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Bioprospecting for new and effective soybean (*Glycine max* L. Merr.) rhizobia in Africa

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Soybean (*Glycine max* L. Merr.) was introduced to Africa since 1700s. However, it is only recently that its cultivation and production have increased due to high demand for use as food and feed to livestock. However, to increase its yields in farmers' fields requires knowledge of the soil bacteria ("rhizobia") that nodulate soybean. Currently, two types of soybean exist in Africa, the strict-nodulating genotypes that require inoculation and the Tropical Glycine cross (TGx) developed by IITA that nodulate freely with native soil rhizobia (the so-called promiscuous nodulating soybean). But even where the soybean genotypes can nodulate freely with native soil rhizobia, there are reports of increased nodulation, N_2 fixation and grain yield with bacterial inoculation. So the main aim of this study was to bioprospect for effective and highly competitive native rhizobia in African soils that can be used as inoculants for increased soybean production. To do so, we isolated and characterized native rhizobia from South Africa, Mozambique, Malawi, Ethiopia and Ghana for symbiotic effectiveness and bacterial diversity. The results revealed significantly marked differences in the N_2-fixing efficiency of native rhizobia from the different countries. Inoculating soybean plants with isolates TUTSFCF-57, TUTSAWI-16, TUTSDTGX-47, TUTSBAW95-111, NAK-104, and NAK-103 from Ethiopia produced similar whole-plant biomass when compared to 5 mM KNO_3-fed plants. The indigenous rhizobial isolates showed comparable effectiveness (measured as %Ndfa and amount of N-fixed) relative to commercial inoculant strains. Planting uninoculated soybean seeds directly in soils collected from different locations in Ethiopia also revealed significant differences in plant growth and symbiotic performance. Whole-plant biomass was highest in soil from Amaro, followed by Boricha, Dorebafano, Pawe, and Mambuk. Percent N derived from fixation and amount of N-fixed were greater in Mambuk soil, followed by Pawe and lowest in Amaro soil. Evaluation of 43 indigenous soybean rhizobia isolated from farmers' fields in Mozambique also revealed variable nodulation and symbiotic effectiveness similar that observed in Ethiopia. The findings of our studies suggest that *B. elkanii* group may be the dominant micro symbiont nodulating soybean in Africa.