**Overview agronomy trial results Zimbabwe, 2010-2011 season**

Linus Franke, Talkmore Mombeyarara, Freddy Baijukya

**General comments**

From the 33 trials originally planned in Zimbabwe for the 2010-2011 growing season, 10 were eventually established and gave yield data. Over-ambitious planning and poor performance of the implementing partner (UZ) caused this large difference between the plan and the actual achievements. Yield data were collected from one bean, two cowpea, two groundnut and five soybean trials. Five of these trials (incl. all groundnut trials) were located in a particular region of Murehwa, just a few km apart from each other.

Yields achieved in the trials were generally poor. There were some exceptions though: one of the two cowpea trials gave excellent biomass yields and in the soybean trial in Mudzi good grain yields were achieved on average (though differences between fertiliser treatments didn’t make much sense). However, groundnut yields varied between 200 and 400 kg/ha, bean yields between 0 and 200 kg/ha and soybean yields were in most cases well below 1000 kg/ha.

Why were yields often so low?  To answer this question, we would ideally separate last season’s institutional problems from the biophysical challenges, but this is often impossible. The institutional problems led to late planting and sometimes poor crop management. The bean trial was planted so late (mid Feb) that yields close to zero could be expected. Other trials were planted late (early Jan), but this did not always led to low yields (e.g. soybean in Mudzi). Other trials were planted perfectly on time (Nov), but yielded little. The main biophysical problems were probably drought and poor inherent soil fertility. From the GPS coordinates and soil data, it is clear that a great deal of the trials were planted on poorly fertile granite sandy soils which are also susceptible to drought. Farmers preferably allocated poorly fertile outer fields to the experiments, rather than the slightly more fertile fields closer to the homestead. Work by other scientists (Zingore et al.) on these granite sands soils in Murehwa also reported legume grain yields of only a few hundred kg/ha. So with all recommended management, yields would still have been very low in many of the trials. Very sandy soils are in general not very suitable for soybean and bean production. One may thus question the rationale of targeting these legumes to areas with very sandy soils.

*Coming season*

In the coming season, the number of trials aimed for will be reduced, probably to 14 trials. Moreover, less trials will be put on the poorly fertile soils, especially in Murehwa. Soybean and bean trials will also be held at sites with a higher silt and clay content, e.g. in Guruve district.

In addition, the agronomy team will start data collection in a large number of D&D trials. These trials cover a much wider variation in soil types and climate conditions than the agronomy trials, and therefore give a better overall picture of the performance of legume technologies than the agronomy trials conducted at a limited number of sites.

