

Irrigation in Hungary

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From a total area of 93 000 km², the share of arable land in Hungary is 82 600 km² /89%/. Of this, 80% is under agricultural cultivation, while the area of forests, fish ponds and reeds makes up 20%.

The natural conditions for plant cultivation vary in different parts of the country. The number of sunshine hours is 1900 to 2100 hours per year and, except in hilly regions, the mean temperatures from early April to late September range from 16.5 to 18 °C. The mean annual precipitation is between 500 and 900 mm.

In the Great Plain, especially in the central and southern part, relatively dry, warm weather prevails. The soil conditions of the country are rather varied.

In 1987 the area equipped for irrigation was 292 000 ha, i.e. only 4.5% of the total cultivated area. The size of area actually irrigated fluctuates greatly as a function of weather and changing economic measures: when averaged over the period between 1970 and 1987, 61% of the equipped area was irrigated.

Irrigation water is taken from surface waters, groundwaters and other sources, the percentage values being 86%, 11% and 3%, respectively. The annual quantity of water used by farms for irrigation and fish ponds is around 800 million m³.

Irrigation methods as a percentage of the total equipped area /1987/:

I. Sprinkling irrigation, total	75.0%
Of this:	
- Stationary irrigation plots	31.0%
- Semi-stationary irrigation plots	44.0%
II. Surface irrigation	18.0%
III. Subsurface irrigation	5.6%
IV. Other irrigation methods	1.4%

State of irrigated farming

During the past decade the production level in Hungarian agriculture has been on the rise, as proved by the level achieved in the production of various crops, as compared with data from international statistics. Thus, on the basis of data from 1987, the average yield of wheat /4370 kg per ha/

assures Hungary the sixth place and that of maize /6130 kg per ha/ the third to fifth place in the world ranking. At the same time, the results of a similar international comparison are not satisfactory if the production levels of water demanding culture such as potatoes /15 970 kg per ha/, sugar beet /36 300 kg per ha/, tomato /3 410 kg per ha/, green pepper /15 070 kg per ha/ and onion /18 610 kg per ha/ are considered.

The situation is similar in the field of irrigated farming, since irrigation, too, should be considered in Hungary as one of the applicable agro-technical elements and its place and role in the general and regional development of agriculture should be defined in this context/. In Hungary, as in many countries located in the zone of conditional irrigation, the development of irrigated farming has not been uniform, but in most cases has been a function of the precipitation conditions of the current period.

In the period between 1978 and 1987 the weather was more rainy than the average. Except for the years 1983 and 1987, during the past 6 to 8 years the increase in the level of agricultural production has not been affected by rainfall shortages; in fact, damage has even been caused by excess water. The abundance of water also meant that among the production factors, water did not represent a minimum but, instead, nearly optimum conditions developed for the other factors. This resulted in a considerable negative change in the attitude towards the necessity of irrigated farming.

In the late 70s, as a result of changes in the economic environment, the conditions for irrigation development and irrigated farming underwent a continuous and significant change. Basic changes took place in the system of public subsidies. Subsidies for the purchase of irrigation equipment were slashed and the sphere of users having special preferences /subsidies of 40 to 70%/ was narrowed down. Water charges became higher. The rises in energy prices resulted in rises in the cost of irrigation. Owing to increase in the costs of construction and transport and in the prices of machinery, the investment costs for irrigation have risen 50% as compared to 1979 figures.

Because of this high rate of increase in costs the range of plant species where irrigation is economical has narrowed down. As a result of all this, many farms where the irrigation hardware was out-of-date or the productivity of irrigated farming could not be assured gave up their water use licences. In 1979 the area furnished with irrigation licences was still 412 000 hectares, while in 1987 it was not more than 292 000 hectares. This drop of 120 000 hectares is very far removed from the objective originally formulated in the concept of long-term development. The structure of this change includes a drop in the area of surface irrigation and of semi-stationary irrigation plots, but at the same time, an increase in the area furnished with up-to-date stationary equipment and trickling facilities.

At the national level the possibilities for irrigation development in terms of state-owned main structures are already available for an additional area of some 200 000 hectares, since for the most part the head works of agricultural water supplies have been completed. However, due to a backwardness in the implementation of farm schemes, the level of utilization is lower than 50%.

The reconstruction of existing plots has practically come to a standstill. Because of a vast decrease in the market demand, which took place from one year to the next, the manufacturers were left without orders and their capacities were therefore converted for the production of other articles or remained unutilized.

However, the positive aspects of these changes can also be mentioned. They are the following:

- the greater proportion of abandoned irrigation schemes is found on areas where the productivity or the water management of the soil is poor.

