Groundnut Cultivar Evaluation Report 2012

Acknowledgments

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REPORT ON GROUNDNUT CULTIVAR EVALUATION TRIALS 2011/12

L Salomon

SUMMARY

During the past six seasons the National Groundnut Cultivar Trials were conducted within the groundnut production areas of South Africa. Fourteen cultivars and breeding lines were tested under both dryland and irrigation conditions and submitted to a wide range of climatic and geographic conditions. The accumulated data sets were statistically analyzed to obtain objective data to be applied for decision making purposes. This information is of great importance as to establish the stability of cultivars within the groundnut industry of South Africa. With the varying seasonal conditions experienced over the past couple of seasons, the necessity of continued evaluation is of great importance. The past season was characterized by late rains for dryland planting and under average rainfall for the rest of the season. Irrigation production gave good high quality groundnut yields.

INTRODUCTION

The importance of adaptation, yield and quality are highlighted in conducting the groundnut evaluation trials. The data obtained is of great value as has been proven by previous groundnut trials as well as with evaluation trials conducted on other crops.

Promising developmental lines as well as registered cultivars are evaluated by accumulated trial data to ensure the availability of the latest relevant data for the producer and industry. It is critical to evaluate the different lines across the major groundnut production areas as it will give better insight into the adaptation over different seasons. This data is used to compile a national cultivar evaluation report.

MATERIAL AND METHODS

Seventeen were planted during October-November 2011. Six registered cultivars, two newly registered cultivars and six potential lines were tested at eleven different localities. Each of these localities has a unique climate and soil-type, which is representative of the groundnut-production areas of South Africa. The trials were divided into three groups : Irrigated/sprayed (nine), irrigated/not sprayed (three) and dryland trials (nine). Seventeen trials were successfully harvested and the data were used to compile this report. Each trial delivered crucial data according to the area in which it was cultivated and the treatments applied. Standard agricultural

practices were employed. The grading tables for each locality were included in this report.

RESULTS

Pod yield (Tables 6;28;50)
The overall performers were Tufa, PC 369-K2 and PC 369-K3, ARC-Opal1 and Anel. Under dryland conditions Tufa, Kwarts, Inkanyezi, ARC-Opal1 and Anel were the best performers. PC 369-K3, PC 357-K1, Tufa and ARC-Opal1 were the best performers under irrigated-sprayed conditions. Under irrigated/not sprayed conditions Tufa, PC 369-K2, PC 299-K1 and Anel were the best performers.

Kernel yield (Tables 7;29;51)
The overall best performers were Tufa, Kwarts, PC 369-K2, PC 369-K3 and ARC-Opla1.

Shelling percentage (Table 8;30;52)
Tables 8, 30 and 52 shows the shelling percentage of the cultivars under the different treatments at the different localities. The irrigated-sprayed trials (Tab 8) had a trial mean of 72.40%.Lichtenburg had the highest average shelling percentage of 77.40% while Brits had the lowest percentage of 66.79%.All cultivars and lines had an average shelling percentage above 70% except Inkanyezi which had a shelling percentage of 67,58% overall average.

The trial mean under dryland conditions (Tab 30) were 69.24% with Schweizer Reneke having the highest mean of 74.62% and Hoopstad having the lowest mean of 60.84%. Akwa, Anel, Inkanyezi, PC 371-K1, Tufa, PC 299-K1 and ARC-Opal1 gave shelling percentages above 70% under dryland conditions.

The irrigated-not sprayed trials (Tab 52) had a mean shelling percentage of 72.59% with Brits having the highest average shelling percentage. Here PC 369-K3 and Kwarts gave shelling percentages above 75%.

Yield reliability (regression) (Table 72-73)
Describing yield reliability one could say it is the summary of the gathered data over all the trial localities over a number of years. The data collected gave a guideline for possible cultivar yield at different yield targets. Cultivar stability can also be judged by the D-value; the lower the value, the higher the stability of the cultivar. The B-value is indicative of the slope of the regression line which is already built into the cultivar reliability.

