "have an excessive concentration of soluble salts (saline halomorphic soils) or adsorbed sodium (alcaic halomorphic soils) or both (saline-alcaic soils) ..... with toxic effects plant destroyers when certain tolerance limits are exceeded "[6,1977](Figure 2 a.& b.).

If we take into account that irrigation systems will also be used on these surfaces, as well as the exploitation of road networks (an extremely important element) and more, the specifics of the destination of these lands (stable crops that will be between 40 and 60 years), it is imperative that the soil be prepared in such a way that it does not require further large-scale interventions, in terms of its structure.

Of course, the improvement works are not only related to the type of agricultural crop to be established, but especially are mandatory and receive a sine-qua-non status, for those who remain in position for many years.

a b

Figure 2.- Halomorphic soils (foto by Marin Ilca)

In addition to the fact that on these island portions that encumber the agricultural surface of the study area, the agricultural crops do not resist - therefore the production decreases - there are other inconveniences that support the decision to invest in the improvement of these soils.

From an economic point of view, the total expenditure on soil improvement dedicated to these areas affected by salinity are, in fact, amounts invested in reducing losses and increasing labor productivity.

The effort to merge the land and systematize it in a way that modern high-capacity agricultural equipment can evolve with maximum efficiency is undermined by these areas with salty soil.

As a plastic example, we could say that a salt soil, in a farm that uses modern equipment, is like a highway with multiple potholes in the road.

In practice, the cost and dynamics of mechanical work of affected soils show great differences from the same work performed on the same unaffected surfaces, due to the fact that areas with "salt" are real traps for machines, often generating if the operator is not careful and enters the machine even marginally in them, congestion. in the dynamics of operations and without always succeeding. These syncopes are present in absolutely all stages of work (scaling, plowing, discussing, sowing, fertilizing, applying treatments, harvesting), accumulating losses in each. In a single agricultural year, only on the experimental soil, accumulated damages were calculated. over 25.5 k euros.

Beyond the economic calculation of losses due to these inserts of salted soil, there is the impossibility of implementing a certain project, which-possible-can increase the profitability of a farm, even if only by opening a new market for safer and more efficient use of products(Figure 3) .

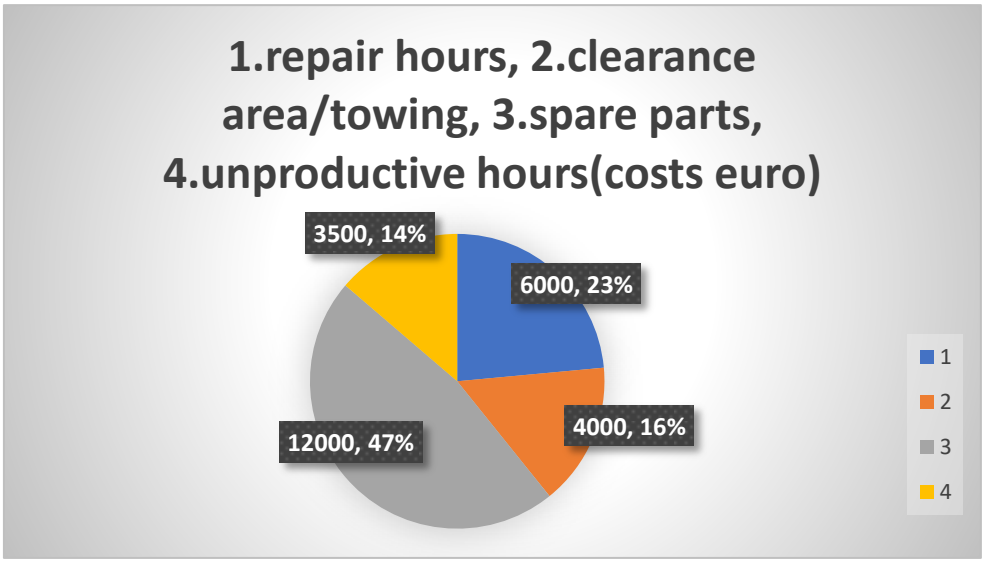

Figure 3. Representation of expenses incurred

After establishing the perimeter of the area where the hazelnut plantation is to be set up, the portions were measured with the GPS equipment of the salt soil portions and marked with logs for delimitation(Figure 4.)

