REHABILITATION AND ECONOMIC ANALYSIS OF THE IRRIGATION SECTOR IN ROMANIA

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Abstract

Irrigation is the main measure to combat the effects of drought on cultivated plants. Natural phenomena that generate natural disasters are excessive drought persisting over time affecting non-irrigated land, climatic and market conditions require producers to invest more and more in irrigation systems, which would allow them to increase the quality, but also the quantity of production. That would make them more competitive. Agriculture is facing risks that have lately gained a different intensity than in previous years. In our country, the disasters caused to agriculture by drought are known, this year being the country most affected by drought, with a minus of 14.5%, given that the entire Europe lost 12% of the total quantity produced according to the European Commission.

The current situation of the irrigation system faces numerous and difficult problems, being in an advanced stage of degradation, and in much of the surface of these facilities, irrigation is not functional, and functional irrigations are inefficient in terms of water and energy consumption, being expensive for farmers. Farmers should be encouraged to contribute to the rehabilitation of key irrigation infrastructure. The implementation of irrigation systems within the agricultural territory is carried out based on preliminary climatic, hydric, hydrogeological, pedological, topographical, geotechnical, and agroeconomic studies. These studies aim to highlight the agricultural territories where it is necessary to fill the water deficit, to indicate the sources of water that can be captured, the territorial configuration of the irrigation system, its functioning regime, investment costs, and forms of its recovery.

Key words:plants, agriculture, irrigation, water.

INTRODUCTION

Man has used irrigation systems to water crops since ancient times. Although the original methods of irrigation were more rudimentary, different types of irrigation systems, based on traditional methods, are still in use around the world today. For thousands of years, irrigation was used by ancient civilisations to provide water to fertile but arid land. Depending on the geography of each area, the available water sources and the annual floods,

different methods were used to use river water for agricultural crops, more precisely:

Water catchment irrigation - 2000 years ago, people living along the Mediterranean Sea and the Nile River Basin relied on flood-driven river floods to provide water for their crops.

Perennial irrigation - First used in Mesopotamia, a "perennial irrigation system" allowed water to reach cultivated fields through a series of artificial canals and waterways extending from the water source. Because there was greater control over water, food cultivation in Mesopotamia was controlled throughout the year.

Terrace irrigation - Dating back to the 3rd millennium BC in Peru, Syria, China and other countries, this type of agricultural irrigation system was mainly used in hilly regions and is one of the oldest irrigation methods.

Underground canals - Underground canals are considered to be the most complex and ingenious of the old irrigation systems.

MATERIALS AND METHODS

Summary of the main irrigation methods. The completion of the moisture deficit is achieved by providing the necessary quantities of water on the depth of the active layer to raise the soil moisture during the growing season or outside it. These measures are taken to ensure stable and reliable agricultural production and to maintain or even improve soil characteristics by supplementing with other appropriate agro-technical methods. The choice of the optimal irrigation method between surface irrigation by submersion, furrow or strip irrigation, sprinkler irrigation, drip irrigation or subirrigation is made taking into account the soil conditions, the topography of the land and the type of crop cultivated, each of which has a set of advantages and disadvantages.

SPRINKLER IRRIGATION / MANUAL WATERING

This method is time-consuming but affordable. It also allows targeted watering where the need arises. It is important to irrigate the soil directly, not the plants. Avoid puddles and run-off. To reduce the workload, you can fragment the work over several days, irrigating only one section at a certain time.

Variable flow sprinklers: Watering is done without the arm sieve, by distributing a variable amount of water, depending on the absorption rate of the soil; water should not simply run off, but should be directed as close as possible to the plant. This method is effective for occasional watering of young vegetables or perennials plants. Watering is useful when water is drawn from a rainwater collection tank and for small quantities.

Sieve sprinkler: Attach a sieve to the neck of the sprinkler to get a fine rain spray. If the sieve is pointing upwards, the flow rate is lower. By pointing it towards the ground, it increases the watering area. It is convenient for watering small seeding areas in the rain or along rows without disturbing the seeds.

High-flow hose: Precise and easy to carry, the garden hose is very efficient, provided you opt for a model that does not knot easily. No need to get wet from head to toe. To avoid inconvenience and waste, don't open the tap too far and keep the end of the hose as close to the base of the plant as possible. This method is recommended for well-grown vegetables (tomatoes, aubergines, courgettes), shrubs or roses. The advantages include minimal equipment for comfort, no travel for feeding and a flow rate that allows you to quickly water a large number of plants or those with high needs.

SURFACE DRIP IRRIGATION

The surface drip irrigation method can be used, under good conditions, on well levelled land. In practice, two variants of this method are widespread: furrow irrigation and strip irrigation.

DRIP IRRIGATION

The first attempts at drip irrigation, under greenhouse conditions, were made

around 1940 in England, but the method did not spread widely until 1950, after its promotion to field crops in Israel (N. Grumeza and O. Draganescu, 1983).
At present, drip irrigation is practised over large areas in the USA, Israel, Australia, South Africa, Western European countries.
The main feature of the method is the gradual, slow distribution of water in the form of droplets in the immediate vicinity of the plant roots, wetting only part of the soil. Because of this feature, the method falls into the category of localised irrigation systems and is the most widespread of them.

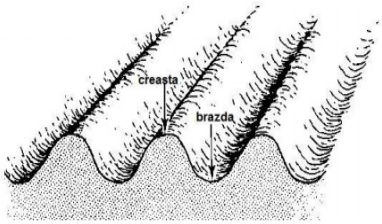

Figure 1.Irrigation through furrows

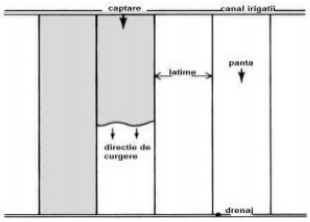

Figure 2.Strip irrigation

RESULTS AND DISCUSSIONS

Irrigation systems arose out of the need to provide water under conditions of moisture deficit in the soil profile. Irrigation, regardless of the size of the areas where it is applied, is the sustainable solution to achieving normal crop yields if soil water is not sufficient.
The area under irrigation is mainly in developing countries 78%, developed countries 15.8% and underdeveloped countries 6.2%, while Asia and Oceania holds 71.7%, North and South America 15,6%, Europe 7,8% and Africa 4,9%.

Currently only about 20% of cultivated areas are irrigated, but they supply 40% of the world's agricultural production, i.e. 60% of total cereal production, and the sources of water used for irrigation are surface streams, groundwater and wastewater sources. The situation of the irrigation sector in Romania shows a dramatic evolution, from the establishment of the large schemes in the period 1970-1975 to 1989, with a developed area of about 3.1 million ha, comprising 375 large irrigation schemes.


Figure 3.Dripirrigation

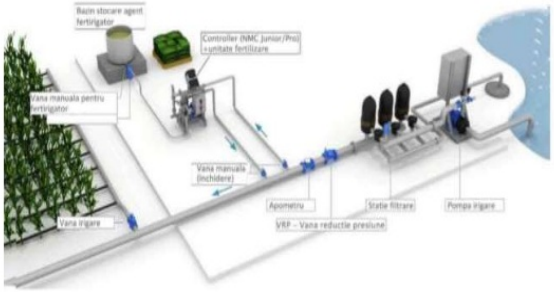
Figure 4.General diagram of a drip irrigation system

Figure 5.Sprinkler irrigation installations with drum and hose

Figure 6.Underground irrigation

CONCLUSIONS

After 1990, irrigation development stagnated mainly for financial and legislative reasons. A significant reduction in irrigation rules and areas compared to 1989 shows that incomplete irrigation of crops was applied, even in particularly dry years such as 1993, 2003 and 2007.

The lack of a watering warning system for many developments often leads to chaotic irrigation, with no regard for the principles of sustainable development. The decision to implement a particular irrigation system must be based on an analysis of the area proposed for development, the availability of water resources, the quality of the water at source and the climatic and soil environmental factors involved in determining the technical solution.

Irrigation can increase production by up to 30%, but more importantly it increases the certainty of stable production.

Romania's agricultural area has seen minor year-on-year decreases, the main factors being the transfer of land to the construction and forestry sectors.

Repeated and discontinuous changes in land improvement legislation have not led to progress, but rather to a deepening of dysfunctions in the system, making it necessary to revise the legislation to provide for new institutional reorganisation measures for efficient administration, research, design, implementation and operation.

Advanced research on irrigation schemes has been carried out worldwide. In particular, research has been carried out on water sources, water and soil quality, irrigation equipment and the component parts of an irrigation system.

The appearance on the world market and in Romania of many constructive types of mobile irrigation equipment and the relative lack of experience in their use requires in situ studies and research on their technical-functional characteristics, applied to different crops, in Romania's pedo-climatic conditions, and at the same time within the framework of local planning, as well as the correlation in operation of their parameters with the climatic conditions specific to the area.

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