Anel and ARC-Opal1 showed stability in their yield targets for the period from 2006 to 2012.

Kernel sizes (Tables 8-14;31-36;52-58)
Differences amongst the cultivars and the lines can be observed within the different trials. It is clear from the data that genotype environmental interactions are more apparent in regard with the past season's climatic extremes, thus the differences in kernel sizes. These influences are evident in the different weights obtained on each sieve during the grading process.

Grading observations (Tables 15-27;37-48;59-70)
Tables 15, 37 and 59 represents the percentage splits found in the grading samples. The locality Vaalharts produced the highest mean under the irrigated/sprayed trials (Tab 15) of 17.34% as well as under irrigated/not sprayed trials (Tab 37) 14.41% and under the dryland trials (Tab 59) Vaalharts produced a mean of 14.27%. The average trial mean for the Irrigated/sprayed trials were 6.89%, for irrigated/not sprayed 8.54% and for dryland trials 4.98%.

Tables 16,38 and 60 shows the percentage UBS (unsound, soiled and blemished kernels) over the different localities. The average trial mean for the irrigated/prayed trials (Tab 16) were 3.59%, for the irrigated/ not sprayed trials(Tab 38) 5.16% and for the dryland trials (Tab 60) 2.44%. The highest trial mean under the irrigated/sprayed trials (Tab 16) was obtained at Potchefstroom with a mean of 7.48% while the lowest mean was obtained at Douglas with a mean of 1.50%. The highest trial mean under the dryland trials (Tab 60) was obtained at Setlagole with a mean of 3.61% and the lowest at Hoopstad with a mean of 0.85%. The highest trial mean under irrigated/not sprayed trials (Tab38) were obtained at Potchefstroom with an average mean of 7.75%.

Tables 17,39 and 61 represents the percentage unsound kernels in the edible grade. The average trial mean for the irrigated/sprayed trials (Tab 17) were 0.94%, for the irrigated/not sprayed trials (Tab 39) 1.99% and for the dryland trials (Tab 61) 0.86%. The highest trial mean for the irrigated/sprayed trials (Tab 17) was obtained at Potchefstroom with a trial mean of 2.39% and the lowest trial mean was obtained at Burhmansdrif with a trial mean of 0.43%. The highest trial mean for the dryland trials (Tab 61) was obtained at Schweizer-Reneke with a trial mean of 1.57% and the lowest trial mean was obtained at Lichtenburg with a mean of 0.34%. The average trial mean for the irrigated/not sprayed trials (Tab 39) were 1.99%.

Table 18, 40 and 62 shows the percentage defects in the edible grade. The average trial mean for the irrigated/sprayed trials (Tab 18) was 5.39%, for the irrigated/not sprayed trials(Tab 40) 7.17% and for the dryland trials(Tab 62) 3.95%. The highest trial mean for the irrigated/sprayed trials (Tab18) was obtained at Potchefstroom with a trial mean of 8.98% and the lowest trial mean at Douglas with a

trial mean of 1.90%. The highest trial mean for the dryland trials (Tab 62) was obtained at Vaalharts with a trial mean of 6.16% and the lowest trial mean was obtained at Hoopstad with a trial mean of 1.77%.

Tables 23-25; 45-47; 67-69 gives an insight into the production of 1-, 2- and 3- kernel pods by the different cultivars and lines. Tufa produced the highest amount of 1-kernel pods over all the trial treatments. Majority of the cultivars and lines produces 2-kernel pods with only a faction of 3-kernel pods being produced.

Tables 26, 48 and 70 shows the percentage round kernels produced by the different cultivars. The average trial mean for the irrigated/sprayed trials (Tab 26) was 93.77, for the irrigated/not sprayed trials (Tab 48) the trial mean was 93.85% and for the dryland trials (Tab 70) the trial mean was 92.68%.

Table 27,49 and 71 is a compilation of the grading tables of the different localities under the different treatments.