***Bean: one variety trial***

Location: Kadadi, Murehwa

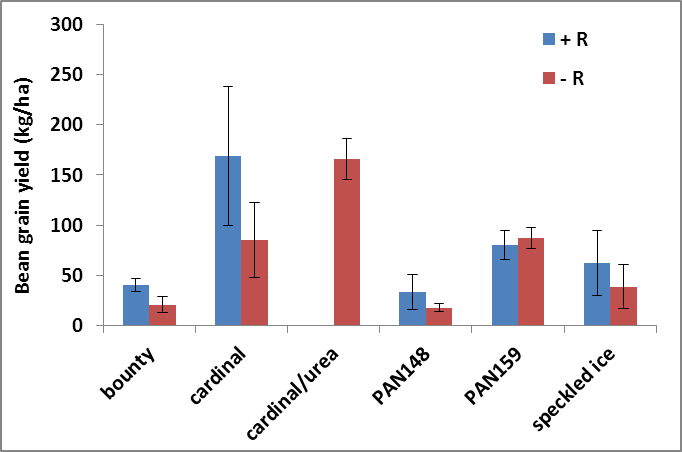
GPS: E31.6986, S17.72303

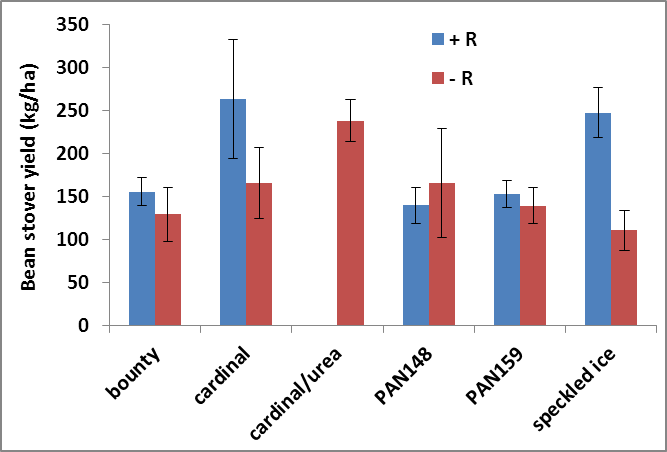
Planting date: 15-02-2011

Soil characteristics:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.11 |  | 0.04 | 23.0 |  | 0.19 | 0.75 | 0.11 |  | 88 | 6 | 6 |

Remarks: This is an outfield with a history of maize monocropping with minimal additions of Compound D for the past 2 seasons at very low rates. This was late planted, and rainfall distribution was poor. Harvested a week or so earlier because livestock (cattle and goats) were beginning to go free after many farmers had harvested their crops. During the season differences between inoculated and uninoculated were slightly visible.





***Cowpea: two input trials***

Location: Mandebvu, Mhondoro

GPS: E30.64253 S18.28134

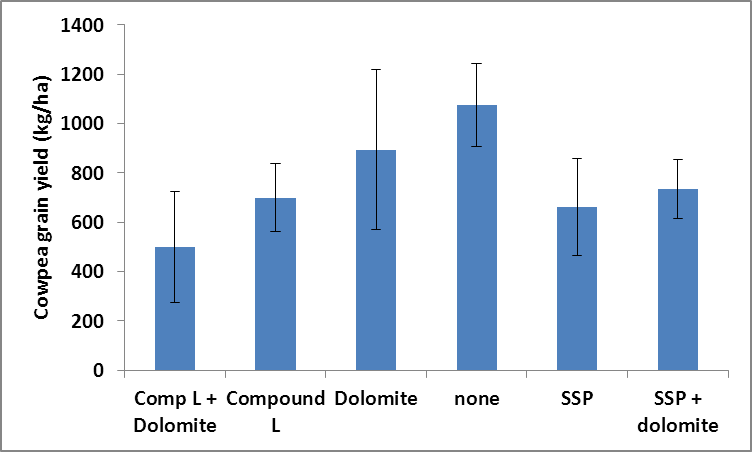
Planting date: 21-11-2010

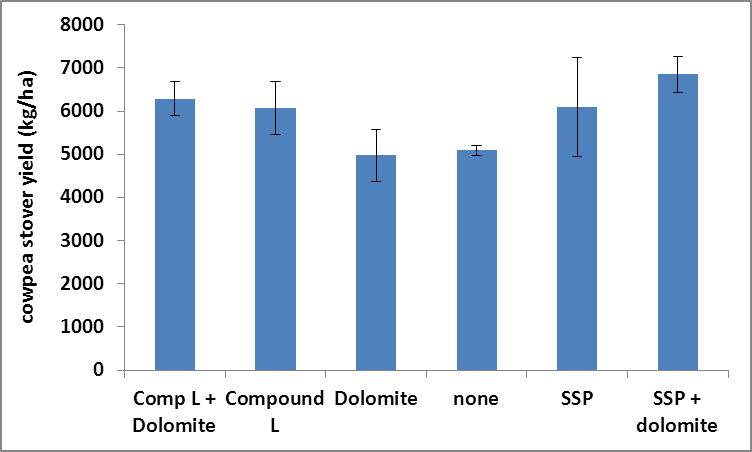
Soil characteristics:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.65 |  | 0.10 | 12.6 |  | 0.75 | 5.34 | 3.25 |  | 62 | 16 | 22 |

Remarks: No impact from the use of inputs on yields, cowpea stover yields very high

Talkmore: The plot was previously fertilised with manure. One of the most important factor in these trials was rainfall distribution especially at the beginning of the season. Fertilised plots experienced moisture stress after germination which even affected plant population in the early stages of the trial. This was mainly as a result of little amounts of rainfall as well as long dry spells. Plots fertilised with compound L suffered the most and had the least plant population even a few weeks after gap filling. The soil fertility status of this field may account for the high biomass yields. Perhaps high N availability resulted in luxury consumption at the expense of grain formation. The compound L treatments added more N thus resulted in more vegetative growth than reproductive growth. From the graphs the higher the biomass yield, the lower the grain yield. The variety used is also a bit questionable because it was purchased as IT18 but after germination it was confirmed to be CBC1.





