Report on Trial activities, 2015

Multi-location advanced yield test of early and medium soybean breeding lines

The advanced yield test trial consist of early and medium maturing soybean lines. Each maturity group has sixteen entries including a check from our release varieties. The locations planted to this trial include Nyankpala, Manga, Yendi, Damongo, Fumesua and Ejura. The objectives are to develop varieties that are suited to the agro-ecological conditions as well as the major farming systems in the interior savanna zone and transitional zone of Ghana, transfer appropriate technologies to farmers for the realization of food security of farm-families and thereby create wealth in the country.

Germination was very good in most of the genotypes except TGX 1989-68FN and TGX 1990-40F where poor germination were recorded. All the germinated plants from the 16 genotypes are looking healthy and strong. All the sixteen genotypes for the early maturing soybean are at the reproductive stage of full bloom whiles the medium maturing soybeans are at reproductive stage of beginning bloom. Thus about 90% of the early maturing genotypes have flowered fully while 20% of medium maturing genotypes have started to flower. Data collected so far include percentage emergence, plant height at 4 and 6 WAP and plant height at flowering.
Figure 1: Vigorously growing plants of some advanced breeding lines grown at Nyankpala

Evaluation of germplasm from IITA (Preliminary trial)

The preliminary yield test trial comprises early and medium maturing soybean lines. Each maturity group has thirteen entries including a check from released varieties. This trial was planted at Nyankpala. The objective is to determine the adaptation of new soybean breeding lines and identify high yielding stable lines with superior characters for farmers.

Plants of all the thirteen genotypes of the various maturity groups had very good germination except in few of the plots where seedlings were attacked by black ants thereby reducing the plant stand after three weeks of germination. Again, all the genotypes of the early maturing lines have reached a full flowering stage while those of the medium maturing lines are at flowering initiation stage. Data collection is in progress.

Figure 2: Plants of early maturing soybean preliminary lines 4WAP at Nyankpala

Variability, heritability and genetic advance for some yield and yield related traits in fifteen exotic soybean genotypes grown in Northern Region of Ghana
The trial includes fifteen (15) genotypes and one check. It was planted at Nyankpala and the objective is to estimate variability, heritability and genetic advance for some yield and yield related traits in the sixteen soybean genotypes. This will help the researchers to the proportion of these traits that will be transferred to offspring when these genotypes are used as parental lines in a cross. The test lines were selected from USDA/University of Illinois germplasm received and tested in 2014.

Poor germination percentage was recorded for most of the genotypes. However, the local check (Soung Pungun) had a very good germination percent than all the other genotypes. On the other hand, most of the genotypes flowered exactly four weeks (4WAP) after planting except the check. By the fifth week (5WAP), all the genotypes had flowered except Soung Pungun. Again, pod formation was initiated by the six weeks after planting (6WAP) in all the genotypes that flowered within 3WAP. Data taken are plant stand at 4 and 6 WAP, plant height at 4, 6 and at flowering; days to flowering, flower colour and leaf area at 6 WAP.
Figure 3: Plant of CLOJO 95-4 (A) and FT Cristaline (D) at flowering stage and (B and C) HS 93-4118 at their flowering and pod formation stage 4WAP and 6WAP respectively

Evaluation of germplasm obtained from USDA/ University of Illinois

The objective is to ascertain the adaptability, stability, environmental reaction on yield and yield components of the exotic lines in the agro-ecological zones of Northern Ghana and for variety development.

This is a repeat of the preliminary test in 2014. The sixty-nine (69) genotypes are 4WAP old. Germination is similar to those used in the heritability studies and this may be as a result of the different environmental conditions as compare to the environment of origin (America). Flowering has been observed in all the genotypes. Flower colour, days to flowering, height at flowering are some of the data collected.

Characterisation and evaluation of rust resistance germplasm obtained from USDA/University of Illinois

Two hundred and fifty-three (253) rust lines obtained from USDA/University of Illinois were plant about five weeks ago at Nyankpala. The aim is to identify genotypes that are most resistance to rust disease and are suited to the agro-ecological conditions as well as the major farming systems of Northern Ghana.
Majority of the genotypes showed good germination and plant stand 3WAP. Again, at 5WAP, about 90% of them have fully developed flowers while 50% of them are at pod initiation stage. Moderate to severe symptoms of rust disease have been observed in some of the genotypes 5WAP indicating that not all of the materials are resistance to the rust disease. The symptoms observed are lesion on upper leaf surface, yellowing of leaves and browning of leaf tissue, however, majority of the genotype have shown no symptoms of the rust disease. Data collected are days to flowering, flower colour, height at flowering and rust score at 5WAP.

Figure 4: Some healthy plants from the rust resistance genotypes
Figure 5: Plants from the rust lines showing symptom of the rust disease
Crossing program: Long duration Ghanaian parents have been planted and the shorter US lines will be planted latter to nick with these.
Progress report; On-farm demonstrations (Soybean)
MATERIALS AND METHODS

Field Design: On-farm field demonstrations have been conducted at six farming communities in Damongo, Walewale, Sawla, Tumu, Kaleo, Navrongo and Sandema. Plot size at each location measured 20m x 20m randomized with four improved soybean varieties namely; Jenguma, Afayak Suong Pungun, TGx-1844-22E (yet to be released).

Application of fertilizers: Phosphorus (P) fertilizer in the form of Triple Superphosphate (TSP) was be applied by broadcasting in each plot at a rate of 2.3kg/plot. The applied fertiliser was then incorporated into the soil with the help of hand hoes before planting as shown below.

Inoculation of seeds: Each variety was inoculated with a *Bradyrhizobium japonicum* inoculant and air dried before planted.
Fig. 1: TSP application before planting and hoe levelling
**Planting:** The improved soybean varieties were planted at a spacing of 75 cm x 5 cm inter-row and intra-row respectively with two seeds per stand (see figure below). No thinning out was done. A farmers’ practice was also established side by side with the demonstrational plots.

![Image of planting]

**Fig 2:** Demonstration of planting in narrow row and dibbling
Fig 3: Farmers planting soybean
**Data taken:**

- Days to 50% emergence
- Plant stand at 14 DAP counting two middle rows

**Data yet to be collected:**

- Number of days to 50% flowering
- Grain yield of a specified area (two 3 m x 3 m sub-plots) of each plot will be measured in all demonstration trials.
- Incidence of pest and disease (scoring sheets to be developed)
- A subsample of 10% of the demonstration plots will have additional data recorded.
- Agronomic traits (pod load, pod clearance, etc.)
- Grain quality (size, colour, etc.)