Consequently, there has been an improvement in the average quality of the remaining irrigable areas.

- Irrigation was abandoned mostly where the ratio of equipped areas to the total farm area was low, i.e. where irrigated farming, due to its low share, had no great influence on the overall production of the farm. In this way the concentration of irrigation within the farms has risen.

- The machinery which went into disuse was mainly amortized, with a reduced capacity, so the average utilization of the remaining equipment has improved.

These features characterized the period lasting up to 1983, when a dry period began, deficient in rainfall, continuing in 1984.

In this situation the Government took several measures for the promotion of irrigation, including the following:

- farms practising irrigation were released from the obligation of paying water charges;

- considerable allowances were given to farms for the purchase of irrigation machinery and equipment.

The experience gained during the droughty period of 1983-1984 has been carefully evaluated by research institutions, production systems and governmental agencies, who were unanimous in stating that a differentiation is necessary in the areal development of irrigated farming. The majority of farms operating between the Danube and Tisza Rivers and in the counties of the Great Plains /Bács-Kiskún, Békés, Csongrád, Hajdú-Bihar, Szolnok counties/ will only be able to maintain their current production level and achieve further development if continuous attention is paid to irrigation as a technological element in their farming activities.

However, this areal limitation can only serve as a rough guideline, since a massive development of irrigated farming in other regions of the country is also justified on the basis of cropping patterns, production levels, land features and economic calculations.

The development of irrigated farming

In Hungary, in contrast to the way in which irrigated farming has progressed in the past, a sound, well-based demand for irrigation is likely to emerge when farms reach a production level from which further development will only be possible through the introduction of complex amelioration and water management.

In such farms, once the natural rainfall has been used up and depending on the production level, the water demand of plant cultivation will be higher, so the introduction and development of irrigated farming will be unambiguously expedient and economical.

In cases where either an increase in the production level or the safe conservation of an existing high level requires more water than is available from natural rainfall, complex regional amelioration will be required to create the conditions essential for the development of irrigated farming.

In Hungary after the turn of the century, if all the additional investments in main works needed for water resources development /which will also serve for the water management of agriculture/ have been implemented, approximately 0.8 to 1.0 million hectares of agricultural land will be irrigable. This represents 20-22% of the agricultural land and is the maximum which can be achieved with Hungary's water resources.

Production goals requiring the development of irrigated farming. - With due consideration to the ecological conditions, most countries plan to develop their irrigated farming because a safe domestic food supply is a basic

goal, in many cases with social, political and strategic importance. The amplification or preservation of export markets and the reduction of imports is in the interest of any national economy.

Every country in the zone of conditional irrigation strives to eliminate the caprices of the weather, particularly of the rainfall supply, over the greatest portion of their cropping area.

In the long-term, if available water resources are utilized to the maximum and 20-22% of the country's best cropping area becomes irrigable, some 40% of agricultural production could be made independent of rainfall fluctuations.

Simultaneously with the rise in the level of agricultural production, the costs are also rising. So, besides the fact that one of the functions of irrigation is to increase production, increasingly more attention should be paid to another factor, the safety of production, especially in the case of crops producing a high value per unit area.

To achieve the production development goals planned in agriculture for the period from 1986 to 1990, irrigation will be necessary over a larger area than at present.

Among the field crops cereals will be decisive both in the medium- and long-term.

The present annual production of cereals, amounting to some 15 million metric tons, could be increased by 1.5 to 2.5 million tons.

As regards the planned yield of maize, production will be limited by water shortages even under average weather conditions on some 30% of the growing area.

According to medium-range food supply plans, to meet population demands for rice, some 45 000-46 000 tons of husked rice /equivalent to 75 000 tons of rough rice/ will be required in 1990. This necessitates an increase of some ten thousand hectares in the rice growing area.

At present the production level of hay and mass forage, grown on an area of 850 000 hectares, and of grazing grounds, extending over almost 1.3 million hectares, is very low, a fact which can be traced back, among other things to deficiencies in the water supply.

It is essential for the consumption of sugar and potatoes to be met entirely from domestic production, and the satisfaction of water demands is decisive for the successful cultivation of these crops.

Hungarian vegetable production is also characterized by low yields and a wide fluctuation in quality. In this field, too, the main directions of development are an increase in yield per unit area, the reduction of fluctuations in the production level, scheduled production adjusted to market demands and improvements in quality.

There are considerable reserves in the field of second crops or double cropping. In areas where the water supply is satisfactory this may also promote, indirectly, an extension in the production of cereals and other crops /potatoes, vegetables, soy-beans, maize/.

