

Maximizing Sustainable Productivity of Faba Bean with N2Africa Packages in Ethiopia



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

Key facts about faba bean



- ❑ Well-managed faba bean can fix about 86 kg N ha⁻¹ yr⁻¹, increase soil nitrate levels by 30 to 40 kg N ha⁻¹ and boost the grain yield of the following wheat crop by 500 to 1500 kg ha⁻¹.
- ❑ Faba bean rhizobial benefits can be maximized by using stress tolerant high-yielding legume varieties, phosphorus nutrient application, liming and optimal agronomic practices.
- ❑ Faba bean is so sensitive to waterlogged conditions that high moisture level limits its production in pelic Vertisols unless proper drainage or sowing date adjustment is practiced
- ❑ When no other factors are limiting, the first nodules of faba bean set just after 2-3 weeks and N is fixed at increasing rate from flowering until pod initiation..



Why N2Africa focus on faba bean?

- Faba bean is daily human diet (dry and green) livestock feed and rotates with cereals (i.e. wheat, barley, teff) to maintain soil fertility in the highlands of Ethiopia.
- Faba bean accounts for one-third (about 865,000 tones) of the total legume production in Ethiopia.
- Its low national average yield (2.1t ha⁻¹), far below the average attainable yield of 2.7-3.5 t ha⁻¹., is attributed to low soil fertility, access to improved seeds and agrochemicals, and sub-optimal agronomic managements.

N2Africa approaches to deliver & disseminate the best fit practices

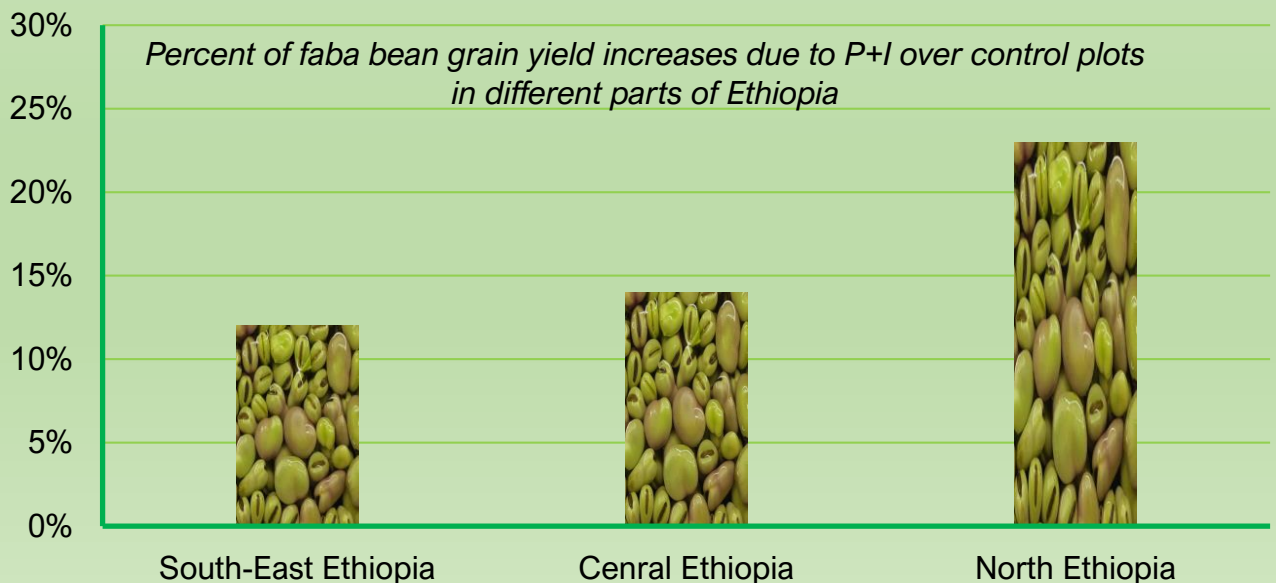
- N2Africa provided hands-on training for smallholder farmers and encouraged them to try out improved legume varieties and technologies, including i.e. phosphorus fertilizers and rhizobium inoculants.
- N2Africa received feedbacks from farmers ensuring wider promotion of preferred best-fit practices.
- 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 has raised new effective indigenous faba bean rhizobial isolates for acidic and non- acidic areas. A new effective faba bean rhizobial isolate (FB-04) introduced to the southeastern and northern Ethiopia.
- N2Africa established a platform of exchange of existing faba bean elite isolates among Haramaya University, Hawassa University, Menagesha Biotech Industry and Ethiopian Institute of Agricultural Research. The platform has enabled the institutions to mutually reassess efficacy of the existing isolates in uniform protocols. Several candidate elite rhizobial isolates of faba bean were identified from the rhizobial biodiversity hotspots of Ethiopia.
- Farmers' preferred high yielding, diseases resistant and marketable varieties were identified.

