



May 2015

PHENOLOGICAL REPORT ON SOYA BEAN VARIETY TRIAL EASTERN CAPE, SOUTH AFRICA

The trial was planted, December 2014, in the Eastern Cape area of Engcobo, which is at an altitude of 800 m and has an average rainfall of 500 to 600 mm of rain of which 70% falls between the months of December and March. The lands that were used do not have access to irrigation and therefore, the trial was done under “dry land” conditions.

The trial was planted out in 6 beds of 4 rows at, row spacing at 52 cm with a space of 1 m between each bed. This space was to aid access for weeding and crop inspection.

The varieties trialled were No. 5 and 6 of RR and BT seeds. They were planted as inoculated seed and with anti fungal products. Thereby, using biological farming at it's best. There was a control planted within the trial.

The land planted had not been used for some years and it was cultivated just once by means of one pass of a disc cultivator. Due to this, the trial was planted into “open soil” and not in a “no till” organic covering scenario. The trial was laid out and planted in a specific direction so as to avoid erosion and wind damage to the seedlings as they emerged post planting. There was no fertiliser used at all through out this trial and knowing that the pH would be < 4.5 KCL and the Phosphate levels will be about 8 ppm with Potassium at 150 ppm. The planting of the trial was completed on the 24 December 2014.

At the time of the inspection, 25 February 2015, the plants were at growth stage R2, just pre flowering, the overall visual look of the trial was one of “good and healthy growth”. On closer inspection, the plants had good crop cover and as a result had beaten the weeds. There was evidence of two rows with a bit of insect damage, nothing serious. The other rows were totally clear of any insect damage. These were the control rows and it is to be expected. The other rows were thick and healthy however, evidence of an old contour was highlighted, as nutrient levels are generally higher around contours due to water runoff and nutrient collection.

The crop was soon to enter the critical growth stage of R4 and R5, rainfall at these stages is essential and should the crop receive the expected average rainfall, then the trial would be expected to yield well and show that under true “no till” farming methods and incorporating the biological element, soya beans can do very well in this area in the future.

So far, the trial of these varieties was showing better results than other known soya trials done in the area by other institutions in the past. From this it can be taken that with correct and timely land preparation, the establishment of an “organic carpet” or “mulch”, correct soil amelioration following a full soil analysis and true “no till” farming methods, the growing of soya is very feasible in this area. The yield will improve as the soils are built up to the required levels of fertility and with the use of no till farming methods.

Pictures below are as of 25 February 2015

Picture showing good colour and foliage density



Picture showing inter row crop cover and uniformity



The old contour is evident by the heavier "green line" at the top of this picture

Pre Harvest Inspection and Yield Assessment

3rd May 2015 the trial was inspected and a yield estimation sample was taken. The crop had senesced and drying off had begun, although the seeds were at a moisture content of above 25%.

Methodology

Each of the 6 beds had a sample taken in two places, the first sample of 20 to 22 plants was taken from an average looking area within the bed. The samples of pods were collected in bags, six in all, and they were retained. These pods were shelled to aid drying and once dried they were weighed 3 times to obtain an accurate weight. Therefore, the weights used per block are the pods collected, shelled and air dried to about 14% moisture.

The second sample was taken from the area identified as the “healthy growth” and where the “sane plants” were identified to be, near the “old contour.” The idea of this was to establish what potential yield could be expected if all the plants within a given area could grow to the same degree.

The varieties, of which there are 4, were divided between the 6 beds. Samples were taken from the area of the bed where 3 or more rows were of the same variety. The numbering of 1 to 6 is from the Western side (right hand side on photo) to the Eastern side (left hand side of photo). The view of the photo is looking South.

The four varieties can be clearly seen. The least dry of the varieties (late maturing) was the 3 rows of grey plants in blocks 4 and 5. The most dry was block 1 followed by block 6.



Results

As the trial was planted without soil amelioration, without fertiliser at planting and without any spray programme in place, the result is that farming this way would lead to a sub-economic yield. Some of the pods had 3 seeds however, the 3rd one was often underdeveloped and did not reach maturity. Some pods were “flat” due to no fully developed seeds inside. These indicate that the nutrition available was insufficient, as expected. There had been an insect infestation at some stage as at least 2 of the lower pods were missing and there was no evidence of them on the ground below the plant. This led the plants to have fewer pods, on average, and therefore, this had been a significant yield reducer.

The reason for pods dropping can also be linked to the inherent lack of nutrition, as the plants are small and only carrying a few pods anyway. Stress caused by excessive heat and/or drought was not likely during this particular growing season.

However, with soil amelioration, the correct blend of base fertiliser at planting and the inclusion of a spray programme incorporating foliar feeds, the result would be far better.

Assumptions	
Row spacing m	0.52
Planted meters m	19230.76923
Samples/ha	17018.37985
Ave plants/sample	20
Plant pop/ha	340367.597

These assumptions were made and used in all the calculations made.

Findings



Herewith, is the most sane (healthy) plant found with 73 pods, it was found in the area of the “healthy growth” area situated close to the “old contour” as was indicated in the initial report.

Sane Plants	24	18	41	27	27	73
showing true	22	16	41	25	23	42
potential	23	15	28	23	21	40
	25	21	38	21	25	55
Total Pods	94	70	148	96	96	210
Ave pods/plant	23.5	17.5	37	24	24	52.5
Ave kg/pod	0.000431198	0.000317058	0.00037863	0.000501698	0.000436735	0.000303219
Ave kg/seed	0.000143733	0.000105686	0.00012621	0.000167233	0.000145578	0.000101073
Ave kg/plant	0.010133151	0.00554852	0.014009323	0.012040763	0.010481633	0.015918981
kg/ha	3448.99632	1888.536256	4768.319471	4098.285466	3567.608119	5418.305474
Yield t/ha	3.44899632	1.888536256	4.768319471	4.098285466	3.567608119	5.418305474

This table is showing the results of the sane plants from the “old contour” area, all plants per block were within 10 plants of each other. The average pod weight of the first samples was used to determine the weight of the best pods and multiplied out giving an indication as to the yield potential of the area under better nutrient available conditions.

The second reason for the better growth could be the moisture availability during earlier growth with water collecting at the “old contour”. This can be simulated by improving the soil water holding capacity by methods such as creating a “mulch blanket” by no-till farming techniques, by improving the soil biology and by enhancing the chemical elemental balancing.

The resulting figures are indicating very good yield potentials of realistically from 3 tons to a possible 5.4 tons/hectare. These yields are certainly possible with using high-level precision farming techniques while incorporating all the biological farming skills available. Timely rainfall will also influence the yields that are achievable.

Conclusion

The overall success of the trial has been seen as the fact that soya beans grow in this area of the Eastern Cape even without added fertiliser. The planting of the trial was only completed on the 24 December 2015, as soya is photosensitive, a better planting date of early November 2014 would have shown an increase in yield. The "sane plants" certainly indicate the potential for good to great yields in the future.

Therefore, with a nearer planting date, the correct soil amelioration and fertiliser input at planting, plus the correct use of foliar-feeds, the use of selective fungicides, insecticides and biological sprays, it can be stated that good to very good yields can be expected in the area of concern within the Eastern Cape.

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