

# Influence of weather conditions and irrigation on yield and quality of hops



Distribution irrigation mains with drippers placed at the ceiling of a wire-work

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Non-irrigated plot



Irrigated plot



Progressive irrigation of hop-gardens

Progressive economical irrigation systems are recommended if we want to use an efficient irrigation system. Drop irrigation was placed on the ceiling of a wire-work (irrigation detail is placed above rows of hop plants) or underground irrigation system (irrigation detail is placed 60 cm under the ground level in the space between hop plants) was used. Drippers were used to provide uniform rate of irrigated water (2 l/hour).

Benefits

- Economy of irrigation water
- Favorable effect of micro-climate within a hop-garden
- Stability of yield
- Automatization of irrigation operation
- Possibility to add water-soluble fertilizers
- It does not keep hop growers from carrying out agricultural operations

## Abstract

Production efficiency of economical system of hop irrigation has been statistically proved by a long-term field trial at a hop farm in Stekník. The farm is a part of Hop Research Institute. Žatec semi-early red-bine hop was used for this purpose. During twelve years of the trial yield of hops was higher by 22 %. Nevertheless, typical quality features of Czech fine aroma hops were not influenced by this increase of hops production. Irrigation water supplied with the help of an irrigational system placed at the ceiling of a wire-work influenced microclimate in a positive way and was efficient as a thermo-regulatory factor. Irrigated air temperature was decreased by 4 °C. Under high day temperatures, typical for the last years, lower temperatures have pleasant influence on biochemical and physiological processes in hop plants.

Day temperatures are to be shown in figure.

## Influence of weather conditions on the need of irrigation

The fact that in the last years' global changes of climatic conditions as well as occurrence of extreme weather courses are common is visible from the following figure. All the above mentioned factors unfavorable for growth of hop plants is possible to a large extent eliminate with the help of irrigations, which can be characterized as an important stabilization factor with its help we are able to cope with precipitation deficits and in this way to decrease their negative effect on hop production. Repeated supplementary irrigation has a favorable influence on habitus of hop plants. Such plants are more vigorous, their assimilatory surface is larger and they are more densely put forth.

Development of hop plants is shown in figure.

## Weather conditions

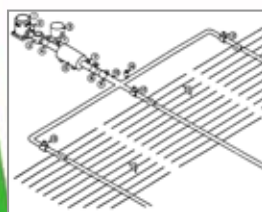
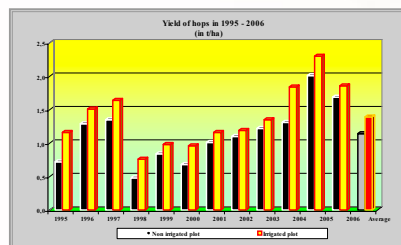
Yield stability is very dependant on the course of weather conditions within the individual years, particularly on precipitations. Deficit of precipitations in the recent years reaches more than 30 % in comparison with a long-term average. High air temperatures enlarge this fact as well. The increase as against the long-term values may be 0,5 – 3,2 °C.

The balance of the cover of precipitation need during a vegetation period is shown in figures.

## Influence of irrigation on yield

Žatec as a center of the same name hop region has the long-term (50 year's) average at the level of 450 mm. Long-term total during a vegetation period is only 261 mm. Weather conditions within a vegetation period are very variable. On average it is necessary to use repeated supplementary irrigation of 25-35 mm 3-5 times per year. Irrigation always had a positive influence on production of hops during the trial.

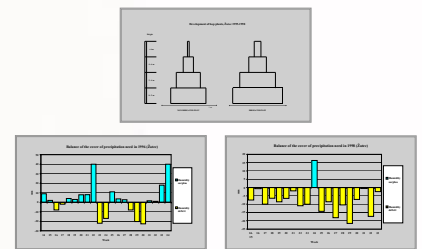
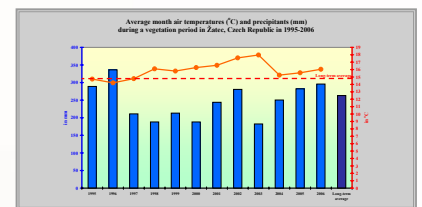
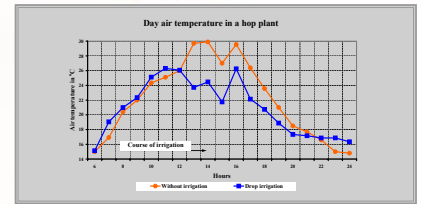
Influence of irrigation on yield of hops is obvious from figure.



## The scheme of drop irrigation detail

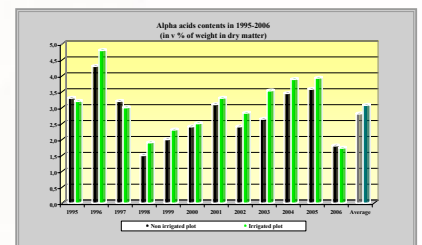
Caption:

- |                              |  |
|------------------------------|--|
| 1 pump                       | 8 slide-valve                              |
| 2 pressure regulator         | 9 flowmeter watermeter                     |
| 3 return valve               | 10 pressure mains                          |
| 4 plug of the pressure mains | 11 distribution pipe system                |
| 5 add manure device          | 12 sectional slide-valve (hand, automatic) |
| 6 filters                    | 13 irrigational mains with drippers        |
| 7 manometer                  | 14 air nozzle                              |



## Influence of irrigation on the contents of alpha acids

On the base of the obtained results we can conclude that irrigation has no negative influence on the contents of alpha acids in hop cones as obvious from figure. Together with the stabilization of hop yield higher production of alpha acids per hectare is clear.



## Control of irrigation regime

A balanced method based on prognosis of irrigation water need in week intervals with the help of a graphic-analytic method was used to control irrigation regime nowadays. The method provides actual data under respect of regional local conditions. It issues from the humidity needs as well as weather conditions.

## Acknowledgement

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