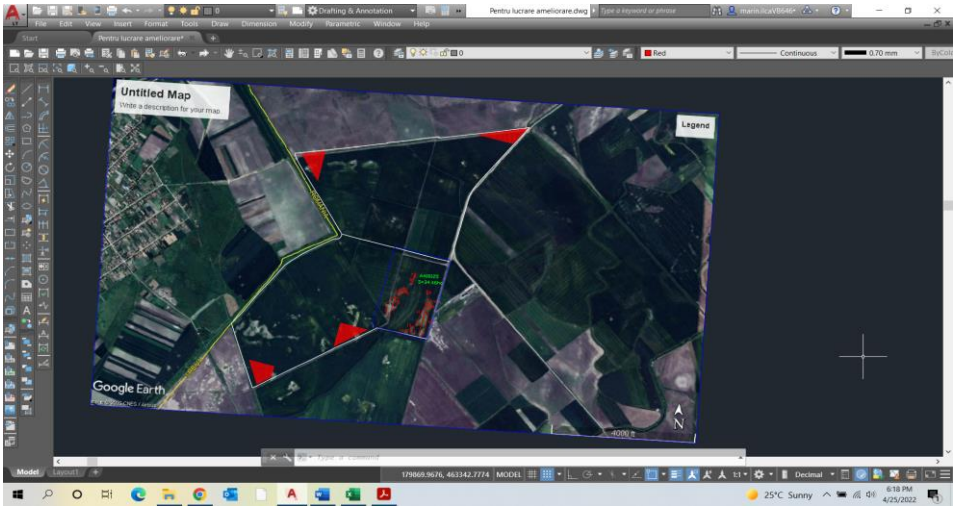

Figure 4. Perimeter of the area(print-scr. by Marin Ilca)

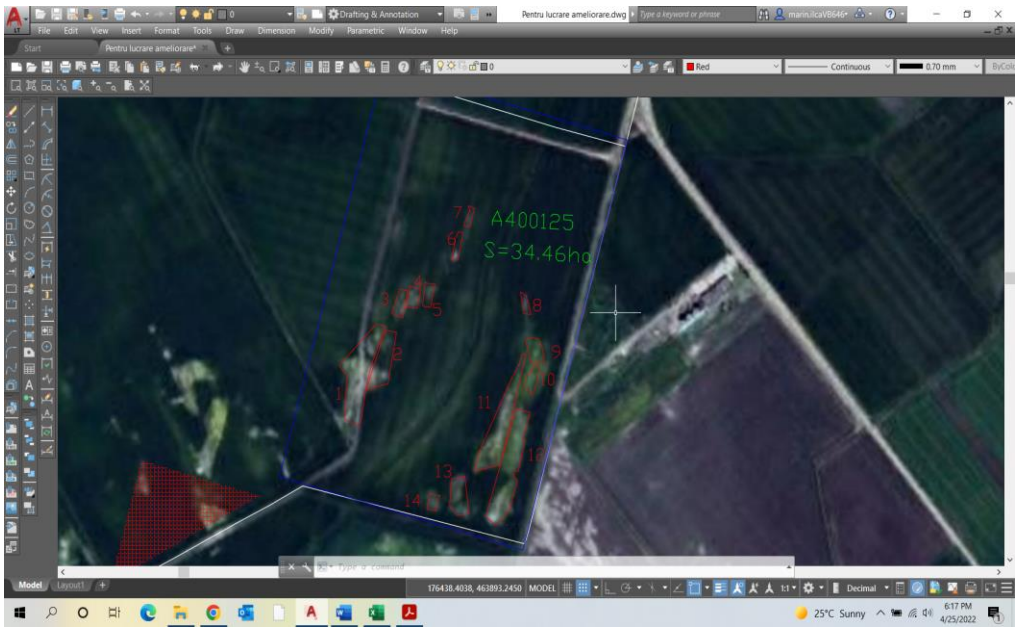

Figure 5.- Perimeter of the area (figure detail- print-scr. by Marin Ilca)

The measurements resulted in a total area of 2.91 ha, listed in the table 1 (Figure 5.), by entities.

