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Article title	Effect of soil amendment with yeasts as bio-fertilizers on the growth and productivity of sugar beet
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Abstract

The use of yeast as a bio-fertilizer in agriculture has received considerable attention because of their bioactivity and safety for human and the environment. This study evaluated the effect of soil amendment with three newly isolated yeast strains on the productivity and the external and internal structure of sugar beet to prove their application as bio-fertilizer. We conducted a two-year pot experiment to investigate the effects of *Kluyveromyces waltii*, *Pachytrichospora transvaalensis* and *Sacharromycopsis cataegensis* on the growth and productivity of sugar beet. Soil was inoculated with three doses of each strain (٠.٠, ٥٠.٠ and ١٠٠.٠ ml pot⁻¹ with concentration of $\sim 10^8$ cfu ml⁻¹). Results showed that application of the yeasts significantly ($P < 0.05$) increased the photosynthetic pigments, soluble sugars, sucrose, and total soluble proteins of sugar beet. *K. waltii* showed the best results among the three yeasts. It increased the sucrose content by about ٤٣% of the control. Anatomy of the leaf and the root showed an increase in thickness of the blade, midvein, dimensions of the vascular bundles, and number and diameter of xylem vessels as the result of application of yeasts. Gas chromatography–mass spectrometry (GC-MS) analysis of the culture filtrates of the yeasts detected some beneficial secondary metabolites that could enhance the plant vigor and the physical and chemical properties of the soil. We assume that application of *K. waltii*, *P. transvaalensis* and *S. cataegensis* as bio-fertilizers is a good alternative of the chemicals in the sustainable and organic farming and safe for human and environment.