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WATER FOOTPRINT IN NITRATE VULNERABLE ZONES: MINERAL vs. ORGANIC FERTILIZATION.

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In intensive agriculture, it is necessary to apply irrigation and fertilizers to increase the crop yield. An optimization of water and N application is necessary. An excess of irrigation implies nitrates washing which would contribute to the contamination of the groundwater. An excess of N, besides affecting the yield and fruit quality, causes serious environmental problems.
Nitrate vulnerable zones (NVZs) are areas designated as being at risk from agricultural nitrate pollution. They include around 16% of land in Spain and in Castilla-La Mancha, the area studied, represents 45% of the total land. In several zones, the N content of the groundwater could be approximately 140 mg L-1, or even higher [1]. The input of nitrogen fertilizers (mineral or organic), applied with a poor management, could be increased considerably the pollution risks.
The water footprint (WF) is as indicator for the total volume of direct and indirect freshwater used, consumed and/or polluted [2]. The WF includes both consumptive water use: blue water (volume of surface and groundwater consumed) and green water (rainwater consumed)). A third element is the water required to assimilate pollution (grey water) [2].
Under semiarid conditions with low irrigation water quality, green WF is zero because the effective rainfall is negligible. Blue WF includes: i) extra consumption or irrigation water that the farmer has to apply to compensate the fail of uniformity on discharge of drips, ii) percolation out of control or salts leaching, which depends on the salt tolerance of the crop, soil and quality of irrigation water, to ensure the fruit yield. In the NVZs, the major concern is grey WF, because the irrigation and nitrogen dose have to be adjusted to the crop needs in order to minimize nitrate pollution.
This study focus on the assessment of mineral and organic fertilization on WF in a fertirrigated melon crop under semiarid conditions with a low water quality. During successive years, a melon crop (Cucumis melo L.) was grown under field conditions. Different doses of ammonium nitrate were used as well as waste compost derived from the wine-distillery industry, which is relevant in this area. Grey WF was estimated in both type of fertilizers using Castellanos et al. [3] methodology. The results showed that in the case of inorganic fertilization gray WF experiment a huge increase when the optimum dose were exceeded. Meanwhile, in the case of organic fertilization, even the doses exceeded the optimum, the increase gray WF was significantly lower. The discussion of these results will be presented based on the mineralization rate and N content of irrigation water.

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