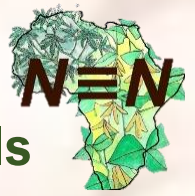


N2Africa Packages Improves Sustainable Productivity of Chickpea in Ethiopian Vertisols



N2Africa - Putting nitrogen fixation to work for smallholder farmers in Africa

Key facts about chickpea

- Chickpea is an important protein source for many households as well as a good cash crop.
- Well-drained Vertisols are best suited for chickpea production. It can be grown as a second crop using remaining residual soil moisture
- Chickpea is little labor intensive, especially compared to cereal crop
- Chickpea can fix 60-176 kg N ha⁻¹ in association with rhizobia; it is 60- 80%percent of its nitrogen requirement. Sufficient soil phosphorus is required for optimal nitrogen fixation of chickpea.



Why N2Africa focus on chickpea?

- Productivity of chickpea is yet below the global averages and what is obtained at on-farm demonstrations and highly variable in different agro-ecologies of Ethiopia.
- Sub-optimal agronomic practices, malnutrition of the soil and lower use of improved varieties highly contribute to the poor yields of chickpea in Ethiopia
- Soil and seed borne diseases and insects do have significant chickpea yield loss in Ethiopia.



N2Africa approaches to deliver & disseminate the best fit practices

- N2Africa provided hands-on training for smallholder farmers and encouraged them to try out improved legume varieties and technologies, including i.e. phosphorus fertilizers and rhizobium inoculants.
- N2Africa received feedbacks from farmers ensuring wider promotion of preferred best-fit practices.
- N2Africa mapped, established and functionalized the Public Private-Partnerships (PPPs), promoted effective legume value chain platforms.
- N2Africa linked scientific knowledge with capacity building, women empowerment, and access to input supply and output markets through the PPPs.

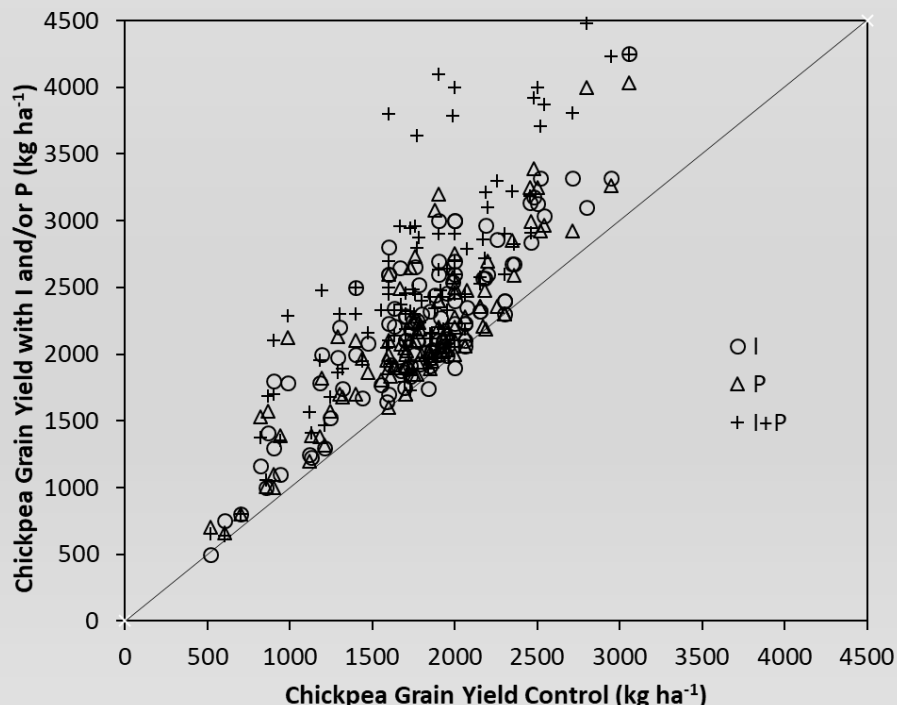


Main Achievements

- N2Africa project has made notable contribution in raising the national rhizobiology research and development expertise, identify new indigenous elite chickpea rhizobial strains via bio-prospecting, and selection, sharing of strains among partners and inoculant technology supply chain.
- N2Africa established a platform of coalition of the willing to exchange elite chickpea rhizobial strains among Hawassa University, Menagesha Biotech Industry and Ethiopian Institute of Agricultural Research; and with multiple partner for the supply chain of inoculant technology.
- The exchange platform has helped the institutions to mutually reassess the shelved elites in uniform protocol and finally to have common elites such as CP-11, CP-63 and CP-M7 etc.
- Farmers' preferred high yielding, diseases resistant and marketable varieties were identified. Kabuli type chickpea varieties are excellent nodulators, high yielders and yet are relatively susceptible to soil borne diseases as compared to desi type chickpea varieties.

