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Risk of nitrate pollution in agricultural systems

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Excessive doses of N and/or water on fertirrigated crops involves a substantial risk of aquifers contamination by nitrates, in addition, the knowledge of N cycling and availability within the soil could assist in avoiding this excessive application. Strategies are being sought to increase water use in cropping systems and to reduce drainage (D). The estimation of N mineralized from soil organic matter is an essential tool to determine the amount necessary to optimize crop yield and minimize the environmental impact of excess N.

In this study we propose a methodology that allows us to evaluate the optimum fertigated management integrating several aspects: economic and environmental. Even the complexity of the system, we have simplified the number of indexes and efficiencies need to establish the framework of N management and its economical and environmental consequences.

The N optimum dose calculation can be determined from the indexes and efficiencies shown in this work, and can be classified into four groups: water use efficiencies (WUE, IRRWUE, DWUE and DIRRWUE), environmental impact indexes (II, EII and ME), soil N mobilization (NMR and NMI) and N use (NupE).

There are relationships among environmental indexes and efficiencies. A correlation matrix was obtained, as well as their statistical significances. Based on this, several variables were selected trying to capture the maximum information with the minimum number of efficiencies and indexes. The following variables were selected avoiding high correlations: crop yield (Relative FY), water use (IRRWUE), N use (NupE) and contamination (II, ME). In spite of comparing different treatments in an integrated way, a radial representation was performance.

Different treatments were compared during three years. An integrated comparison taking in account the variation of each factor selected per Nitrogen dose are discussed.

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