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Effect of Plastic Mulch and Anti-Transpiration Materials on Yield, Yield Components and Water Use Efficiency of Rainbow Corn (*Zea mays* var. *indurata*) under Different Irrigation Regimes

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Abstract

In order to investigate the effect of plastic mulch and anti-transpiration materials on yield, yield components and water use efficiency of rainbow corn (*Zea mays* var. *indurata*) under different irrigation regimes, an experiment was carried out as split-split plot based on a randomized complete block design with three replicates at Marvdasht city of Farce Province during the two successive seasons 2016 and 2017. The irrigation regimes (irrigation after 25, 40 and 60 % of field capacity water depletion) were consisted as the main plots and two levels plastic mulch (with and without mulch) were allocated to the sub-plots. Three levels anti-transpiration materials (kaolin, atrazine and no material) were consisted as the sub-sub plots. Irrigation regimes were applied based on field capacity water depletion at the depth of root development. To achieve these irrigation levels, soil moisture was calculated by weighting method through a frequent and daily soil at the depth of root development. At irrigation regime of 25 % of FC water depletion, the highest fresh ear yield (1629.1 g m^{-2}) was found when soil surface was covered with plastic mulch and plants were sprayed with atrazine. On the other hand, the minimum fresh ear yield (1026.4 g m^{-2}) was obtained when soil surface left uncovered and no anti-transpiration materials were applied. With decreasing of soil moisture, the application of atrazine compared with kaolin resulted in increased fresh ear yield. When irrigation was applied after 60% of field capacity water depletion, the highest harvest index (53 %) was obtained in the plastic mulch treatment and non-anti-transpiration treatment. The maintenance of moisture under the plastic mulch increased harvest index compared with the uncovered soil surface. At irrigation regime of 60 % of field capacity water depletion, the highest water use efficiency (2.83 kg m^{-3}) was related to those plots which were covered with plastic mulch and treated with atrazine. According to the results, application of plastic mulch and atrazine as an anti-transpiration material could increase crop yield and water use efficiency in regions where water is the main limiting factor.

Keywords: 1000 grain weight, ear yield, evapotranspiration, kaolin, rainbow corn, water consumption

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