Location: Chikwanha, Mhondoro

GPS: E30.64253 S18.28134

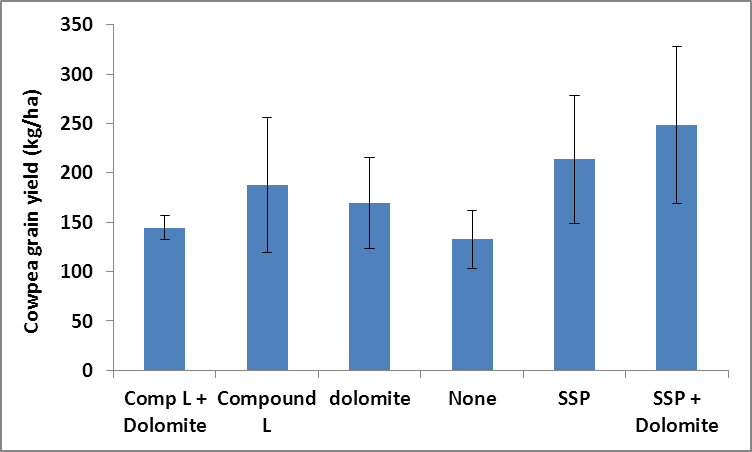
Planting date: 20-11-2010

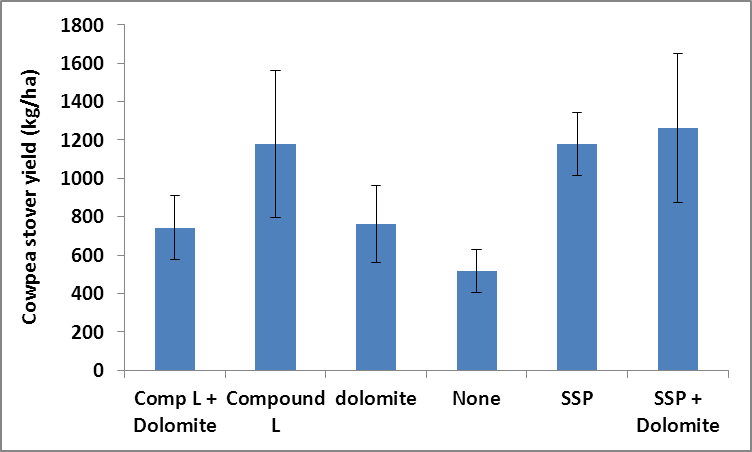
Soil characteristics:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.97 |  | 0.04 | 10.6 |  | 0.16 | 2.2 | 0.4 |  | 90 | 6 | 4 |

Remarks: Yields very low.

Talkmore: Although this field is only a few metres away from the mandebvu field with cowpea, the soil types are slightly different. Farmer – low wealth status no cattle . More moisture was stress was observed in this trial because of higher % sand than the other cowpea trial. Yields very low because of very low N status. All compound L plots were almost wilting a few weeks after emergency. Response to P application was quite visible, although compound L had a burning effect on the crops. Low yield in compound L plots could be due to low plant population.