Table 1

Table surface (Ha)

Nr..	surface Ha
1	0.65
2	0.28
3	0.08
4	0.07
5	0.07
6	0.07
7	0.03
8	0.04
9	0.1
10	0.08
11	0.56
12	0.65
13	0.19
14	0.04
TOTAL	2.91

The objective of the work was to replace the salted land with a mix of fertile land, gypsum (22to / ha) and manure (bovine grain 40to / ha).

Obviously, the first operation was to remove the existing soil layer at a depth of 1.7m with the excavator and transport it to a dump, with trucks, running in the extremities of each entity, ramps for entry-exit of equipment, arranged on the same axis (Figure 6.a,b,c,).

a b c

Figure 6.- Excavation-transport work stage(foto by Marin Ilca)

After clearing, a two-claw scaler was towed by a Challenger 775 E 405 HP tractor, at a depth of 1 meter, for drainage, plaster insertion preparation and soil aeration (Figure 7.a,b).

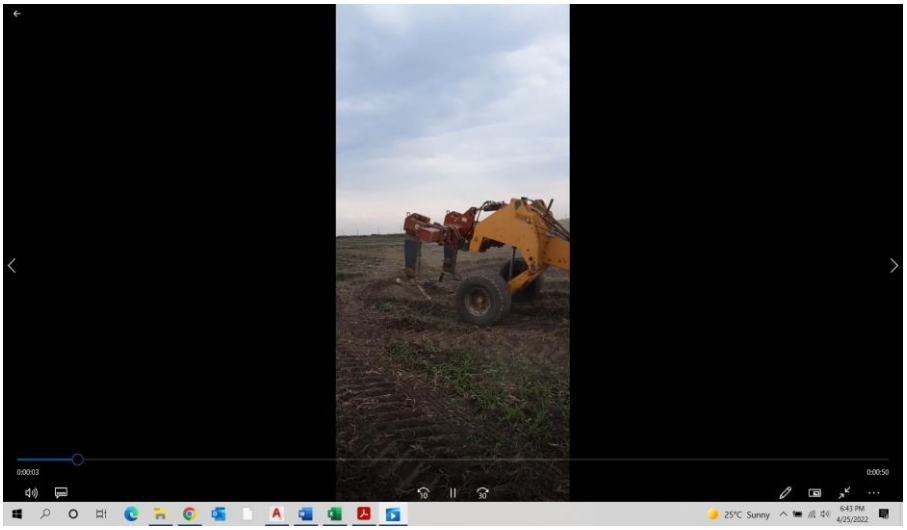

Figure 7.a-Scaling equipment(foto by Marin Ilca)

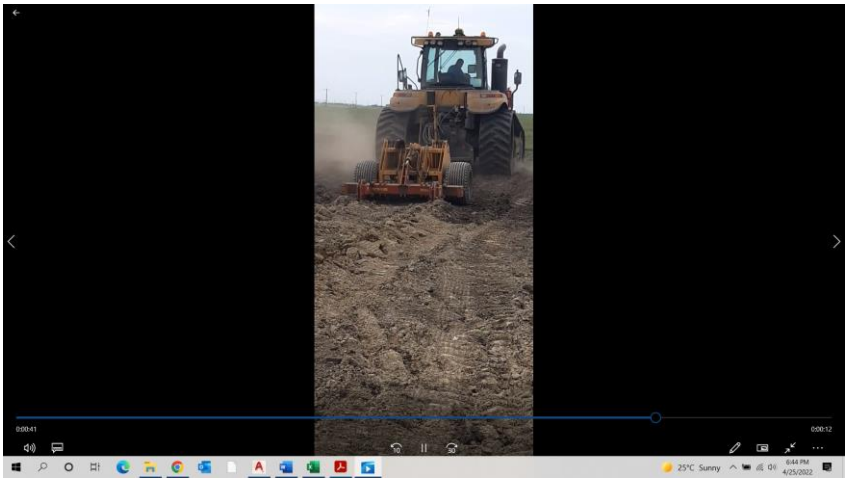

Figure 7.b-Scaling machine in operation(foto by Marin Ilca)

The second important phase was the administration of the gypsum powder with the organic fertilizer spreader and its mixing with the help of the Badalini trailed chainsaw, then, in successive layers, the cow feed and the fertile soil.