Preconditions for achieving the goals

At the farms using water: In order to make irrigated farming successful each element in the technology should be maintained at an optimum level. Both the time of irrigation and the necessary water quantity should be determined in accordance with the ecological demands of the plants; for this, a high technical standard and a high degree of on-farm organization are basic requirements.

In the field of technology engineering: The reconstruction of main water supplies, begun between 1980 and 1985 on the systems concept, should be

continued and should include the modernization of the existing structures, so as to achieve savings in water, energy and labour. Within this framework, wherever possible the double-use systems /conveying both irrigation water and excess water/ should be separated, seepage losses should be reduced, satisfactory mechanical maintenance should be ensured, the opportunities offered by co-operation between systems should be utilized, and up-to-date standards should be assured in control, management and communications.

Irrigation techniques: up-to-date, high performance, labour-, energy- and cost-saving irrigation equipment will be required, to meet the standards of large-scale production technologies and to make full use of these technologies.

The main requirements for technical development are as follows:

It will be necessary to mass-produce

- automated water level control equipment for use in open channels;
- labour- and energy-saving pumps and pipe fittings;
- measurement and communication devices, and local automatic systems for the centralized control of irrigation systems.
- In the field of product development an increase is necessary in the delivery capacity and automation of lateral pipelines.
- The efficiency of irrigation investments could be increased considerably by reducing costs during the design and construction stages. To this end greater uniformity and typification of the structures is recommended.
- Over the whole sphere of technical development and manufacturing, the advantages and possibilities of international cooperation should be utilized more intensively.

In the field of economic control: The development of irrigation should be considered an integral part of amelioration and, besides making maximum use of rainfall, the groundwater level should be controlled at all times at a level suited to the ecological demands of the given crop.

In the course of this work, differentiated, long-term plans should be made for each region depending on the susceptibility to drought, on the irrigation facilities available, on the crop, etc. Furthermore, priority should be given to forms of water use fitted to the ecological conditions and to a more intensive utilization of both the main works and the land. The basic conditions for meeting all these requirements are

- the promotion of irrigation development and reconstructions through public subsidies and loans, as is done in many other countries in the world, in such a way that the promotion system covering the purchase of irrigation machinery and equipment and the construction work should be maintained for a fairly long period;
- the introduction of a modernized system of water charges creating incentives for both water suppliers and consumers;
- more intensive progress in the field of sewage utilization in agriculture. The experience gained in the operation of experimental plots indicates that favourable investment conditions should shortly be formulated for the farms, and the charges made for the use of sewage should act as incentives to the farms utilizing it.

Personal and organizational conditions

A precondition for the satisfactory and timely fulfilment of any objectives or plans is the availability of experts with the proper qualifications.

Due to the seasonal nature of irrigation and to fluctuations in development, labour migration is rather intensive among the skilled workers.

A radical change in this situation can only be expected if complex regional amelioration plans are implemented on individual farms and if the work of on-farm water management provides work for a permanent staff throughout the year. Only this type of complexity can lead to the establishment of a permanent organization dealing with amelioration.

It should be stressed that, although the starting point in irrigated farming should be necessity, just as in many other branches of the national economy, the optimum for a given period should nevertheless be determined by comparing necessity to the possibilities available, since neither the government nor the farms are in a position to make up rapidly for the recent delays in the development of irrigation capacities.

A realistic plan for the period from 1986 to 1990 could be:

- the continuation of head works reconstruction in a systems concept;
- the prevention of any further decrease in irrigation capacities and, within the framework of reconstructions, the furnishing of some 40% of the total equipped area of 300 000 hectares with labour-, energy-, and water-saving, high-capacity equipment;
- the development of irrigation systems on an area of 50 000-55 000 ha, mostly using mobile and quarter-stationary equipment;
- the extension of trickle irrigation to cover a further area of 4 000-5 000 ha.

The implementation of this plan will need greater financial resources, both at the national and farm level, than was spent for similar purposes between 1981 and 1987.

It should be realized that even this objective can only be achieved if both the economic requirements /industrial background, design capacity, agrotechnical conditions, change in attitudes, number of experts, etc./ and the complex system of conditions required for irrigated farming are met. One precondition for greater progress is the objective justification of the domestic grounds for and effectiveness of irrigated farming. The intentions are good and, as has been proved by an analysis of the recent period, rich, wide experience and a well-trained staff of agricultural and technical experts is available. There is thus every hope that this stage in the development of irrigated farming, which is now in terms of both quantity and quality, will be successful.