***Groundnut: two inputs trials***

Location: Gwindi, Murehwa

GPS: E31.69485, S17.71519

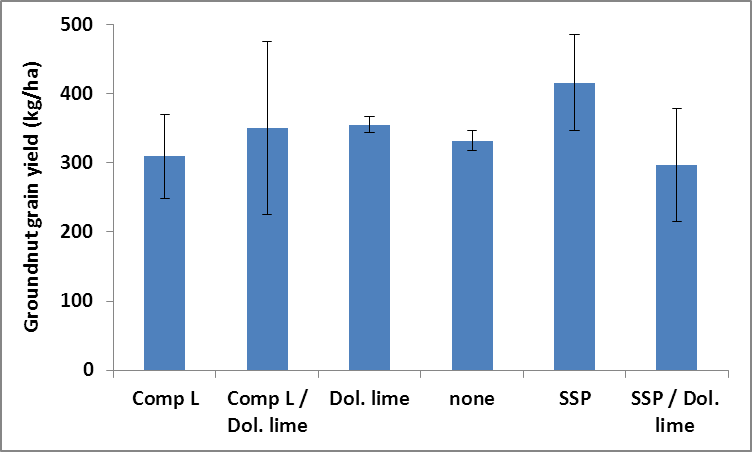
Planting date: 22-11-2010

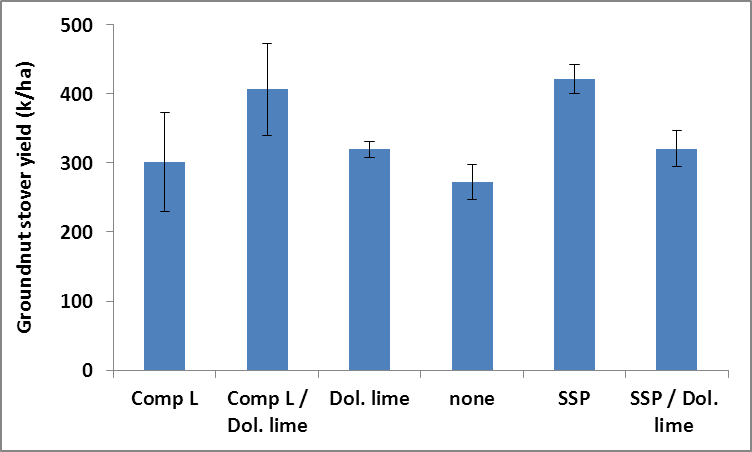
Soil characteristics:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 6.54 |  | 0.04 | 44.8 |  | 0.115 | 1.97 | 0.192 |  | 92 | 4 | 4 |

Remarks: Yields very low.

Talkmore: A sandy mid field which is low in fertility. Low amounts of rainfall distributed unevenly throughout the season. A bit of fertiliser burn (compound L ) evident about three weeks after emergency.





Location: Gandanhamo, Murehwa

GPS: E31.70933, S17.725

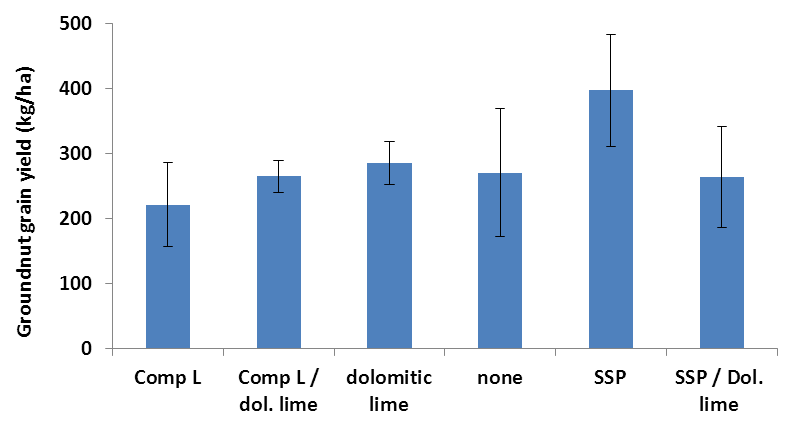
Planting date: 24-11-2010

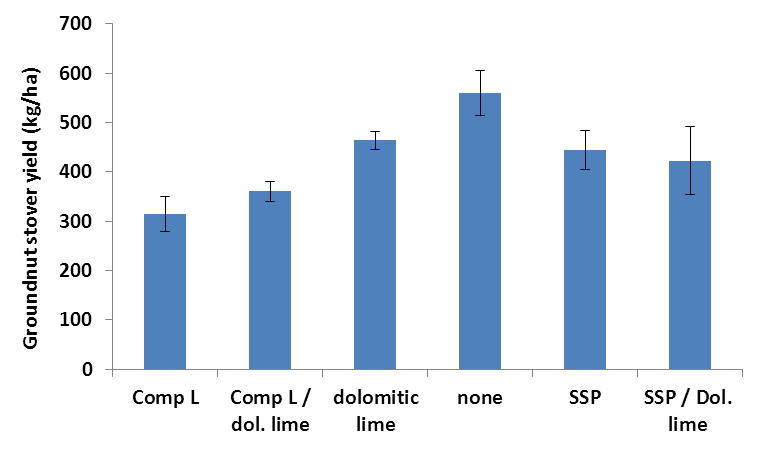
Soil characteristics

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.94 |  | 0.09 | 13.3 |  | 0.072 | 1.29 | 0.23 |  | 90 | 6 | 4 |

Remarks: yield very low.

