

# The necessity and possibilities of irrigation in fruit growing under conditions of Hungary

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**Summary:** Climatic and soil conditions are highly suitable for most temperate fruit species and promise profitable yields with good quality. An accurate choice of the growing site is, however, decisive because of the wide range agro-climatic variation in soils within the country. One of the most important factors is the annual precipitation which does not exceed, in general, 700 mm. The aims of irrigation practices are, succinctly speaking, the improvement of quantity and security of yields and the guarantee of quality. The relative importance of those criteria changes according to the fruit species. In up to date apple, pear and cherry production, micro-irrigation systems are mainly considered. According to recent experiences, the micro-jet type of water distribution should be preferred to the dripping system. In cherries, the choice of the method is motivated by the need to prevent fruit cracking. Most of the peach and apricot plantations are located on the dry and moderately dry regions of the country. Because of the late freezes, the improvement of security is crucial. There the investment of irrigation systems should concentrate to the possibility of anti-freeze sprays. High water requirements of plums are met in Hungary by irrigation where the method should be decided at the plantation and adapted to the harvesting procedure which could be mechanised or (in high density plantations) picked by hand. Sour cherries are perhaps the less dependent on watering under Hungarian conditions. Yields in small fruits: currants, gooseberries, raspberries and strawberries could be increased by irrigation to 40–50 % and may improve quality too. In those cultures the system of moving flexible wing tubes are considered to be the best irrigation technique.

## Introduction

Climatic and soil conditions of Hungary are favourable for the successful production of most temperate fruit species promising considerable good quality of the crop. The importance of a proper choice of growing site is doubtlessly crucial because of the wide variation in annual precipitation and soil conditions. The precipitation is considered to be hardly sufficient for most fruit species on the majority of the area being mostly less than 700 mm per annum.

The main purpose of irrigation is the improvement of the quantity and security of yields and of the quality of the crop. The importance of irrigation is increased by the expanding practices of integrated orchard management (Soltész, 1977).

## Material and methods

In a study of plantations during the period of 1989–1998, an estimate of the yielding potential (the maximum possible

yields) in the individual fruit species has been attempted taking in account the actual precipitation of the respective seasons as well as sites. The yearly data collected by the Central Office of Statistics referring to the means of commercial plantations are also informative.

## Results and conclusions

Maximal yields achieved without irrigation are presented in Table 1. Appropriate technologies of production facilitate some more than double as much yield as the national mean registered, even in dry seasons or dry growing sites. Most differences are found in stone fruits, as sour cherry, plum, apricot and peach which produce about one third of the possible maxima of non irrigated plantations. In this respect apple and pear are much more responsive to favourable humidity. Therefore we can state that irrigation is mainly contributing to the security of yields in stone fruits, whereas it improves the yield and the quality (fruit size) rather in

**Table 1** Maximum of possible yields of orchards without irrigation in Hungary. (Statistical data of commercial fruit plantations)

Species	Maximum of possible yields in tons per hectare		
	Rainy season or site <sup>(2)</sup>	Dry season or site <sup>(1)</sup>	National 10 year means <sup>(3)</sup>
Apple	60	25	18
Pear	40	15	10
Sweet cherry	12	8	4
Sour cherry	20	12	4
Plum	30	18	5
Apricot	16	10	3
Peach	30	15	5

<sup>(1)</sup> Yearly precipitation of 700–800 mm<sup>(2)</sup> Yearly precipitation less than 500 mm<sup>(3)</sup> Data of the Central Office of Statistics

pome fruits. In both cases, a development the proper choice of the systems of irrigation are fully justified.

At the moment, the ratio of irrigated plantations is rather low in Hungary (Table 2). Due to an efficacious state subsidy the area of irrigated orchards will grow substantially mainly in the high-density plantations trained to an intensive tree form. Thus an improvement of security and quality is expected soon.

**Table 2** The fraction of irrigated orchards and the irrigation systems used in fruit production of Hungary

Species	The per cent ratio of irrigated plantations	The most utilised system of irrigation
Apple	7	drip
Pear	3	drip
Sweet cherry	6	drip
Sour cherry	2	sprinkler
Plum	2	drip
Apricot	1	sprinkler
Peach	3	sprinkler

In apple, pear and cherry plantations the modern methods of micro-irrigation are expanding. According to our experiences micro sprinklers are preferred to drip-irrigation in intensive plantations. In cherries the risk of fruit cracking is also a decisive criterion.

Peach and apricot (commercial) plantations are concentrated in the dry and moderately dry regions of the country. Because of the late freezes at flowering time, the reduction of risk is a main purpose of the production technique. The raising

of the ratio of irrigated areas up to at least 50%, and jointly, the application of methods facilitating the anti-freeze effect of liquid water on the bursting buds is a real aim to be set.

The relatively high water requirement of plums should be met equally by irrigation. With the massive introduction of the Japanese type plums the security of yields received an additional accent. The introduction of yield will influence the possible methods of harvest as well. Among the stone fruits, it is the sour cherry which is less dependent on irrigation (Szabó et al., 1998).

In dry seasons and/or sites the intensive systems of apple, pear, cherry and plum plantations require about 200–250 mm water supplemented. Peach and apricot would be satisfied, generally, by 100–150 mm given in addition.

In the determination of the water quantities to be administered the following factors are to be considered:

- productivity and health of the fruit tree,
- seasonal distribution of rainfall,
- physical structure, water capacity and related properties of the soil,
- system of training, size and distribution of the root system,
- sod or surface cultivation,
- method and objective of irrigation,
- different water requirements and responsiveness of the respective varieties.

Irrigation is also indispensable in the successful production of small fruits. According to experiences gained in currants, gooseberries, raspberries and strawberries an increment of more than 50% is expected in yield as well as in quality by proper irrigation. For those cultures a sprinkler system with flexible-tubes as wings are the most suitable equipment.

Profitable commercial fruit growing in Hungary is already strictly associated with some up to date system of irrigation.

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