## Results agronomy trials Malawi, 2011-2012

### General comments

The agronomy trials in Malawi in the 2011-2012 season consisted of:

* Two common bean input trials (variety: Kholophethe), of which one failed completely due to BSM attack.
* Four soybean variety trials; blanket application of TSP. For soybean variety Tikolore a comparison was made with the application of Super D.
* Three soybean input trials (variety: Makwacha).
* One combined cowpea input and variety trial.
* Two combined groundnut input and variety trial. One trial failed completely; in the other trial only four out of eight replications could be harvested.

Trials were established in different fields in the same mandate area. Each field represents a replication.

Error bars in graphs represent standard error of means.

*Conclusions*

Common bean input trial: application of fertilizer inputs did not influence grain yields. All treatments showed a great response to inoculation, however. The treatment with compound D and inoculation achieved the highest average grain yield.

Soybean variety trials: all varieties showed a strong response to inoculation. Generally varieties PAN 1867, Solitera and Tikolore had the largest increase in grain yields. The average number of nodules also increased considerably with inoculation. Application of Super D to variety Tikolore gave generally lower grain yields than with application of TSP.

Soybean input trials: soybean grain yields responded strongly to inoculation, whereas the increase as result of fertilizer inputs in most trials was not convincing. A notable interaction of fertilizer inputs and inoculation, however, resulted in the highest soybean grain yields. There was no clear distinction between the impact of TSP, Super D and Compound D; they often returned similar grain yields.

Cowpea trial: cowpea grain yields for variety IT-16 were consistently higher than for variety Sudan 1. Grain yields of Sudan 1 benefitted from the application of Compound D, and to a lesser extent also from Super D. Yields for variety IT-16 were not influenced by fertilizer application.

Groundnut: variety CG 7 was severely affected by rosette virus and the entire harvest for this variety failed. Also variety Nsinjiro could only be harvested on four out of eight plots as rosette virus, rust and drought affected the trials. None of the fertilizer inputs applied showed a convincing increase in groundnut grain yields.

***Common bean input trial***

Code: MAL001

Location: Linthipe, Dedza

Comment: bean attacked by BSM and farmer hauled the crop to put in a cowpea relay crop.

***Common bean input trial***

Code: MAL014

Location: Lilongwe, Mkwinda

GPS: E 33.79357; S 14.088494; altitude: 1218 m

Planting date: 19-12-2011

Harvest date: 4-4-2012

Comments: Trials results represent the average of four replications on different fields in the same area.

Germination for all treatments was around 90%. Application of different fertilizer inputs (TSP, Super D or Compound D) did not result in yield increases. In contrast, there was a great response to inoculation, both in the control and in the treatments with fertilizer. The yields for the control with inoculation were even slightly higher than for the treatments with TSP and Super D. The treatment with compound D achieved the highest average grain yield.

***Soybean variety trial***

Code: MAL006

Location: Linthipe, Dedza

GPS: E 34.07082; S 14.19762; altitude: 1203 m

Planting date: varying from 29-12-2011 to 5-1-2012

Harvest date: NA

Comments: Trials results represent the average of seven replications on different fields in the same area.

Germination was relatively low for the varieties Makwacha and Soliteram, and highest for variety Nasoko. The average number of nodules increased considerably after inoculation for all varieties, although for Soprano and Tikolore the difference was less evident than for the other varieties. Soybean grain yields of all varieties showed a strong response to inoculation, with increases from less than 1500 to around 2250 kg/ha. The difference between the varieties is negligible compared to the difference with and without inoculation. All varieties received TSP fertilizer. For variety Tikolore an additional treatment with Super D fertilizer was tested. Super D with variety Tikolore did not increase yields compared to application of TSP, however.

***Soybean variety trial***

Code: MAL022

Location: Linongwe, Mkwinda

GPS: E 33.79357; S 14.088494; altitude: 1218 m

Planting date: 19-12 to 21-12-2011

Harvest date: 4-5 to 6-5-2012

Comments: Trials results represent the average of five replications on different fields in the same area.

Germination was more than 90% for all treatments. Soybean without inoculation barely had any nodules, while in the treatments with inoculation the average number increases to 50 to 85 nodules per plant. Grain yields also showed a strong response to inoculation, with yields being almost twice as high for the varieties PAN 1867 and Solitera. These varieties also showed a stronger response to inoculation than the other varieties. The application of Super D with variety Tikolore gave lower yields with inoculation than with application of TSP.

***Soybean variety trial***

Code: MAL029

Location: Lilongwe, Msunde

GPS: E 33.673439; S 13.995434; altitude: 1151 m

Planting date: 4-1-2012

Harvest date: 5-5-2012

Comments: Trials results represent the average of three replications on different fields in the same area.