Talkmore: Signs of fertiliser burn also visible in this trial. A sandy outfield with low fertility status and the farmer would be a poor farmer. Fertiliser burn in Compound L plots visible about three weeks after emergency. Plants appeared to be wilting in fertilised plots but much more in the Compound L plots until they received enough rains. This affected the growth of the crop in these plots for the season. This is the same with the Gwindi field trial

`



***Soybean: 3 variety trials + 2 input trials***

Location: Kadadi, Murehwa

GPS: E31.6986, S17.72303

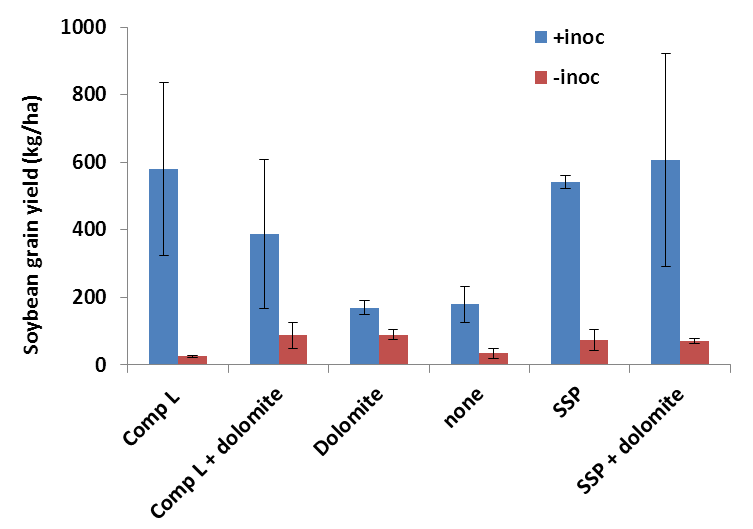
Planting date: 16-12-2010

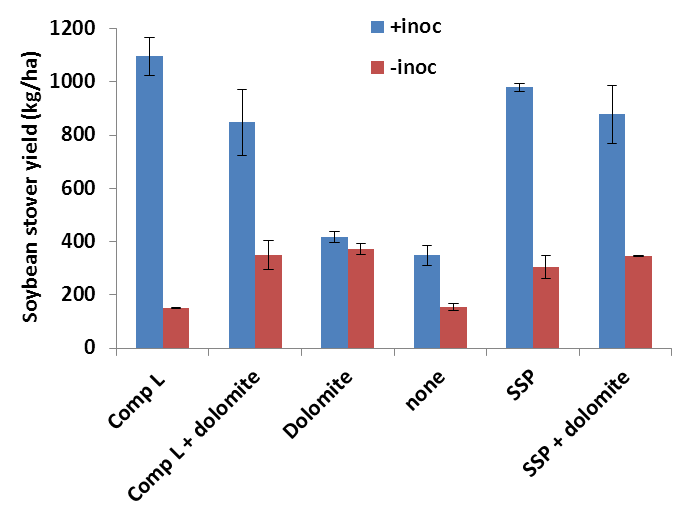
Soil characteristics:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.23 |  | 0.05 | 16.7 |  | 0.077 | 0.50 | 0.108 |  | 86 | 8 | 6 |

Remarks: yields low but strong response to inoculation and compound L as well as SSP.

Talkmore: A sandy outfield with poor structure and fertility status. Generally rainfall amount and distribution was rather drastic. A general response to P application shown and addition of Ca and Mg alone did not result in yield increase.





