

Mango Tree Response to Different Irrigation Treatments at Different Phenological Stages

The objective of this research is to evaluate the effect of different irrigation treatments at different phenological stages, on fruit quantity and quality of mango cultivars ('Kent'), drip irrigated and under semi-arid conditions to maximize water use efficiency (WUE), maximize crop level and reduce alternate bearing.

THE IMPORTANCE AND UNIQUENESS OF THE STUDY

The success of this research will provide to the mango growers with vital information regarding how and when to irrigate the Kent mango to maximize production and when and how water can be saved in a season and its potential consequences in the case to be necessary. Irrigation protocols that take in account the different phenological stages and present status of the trees (i.e. present and past yield), can be developed to maximize crop and water use efficiency in this crop in the short, medium and potentially long term.



This will be the first study of its kind carried out in Peru and in the Kent mango worldwide. There is a complete lack of information on how to irrigate the Kent mango under semi-arid conditions to maximize fruit quantity and quality and reduce alternate bearing.

MATERIALS AND METHODS

Plant Material and Experimental Site

The study was performed during the 2018 season for the first time. The research will be carried out in a commercial mango orchard located nearby Piura region, Peru. The mango (*Mangifera indica* L. cv. Kent) trees at the selected site are 9 years old and were planted at a density of 333 trees per hectare. Cultural practices, such as pruning, fertilization, and pest and weed control will be conducted as in commercial orchard.

In this experiment we compared the performance of trees irrigated in two different ways, **1)** control treatment where the trees were irrigated based on 100% evapotranspiration replacement (e.g. if the daily evapotranspiration was 3.2 mm, the same day the trees will receive 3.2 mm of irrigation or 32 M3/ha) and **2)** Growth Based Irrigation (GBI™) treatment, where the trees were irrigated according to the algorithm tailormade for this mango crop under its particular growing conditions.

THE RESULTS

The yield in the control plot was 30.2 T/ha while in the GBI™ plot was 46.3 T/ha, meaning a yield increment of 53% by the GBI™ irrigation strategy (Fig. 1). Also, the average fruits number per tree (+47%), fruit size distribution (Fig. 2) and average fruit size (+3.5%) was bigger and higher in the GBI™ treatment respect to the control one. These results are against the common assumption of the mango growers where more fruit per tree means smaller fruit.



Fig. 1. Yield comparison between the Control and Growth Based Irrigation (GBI™) treatment.

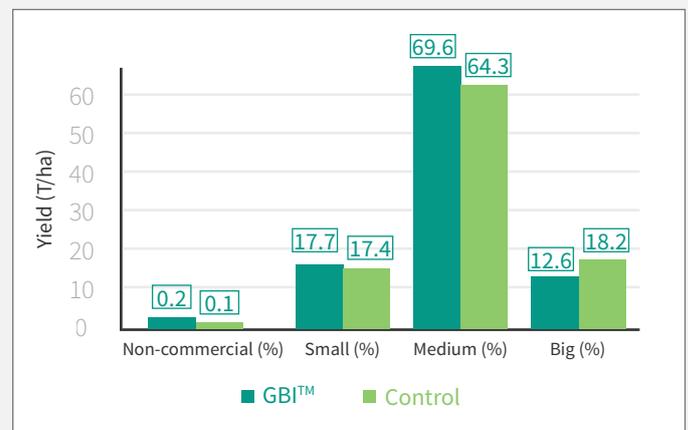


Fig. 2. Comparison of fruit size distribution according to international commercial standards between the control and GBI™ treatment.

Fig. 3 compares the season water consumption and water use efficiency (cubic meter of water per ton of fruit yielded) of both treatments. The GBI™ irrigation treatment consumed 30% less water than the control one during season 2018, while the yield was 53% higher in the former one. Therefore, the water use efficiency in the GBI™ plot was more than double respect to the control treatment, while 20.3 m³ of water in the control treatment was needed to produce one ton of fruit in the GBI™ treatment was only 9.3 m³ (Fig. 3).

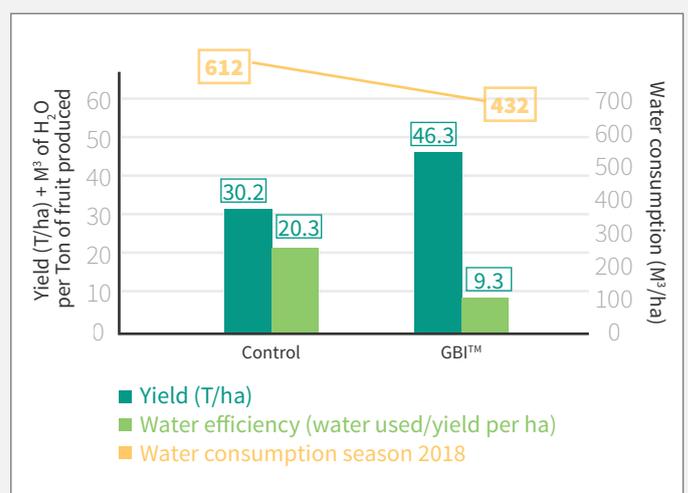


Fig. 3. Comparison of water consumption and water use efficiency between Control and GBI™ treatment.