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Improving the efficiency of soil nutrient release by PGPBs: the case study of 'Fucino' *Solanum tuberosum*

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INTRODUCTION - Phosphorus (P) can be a limiting nutrient that affects plant growth. In soil, P is present in a range of inorganic (Pi) and organic (Po) forms, which determine its bioavailability. Most forms of P in agricultural soils are Pi, which plants cannot absorb or utilize. This situation requires continuous phosphorus fertilization campaigns to ensure optimal agricultural production. However, applying these products represents a massive cost for farmers and contributes to environmental pollution. To counteract this, microorganism-based agronomic practices (PGPM) have been developed in recent decades to sustainably ensure production quality. PGPM with phosphate solubilizing ability are known as phosphate-solubilizing microorganisms (PSM) and can convert inorganic and inaccessible forms of phosphate uptake (PO_4^{3-}) into available forms (e.g., HPO_4^{2-}).

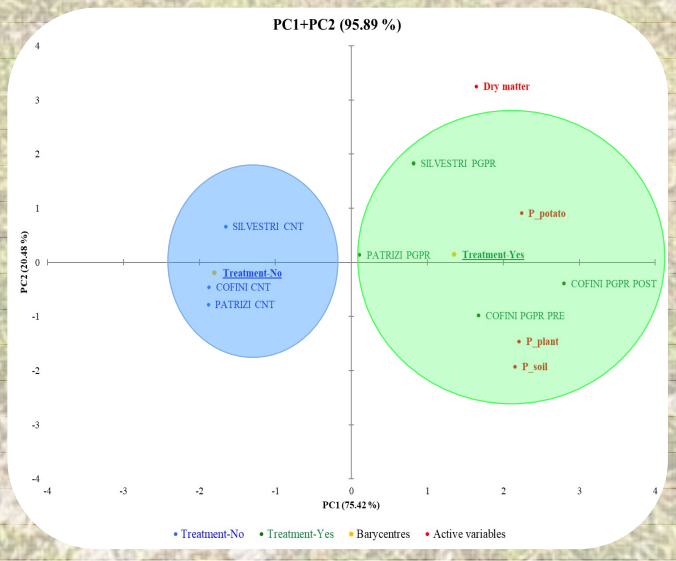
THE PATENT n. 102022000009890 - The object of the invention is to provide an agronomic procedure for obtaining horticultural product by inoculating seeds with PSM. Trials were carried out on potatoes with three parallel open field experiments. Field were selected within Fucino plateau (670 m asl Abruzzo, Italy), one of the most important productive landscape for potatoes and horticultural crops.

RESULTS - In the presence of PSM treatment the tubers showed a marked improvement in phosphorus content. Statistical analysis showed significant increases (+74%; $p < 0.05$) and a clear separation of the treated condition from the control condition.

Fucino productive landscape.

One of the open field used for the trials located at Fucino (Italy).

Phosphate content estimation carried out on samples.



Principal component analysis showing control and treated clusters.

CONCLUSIONS - In the presence of PSM there was a mobilization of phosphate. Enriched in the absence of phosphate-based chemical fertilization, the tubers were enriched with phosphorus already present in the soils and mobilized by the activity of the bacterial strain used. These findings suggest the suitability of the same method in other horticultural crops, cutting fertilizers needs and achieving sustainable production.

References

Laboratory

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