Chickpea variety name	PPP Cluster	Recommended Areas (Woredas/ Districts)
Arerti, Habru	North, South & South-East	Northern Ethiopia (Dembia, Enemay, Gonder Zuria) Southern Ethiopia (Damot Gale) South-Eastern Ethiopia (Ginir)
Arerti, Habru, Natoli	Central	Central Ethiopia (Ada'a, Gimbich, Becho)

- N2Africa evidences indicated that application of inoculation and P fertilizer have resulted in increased chickpea yield (from at least 3% relative responses and more) for 99% of farms involved in the on-farm demonstration trials, irrespective of differences in agro-ecological location.
- The percent yield increases due to the application of P fertilizer and inoculation ranged from 11-24 and 21-47% in Ada'a, central Ethiopia and Damot Gale districts, southern Ethiopia, respectively. However, inoculation alone resulted in 11 and 25% yield advantage over the control in central and southern Ethiopia, respectively.
- A significant number of smallholder farmers could benefit both agronomically and economically from application of rhizobium inoculants and P fertilizer to chickpea.

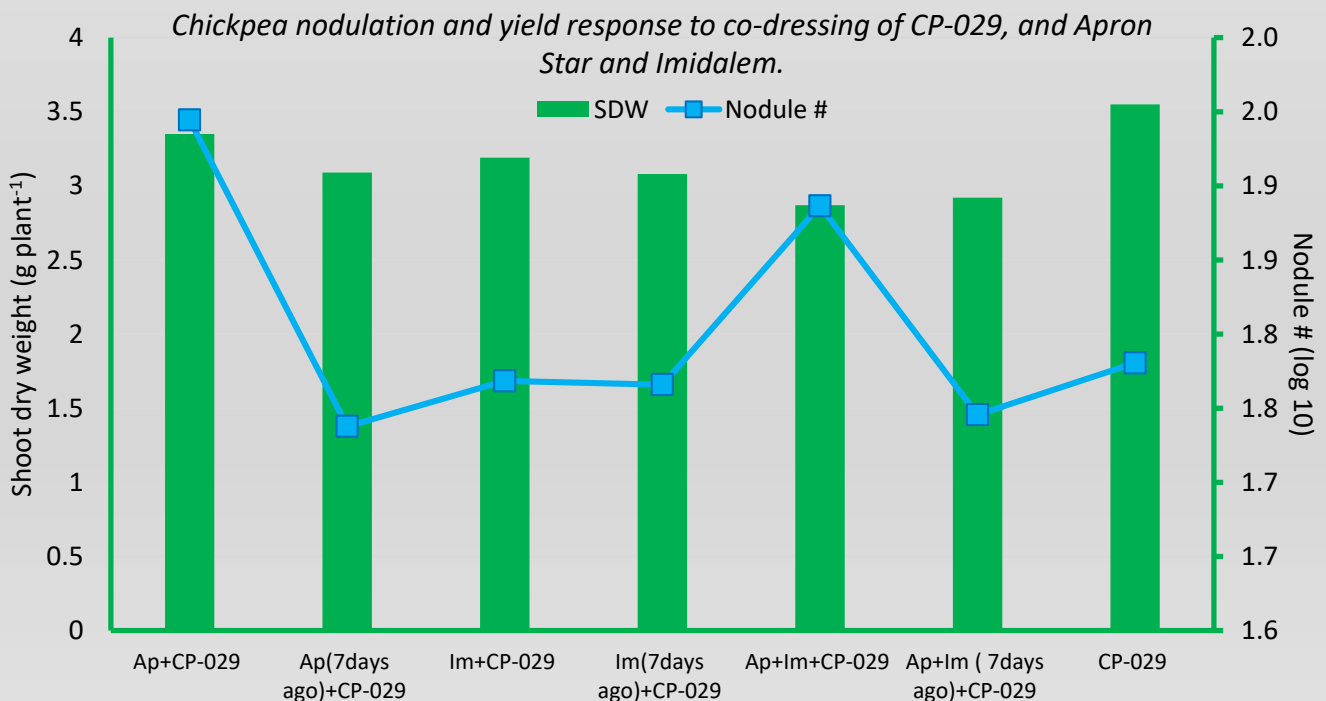


Main Achievements

- Generally, positive responses to P&/or I applications could be lacking on some farms due to several factors. Diagnosing the real cause of non- responsiveness of soils is critical for the specific legume growing environment. For instance, N2Africa verified that application of 30 kg S ha⁻¹ (sulfur) helped chickpea farms to respond to the P+I application at Gonder Zuria woreda, Northern Ethiopia.
- Where insufficient N and rhizobium concentrations of $10^2\text{-}10^3\text{ g}^{-1}$ of soil, chickpea demands inoculation.



- Co-dressing of chickpea seed with rhizobial inoculant and fungicides, i.e. Apron star (2 g a.i. per kg seed) do not harm rhizobia and nitrogen fixation process substantially as compared to inoculant alone. Hence, fungicide and inoculant can be co-dressed during chickpea planting. However, the fungicide dressing precedes the rhizobial inoculant (which is done right before planting).





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