

Water productivity and crop yield in five chickpea varieties – how important is supplemental irrigation?

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ABSTRACT

Chickpea (*Cicer arietinum* L.) is one of the most important pulse crops in the world as a source of protein for human consumption. In Mediterranean regions, chickpea is traditionally grown as a rainfed crop, thus highly dependent on rainfall. In this situation, supplemental irrigation may be applied. The objective of our study was to evaluate the improvement in crop yield and water productivity with supplemental irrigation in five chickpea varieties (three kabuli type and two desi type) from the Portuguese breeding selection program. Field tests were carried out over two cropping seasons (2009, dry year and 2010, wet year), in Southern Portugal, using four irrigation treatments, full (100%) crop irrigation requirements (IR), 50 % of IR, 25 % of IR and rainfed. A significant increase in grain and shoot biomass yields was observed especially in dry years. Elixir (kabuli type) variety showed the highest grain and biomass yield, harvest index and water productivity. In the dry year, the highest water productivity for grain and biomass production was attained at the 50% and in the wet year in the rainfed treatment.

INTRODUCTION

In Mediterranean regions, chickpea is traditionally grown as a rainfed crop, sown in Spring (March-April) (López-Bellido, 2008) and it is considered one of the most drought tolerant food legumes. Grown as a rainfed crop, the production of chickpea is very dependent on rainfall, that is generally scarce and very variable, and on residual soil moisture. As the season progresses, the crop is exposed to increasing temperatures and soil moisture deficit, resulting in low and variable yields (Oweis et al., 2004). Although water availability can be a major limiting factor in chickpea production, there are other factors, such as planting date, cropping system and cultivar that can have a significant impact in chickpea yield and water use efficiency (Gan et al., 2010). Apart from improving yield, supplemental irrigation has the potential of stabilizing crop yield and reducing the risk of crop failure in dry years (Oweis et al., 2004). Similarly to what happens to yield, water productivity can vary substantially depending on cropping systems, irrigation level, planting date, meteorological conditions and chickpea genotypes. The objective of this study was to evaluate the improvement on crop yield and water productivity with supplemental irrigation in five chickpea varieties from the Portuguese breeding selection program.