N2Africa develops best-fit agronomic practices for grain legumes in Africa

The agronomy activities of N2Africa are implemented under Objective 2 of the project (*Select multi-purpose legumes (food, fodder, stakes, and soil fertility management) for enhanced biological nitrogen fixation (BNF) and integrate these into farming systems).* Activities focus mainly on i) identification of best varieties of soyabean, common bean, cowpea, groundnut, as well as multi-purpose tree and forage legumes with high BNF potential; and ii) developing best fit agronomic practices for maximizing potential benefits of selected legume germplasm and inoculant technologies on increasing and stabilizing productivity. Country specific priority legumes and agronomic practices identified and prioritized during project inception workshops in year 1 continue to be revised at the beginning of each planting season and modified according to outcome of activities implemented in the previous season(s) in order to accommodate new emerging issues from farmers, market demands as well as biophysical challenges including pests and diseases and drought.

Agronomy work to date

Trials to identify best varieties of soyabean, bean, cowpea and groundnut with high BNF potential continues in all 8 project countries. Currently, a total of 135 varieties have been evaluated at 65 action sites in the project's eight countries (Table 1). Some varieties are showing good performance across many impact zones, for example the soyabean variety TGx1740-2F (performing well in the East, Central and southern Africa) and soyabean variety TGx1904-6F (performing well in West and Southern Africa). In many ways it is surprising these varieties do so well in the highlands of East and Central Africa, and in southern Africa, given that they were selected by IITA under very different environments in Nigeria. Likewise, climbing bean varieties Gasilida and RWV 2070 appear to be suitable for both medium and higher altitude areas of East and

Table 1. Grain legume varieties undergone evaluation for BNF potential in different countries. Rainfall in East Africa is bimodal allowing two cropping seasons each year.

Country	Soyabean	Bean	Groundnut	Cowpea	Total
Kenya	13	17	0	0	30
DR Congo	8	10	0	0	18
Rwanda	8	10	0	0	18
Nigeria	5	0	5	6	16
Ghana	6	0	6	6	18
Zimbabwe	6	6	2	1	15
Malawi	6	4	2	2	14
Mozambique	6	0	0	0	6
Total	**58**	**47**	**15**	**15**	**135**

Table 2. Legume technologies tested in different countries

Country	Trial type						Total	Trials with data available
	Rhizobium inoculation/ P fertilization	Legume disease evaluation	Systems (intercropping /rotation/g)	staking climbing beans	Non-responsive soils	Mid-season drought		
Kenya	18	2	9	4	0	3	36	34
DR Congo	12	2	4	3	0	0	21	17
Rwanda	14	2	8	0	0	0	24	17
Nigeria	18	0	0	0	3	0	21	21
Ghana	8	0	2	0	0	0	10	10
Zimbabwe	8	0	0	0	0	0	8	6
Malawi	8	0	0	0	0	0	8	4
Mozambique	3	0	0	0	0	0	3	3
Total	**89**	**6**	**23**	**7**	**3**	**3**	**131**	**112**

Central Africa. Several other varieties seem to perform best under rather specific conditions. Certainly, identification of legume varieties to specific production niches will be the focus of our work in the first quarter of year 3.

The agronomy team is also working to develop best-fit legume agronomic practices in the different impact zones. So far we have established 131 trials in the N2Africa mandate areas across the 8 countries, with 89 trials evaluating the impact of inoculants and phosphorus application on legume performance (Table 2). Currently, we have complete data sets available from 112 trials, and data from the remaining 19 trials are still with partners in the different countries. The results available provide evidence of positive response of soyabean, cowpea, groundnut and bean to the application of P-based fertilisers (TSP or SSP). Response to P fertilizer was not observed in all cases where growth and yields were poor, implying that other factors were limiting – what have been termed the non-responsive soils. Addressing the underlying constraints in non-responsive soils, as well as the extent of other limiting factors is the current task of the agronomy team. In East and Central Africa where the agronomy work has been completed for three seasons (the fourth season on-going), adaptive research campaigns have started to address the emerging issues including: best rotation and intercropping system of cereals and grain legumes, legume diseases (soyabean rust), best staking materials and staking methods of climbing beans. In Kenya, we have started to address the problem of mid-season drought. It is expected that results from these initiatives will contribute to better-informed advocacy messages and improve targeting of our legume technologies.

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