

## IDENTIFYING ELITE RHIZOBIA FOR SOYBEAN (*GLYCINE MAX*) IN KENYA

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Africa's microbial biodiversity is too often not mobilized to benefit its poor farmers. Bio-prospecting and isolate characterization was conducted in Kenya to identify elite strains of rhizobia capable of effectively nodulating promising soybean varieties. One hundred isolates were recovered from nodules of wild and cultivated legume hosts growing in different agro-ecological zones, ranging from the coastal sand dunes and mangrove swamps, through the uplands and Rift Valley highlands, to the Afro-montane zone of Mount Elgon and the Lake Victoria Basin, a transect of about 1045 km. These isolates were authenticated and tested for effectiveness on soybean (*Glycine max*) var. SB 19 in sterile vermiculite, and the twenty-four most promising isolates screened in potted soil to assess their competitive abilities on two varieties ("promiscuously nodulating" SB 19 and specific SC Safari). The six best performing isolates were then evaluated under field conditions, comparing them to *Bradyrhizobium japonicum* strain USDA110, a widely recognized industry standard. Test isolates were classified into five categories, non-infective (20%), ineffective (26%), partly effective (26%), effective (17%) and highly effective (11%) based on their performance relative to controls and industry standards. The indigenous rhizobia that outperformed USDA110 were considered highly effective. In potted soil, all the 24 native rhizobia isolates nodulated promiscuous soybean (SB19) but only 46% of them nodulated specific soybean (Safari). In the field experiment, strain NAK 128 performed best on both promiscuous and specific soybean varieties, significantly ( $p < 0.05$ ) outperforming USDA110 by 29% and 24%, respectively. Partial economic return to inoculation with NAK 128 was about 21:1, justifying inoculation as a field practice and producing up to 2.5 million nodules ( $334 \text{ kg ha}^{-1}$ ), significantly ( $p < 0.05$ ) more than USDA 110. The three best isolates from this investigation, NAK 84, 89 and 128 outperformed the management receiving  $78 \text{ kg N ha}^{-1}$ , require further characterization and field testing but clearly have commercial potential and are available to interested parties.

**Key words:** Bio-prospecting, promiscuous soybean, rhizobia strain selection, USDA 110

**Theme:** Nitrogen on the context of food production for oral presentation.