The last intervention consisted in adding fertile soil until the entities were filled and leveled with a trailed blade(Figure 8.).

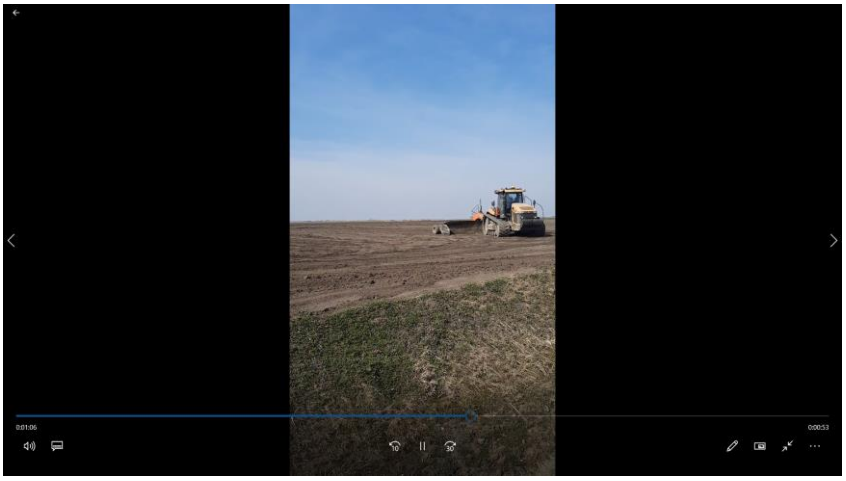

Figure 8. Trailed blade for leveling(foto by Marin Ilca)

RESULTS AND DISCUSSIONS

All the works were carried out under its own direction, except for the transport of the material which was executed by third parties. The operation lasted 210 hours.

The calculations resulted in the following amounts:

1. Transportation 5333
2. Workforce 5500

3. Fuel expenses 6700
4. Other expenses 4800

The total of 22333 euros spent represents approximately half of the amount that the Farm would have paid, in case all the works would have been executed with third parties, at the average market price. hectare, which is an acceptable price for this type of work.

The works were completed in August 2020, the first established crop was a spring crop (soybean), to allow time for the land on which it was intervened to "settle". As expected, the harvest was insignificant in quantity. , the number of plants per meter / square reached maturity being insignificant, but the main objective was achieved: no downtime, no traffic jams, increasing the speed of execution, no damaged equipment and .....more life in the soil, to restore the microfauna and microflora (Figure 9.).

The complete restoration or not of the soil (from a strictly agronomic point of view), will be revealed to us in the next 3-4 years.

Figure 9. ...after a year

CONCLUSIONS

Science, technology and research are the "shadow" tools with which specialists try to solve this problems, and the results are put into practice. resistant and more productive, the elaboration of agrotechnical strategies in accordance with the new mentality of approaching the cultivation of the land and last but not least, the arrangement of the soils by leveling and implementation of modern irrigation and drainage systems.

The implementation of projects for the establishment of agricultural crops can create difficulties, also due to the structure of the soil (in this case, saline soils), but these problems can be solved.

The solution of applying amendments, ensuring an efficient drainage by restoring or building drainage channels is really beneficial but if they are completed with the removal of the saline soil layer and its replacement with a mix of bio-fertilizer, fertile soil and gypsum, with safety success is safer and longer lasting.

The costs of land improvement and soil improvement works are not only for volens-nolens interventions but are real investments for reducing future losses and increasing the value of agricultural land.

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