Location: Masuka, Mudzi

GPS: E32.7735, S17.0923

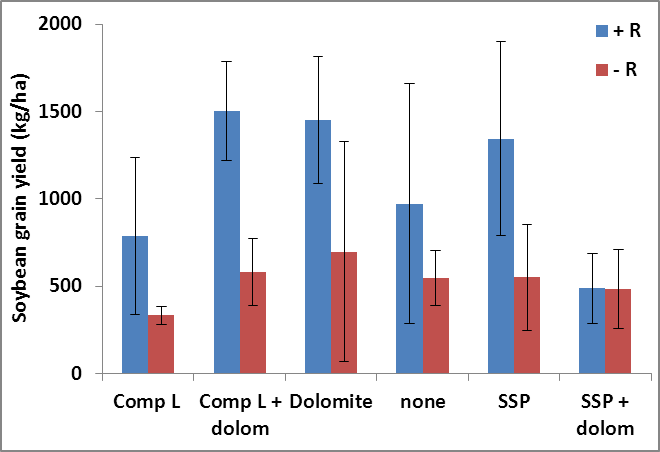
Planting date: 04-01-2011

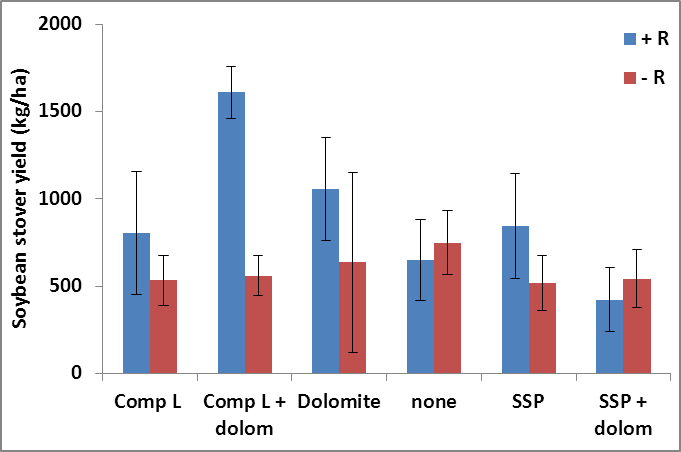
Soil characteristics:

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 6.31 |  | 0.07 | 13.3 |  | 0.30 | 4.48 | 1.21 |  | 88 | 4 | 8 |

Remarks: Relatively high yields, strong effect of inoculation in most treatments, fertiliser input effects on yield make no sense.

Talkmore: Block 5 and 6 slightly different from the rest of the field, a bit more fertile masking the effects of fertiliser . This variability within the plot could account for the chaotic response to fertiliser application. The experimental field was however a mid-field.





Location: Ngundu Enia, Murehwa

GPS: E31.6984, S17.69132

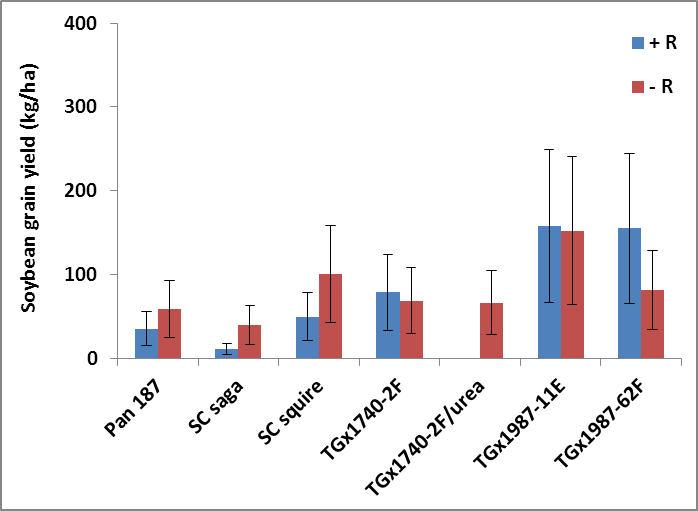
Planting date: 05-01-2011

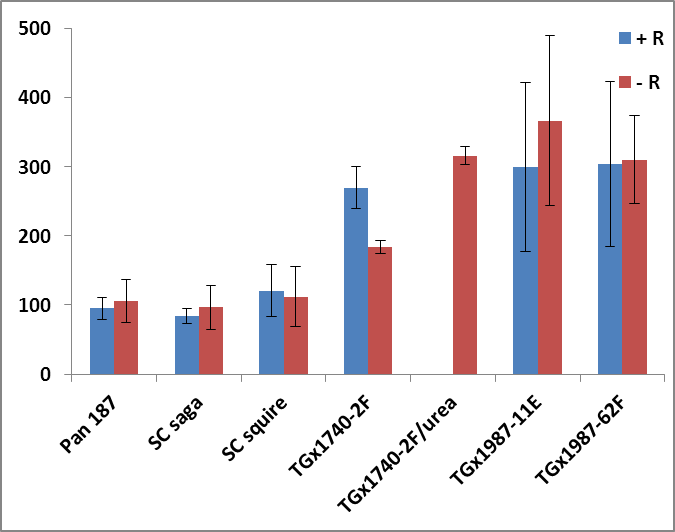
Soil characteristics

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.52 |  | 0.05 | 11.6 |  | 0.097 | 0.77 | 0.15 |  | 92 | 4 | 4 |

Remarks: Very low yields, TGx varieties perform relatively good, no impact visible from inoculation.

Talkmore: A sandy outfield with poor structure . management of this plot a challenge. Late weeding , poor distribution of rainfall.





Location: Hwedza

GPS: S18.8815, E031.6969

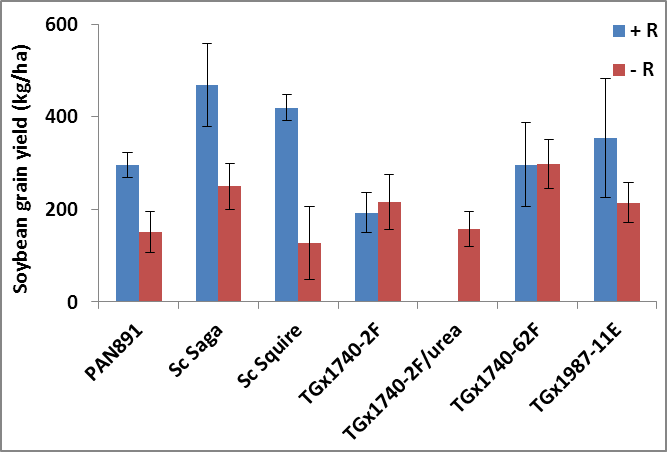
Date of planting: 18-01-2011

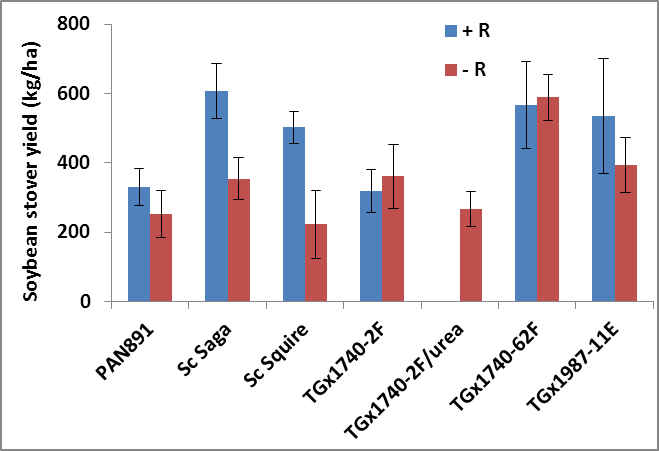
Soil characteristics

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 6.27 |  | 0.06 | 18.6 |  | 0.14 | 3.23 | 0.32 |  | 88 | 6 | 6 |

Remarks: late planting, yields generally low, a response to inoculation visible, but not with TGx varieties

Talkmore: This field is probably the best managed field although it is also a sandy outfield. Experiments in Hwedza were almost not established but however a late decision resulted in the late planting. The promiscuous TG varieties did not respond to inoculation but the local specific varieties responded well.





Location: Mushayi, Mhondoro

GPS: E30.74365, S18.11114

Date of planting: 06-01-2011

Soil characteristics

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| pH (H2O) | Total C | Total N | P (Olsen) | C.E.C | K | Ca | Mg | Na | Sand | Silt | Clay |
|  | % | % | ppm | cmol/kg | cmol/kg | cmol/kg | cmol/kg | cmol/kg | % | % | % |
| 4.59 |  | 0.10 | 10.38331 |  | 0.610256 | 7.45 | 3.75 |  | 64 | 18 | 18 |

Remarks: no response to inoculation, grain yields low.

Talkmore: This field showed quite some variability hence some plots were yielding higher than expected. Lack of response to inoculation could be due moisture stress soon after planting . Rainfall distribution and amount was not good enough.

