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## Elite bradyrhizobium markedly enhanced symbiotic N<sub>2</sub> fixation towards yield advantage in cowpea: An option for sustainability

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### Abstract

Due to its N<sub>2</sub>-fixating capacity, cowpea contributes much to production and soil sustainability in resource limited tropical regions. However, its symbiotic N contribution and yield frequently remained low under field circumstances, in part because of the restricted application and ineffectiveness of bio-inoculants. Therefore, using a factorial randomised complete block design with four replications, a two-year field experiment was carried out to assess the effect of cowpea infecting *Bradyrhizobium* strains (CP-24 and CP-37) on shoot biomass and symbiotic N nutrition of four cowpea varieties (Keti, TVU, Black eye bean, and White wonderer trailing) at three sites. The N contribution was calculated using the <sup>15</sup>N natural abundance. Inoculating cowpea markedly increased shoot biomass, nodulation, % Ndfa and amount of N<sub>2</sub> fixed, indicating the symbiotic efficiency of the *Bradyrhizobium* strains used. Compared to the un-inoculated control, inoculation with CP-24 strain increased shoot N content, % Ndfa and N fixed by 40 %, 15 %, and 41 %, respectively. In addition, the inoculant by variety interaction also had a significant effect on nodule number, nodule dry weight and N fixed, with paramount advantage from TVU and White wonderer trailing combination with CP-24. A strong positive correlation between biomass accumulation and N<sub>2</sub> fixed, and N<sub>2</sub> fixed and seed yield was also observed. In general, inoculation of varieties TVU and White wonderer trailing with CP-24 *Bradyrhizobium* strain is recommended at all the three tested sites and similar agro-ecological environments for improved symbiotic N nutrition and associated yield advantage of cowpea as these combinations outperformed the response from Keti and Black eye bean varieties combination with either of the two strains.

### Keywords: