



*South African  
Soybean Crop*

*Quality Report  
2012/2013 Season*

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# SOUTH AFRICAN COMMERCIAL SOYBEAN QUALITY FOR THE 2012/2013 SEASON

## Acknowledgements

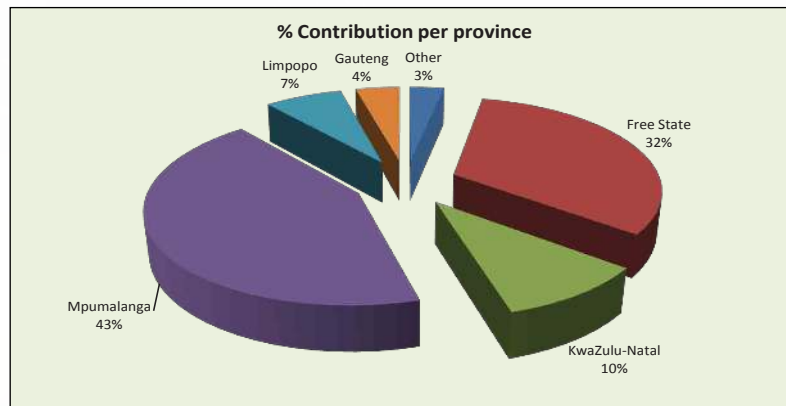
*With gratitude to:*

- *The Oil & Protein Seed Development Trust for its financial support in conducting this survey.*
- *The Grain Silo Industry and its members for their cooperation in providing the samples to make this survey possible.*

## Introduction

The finalized commercial figure for the soybean crop of the 2012/2013 season as overseen by the National Crop Estimates Liaison Committee (CELC) is 784 500 tons. The final calculated crop figure was adjusted downward by 2 600 tons (0.33%). The commercial soybean crop increased by almost 21% (134 500 tons) from the 2011/2012 season. The major soybean-producing provinces, contributing 75% of the total crop, were Mpumalanga and the Free State.

**Graph 1: Contribution of the provinces to the production of the 2012/2013 soybean crop**



*Information provided by the CEC.*

During the harvesting season, a representative sample of each delivery of soybeans at the various silos was taken according to the prescribed grading regulations. The sampling procedure for the samples used in this survey is described on page 22. One hundred and fifty composite soybean samples, proportionally representing the different production regions, were analysed for quality. The samples were graded, milled and chemically analysed for moisture, protein, fat and ash content. Fifteen randomly selected samples were analysed for genetic modification and ten for protein bound amino acid profile. The amino acid analyses were sponsored by the SAGL.

The goal of this crop quality survey is to accumulate quality data on the commercial soybean crop on a national level. This valuable data reveal general tendencies, highlight quality differences in the commercial soybeans produced in different local production regions and provide important information on the quality of commercial soybeans intended for export. A detailed database containing information collected over several seasons is essential and will assist with decision making processes.

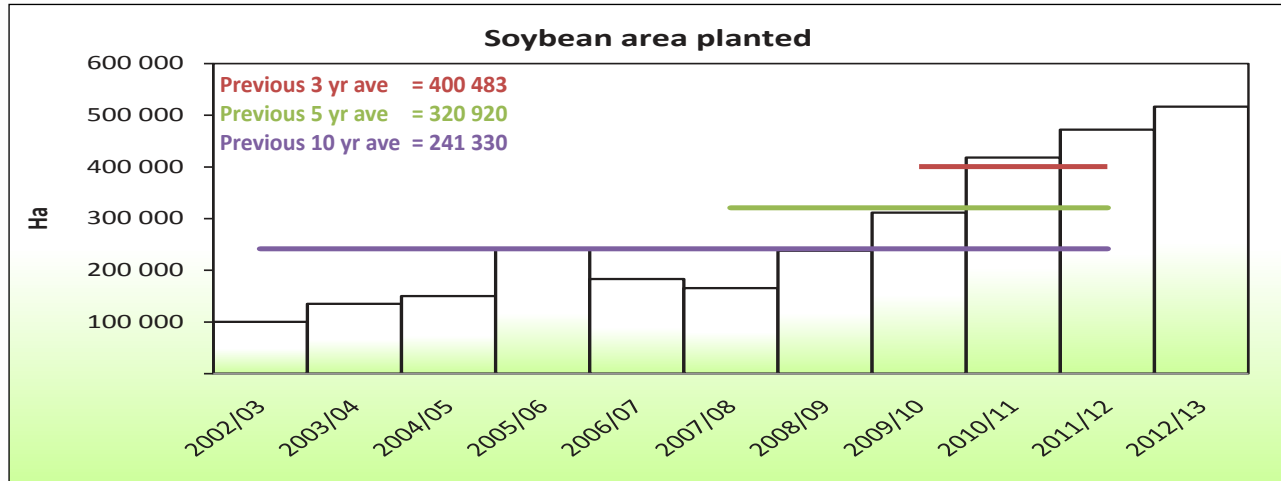
This is the second annual soybean crop quality survey performed by The Southern African Grain Laboratory NPC (SAGL). SAGL was established in 1997 on request of the Grain Industry. SAGL is an ISO 17025 accredited testing laboratory and participates in one national and twelve international proficiency testing schemes as part of our ongoing quality assurance procedures to demonstrate technical competency and international comparability.

The results are available on the SAGL website ([www.sagl.co.za](http://www.sagl.co.za)). The hard copy reports are posted to all the Directly Affected Groups and interested parties. The report is also available for download in a PDF format from the website.

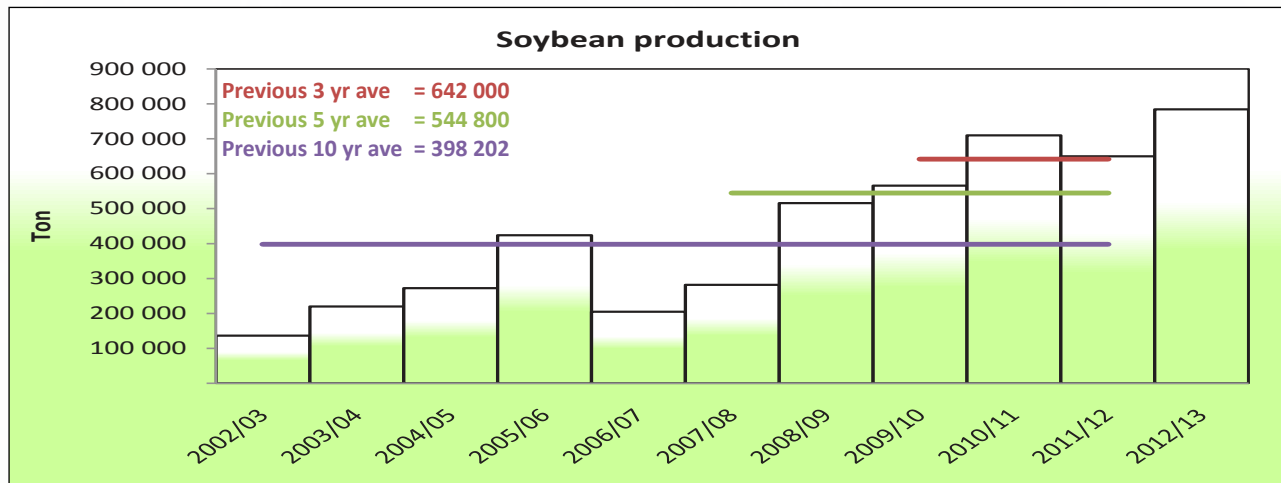
## Production, Supply and Demand

The area utilized for soybean production increased from 472 000 hectares in the previous season to 516 500 hectares this season. A steady increase has been observed over the last six seasons. The yield increased from 1.38 t/ha to 1.52 t/ha.

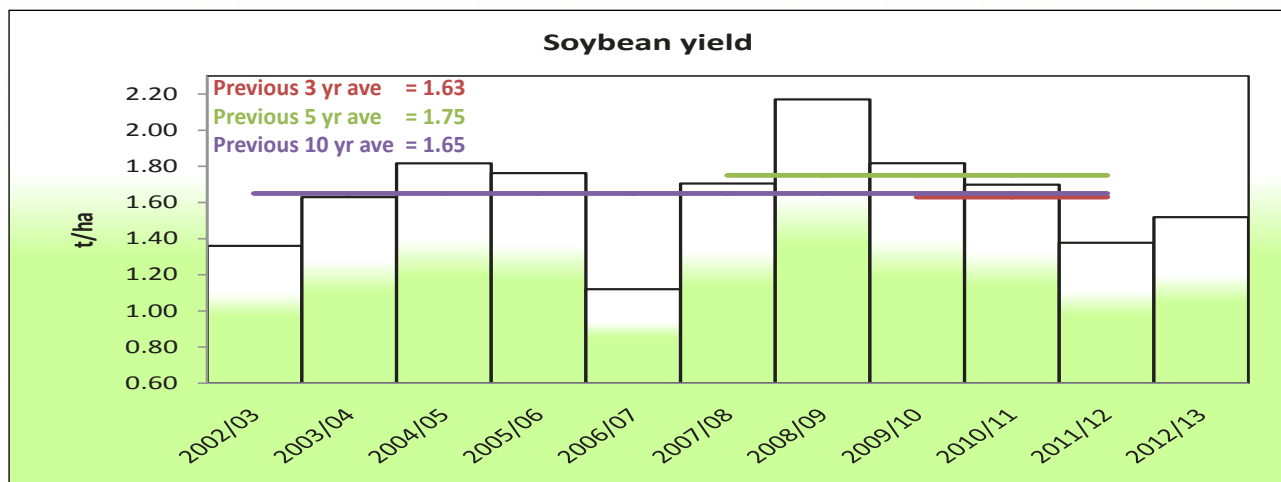
**Graph 2: Total RSA area utilized for soybean production from 2002/03 to 2012/13**



**Graph 3: Soybean production in RSA from 2002/03 to 2012/13**

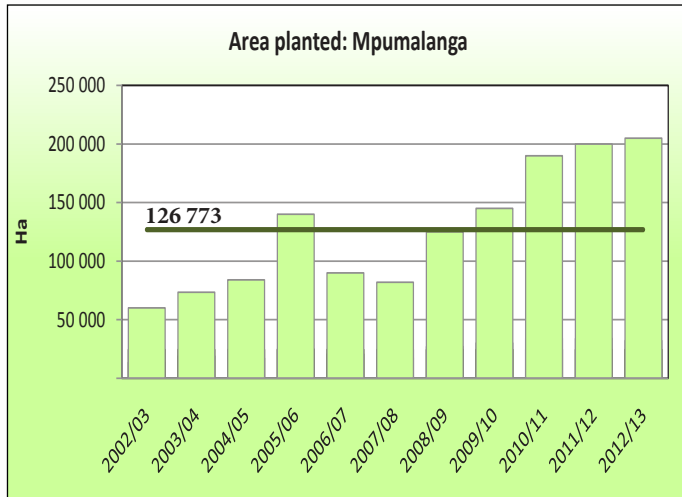


**Graph 4: RSA soybean yield from 2002/03 to 2012/13**

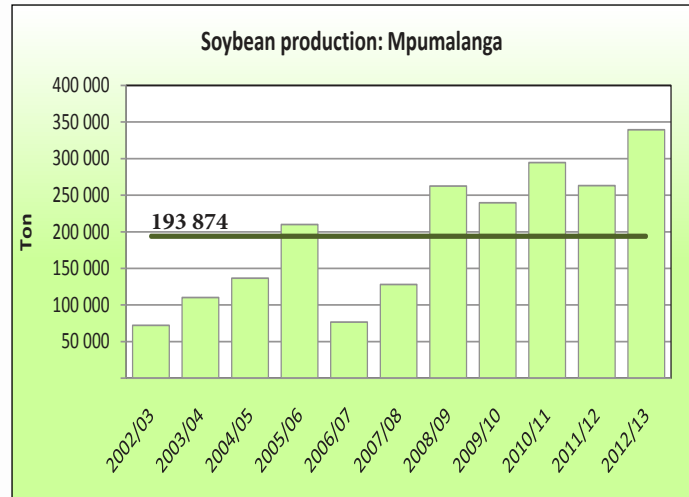


Information provided by the CEC.

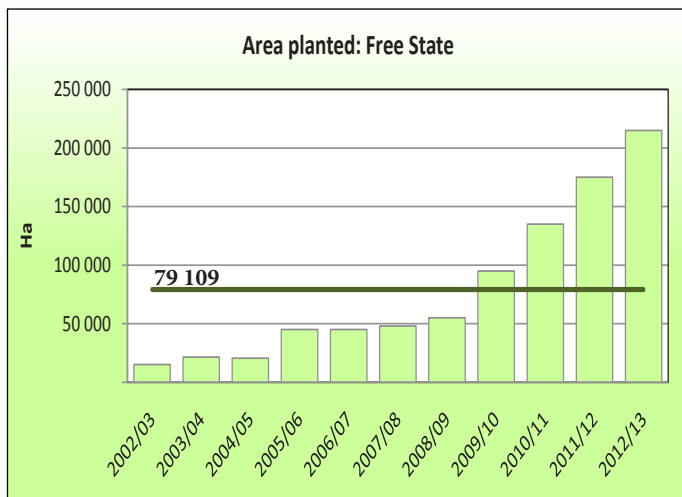
**Graph 5: Area utilized for soybean production in Mpumalanga since 2002/03**



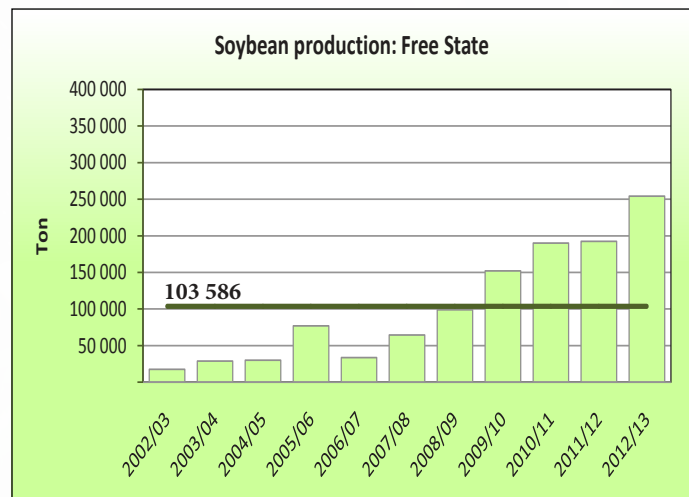
**Graph 6: Soybean production in Mpumalanga since 2002/03**



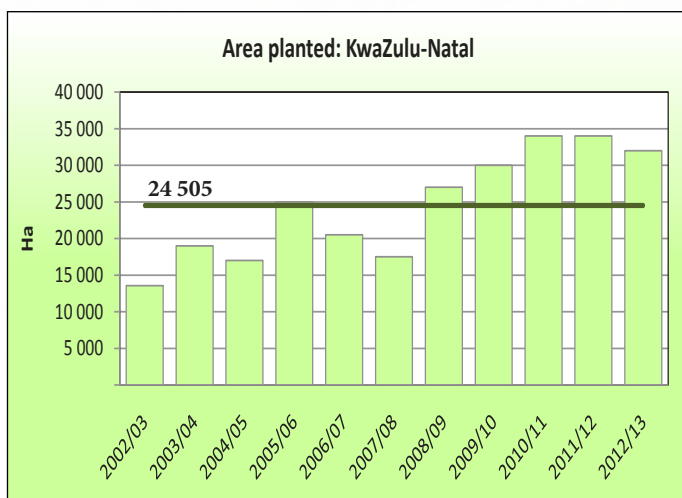
**Graph 7: Area utilized for soybean production in the Free State since 2002/03**



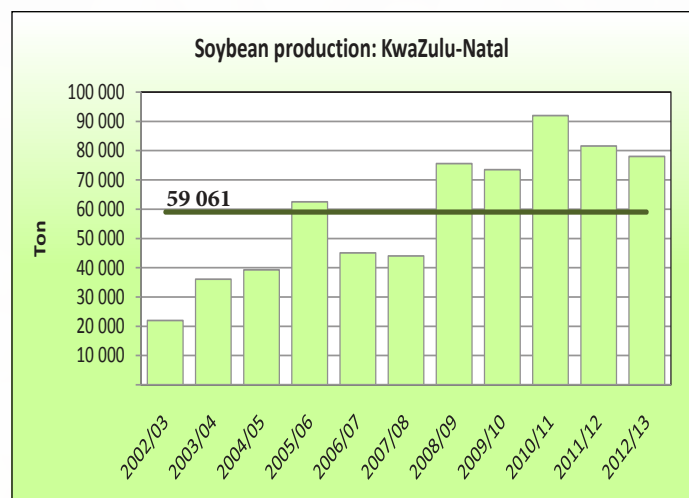
**Graph 8: Soybean production in the Free State since 2002/03**



**Graph 9: Area utilized for soybean production in KwaZulu-Natal since 2002/03**



**Graph 10: Soybean production in KwaZulu-Natal since 2002/03**



Information provided by the CEC.

According to the BFAP Baseline, Agricultural Outlook 2013 – 2022, the favourable return per hectare projected for soybeans due to improved yields and strong prices will result in further increases in plantings and by 2022 soybean plantings are expected to reach 915 000 hectares and production 2.1 million tons. Local soybean crushing capacity is expanding rapidly and by 2015 the entire crop is projected to be processed locally. South Africa currently produces more than half of Africa’s soybeans.

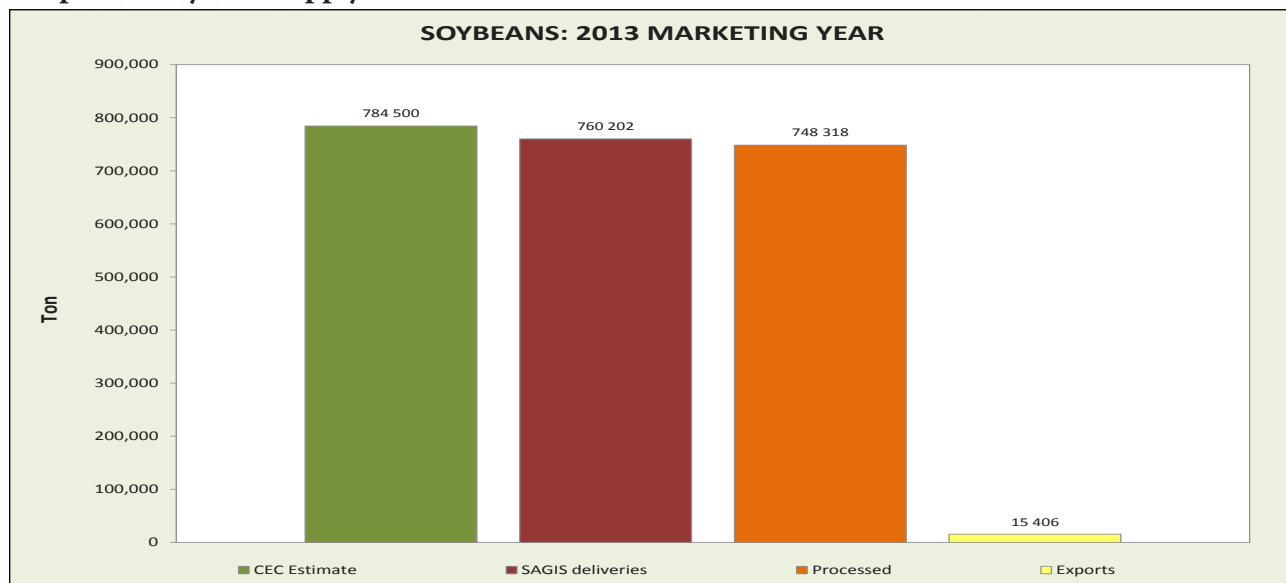
Soybean production is expected to increase in especially Mpumalanga and the North West, as part of the trend towards conservation agriculture. This trend is observed worldwide with the total soybean production in Brazil produced under the no-till system. Crop rotation forms an inherent part of conservation agriculture and soybeans lean itself extremely well to crop rotation systems.

Of the 748 318 tons of soybeans processed during this season, 3.6% was used for human consumption, 21.6% for animal feed as full fat soya and 74.8% crushed to produce oil or oilcake. The demand for full fat soya increased with 11.6% and that for oil/oilcake with 35.8% from the previous season. The amount of soybeans crushed, more than doubled since the 2010/2011 season (247 300 tons to 560 095 tons).

Only 15 406 tons of soybeans were exported compared to the 157 500 tons in the 2011/2012 season. Globally, Brazil, the USA and Argentina are responsible for approximately 87% of soybean exports. Argentina is the largest exporter of soybean meal or oilcake. These countries are also the largest producers of soybeans and together with China and India, produce about 90% of the soybeans cultivated worldwide.

According to the Directorate: Statistics and Economic Analysis from the Department of Agriculture, Forestry and Fisheries (DAFF), soybeans’ contribution to agricultural production increased from R84 000 in 1947 to R3 684 252 in the 2012/2013 season. Soybeans is the third largest contributor to the gross value of agricultural products, maize being the largest followed by wheat.

**Graph 11: Soybean supply and demand overview 2012/2013 season**



Information provided by SAGIS.

	SOYBEANS: SUPPLY AND DEMAND TABLE BASED ON SAGIS' INFO ('000t)													Publication date: 2014-02-24			10 Year average	
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		Current Season Jan - Dec
	Season (Jan - Dec)																	
CEC (Crop Estimate)	200,900	174,800	148,700	209,700	202,400	136,500	220,000	272,500	424,000	205,000	282,000	516,000	566,000	710,000	650,000	784,500		398,200
<b>SUPPLY</b>																		
Opening stock (1 Jan)	61,000	86,000	42,100	56,500	61,000	105,000	48,700	100,500	89,100	131,600	96,500	89,500	112,600	102,700	306,100	175,857		118,230
Prod deliveries	215,000	199,000	153,900	226,100	218,000	127,200	217,000	262,900	409,300	196,400	264,300	503,600	534,700	685,100	623,900	760,202		382,440
Imports	0	14,000	91,900	13,900	34,800	23,400	18,000	14,300	10,400	120,100	16,300	1,400	2,300	300	300	321		20,680
Surplus	5,000	0	0	0	200	1,200	0	0	2,100	3,600	1,700	0	3,700	1,600	3,100	2,207		1,700
<b>Total Supply</b>	<b>281,000</b>	<b>299,000</b>	<b>287,900</b>	<b>296,500</b>	<b>314,000</b>	<b>256,800</b>	<b>283,700</b>	<b>377,700</b>	<b>510,900</b>	<b>451,700</b>	<b>378,800</b>	<b>594,500</b>	<b>653,300</b>	<b>789,700</b>	<b>933,400</b>	<b>938,587</b>		<b>523,050</b>
<b>DEMAND</b>																		
Processed*	173,000	213,000	217,600	215,500	193,500	194,000	172,500	266,800	368,700	347,000	274,700	311,900	413,600	427,000	584,000	748,318		336,020
-human	4,000	9,000	15,800	17,300	19,300	23,400	16,600	23,100	24,700	21,400	27,300	29,600	30,700	30,100	27,000	26,708		25,390
-animal feed (full fat soya)	79,000	91,000	132,300	147,700	141,700	139,800	123,400	189,500	216,400	191,900	110,400	167,100	198,800	149,600	144,700	161,515		163,160
-crush (oil/oilcake)	90,000	113,000	69,500	50,500	32,500	30,800	32,500	54,200	127,600	133,700	137,000	115,200	184,100	247,300	412,300	560,095		147,470
Withdrawn by producers	0	0	5,300	2,300	3,800	3,800	2,300	2,900	5,200	2,900	3,900	4,900	4,800	3,900	4,600	3,861		3,920
Released to end-consumers	0	0	1,300	4,400	6,300	2,300	2,100	3,400	1,900	1,200	1,000	1,200	3,600	3,000	3,400	2,234		2,310
Seed for planting purposes	2,000	10,000	1,200	1,000	2,900	2,700	2,500	2,500	2,500	1,500	3,100	5,300	4,900	5,200	5,700	5,295		3,590
Net receipts(-)/disp(+)	7,000	21,000	1,100	6,400	1,300	200	0	2,700	-200	1,400	1,200	2,600	2,400	1,700	2,300	1,643		1,430
Deficit	0	10,000	2,100	4,500	0	0	1,600	1,900	0	0	0	400	0	0	0	0		390
Exports	13,000	2,000	2,800	1,400	1,200	5,100	2,200	8,400	1,200	1,200	5,400	155,600	121,300	42,800	157,500	15,406		50,070
<b>Total Demand</b>	<b>195,000</b>	<b>256,000</b>	<b>231,400</b>	<b>235,500</b>	<b>209,000</b>	<b>208,100</b>	<b>183,200</b>	<b>288,600</b>	<b>379,300</b>	<b>355,200</b>	<b>289,300</b>	<b>481,900</b>	<b>550,600</b>	<b>483,600</b>	<b>757,500</b>	<b>776,757</b>		<b>397,730</b>
<b>Ending Stock (31 Des)</b>	<b>86,000</b>	<b>43,000</b>	<b>56,500</b>	<b>61,000</b>	<b>105,000</b>	<b>48,700</b>	<b>100,500</b>	<b>89,100</b>	<b>131,600</b>	<b>96,500</b>	<b>89,500</b>	<b>112,600</b>	<b>102,700</b>	<b>306,100</b>	<b>175,900</b>	<b>161,830</b>		<b>125,320</b>
- processed p/month	14400	17800	18100	18000	16100	16200	14400	22200	30700	28900	22900	26000	34500	35600	48700	62360		28010.0
- months' stock	6.0	2.4	3.1	3.4	6.5	3.0	7.0	4.0	4.3	3.3	3.9	4.3	3.0	8.6	3.6	2.6		4.5

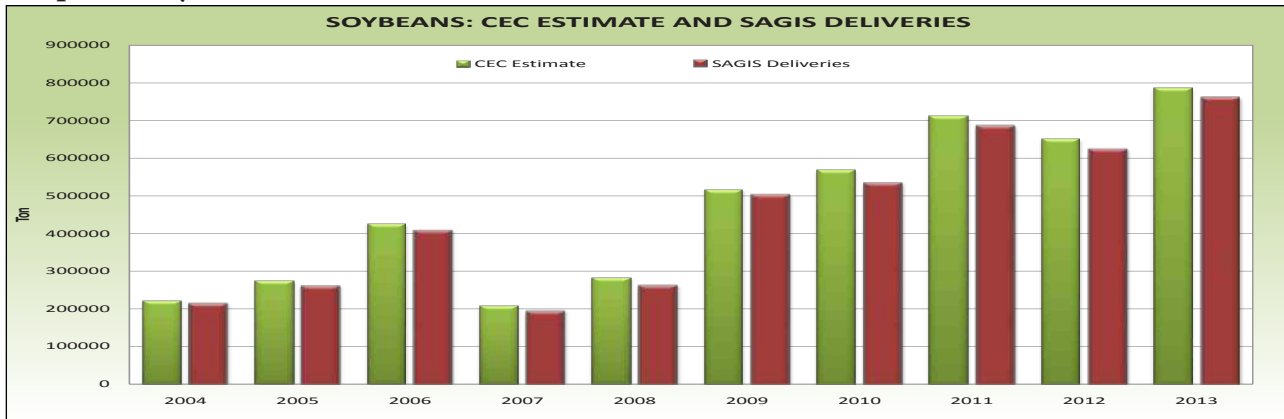
Note: \* 1997/98-2007 updated May - Jul 2007

Note: Figures in red: opening stock and ending stock difference

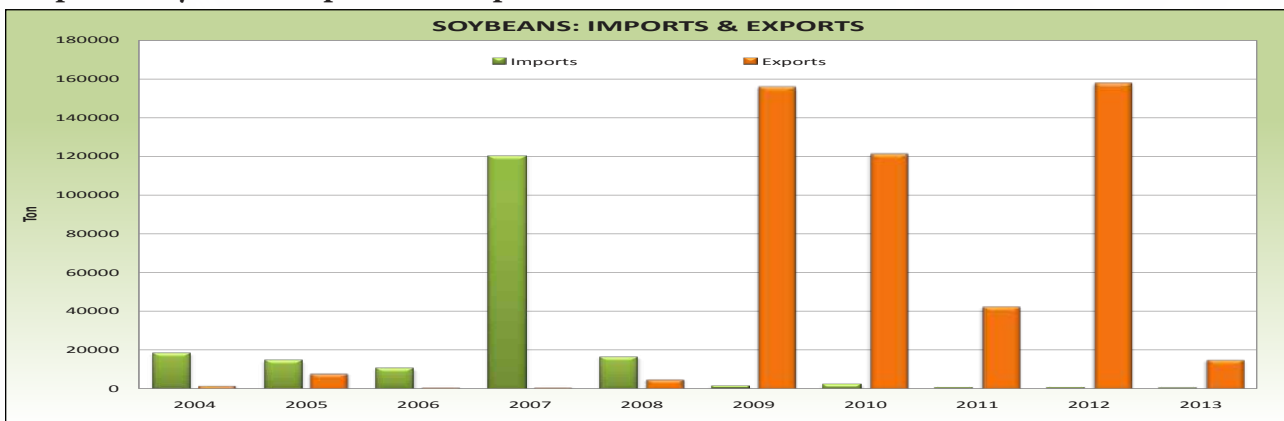
Note: \*\*\* Figures for current season up to date



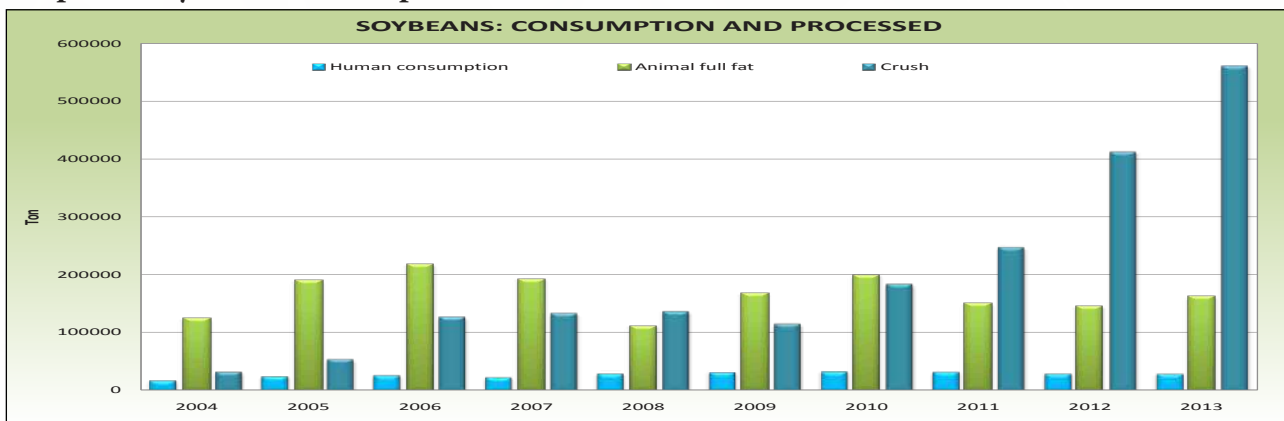
**Graph 12: Soybeans: CEC Estimate vs SAGIS deliveries over 10 seasons**



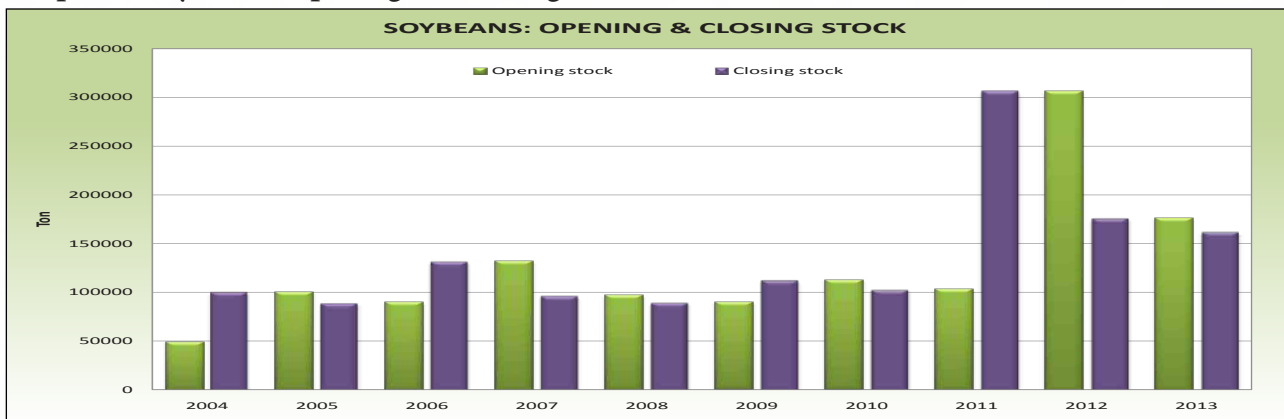
**Graph 13: Soybeans: Imports and Exports over 10 seasons**



**Graph 14: Soybeans: Consumption and Processed over 10 seasons**



**Graph 15: Soybeans: Opening and closing stock over 10 seasons**



Information provided by SAGIS.

## RSA Production Regions

The RSA is divided into 9 provinces as illustrated in Figure 1. The 9 provinces are divided into 36 grain production regions.

The regions are distributed as follows:

- Region 1: Namakwaland
- Regions 2 and 3: Swartland
- Regions 4 to 6: Rûens
- Regions 7 and 8: Eastern Cape
- Region 9: Karoo
- Region 10: Griqualand West
- Region 11: Vaalharts
- Regions 12 to 20: North West
- Regions 21 to 28: Free State
- Regions 29 to 33: Mpumalanga
- Region 34: Gauteng
- Region 35: Limpopo
- Region 36: KwaZulu-Natal

These production regions are described on pages 15 to 21 (in the header of the quality data per region tables), providing the depot names (silo's/bunkers/bags) for each region.

The contribution of the three main production areas to the total crop is as follows:

- Mpumalanga, 339 500 tons (43%)
- Free State, 254 250 tons (32%) and
- KwaZulu-Natal, 78 000 tons (10%).

Soybeans are not cultivated in the Southern production regions. Canola is the key oilseed crop in the winter rainfall area.

**Figure 1: RSA Provinces**



## Soybean Crop Quality 2012/2013 – Summary of results

Ninety-five percent (142) of the 150 samples analysed for the purpose of this survey were graded as Grade SB1 and eight of the samples were downgraded to COSB (Class Other Soya Beans). Seven of the samples were downgraded as a result of the percentage other grain present in the samples exceeding the maximum permissible deviation of 0.5%. The eighth sample was downgraded as a result of both the percentage other grain and percentage defective soybeans on the 4.75 mm round hole screen (max. 10%) exceeding the maximum permissible deviations.

The North West province (four samples) reported the highest weighted average percentage soybeans and parts of soybeans which pass through the 4.75 mm round hole screen namely 3.61% and the Northern Cape (one sample) the lowest at 0.81%. Mpumalanga province with the highest number of samples (85) reported an average of 2.27%. The Free State province averaged 3.39% (forty samples).

The percentage soiled soybeans ranged from 0% in the Northern Cape (one sample) to 1.94% in Limpopo province also on one sample. Mpumalanga averaged 0.53% and the Free State 0.02%.

No wet pods were observed by SAGL during the grading of the samples, while wet pods were reported by graders at the various depots. Based on discussion with individuals from industry, two possible explanations exist: During grading of the samples at the depots (prior to the samples being collected and forwarded to SAGL), the wet pods were removed from the samples for the determination of the percentage foreign matter and not replaced. The other explanation being that during the time elapsed (sometimes weeks) from the samples being taken to being forwarded to SAGL by the depots, the pods dried out and were no longer visible or identifiable as wet pods according to the definition. This matter will be discussed with the Grain Silo Industry prior to commencement of the 2013/2014 harvesting season.

The protein, fat and ash components are reported as % (g/100g) on a dry/moisture free basis (db). The average protein content of these samples was 40.63%, 1.2% higher than the 39.42% of the 2011/2012 season. The average fat content was 18.8% which compares very well with the 18.7% of the previous season. The ash content over the two seasons was almost identical, this season was slightly higher (0.03%) at 4.65%.

**Table 1: Comparison of RSA soybean quality with average international soybean quality**

	USA <sup>1</sup>	Brazil <sup>1</sup>	Argentina <sup>1</sup>	Range	RSA			
					2011/2012		2012/2013	
					Average	Range	Average	Range
<b>Protein, % (db)</b>	40.0**	40.8**	38.3**	31.4 - 45.5	39.42	31.45 - 45.23	40.63	34.34 - 43.25
<b>Fat, % (db)</b>	20.9**	22.4**	22.0**	18.0 - 24.0	18.7	15.1 - 22.8	18.8	13.7 - 22.7
<b>Ash, % (db)</b>	-	-	-	-	4.62	4.05 - 5.43	4.65	4.14 - 5.61
<b>Number of samples</b>	55	35	19		100		150	

<sup>1</sup>Thakur Maitri, Hurburgh Charles R, 2007. Quality of US Soybean Meal Compared to the Quality of Soybean Meal from Other Origins. *J Am Chem Soc* (2007) 84:835-843.

\*\*Conversion of results from 13% moisture basis to dry basis was done by SAGL.

The weighted average protein content per province ranged from 40.05% (one sample from the Northern Cape) to 41.32% (5 samples from North West). Mpumalanga and the Free State averaged 40.66% and 40.61% respectively. The highest average fat content was measured on one sample from the Limpopo province, namely 21.6% and the lowest in North West (18.2%). Mpumalanga's average fat content was 21.6% and that of the Free State province 18.6%. Weighted average ash values ranged from 4.98% in Limpopo and the Northern Cape to 4.58% in Mpumalanga. The Free State averaged 4.74%.

The average level of each of the amino acids tested on the 10 samples compared very well with that of the previous season, with the average difference being 0.1g/100 (as is). The largest difference between the averages of the two seasons was observed on Glutamic acid with a 0.4g/100g difference. Please see Table 3 on page 12.

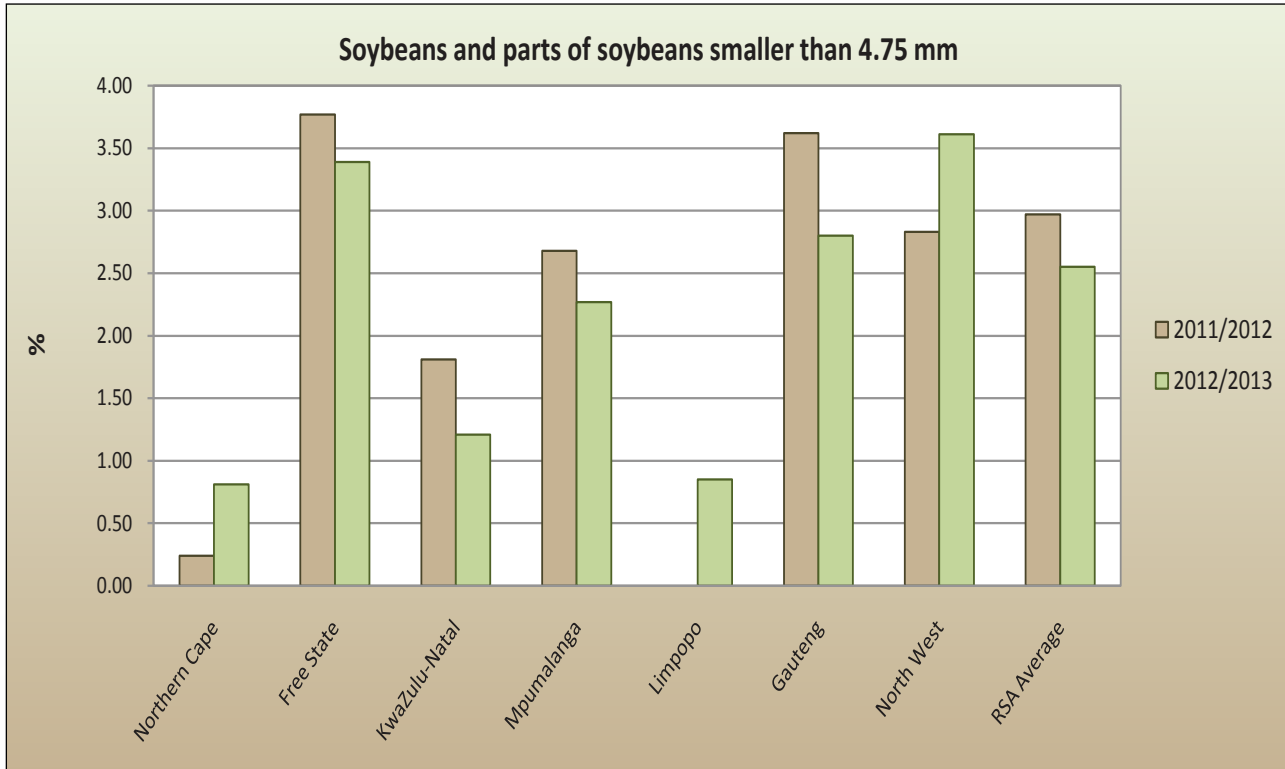
All fifteen samples tested, tested positive for the presence of the CP4 EPSPS trait (Roundup Ready®) (Table 4, page 14).

See Table 2 for a summary of the RSA Soybean Crop Quality averages of the 2012/2013 season as well as pages 15 to 21 for the average soybean quality per region.

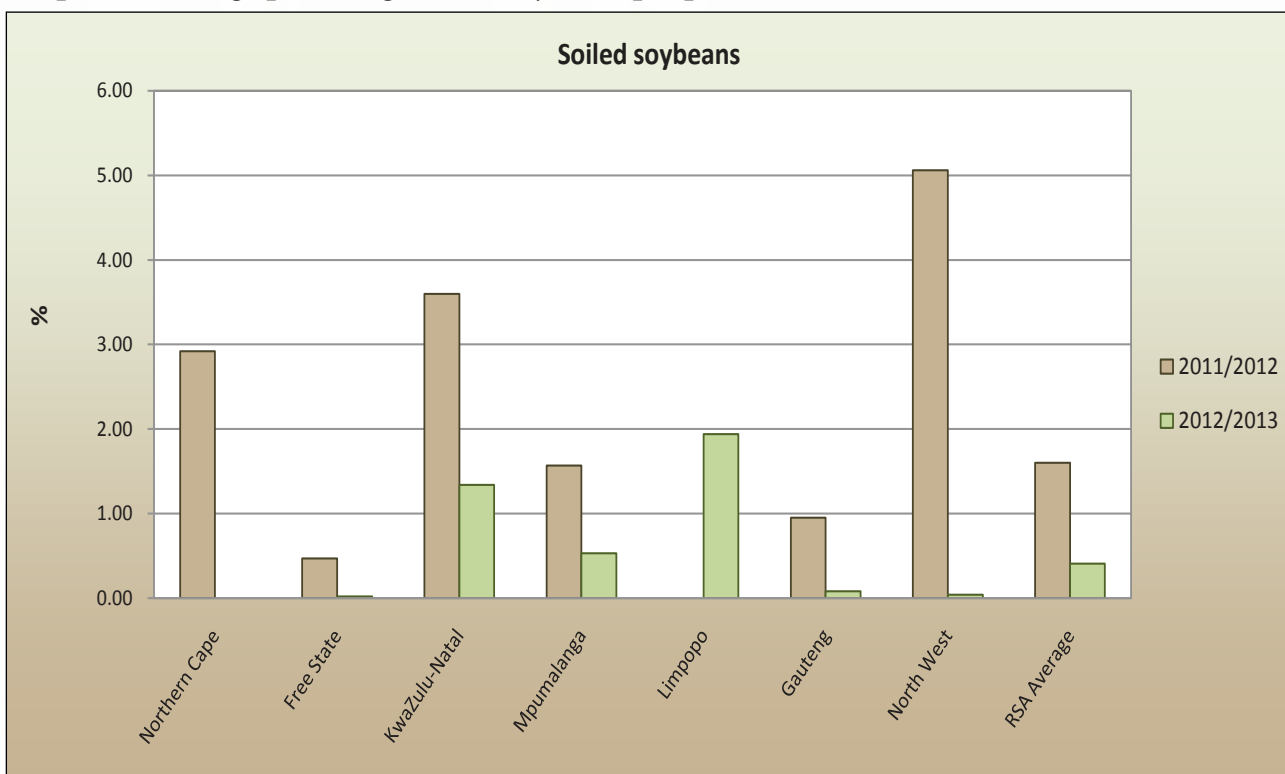
**Table 2: South African Soybean Crop Quality Averages 2012/2013**

Class and Grade Soya	SB1	COSB	Average
<b><u>Grading:</u></b>			
(A) Wet pods, %	0.00	0.00	0.00
(B) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.45	1.20	0.49
(C) Other grain, %	0.06	0.91	0.11
(D) Sunflower seed, %	0.00	0.00	0.00
(E) Stones, %	0.01	0.02	0.02
(F) Sclerotinia, %	0.03	0.00	0.03
(G) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	2.53	2.97	2.55
(H) Defective Soybeans on the 4.75 mm round hole screen, %	1.49	12.29	2.07
(I) Soiled Soybeans, %	0.43	0.05	0.41
(J) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.48	1.20	0.52
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	0	0
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	0	0
Undesirable odour	No	No	No
Live insects	No	No	No
<b>Number of samples</b>	<b>142</b>	<b>8</b>	<b>150</b>
<b><u>Chemical analysis:</u></b>			
Moisture, % (17hr, 103 °C)	7.2	7.2	7.2
Protein, % (db)	40.58	41.49	40.63
Fat, % (db)	18.8	18.5	18.8
Ash, % (db)	4.65	4.56	4.65
<b>Number of samples</b>	<b>142</b>	<b>8</b>	<b>150</b>

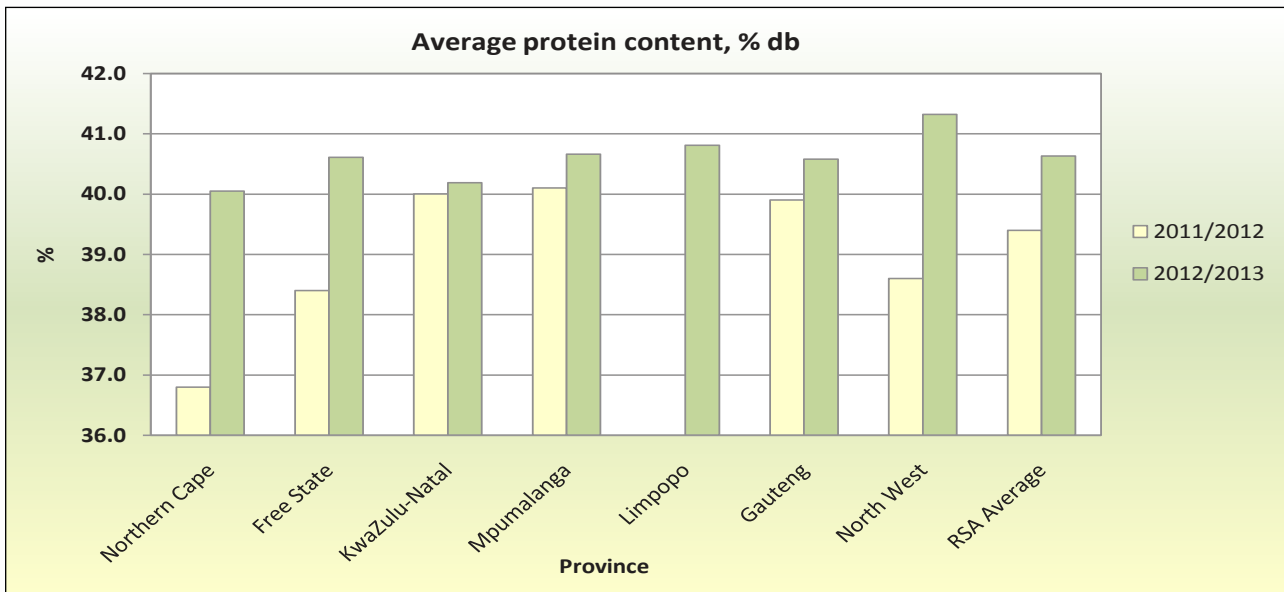
**Graph 16: Average percentage soybeans and parts of soybeans which pass through the 4.75 mm round hole screen per province over the last two seasons**



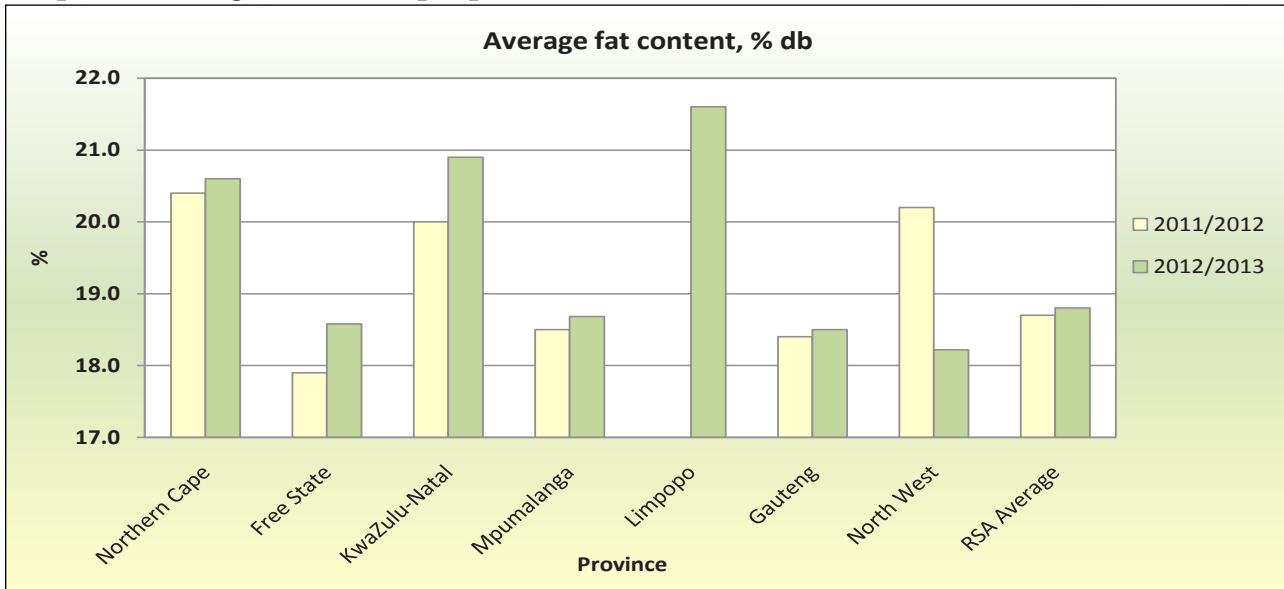
**Graph 17: Average percentage soiled soybeans per province over the last two seasons**



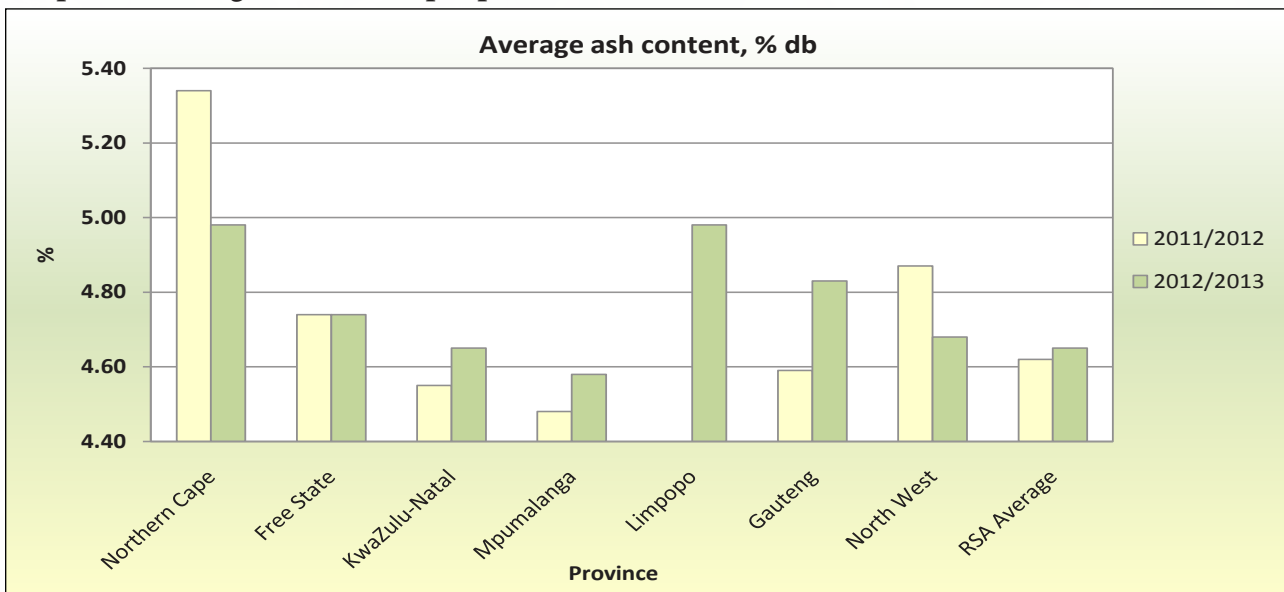
**Graph 18: Average protein content per province over the last two seasons**



**Graph 19: Average fat content per province over the last two seasons**



**Graph 20: Average ash content per province over the last two seasons**



## Amino Acids

Soybean is an excellent source of protein and therefore the most important source of dietary protein for animal feed in South Africa and also most parts of the world. Eight essential amino acids, necessary for human nutrition and which are not synthesized naturally in the body, are found in soybeans.

Ten samples (representing different regions as well as different classes and grades) were selected randomly for amino acid analysis.

The protein bound amino acids determinations were done by liquid chromatographic analysis using a Pico-Tag method (Methods on page 23). The analyses were done in duplicate and the average values reported. The working standard concentration is 1.25 µmol/ml and each amino acid value is calculated to ng/injection (8 µl). Results are reported as g amino acid / 100g sample, on an “as is” basis.

The amino acid values are reported with the crude protein values which were calculated to 16% nitrogen by multiplying the nitrogen value by 6.25. These crude protein values are also reported on an “as is” basis for comparison purposes.

It is important to note that the amino acid analyses were done on the whole soybean samples and not on isolated soybean protein or heat processed soybean meal. It is well known that soybeans must be heat processed to destroy anti-nutritional factors and thereby improving the digestibility of all amino acids. Over-processing however will reduce the concentration and decrease the digestibility of the amino acids, most critically lysine and cysteine.

*The amino acid analyses were sponsored by the SAGL.*

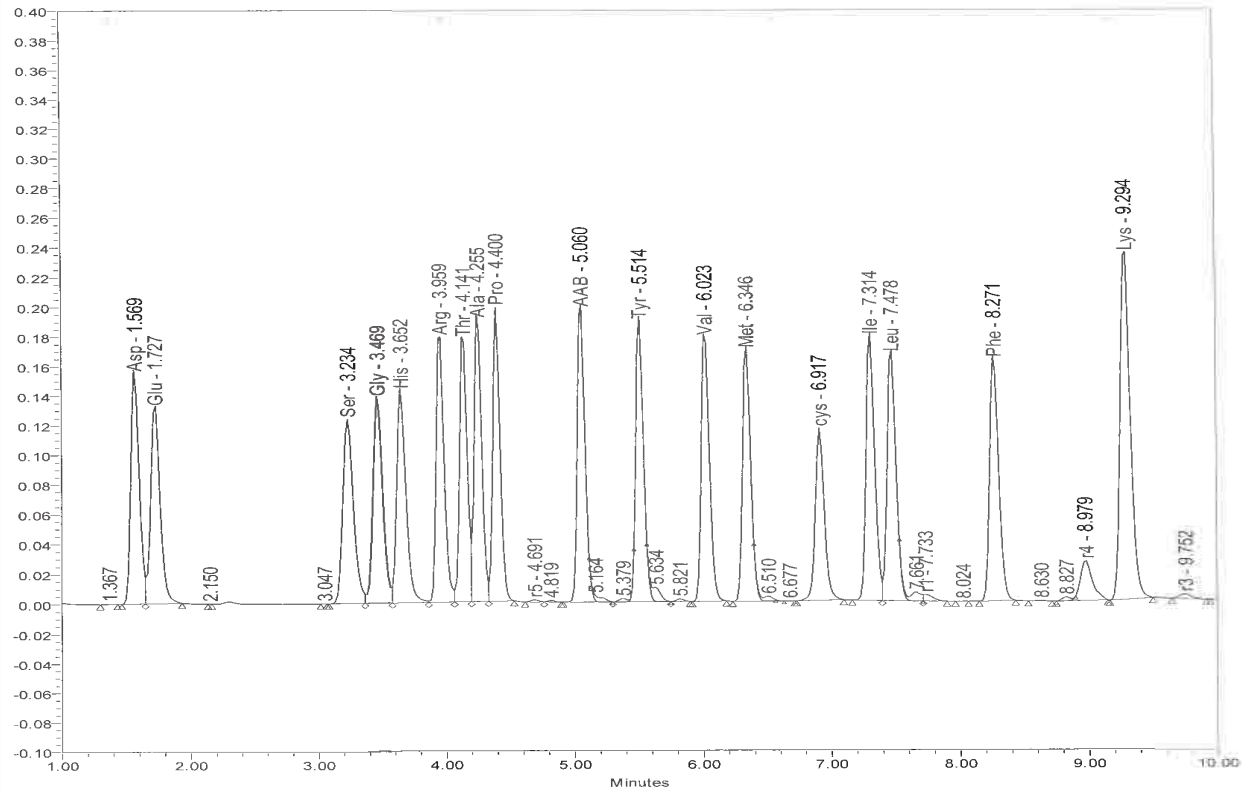
**Table 3: Amino Acid and crude protein results for the 2012/2013 season**

<i>Region</i>	<i>10</i>	<i>17</i>	<i>25</i>	<i>28</i>	<i>30</i>	<i>31</i>	<i>33</i>	<i>34</i>	<i>35</i>	<i>36</i>
<i>Grade</i>	SB1	SB1	COSB	SB1	SB1	SB1	SB1	SB1	SB1	COSB
Tryptophan*, g/100g (as is)	0.45	0.50	0.45	0.44	0.43	0.46	0.49	0.46	0.46	0.47
Methionine*, g/100g (as is)	0.52	0.55	0.49	0.51	0.47	0.52	0.50	0.48	0.58	0.47
Cysteic acid, g/100g (as is)	0.85	0.88	0.79	0.83	0.79	0.80	0.81	0.77	0.96	0.74
Aspartic acid, g/100g (as is)	3.97	4.24	3.68	4.12	3.64	3.99	4.09	3.87	4.10	3.96
Glutamic acid, g/100g (as is)	6.98	7.62	6.48	7.15	6.50	7.09	7.29	6.81	7.36	7.14
Serine, g/100g (as is)	1.91	2.02	1.86	2.02	1.85	1.89	1.91	1.83	1.94	1.93
Glycine, g/100g (as is)	1.57	1.61	1.49	1.63	1.50	1.53	1.56	1.57	1.57	1.57
Histidine*, g/100g (as is)	1.15	1.14	1.09	1.14	1.02	1.07	1.04	1.16	1.10	1.09
Arginine, g/100g (as is)	2.47	3.02	2.35	2.71	2.49	2.70	2.64	2.71	2.75	2.56
Threonine*, g/100g (as is)	1.43	1.48	1.37	1.46	1.34	1.38	1.39	1.38	1.42	1.41
Alanine, g/100g (as is)	1.52	1.63	1.45	1.56	1.44	1.53	1.55	1.49	1.57	1.53
Proline, g/100g (as is)	1.87	2.00	1.84	1.93	1.80	1.90	1.95	1.89	1.94	1.90
Tyrosine, g/100g (as is)	1.18	1.24	1.12	1.26	1.22	1.17	1.22	1.16	1.25	1.21
Valine, g/100g (as is)	1.69	1.83	1.62	1.83	1.66	1.78	1.74	1.65	1.78	1.72
Isoleucine*, g/100g (as is)	1.52	1.62	1.55	1.63	1.45	1.54	1.56	1.52	1.60	1.57
Leucine*, g/100g (as is)	2.65	2.83	2.55	2.69	2.48	2.69	2.78	2.67	2.82	2.73
Phenylalanine*, g/100g (as is)	1.75	1.89	1.69	1.80	1.64	1.77	1.84	1.74	1.87	1.78
Lysine*, g/100g (as is)	2.42	2.60	2.42	2.39	2.24	2.42	2.48	2.44	2.48	2.47
Crude protein, % (as is)	39.94	37.44	36.61	36.46	39.16	39.95	37.34	37.00	37.24	37.25
Number of samples	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>	<i>1</i>

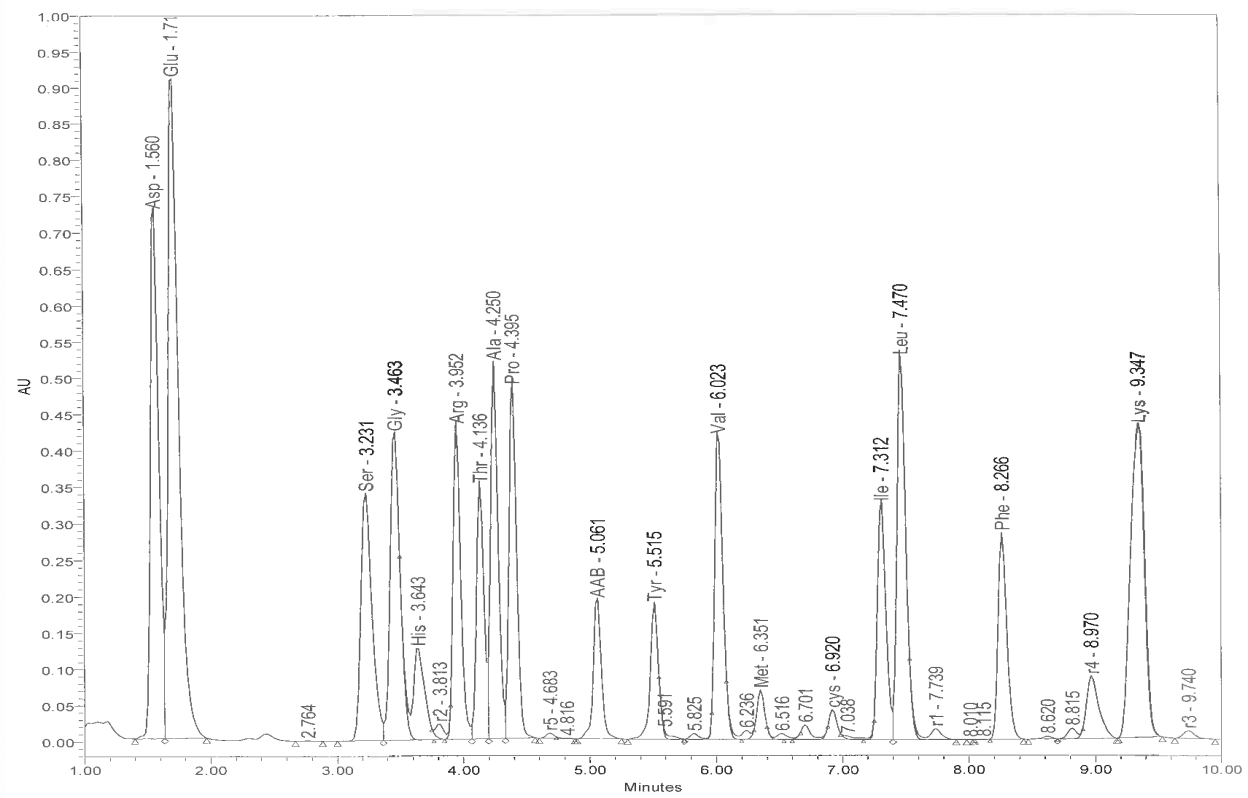
\*Essential amino acids

# Amino Acids Chromatogram

Standard [1.25 µmol/ml]



Sample (including internal standard)





## Genetic Modification (GM)

The SAGL screened 15 of the crop samples to test for the presence of CP4 EPSPS (Roundup Ready).

The crop quality samples received by the SAGL are composite samples per class and grade, made up of individual deliveries to grain silos.

SAGL used the EnviroLogix QuickComb kit for bulk soybeans to quantitatively determine the presence of genetically modified soybeans.

All of the samples tested positive for the presence of CP4 EPSPS.

GMO Protein/Trait	Event	Trade name/Brand
CP4 EPSPS	GTS40-3-2 MON89789	Roundup Ready®

The detection range for the CP4 EPSPS trait is 0.125% to 3%. The limit of quantification (LOQ) is therefore 0.125%.

Values higher than 3%, the highest value of the detection range for the CP4 EPSPS trait, are reported as > 3%.

The Coefficient of Variation for this analysis is 20%.

**Table 4: GM results for the 2012/2013 season**

Region	Class and grade	CP4 EPSPS, %
10	SB1	>3.0
17	SB1	2.4
21	SB1	>3.0
25	SB1	>3.0
26	COSB	3.0
28	SB1	>3.0
29	SB1	>3.0
30	SB1	>3.0
30	SB1	>3.0
31	SB1	>3.0
32	SB1	>3.0
33	SB1	>3.0
34	SB1	2.6
35	SB1	2.9
36	SB1	>3.0
<i>Average</i>		>3.0
<i>Number of samples</i>		15

**SOUTH AFRICAN  
REGIONAL SOYBEAN QUALITY**

PRODUCTION REGION	(10) Griqualand-West				(13) North West Central Region (Sannieshof)				(17) North West Central Northern Region (Ottosdal)			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
Intake silos	Britstown Douglas Havenga Brug Marydale Modderrivier Oranjerivierstasie Prieska Rietrivier Upington				Biesiesvlei Bossies Gerdau Oppaslaagte Sannieshof				Bospoort Lethabong (Hartbeesfontein) Kleinharts Melliodora Ottosdal Rostrataville Vermaas Werda			
<b><u>Grading:</u></b>												
(a) Wet pods, %	0.00	-	-	-	0.00	-	-	-	0.00	0.00	0.00	0.00
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.13	-	-	-	1.33	-	-	-	0.42	0.34	0.50	0.11
(c) Other grain, %	0.00	-	-	-	1.24	-	-	-	0.01	0.00	0.01	0.01
(d) Sunflower seed, %	0.00	-	-	-	0.00	-	-	-	0.05	0.00	0.10	0.07
(e) Stones, %	0.00	-	-	-	0.00	-	-	-	0.00	0.00	0.00	0.00
(f) Sclerotinia, %	0.01	-	-	-	0.00	-	-	-	0.00	0.00	0.00	0.00
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	0.81	-	-	-	6.22	-	-	-	3.14	2.45	3.83	0.98
(h) Defective Soybeans on the 4.75 mm round hole screen, %	0.79	-	-	-	1.62	-	-	-	0.91	0.53	1.28	0.53
(i) Soiled Soybeans, %	0.00	-	-	-	0.00	-	-	-	0.00	0.00	0.00	0.00
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.15	-	-	-	1.33	-	-	-	0.42	0.34	0.50	0.11
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	-	-	-	0	-	-	-	0	0	0	0
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	-	-	-	0	-	-	-	0	0	0	0
<b>Number of samples</b>	<b>1</b>				<b>1</b>				<b>2</b>			
<b><u>Chemical analysis:</u></b>												
Moisture, % (17hr, 103 °C)	8.6	-	-	-	7.8	-	-	-	6.7	6.7	6.7	0.00
Protein, % (db)	40.05	-	-	-	41.69	-	-	-	42.43	42.04	42.82	0.55
Fat, % (db)	20.6	-	-	-	19.3	-	-	-	16.7	16.6	16.7	0.07
Ash, % (db)	4.98	-	-	-	4.54	-	-	-	4.55	4.27	4.83	0.40
<b>Number of samples</b>	<b>1</b>				<b>1</b>				<b>2</b>			

**SOUTH AFRICAN  
REGIONAL SOYBEAN QUALITY**

PRODUCTION REGION	(18) North West Central Region (Ventersdorp)				(21) Free State North-Western Region (Viljoenskroon)				(22) Free State North-Western Region (Bothaville)			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
Intake silos	Bodenstein Buckingham Coligny Enselspruit Makokskraal Potchefstroom Ventersdorp				Attie Groenebloem Heuningspruit Koppies Rooiwal Vierfontein Viljoenskroon Vredefort Weiveld				Allanridge Bothaville Mirage Odendaalsrus Schoonspruit Schuttesdraai			
<b><u>Grading:</u></b>												
(a) Wet pods, %	0.00	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.83	-	-	-	0.92	0.38	2.36	0.72	0.62	0.07	1.16	0.77
(c) Other grain, %	0.16	-	-	-	0.11	0.00	0.35	0.14	0.05	0.00	0.09	0.06
(d) Sunflower seed, %	0.00	-	-	-	0.01	0.00	0.05	0.02	0.00	0.00	0.00	0.00
(e) Stones, %	0.00	-	-	-	0.03	0.00	0.19	0.08	0.00	0.00	0.00	0.00
(f) Sclerotinia, %	0.00	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	1.93	-	-	-	5.76	1.40	9.31	3.50	2.46	0.84	4.07	2.28
(h) Defective Soybeans on the 4.75 mm round hole screen, %	0.83	-	-	-	1.48	0.41	3.25	1.13	1.49	1.33	1.65	0.23
(i) Soiled Soybeans, %	0.14	-	-	-	0.02	0.00	0.10	0.04	0.00	0.00	0.00	0.00
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.83	-	-	-	0.92	0.38	2.36	0.72	0.62	0.07	1.16	0.77
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	-	-	-	0	0	0	0	0	0	0	0
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	-	-	-	0	0	0	0	0	0	0	0
<b>Number of samples</b>	<b>1</b>				<b>6</b>				<b>2</b>			
<b><u>Chemical analysis:</u></b>												
Moisture, % (17hr, 103 °C)	6.7	-	-	-	6.7	6.5	6.8	0.10	7.8	7.7	7.8	0.07
Protein, % (db)	40.92	-	-	-	40.90	38.83	42.08	1.23	40.02	37.88	42.15	3.02
Fat, % (db)	20.2	-	-	-	18.7	17.7	20.0	0.84	20.9	20.4	21.4	0.71
Ash, % (db)	4.83	-	-	-	5.01	4.82	5.61	0.30	4.61	4.38	4.83	0.32
<b>Number of samples</b>	<b>1</b>				<b>6</b>				<b>2</b>			

## SOUTH AFRICAN REGIONAL SOYBEAN QUALITY

PRODUCTION REGION	(24) Free State Central Region				(25) Free State South-Western Region (Bethlehem)				(26) Free State South-Eastern Region (Senekal)			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
Intake silos	Bloemfontein Brandfort De Brug Geneva Hennenman Koffiefontein Kroonstad Petrusburg Theunissen Van Tonder Welgeleë Winburg				Bethlehem Clocolan De Wetsdorp Ficksburg Fouriesburg Marseilles Modderpoort Slabberts Tweespruit Westminster Zastron				Arlington Kaallaagte Libertas Marquard Meets Monte Video Senekal Steynsrus			
<b><u>Grading:</u></b>												
(a) Wet pods, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.43	0.05	0.69	0.33	0.75	0.15	1.86	0.65	0.54	0.25	0.90	0.26
(c) Other grain, %	0.11	0.00	0.22	0.11	0.01	0.00	0.05	0.02	0.33	0.09	0.69	0.21
(d) Sunflower seed, %	0.03	0.00	0.08	0.04	0.04	0.00	0.10	0.04	0.02	0.00	0.06	0.02
(e) Stones, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.08	0.03
(f) Sclerotinia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	5.73	4.50	6.38	1.07	3.37	1.37	5.30	1.49	4.04	0.46	7.00	2.43
(h) Defective Soybeans on the 4.75 mm round hole screen, %	2.21	0.95	3.14	1.13	1.17	0.21	1.74	0.55	1.10	0.68	1.81	0.41
(i) Soiled Soybeans, %	0.02	0.00	0.06	0.03	0.00	0.00	0.00	0.00	0.09	0.00	0.34	0.14
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.43	0.05	0.69	0.33	0.75	0.15	1.86	0.65	0.54	0.27	0.90	0.26
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	0	0	0	0	0	0	0	0	0	0	0
<b>Number of samples</b>	<b>3</b>				<b>6</b>				<b>6</b>			
<b><u>Chemical analysis:</u></b>												
Moisture, % (17hr, 103 °C)	6.6	6.6	6.6	0.00	7.3	6.7	8.3	0.78	7.6	6.8	8.1	0.64
Protein, % (db)	38.18	34.34	41.80	3.73	38.95	37.42	40.33	1.25	40.42	39.94	42.04	0.80
Fat, % (db)	18.2	17.9	18.7	0.44	18.4	17.9	19.1	0.50	19.2	17.7	20.1	0.86
Ash, % (db)	5.02	4.76	5.17	0.23	4.61	4.14	4.91	0.29	4.81	4.67	5.18	0.19
<b>Number of samples</b>	<b>3</b>				<b>6</b>				<b>6</b>			

## SOUTH AFRICAN REGIONAL SOYBEAN QUALITY

PRODUCTION REGION	(27) Free State Northern Region				(28) Free State Eastern Region				(29) Mpumalanga Southern Region							
	Intake silos															
	Gottenburg Heilbron Hoogte Mooigeleë Petrus Steyn Wolwehoek				Afrikaskop Ascent Cornelia Daniëlsrus Eeram Frankfort Harrismith Jim Fouché Kransfontein Memel Reitz				Tweeling Villiers Vrede Warden Windfield				Balfour Grootvlei Holmdene Platrand Val Greylingstad Harvard Leeuspruit Standerton			
<b><u>Grading:</u></b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>				
(a) Wet pods, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.66	0.24	0.96	0.35	0.29	0.02	0.97	0.27	0.13	0.00	0.24	0.08				
(c) Other grain, %	0.20	0.00	0.38	0.19	0.01	0.00	0.08	0.02	0.04	0.00	0.21	0.07				
(d) Sunflower seed, %	0.03	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
(e) Stones, %	0.00	0.00	0.00	0.00	0.04	0.00	0.25	0.08	0.02	0.00	0.17	0.05				
(f) Sclerotinia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.07	0.03				
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	4.21	3.70	5.34	0.77	1.36	0.07	3.44	1.23	3.35	1.50	7.72	2.05				
(h) Defective Soybeans on the 4.75 mm round hole screen, %	0.93	0.58	1.06	0.23	1.62	0.42	3.17	0.93	1.81	0.85	3.18	0.72				
(i) Soiled Soybeans, %	0.03	0.00	0.13	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.65	0.24	0.94	0.34	0.29	0.02	0.97	0.27	0.15	0.00	0.26	0.08				
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	0	0	0	0	0	0	0	0	0	0	0				
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	0	0	0	0	0	0	0	0	0	0	0				
<b>Number of samples</b>	<b>4</b>				<b>13</b>				<b>11</b>							
<b><u>Chemical analysis:</u></b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>				
Moisture, % (17hr, 103 °C)	6.6	6.5	6.7	0.08	6.7	6.5	8.0	0.39	6.6	6.5	6.7	0.08				
Protein, % (db)	41.84	39.29	43.19	1.83	41.78	39.32	43.25	1.23	40.90	39.36	41.70	0.69				
Fat, % (db)	18.3	17.2	19.4	0.99	18.1	17.3	18.8	0.52	18.2	16.4	19.5	0.85				
Ash, % (db)	4.66	4.52	4.79	0.14	4.61	4.45	4.93	0.14	4.75	4.55	5.02	0.15				
<b>Number of samples</b>	<b>4</b>				<b>13</b>				<b>11</b>							

