

## الملخص الانجليزي لرسالة الدكتوراه

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عنوان الرسالة: تأثير الري الناقصى المستمر والمرحلى على إنتاجية أربعة محاصيل خضروات في ظروف  
الحقل المكشوف في منطقة البحر الأبيض المتوسط

### **Effect of continued and regulated deficit irrigation on the productivity of four vegetable crops in open-field conditions in the Mediterranean area**

#### **ABSTRACT**

Water scarcity is becoming a critical problem in arid and semi-arid areas of the world, where part of the production of the main horticultural crops is located, as is the case of the Mediterranean area. Drought is one of the main limiting factors in agriculture and it is seriously affecting the production of horticultural crops. The improvement of water productivity in agriculture in general, and in horticulture in particular, can be achieved through the use of certain strategies.

Deficit irrigation consists of the supply of water below the irrigation water requirements (IWR), so that there is a reduction in evapotranspiration. It can be done continuously (CDI) or regulated (RDI). With deficit irrigation, the irrigation water use efficiency can be improved, maintaining yield, and it could even lead to an improvement in the quality of the harvest. This study, carried out at the Cajamar in Paiporta Experimental Center (Valencia, Spain), analyzes the effect of deficit irrigation on four of the main cultivated horticultural crops, open field cultivated in the Mediterranean area: two of autumnal-winter crops (cauliflower and onion) and two spring-summer crops (pepper and watermelon). In the evaluation, the following parameters have been analyzed: plant growth and water status, yield, irrigation water use efficiency, quality of production and crop profitability. In the first season the CDI was tested, which allowed to establish the different growth stages for each crop, which were used in the following season for the RDI.

In the four crops, the control plants (100% IWR) have shown an adequate water status, in terms of both relative water content and membrane stability index, while those subjected to a severe CDI, have shown the lowest values of both indexes. The negative effect of deficit irrigation on yield has been less important in autumn-winter crops than in spring-summer crops, especially in cauliflower. The CDI at 50% IWR has drastically reduced the marketable yield and, consequently, the gross revenue, although it has supposed an improvement in the irrigation water use efficiency for the autumn-winter crops. From the individual analysis of the crops, it can be stated that cauliflower yield obtained with CDI at 75% IWR or RDI at 50% IWR during the juvenile phase, has remained at levels similar to the control, improving the irrigation water use efficiency. In relation to onion, in case of severe water restriction, it would be advisable to apply CDI with 75% IWR or RDI at 50% IWR during bulb ripening, since these strategies have slightly decreased yield, improving the irrigation water use efficiency. In less restrictive

conditions, RDI at 75% IWR during the bulb maturation has led to a satisfactory yield, with an increase in the irrigation water use efficiency. In Italian sweet pepper, the application of RDI to 75% IWR during the harvesting has resulted in a considerable reduction of the yield, and therefore, of the gross income, although with important water savings and increasing the fruit soluble solids and phenolic compounds content. By shortening the cultivation cycle until the beginning of September, when most of the marketable yield has already been harvested, significant water savings would be achieved, and the land could be used in other crops. CDI at 75% IWR and 50% IWR, or RDI at 50% IWR at harvesting have resulted in a high incidence of fruit affected by blossom-end rot. In watermelon the RDI application can be recommended, both 75% and 50% IWR, during the fruit ripening, since it has led to acceptable marketable yields. In general terms, it can be affirmed that the application of CDI and RDI in the four crops has not significantly affected the product quality, in terms of the analyzed parameters.