Percentage choice grade (Table 19; 41; 63)
Table 19, 41 and 63 shows the percentage choice grade obtained at the different localities and treatments. The average trial mean for the irrigated sprayed trials (Tab 19) was 79.62%, for the irrigated/not sprayed trials (Tab 41) 75.36% and for the dryland trials (Tab 63) 77.5%.The highest trial mean for the irrigated/sprayed trials (Tab 19) was obtained at Brits with a mean of 93.87% and the lowest trial mean was obtained at Potchefstroom with a mean of 67.87%. The highest trial mean for the dryland trials (Tab 63) was obtained at Hoopstad with a mean of 94.47% and the lowest trial mean was obtained at Vaalharts with a mean of 63.98%.

Standard-, diverse- and crushing grade (Table 20-22; 42-44; 64-66)
The highest trial mean for Standard grade under the irrigated/sprayed trials (Tab 20) was obtained at Naboomspruit with a mean of 11.90% and under the dryland trials (Tab 64) was obtained at Vaalharts with a mean of 3.04%. The average trial mean for the irrigated/not sprayed trials (Tab 42) was 3.46%.

The highest trial mean for Diverse grade under the irrigated/sprayed trials (Tab 21) was obtained at Vaalharts with a mean of 25.44% and under the dryland trials (Tab 65) was obtained at Vaalharts with a mean of 27.06%. The average trial mean for the irrigated/not sprayed trials (Tab 43) was 16.39%.

The highest trial mean for Crushing grade under the irrigated/sprayed trials (Tab 22) was obtained at Vaalharts with a mean of 5.69% and under the dryland trials (Tab 66) was obtained at Vierfontein with a

mean of 21.91%. The average trial mean for the irrigated/not sprayed trials (Tab 44) was 4.79%.

Comparison of high oleic acid lines with Akwa
For biological control the cultivar Akwa was selected to evaluate the high oleic acid cultivar SA Juweel and the newly registered high oleic line ARC-Oleic2.When considering the LSD (5%) located in Tables 7, 30 and 53 one can state that under irrigated/ sprayed conditions (Tab 7) Akwa did better than SA Juweel and ARC-Oleic2, but it must be noted that ARC-Oleic2 performed better than SA Juweel. Statistically the difference between the cultivars is not significant Under dryland condition (Tab 51) it is noted that the difference between Akwa and ARC-Oleic2 is not significant, but the difference between ARC-Oleic2 and SA Juweel is significant where ARC-Oleic2 outperforms SA Juweel.

It must be stressed that it is imperative to collaborate this findings along with the complete grading tables (Tab 27, 49 and 71) in order to determine the quality differences between these cultivars.

DISCUSSION & CONCLUSIONS

The past season ensured a wide range of factors such as climatic differences, production methods and geological locations were evaluated as a means to define cultivar and line performance. While compiling the report all these aspects was brought together to ensure a relevant reliability for the different cultivars over the long term. As climatic conditions differ from year to year and from decade to decade, renewal of the known impacts must be made as global warming comes into play and influence everyday existence. Overall good results were obtained. Good quality groundnuts can be attributed to the practicing of sound cultivation practices and good harvesting procedures. Harvesting at the correct time has had a huge impact on this season’s groundnut crop as late rains and the inability to harvest came into play.

With six years’ data available to compile the cultivar reliability table it can be said that a better light is shed on the different cultivars’ reliability over a wider range of production conditions. The current trial distribution covers most if not all the production areas of South Africa and gives an insight to every locations unique package of conditions. Once again the results have shown that weather can ultimately make or break the groundnut industry.

A heartfelt “Thank you” goes out to every farmer and factory that supported this project and made possible to deliver such a comprehensive report to the Groundnut Industry of South Africa.