Again, all varieties showed an enormous increase in the number of nodules as a result of inoculation. Remarkably, grain yields did not benefit to the same extent. Grain yields of varieties Makwacha, Nasoko, PAN 1867 and Tikolore (with Super D) showed no response to inoculation, and standard errors are large as some fields returned very low yields of less than 500 kg/ha (irrespective of the different treatments). Only varieties Solitera and Tikolore (with TSP) did show a convincing response to inoculation.

***Soybean variety trial***

Code: MAL063

Location: Salima, Chitala

GPS: E 34.28720; S 13.68263; altitude: 592 m

Planting date: varying between 3-1-2012 and 25-1-2012

Harvest date: varying between 24-5-2012 and 25-6-2012

Comments: Trials results represent the average of nine replications on different fields in the same area.

Germination was around 80% for most varieties. For varieties Makwacha and Soprano, the percentage was a bit lower. The average number of nodules for all varieties increased as a result of inoculation. Grain yields for varieties PAN 1867 and Solitera nearly doubled with inoculation, and other varieties greatly benefitted from inoculation as well. Again, Tikolore with TSP fertilizer gave higher grain yields than with Super D.

***Soybean input trial***

Code: MAL003

Location: Linthipe, Dedza

GPS: E 34.07675; S 14.19898; altitude: 1221 m

Planting date: 4-1 and 6-1-2012

Harvest date: varying between 23-5 and 28-5-2012

Variety: Makwacha

Comments: Trials results represent the average of three replications on different fields in the same area.

Germination of the treatments with inoculation was reasonable, around 80%. Germination with inoculation in one site was very low, however, which results in lower germination averages for the treatments with inoculation. The average number of nodules was only counted in one site, and only in the control treatment the number increased with inoculation. Grain yields slightly improved with application of TSP without inoculation, but the combined effect of inoculants and fertilizer inputs had the largest impact on grain yields. Soybean yields increased from about 1300 kg/ha in the uninoculated control to around 2200-2300 kg/ha with inoculation and TSP, Super D or Compound D.

***Soybean input trial***

Code: MAL027

Location: Lilongwe, Msunde

GPS: E 33.673439; S 13.995434; altitude: 1151 m

Planting date: 4-1-2012

Harvest date: 3-5-2012

Comments: Trials results represent the average of two replications on different fields in the same area.

Germination in all treatments was above 90%. The average number of nodules in soybean increased from virtually none to 50 to 200 per plant as a result of inoculation. Remarkably, this did not result in increases in yield. Only in the treatment with TSP, grain yields increased after inoculation, but yields are still comparable to the control. Application of Compound D improved yields slightly compared to the control, although not consistently.

***Soybean input trial***

Code: MAL057

Location: Salima, Chitala

GPS: E 34.22567; S 13.69577; altitude: 676 m

Planting date: varying between 3-1-2012 and 23-1-2012

Harvest date: varying between 23-5-2012 and 24-6-2012

Comments: Trials results represent the average of five replications on different fields in the same area.

Germination was reasonable on all plots, varying between 85 and 93%. Inoculation increased the average number of nodules from almost none to a few per plant. Application of fertilizer inputs did not enhance grain yields, but inoculation did, in both the control and the treatments with fertilizer. The interaction of inoculation and Super D, or inoculation and Compound D resulted in the strongest yield increases, with almost a doubling of yields.

***Cowpea combination variety/input trial***

Code: MAL032

Location: Salima, Chitala

GPS: E 34.28720; S 13.68263; altitude: 592 m

Planting date: varying between 21-12-2011 and 18-1-2012

Harvest date: varying between 7-3-2012 and 16-4-2012

Comments: Trials results represent the average of 15 replications on different fields in the same area.

Germination percentages were reasonable, on average around 80% for all treatments. Cowpea grain yields for variety IT-16 were consistently higher than for variety Sudan 1; in the control treatment and the treatment with TSP even twice as high. Grain yields of Sudan 1 benefitted from the application of Compound D, and to a lesser extent also from Super D. Yields for variety IT-16 were not influenced by fertilizer application.

***Groundnut input trial***

Code: MAL021

Location: Lilongwe, Mkwinda

Comment: CG7 wiped out by rosette disease and a farmer mixed up the harvest from Nsinjiro

***Groundnut combination variety/input trial***

Code: MAL049

Location: Salima, Chitala

GPS: NA

Planting date: varying between 20-12-2011 and 17-1-2012

Harvest date: varying between 12-6-2012 and 19-6-2012

Comments: Originally, replications were established in eight different fields. However, variety CG 7 was severely affected by rosette virus, and none of the plots with this variety was harvested. Variety Nsinjiro was harvested on only four of the eight fields, as some fields were also affected by rosette virus, by rust or by drought shortly after planting. Therefore, results only represent the average of four fields with variety Nsinjiro. The grain yield of this groundnut variety did not seem to benefit from the application of fertilizer inputs. Only with Compound D yields increased from slightly less than 2000 kg/ha to about 2250 kg/ha, but standard errors are relatively large.