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قسم الميكروبيولوجيا الزراعية

جامعة الفيوم

البحث الثالث

Samah M. Youssef , Ahmed Shaaban , Abdelsattar Abdelkhalik , Ahmed R. Abd El Tawwab, **Laila R. Abd Al Halim,** Laila A. Rabee, Khairiah Mubarak Alwutayd , Reda M. M. Ahmed ,Rahaf Alwutayd and Khaulood A. Hemida **(2023).** Compost and Phosphorus/Potassium-Solubilizing Fungus Effectively Boosted Quinoa's Physio-Biochemical Traits, Nutrient Acquisition, Soil Microbial Community, and Yield and Quality in Normal and Calcareous Soils. Plants 2023, *12*, 3071.	البحث الثالث
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Title	**Compost and Phosphorus/Potassium-Solubilizing Fungus Effectively Boosted Quinoa's Physio-Biochemical Traits, Nutrient Acquisition, Soil Microbial Community, and Yield and Quality in Normal and Calcareous Soils**.
Participants	Samah M. Youssef , Ahmed Shaaban , Abdelsattar Abdelkhalik , Ahmed R. Abd El Tawwab, **Laila R. Abd Al Halim,** Laila A. Rabee, Khairiah Mubarak Alwutayd , Reda M. M. Ahmed ,Rahaf Alwutayd and Khaulood A. Hemida**.** [1]Horticulture Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt; smy00@fayoum.edu.eg (S.M.Y.); aga04@fayoum.edu.eg (A.A.) [2] Agronomy Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt [3] Soil and Water Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt; ara08@fayoum.edu.eg (A.R.A.E.T.); rmm11@fayoum.edu.eg (R.M.M.A.) [4] Agricultural Microbiology Department, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt; [5] Department of Food Science and Technology, Faculty of Agriculture, Fayoum University, Fayoum 63514, Egypt; lar00@fayoum.edu.eg [6] Department of Biology, College of Science, Princess Nourah bint Abdulrahman University, Riyadh 11671, Saudi Arabia; kmalwateed@pnu.edu.sa [7] Department of Information Technology, College of Computer and Information Science, Princess Nourah Bint Abdulrahman University, Riyadh 11671, Saudi Arabia; 441004641@pnu.edu.sa [8] Botany Department, Faculty of Science, Fayoum University, Fayoum 63514, Egypt; kah00@fayoum.edu.eg
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ABSTRACT

Calcareous soil had sufficient phosphorus and potassium (PK) in different forms due to the high contents of PK-bearing minerals; however, the available PK state was reduced due to its PKfixation capacity. Compost, coupled with high PK solubilization capacity microbes, is a sustainable solution for bioorganic fertilization of plants grown in calcareous soil. A 2-year field experiment was conducted to investigate the effect of compost (20 t ha−1) with *Aspergillus niger* through soil drenching (C-AN) along with partial substitution of PK fertilization on quinoa performance in normal and calcareous soils. Treatments included PK100% (72 kg P2O5 ha−1 + 60 kg K2O ha−1 as

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conventional rate), PK100%+C-AN, PK75%+C-AN, PK50%+C-AN, PK25%+C-AN, and only C-AN in normal and calcareous soils. Results showed that C-AN and reduced PK fertilization (up to 75 or 50%) increased photosynthetic pigments and promoted nutrient acquisition in quinoa grown in calcareous soil. Reduced PK fertilization to 75 or 50% plus C-AN in calcareous soil increased osmoprotectants, nonenzymatic antioxidants, and DPPH scavenging activity of quinoa's leaves compared to the PK0%+C-AN treatment. The integrative application of high PK levels and C-AN enhanced the quinoa's seed nutritional quality (i.e., lipids, carbohydrates, mineral contents, total phenolics, total flavonoids, half maximal inhibitory concentration, and antiradical power) in calcareous soil. At reduced PK fertilization (up to 75 or 50%), application of compost with *Aspergillus niger* through soil drenching increased plant dry weight by 38.7 or 53.2%, hectoliter weight by 3.0 or 2.4%, seed yield by 49.1 or 39.5%, and biological yield by 43.4 or 33.6%, respectively, compared to PK0%+C-AN in calcareous soil. The highest P-solubilizing microorganism's population was found at PK0%+C-AN in calcareous soil, while the highest *Azotobacter* sp. population was observed under high PK levels + C-AN in normal soil. Our study recommends that compost with *Aspergillus niger* as a bioorganic fertilization treatment can partially substitute PK fertilization and boost quinoa's tolerance to salt calcareous-affected soil.