Table 1: Co-operators at the different irrigation localities (Sprayed/Not Sprayed) 2011/12

TR No.	Locality	Responsible Official	Institution	Postal Adress	Code
1	Brits	T.W. Molebatsi/ T. Kruger	ARC-GCI	P/Bag X1251, Potchefstroom	2520
2	Burhmansdrift	L. Salomon	ARC-GCI/ Nu-nut	P/Bag X1251, Potchefstroom	2520
3	Douglas	L. Salomon/L. Banting	ARC-GCI/ GWK	P/Bag X1251, Potchefstroom	2520
4	Lichtenburg	W. Otto/C. Van Gerwe	NWK	PO Box 107. Lichtenburg	2740
5	Naboomspruit	L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2520
6	Potchefstroom	L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2520
7	Vaalharts	J v. Schalkwyk/ L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2520

Table 2: Co-operators at the different Dryland localities 2011/12

TR No.	Locality	Responsible Official	Institution	Postal Adress	Code
1	Hoopstad	L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2550
2	Lichtenburg	W. Otto/C. Van Gerwe	NWK	PO Box 107, Lichtenburg	2740
3	Potchefstroom	L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2520
4	Schweizer-Reneke	L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2520
5	Setlagole	L. Salomon/L. de Kock	ARC-GCI/RobaNuts	P/Bag X1251, Potchefstroom	2520
6	Vierfontein	L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2550
7	Vaalharts	J. v. Schalkwyk/ L. Salomon	ARC-GCI	P/Bag X1251, Potchefstroom	2550

Table 3: Localities and details of Co-operators 2011/12

TR No.	District	Farm Name	Owner	Address	Magistrate district
1	Brits	Brits Research station	ARC	PO Box 1261 Brits, 0250	Brits
2	Burhmansdrift	Vlakplaats	Bob Scott	PO Box 24 Burhmansdrift,	Zeerus
3	Douglas	Not supplied by GWK			Kimberly
4	Hoopstad	Excelcior	Callie Snyman	PO Box 156 Hoopstad. 9479	Hoopstad
5	Lichtenburg	Rietgat	NWK	PO Box 107 Lichtenburg, 2740	Lichtenburg
6	Naboomspruit	Bufland	Leon en Deon Eksteen	PO box 882 Naboomspruit 0560	Naboomspruit
7	Potchefstroom	Agriculture centre	ARC	P/Bag X1251 Potchefstroom, 2550	Potchefstroom
8	Schweizer-Reneke	Homansvlei	Paul Pretorius	PO Box 3916 Schweizer-Reneke, 2780	Schweizer-Reneke
9	Setlagole	Roba nuts	Lourens de Kock	PO Box 252 Stella, 8650	Setlagole
10	Vaalharts	Vaalharts Research station	ARC	P/Bag X 9 Jan Kempdorp, 9550	Hartswater
11	Vierfontein	Bult Canaan	Cor Brink	PO Box 53 Okney, 2620	Orkney

Table 4: Details of trial localities: Irrigated (Sprayed/Not Sprayed) 2011/12

TR no.	Localities	Planting date	Final Harvest date	Growth season	Row width
1	Brits	27/10/2011	29/3/2012	±150	90 cm
2	Burhmansdrift	8/12/2011	10/5/2012	±150	90 cm
3	Douglas	3/11/2011	4/4/2012	±150	76 cm
4	Lichtenburg	04/11/2010	29/4/2011	±150	90 cm
5	Naboomspruit	18/10/2011	15/3/2012	±150	50 cm
6	Potchefstroom	31/10/2011	2/4/2012	±150	90 cm
7	Vaalharts	4/11/2011	5/4/2012	±150	76 cm

Table 5: Details of trial localities: Dryland 2011/12

PR no.	Localities	Planting date	Final Harvest date	Growth season	Row width
1	Hoopstad	3/12/2011	9/5/2012	±150	78 cm
2	Lichtenburg (Rietgat)	30/11/2010	29/4/2011	±150	90 cm
3	Potchefstroom	31/10/201	2/4/2012	±150	90 cm
4	Schweizer-Reneke (Paul)	5/12/2011	5/5/2012	±150	90 cm
5	Setlagole	7/12/2011	22/5/2012	±150	90 cm
6	Vierfontein	1/12/2011	2/05/2012	±150	90 cm
7	Vaalharts	4/11/2011	5/4/2012	±150	76 cm