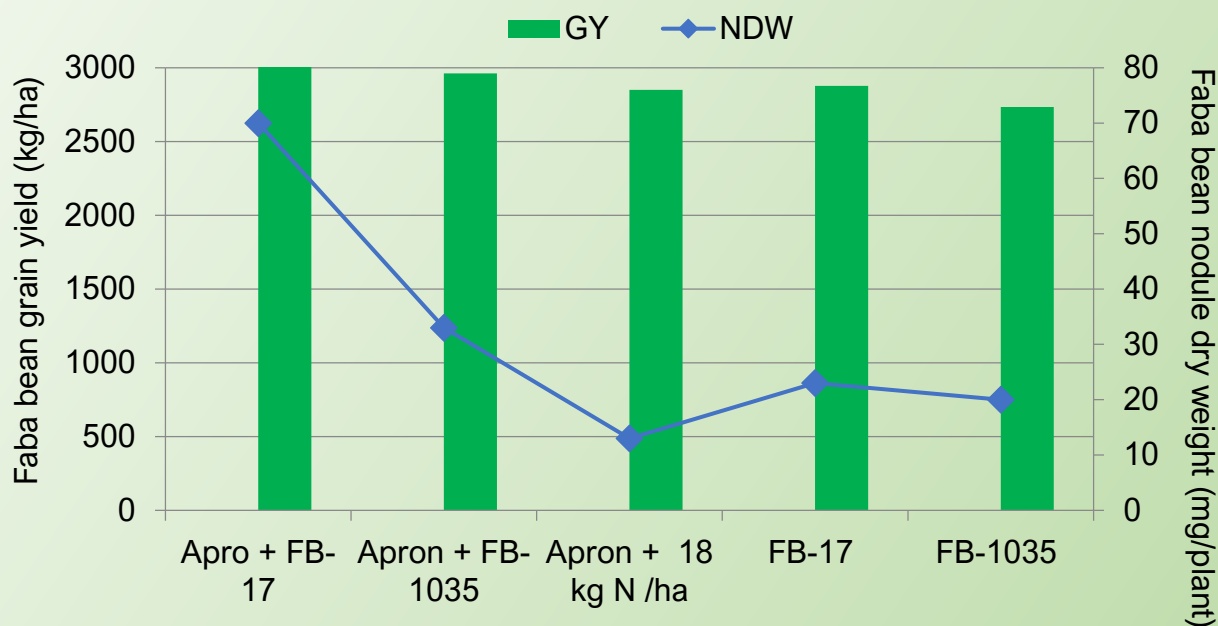
Faba bean variety name	PPP Cluster	Recommended Areas (Woredas/ Districts)
Wolki, Dosha, Moti	North	Northern Ethiopia (Dabat, Debark, Farta, Yilmana Densa)
Degaga, Shallo, Dosha, Moti	South-East	South-Eastern Ethiopia (Agarfa, Goba, Sinana)

- On a wide range of on-farm trials implemented in diverse agro-ecologies of Ethiopia demonstrated inoculation and P fertilizer application increased faba bean grain and biomass yields. The mean yield grain yields responses due to inoculation and 23-46 kg P₂O₅ ha⁻¹ fertilizer application over control plots varies from 11% (in South-Eastern Ethiopia), 23% (Northern Ethiopia) to 41% (Central Ethiopia). This implies that significant number of smallholder farmers could benefit both agronomically and economically from application of rhizobium inoculants and P fertilizer to faba bean.



Main Achievements

- Fungicides for the control of seed borne diseases (i.e. Apron star at 2g a.i./kg seed) can be co-dressed with rhizobial inoculant to same faba bean seed without nodulation and yield reduction. However, the fungicide needs to be dressed earlier while the inoculant should be dressed just before planting.



- N2Africa project found out that rhizobial strains respond differently to different faba bean varieties and agroecologies. For instance, the faba bean variety Doshia responded well to the EAL-110 strain at chromic Vertisols of K/malema and to FBW-145 at Nitisol condition of Wolmera, Central Ethiopia. However, Wolki and Moti varieties preferred isolate EAL-110 at both agroecologies.

District	Soil type	Variety	Strains	Grain Yield (kg/ha)
K/maliema	Chromic Vertisols	Doshia	EAL-110	3435.83
		Moti	EAL-110	3492.1
		Wolki	FBW-145	3038.35
Ejerie	Acidic Nitisol	Doshia	FBW-145	2391.55
		Moti	EAL-110	2415.91
		Wolki	FBW-145	2288.11



ILRI-N2Africa, Box 5689 Addis Ababa, Ethiopia • +251 11617 2000

ilri.org • n2africa.org • n2africa-ethiopia.ilriwikis.org

N2Africa project is funded by Bill & Melinda Gates Foundation



This publication is licensed for use under the Creative Commons Attribution 4.0 International License.. April 2019