UNIVERSITÀ DEGLI STUDI DI PADOVA
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CONTROL FERT

Control release fertilization for smart climate farming

World population will reach 9.6 billion in 2050, increasing by almost 33% since 2019. Consequently, food production will need to address a substantial increase. Agricultural production must intensify, without compromising ecosystem services essential for life on earth. The Covid pandemy and the present Russia crisis exacerbated the already critical situation of food availability, extending the problem of food supply to areas where it was not suffered. In this scenario, Italy too can become under risk, due to its dependency for energy and fertilizers supply. There is urgent need to develop efficient and prompt solutions to support crop productivity. Fertilization is one of the main important agronomic practices to sustain and maximize crops yield, but if it is not well managed can exert a negative impact on the environment. Among fertilizers, the synthetic nitrogen (N) fertilizers have sustained the agricultural production so far, and their importance for maintaining the global food supply is even growing. However, many environmental problems linked to N fertilization have been reported (e.g. NO3 contamination of surface and ground water resources, increase of N2O and NH3 emission in the atmosphere, etc.). Achieving synchrony between N supply and crop demand without excess or deficiency is the key to optimizing tradeoffs amongst yield, profit, and environmental protection in crop production. The use of smart fertilizers, such as controlled release fertilizers through inhibitors addition, are one possible management practice to enhance fertilizer N effectiveness, and to decrease environmental impact. The purpose of CONTROL FERT project is to develop new urea formulations, single and/or multilayer urea grains with the possibility to place different urease and/or nitrification low impact organic inhibitors in different layers, originating a multi-stage granule that will allow to exploit different processes of N transformation in different times. This will permit to release the N gradually, with a rhythmable to fit the crop requirements during the growing stages, which typically follows asigmoidal time pattern. Synchronizing the rhythms of crop needs and soil availability, canbe achieved higher N use efficiency, reducing losses and optimizing distribution techniques. The “smart” fertilizers will be tested in different agroecological conditions (different experimental sites) in open field trials, after their preliminary validation in laboratory. This approach will allow to test smart fertilizers prototypes in real farming conditions, giving reliable results and producing prototypes characterized by high TRL.

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