Economic Efficiency of Irrigation Regime of Tomatoes and Cucumbers Crops Cultivated in Of Protected Areas

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Abstract. Irrigation is the method to cover the soil water deficit for the benefit of agricultural production. It took different forms in time and space, both in terms of concepts and one of the methods of application. The main goal of our research is to determine whether the furrow or drip watering at different times of onset of splashing. Irrigation by furrows lead to the achievement of higher water consumption, but may be, in some cases, a key element in achieving higher production by the administration of large quantities of water. Lower production obtained in the case of drip watering may have economic justification, because the water was more efficiently valued on the plant. As a result, the farmer is often placed in a dilemma: it is preferable to obtain smaller quantities of fruit with lower water consumption or to obtain higher yields, even in the conditions that the water taken in large quantities can lead to diseases.

Keywords: cucumber, irrigation regime, protected area, tomato, water consumption

INTRODUCTION

Good management of soil moisture is very important, any failure to do so with negative effects on plants and the economic efficiency of the culture.

Knowing the relationship between water consumption and crop production in different natural conditions present interest to the design of irrigation facilities and their operation.

All these issues above are more pronounced for crops in protected areas, where rainfall does not penetrate. Because the tunnels are very frequent watering, the risk of errors in their application is quite high.

MATERIALS AND METHODS

The main hydro-physical soil indicators are:
- apparent density: DA = 1.27 g/cm³
- wilting coefficient: CO = 12.07%
- field capacity: CC = 26.72%
- physical and chemical characterization of soil: pH = 5.52 – 5.75; CaCO3 = 3.0 – 4.4 %

To achieve the desired results in terms of product quality obtained, but also in terms of costs we used in our research hybrids most used by local producers. Thus we chose for cucumbers the hybrid F1 Crispin and for tomatoes the hybrid F1 Cronos.
RESULTS AND DISCUSSIONS

To calculate the watering norm of using wetting by furrow irrigation using the formula:

\[ m = 100 \times H \times DA \times (CC - P_{mom}) + losts(m^3/ha) \]

where:
- \( H \) - depth that moisten the soil (m);
- \( DA \) - soil apparent density (g/cm³);
- \( CC \) - field capacity soil water (% by weight of dry soil);
- \( P_{mom} \) - the supply of ground water momentarily (% by weight of dry soil).

Watering norm for localized irrigation (drip irrigation) is calculated as:

\[ m_1 = m \times P \]

where:
- \( m \) - watering norm for traditional watering methods (drip and sprinkler);
- \( P \) - percentage of the total wetted surface.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Watering method</th>
<th>(m³/variant)</th>
<th>(m³/repetition)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cucumber</td>
<td>Furrows</td>
<td>0.938</td>
<td>0.313</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Drip</td>
<td>0.469</td>
<td>0.156</td>
</tr>
<tr>
<td>Tomato</td>
<td>Furrows</td>
<td>1.095</td>
<td>0.365</td>
</tr>
<tr>
<td>Tomato</td>
<td>Drip</td>
<td>0.548</td>
<td>0.183</td>
</tr>
</tbody>
</table>

In terms of recovery, irrigation efficiency is expressed by three coefficients:
- the overall efficiency;
  - Thus for the culture that was used furrow irrigation system we have:
    \[ n = 46.25\% \]
  - If you use drip irrigation system was obtained:
    \[ n = 90.24\% \]
- the efficiency of the network;
- the efficiency plot.

Expression watering efficiency is based on uniformity or watering and water losses or obtained according to the uniformity of production, though there are a number of other qualitative indices drip mainly droplet size and a number of factors crop technology.

The watering efficiency of the two cultures is presented in Tab. 2.

<table>
<thead>
<tr>
<th>Crop</th>
<th>Watering method</th>
<th>n %</th>
<th>nr %</th>
<th>np %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cucumber</td>
<td>Furrows</td>
<td>42.75</td>
<td>76.12</td>
<td>56.15</td>
</tr>
<tr>
<td>Cucumber</td>
<td>Drip</td>
<td>83.41</td>
<td>87.46</td>
<td>95.37</td>
</tr>
<tr>
<td>Tomato</td>
<td>Furrows</td>
<td>40.23</td>
<td>82.69</td>
<td>48.65</td>
</tr>
<tr>
<td>Tomato</td>
<td>Drip</td>
<td>87.37</td>
<td>90.55</td>
<td>96.48</td>
</tr>
</tbody>
</table>
Report effort - effect of investment (investment efficiency):

Most profitable crop is cucumber (30.7% vs. 27.92%), although drip irrigation system involves higher costs than at the furrows, but they all get an annual profit in the two largest crops. (Tab. 3)

<table>
<thead>
<tr>
<th>Crop</th>
<th>Total costs</th>
<th>Total value</th>
<th>Annual profit</th>
<th>profit rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cucumber</td>
<td>410723.4</td>
<td>536392.5</td>
<td>125669.1</td>
<td>30.70</td>
</tr>
<tr>
<td>Tomato</td>
<td>272085</td>
<td>347820</td>
<td>75735</td>
<td>27.92</td>
</tr>
</tbody>
</table>

CONCLUSION

This paper has followed all the stages of culture has been used when watering the furrows and when drip method was used, but their effectiveness in economic terms.

The paper has been pursued following:
- increased production from the two cultures;
- reducing the amount of water used;
- effectiveness of this project economically.

REFERENCES