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Methodology to assess economic and environmental impacts of Nitrogen in fertirigation systems.

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To determine the risk of nitrate pollution in agricultural systems have identified several indexes and efficiencies that may lead an effective N fertilizer management for obtain the maximum yield with minimum environmental impact and health.

An overdose N can have a negative impact as diminished the production and quality of the fruit and, at the same time, contaminate groundwater. From health point of view, these are the fundamental source of supply to human populations (Castellanos et al., 2010) and an excess of nitrate can be accumulated in pulp fruit.

Several indexes and efficiencies have been applied to describe the agronomic management as well as their environmental impact in the area. These can be classified into four groups:
a) Water use efficiencies (WUE, IRRWUE, DWUE and DIRRWUE), calculated based on crop evapotranspiration (ETc) or irrigation water (Irr) and in relation to the fruit yield (FY) and dry weight (DW).
b) Environmental impact indexes: impact index (II), environmental impact index (EII) and management efficiency (ME)
c) Soil N mobilization: N mineralization rate (NMR) and N mineralization index (NMI)
d) N use: N uptake efficiency (NupE).

This research was carried out on the greatest area dedicated to the cultivation of melon crop in central Spain, where fertirrigated systems are of common use. Growers tend to apply an overdose on the N. Recently, areas vulnerable to nitrate contamination from agricultural sources have been declared in this area (Directive 91/676/CEE). This problem is aggravated because groundwater is one of the main sources for drinking, besides being used for irrigation.

Eleven different doses of N available (N applied plus mineral N in soil before transplanting the melon plants) were used in this study, which ranged between 47 and 461 kg ha-1. The experiment characteristics are more detailed in Castellanos et al. (2010).

The proposed indices and efficiencies proved to be an effective tool for determining the risk of nitrate contamination as the N rate used and should be promoted in future BPA to reduce nitrate contamination in aquifers through optimized management of N inorganic fertilizer.

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