**SOUTH AFRICAN  
REGIONAL SOYBEAN QUALITY**

PRODUCTION REGION	(30) Mpumalanga Eastern Region				(31) Mpumalanga Central Region				(32) Mpumalanga Western Region			
	Intake silos	Amersfoort Badplaas Carolina Davel Eerstelingsfontein Ermelo Estancia Lothair Maizefield Mkondo Morgenzon Overvaal	Panbult Vaalkrantz		Bakenlaagte Brakfontein Bethal Devon Kinross Leandra Trichardt				Argent Dryden Endicott Elof Hawerklip Kendal Ogies			
<b><u>Grading:</u></b>	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
(a) Wet pods, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.35	0.06	1.26	0.31	0.52	0.08	2.13	0.57	0.51	0.22	0.98	0.25
(c) Other grain, %	0.08	0.00	1.03	0.21	0.13	0.00	1.24	0.33	0.04	0.00	0.19	0.08
(d) Sunflower seed, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(e) Stones, %	0.01	0.00	0.34	0.06	0.02	0.00	0.26	0.07	0.02	0.00	0.20	0.06
(f) Sclerotinia, %	0.01	0.00	0.07	0.02	0.16	0.00	0.65	0.20	0.09	0.00	0.35	0.10
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	2.03	0.41	6.14	1.24	2.19	0.24	4.76	1.34	2.87	1.04	6.97	1.90
(h) Defective Soybeans on the 4.75 mm round hole screen, %	1.66	0.67	4.03	0.67	1.88	0.42	3.24	0.95	1.22	0.69	2.17	0.44
(i) Soiled Soybeans, %	0.43	0.00	4.89	0.96	0.46	0.00	1.47	0.60	1.38	0.00	6.27	2.20
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.36	0.06	1.26	0.31	0.67	0.12	2.13	0.55	0.60	0.22	1.12	0.25
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	0	0	0	0	0	0	0	0	0	0	0
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	0	0	0	0	0	5	1.34	0	0	0	0
<b>Number of samples</b>	<b>38</b>				<b>14</b>				<b>11</b>			
<b><u>Chemical analysis:</u></b>	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
Moisture, % (17hr, 103 °C)	7.1	6.5	9.9	0.78	7.4	6.6	8.3	0.66	7.8	6.6	8.2	0.57
Protein, % (db)	40.76	38.44	42.26	0.90	40.93	39.62	42.44	0.82	40.41	39.12	42.60	1.09
Fat, % (db)	18.4	13.7	21.3	1.77	18.4	17.3	19.3	0.56	19.2	17.0	20.5	1.14
Ash, % (db)	4.47	4.23	4.80	0.13	4.58	4.39	5.00	0.16	4.70	4.44	4.85	0.14
<b>Number of samples</b>	<b>38</b>				<b>14</b>				<b>11</b>			

**SOUTH AFRICAN  
REGIONAL SOYBEAN QUALITY**

PRODUCTION REGION	(33) Mpumalanga Northern Region				(34) Gauteng				(35) Limpopo			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
Intake silos	Driefontein Lydenburg Marble Hall Middelburg Stoffberg Pan Arnot Wonderfontein				Bloekomspruit Bronkhorstspruit Glenroy Goeie Hoek Kaalfontein Middelvei Nigel Oberholzer Raarthsvei				Alma Bela-Bela (Warmbad) Crecy Immerpan Lehau Modimolle (Nylstroom) Mokopane (Potgietersrus) Mookgophong (Naboomspruit) Northam Nutfield Pienaarsrivier Polokwane (Pietersburg) Roedtan Settlers Tzaneen Vaalwater			
<b><u>Grading:</u></b>												
(a) Wet pods, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.85	0.17	2.52	0.81	0.50	0.16	1.32	0.35	0.38	-	-	-
(c) Other grain, %	0.22	0.00	1.91	0.56	0.11	0.00	0.51	0.17	0.00	-	-	-
(d) Sunflower seed, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-
(e) Stones, %	0.01	0.00	0.09	0.03	0.02	0.00	0.15	0.05	0.00	-	-	-
(f) Sclerotinia, %	0.01	0.00	0.07	0.02	0.01	0.00	0.06	0.02	0.00	-	-	-
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	1.51	0.32	3.23	1.03	2.80	0.39	9.91	2.74	0.85	-	-	-
(h) Defective Soybeans on the 4.75 mm round hole screen, %	0.94	0.15	2.12	0.67	0.99	0.56	1.30	0.26	2.94	-	-	-
(i) Soiled Soybeans, %	0.65	0.00	1.96	0.70	0.08	0.00	0.65	0.20	1.94	-	-	-
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.86	0.17	2.52	0.82	0.51	0.18	1.32	0.35	0.38	-	-	-
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	0	0	0	0	0	0	0	0	-	-	-
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	0	0	0	0	0	0	0	0	-	-	-
<b>Number of samples</b>	<b>11</b>				<b>10</b>				<b>1</b>			
<b><u>Chemical analysis:</u></b>												
Moisture, % (17hr, 103 °C)	8.1	7.3	9.6	0.56	6.9	6.5	8.0	0.45	8.5	-	-	-
Protein, % (db)	39.75	38.19	41.24	0.97	40.43	39.03	42.15	1.08	40.81	-	-	-
Fat, % (db)	20.0	18.6	22.7	1.24	18.5	16.6	20.4	1.04	21.6	-	-	-
Ash, % (db)	4.63	4.33	5.35	0.30	4.84	4.68	4.96	0.11	4.98	-	-	-
<b>Number of samples</b>	<b>11</b>				<b>10</b>				<b>1</b>			

**SOUTH AFRICAN  
REGIONAL SOYBEAN QUALITY**

PRODUCTION REGION	(36)			
	KwaZulu-Natal			
Intake silos	Bergville Bloedrivier Dannhauser Dundee Mizpah New Amalfi Paulpietersburg Vryheid Winterton			
<b><u>Grading:</u></b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>
(a) Wet pods, %	0.00	0.00	0.00	0.00
(b) Foreign matter, including stones, other grains, sunflower seeds and stones: Provided that such deviations are individually within the limits specified in items (c), (d), and (e), %	0.73	0.15	2.35	0.69
(c) Other grain, %	0.13	0.00	0.80	0.26
(d) Sunflower seed, %	0.00	0.00	0.00	0.00
(e) Stones, %	0.00	0.00	0.04	0.01
(f) Sclerotinia, %	0.00	0.00	0.00	0.00
(g) Soybeans and parts of Soybeans which pass through the 4.75 mm round hole screen, %	1.21	0.00	3.12	1.15
(h) Defective Soybeans on the 4.75 mm round hole screen, %	11.41	0.16	90.55	29.69
(i) Soiled Soybeans, %	1.34	0.00	4.84	1.86
(j) Deviations in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items, %	0.73	0.15	2.35	0.69
Noxious seeds ( <i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i> )	0	0	0	0
Noxious seeds ( <i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i> )	0	0	0	0
<b>Number of samples</b>	<b>9</b>			
<b><u>Chemical analysis:</u></b>	<b>ave</b>	<b>min</b>	<b>max</b>	<b>stdev</b>
Moisture, % (17hr, 103 °C)	7.9	7.3	8.3	0.29
Protein, % (db)	40.19	39.20	41.39	0.69
Fat, % (db)	20.9	19.8	21.8	0.65
Ash, % (db)	4.65	4.31	4.80	0.14
<b>Number of samples</b>	<b>9</b>			



# METHODS

## **SAMPLING PROCEDURE:**

A working group determined the process which needs to be followed to ensure that the crop quality samples which were sent to the SAGL by the various grain silo owners, were representative of the total crop.

Each delivery was sampled as per the grading regulations for grading purposes.

After grading, the grading samples are placed in separate containers according to class and grade.

After 80% of the expected harvest has been received, the content of each container is divided with a multi slot divider in order to obtain a 3 kg sample. (This should be done for each class and grade separately).

If there is more than one container per class and grade, the combined contents of the containers are mixed thoroughly before dividing it with a multi slot divider to obtain the required 3 kg sample.

The samples are marked clearly with the name of the depot, the bin/bag/bunker number(s) represented by each individual sample as well as the class and grade and are then forwarded to the SAGL.

## **GRADING:**

Full grading was done in accordance with the Regulations relating to the Grading, Packing and Marking of soybeans intended for sale in the Republic of South Africa (No. R 225 of 6 March 2009).

Please see pages 25 to 32 of this report.

## **CHEMICAL ANALYSIS:**

### **Milling**

Prior to the chemical analyses, the soybean samples were milled on a Retch ZM 200 mill fitted with a 1.0 mm screen.

### **Moisture**

The method prescribed under the ISTA International Rules for Seed Testing, Section 9, latest edition was used to determine the moisture content of the soya samples. This method determines moisture content as a loss in weight of a sample when dried in an oven at 103 °C for 17 hours.

### **Protein**

The Dumas combustion analysis technique was used to determine the crude protein content, according to AACCI method 46-30.01, latest edition.

This method prescribes a generic combustion method for the determination of crude protein. Combustion at high temperature in pure oxygen sets nitrogen free, which is measured by thermal conductivity detection. The total nitrogen content of the sample is determined and converted to equivalent protein by multiplication with a factor of 6.25 to obtain the protein content.

**Fat**

In-House method 024 was used for the determination of the crude fat in the samples. After sample preparation the fat is extracted by petroleum ether with the aid of the Soxhlet extraction apparatus, followed by the removal of the solvent by evaporation and weighing the dried residue thus obtained. The residue is expressed as % crude fat.

**Ash**

Ash is defined as the quantity of mineral matter which remains as incombustible residue of the tested substance, after application of the described working method. In-house method No. 011, based on AACCI method 08-02.01 Rapid (Magnesium Acetate) method, was used for the determination.

**GMO (Genetically Modified Organisms):**

The EnviroLogix QuickComb kit for bulk soybeans was used to quantitatively determine the presence of genetically modified soybeans. The kit is designed to extract and detect the presence of certain proteins at the levels typically expressed in genetically modified bulk soybeans. The procedure prescribed in the EnviroLogix – QuickScan Instruction Manual, latest edition was followed. Results were scanned and interpreted quantitatively with the EnviroLogix QuickScan system.

**AMINO ACIDS:**

Following acid hydrolysis of the samples, the protein bound amino acids were determined by using In-house method No. 009, liquid chromatographic analysis of amino acids using a modified Pico-Tag method.

In-house method No. 015, where the sample is first oxidized and dried, was followed for the determination of cysteine (as cysteic acid) and methionine (as methionine sulfone). The samples were then analysed with liquid chromatography using a modified Pico-Tag method as for the other protein bound amino acids.

For the determination of tryptophan according to In-house method No. 007, the samples are hydrolysed under alkaline conditions with a saturated barium hydroxide solution heated to 110 °C for 20 hours. The hydrolysate is analysed by reverse phase liquid chromatography with UV detection at 285 nm. All the samples were hydrolysed in duplicate.



## CERTIFICATE OF ACCREDITATION

*In terms of section 22(2)(b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that:-*

### **SOUTHERN AFRICAN GRAIN LABORATORY** Co. reg no: 1997/018518/08

Facility Accreditation Number: **T0116**

is a South African National Accreditation System accredited Testing laboratory  
provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying schedule of accreditation,  
Annexure "A", bearing the above accreditation number for

### **CHEMICAL & PHYSICAL ANALYSIS**

*The facility is accredited in accordance with the recognised International Standard*

**ISO/IEC 17025:2005**

*The accreditation demonstrates technical competency for a defined scope and the operation of a  
laboratory quality management system*

While this certificate remains valid, the Accredited Facility named above is authorised to  
use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

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**M F R Josias**  
Chief Executive Officer

**Effective Date: 01 November 2009**  
**Certificate Expires: 31 October 2014**



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**GOVERNMENT NOTICES**  
**GOEWERMENSKENNISGEWINGS**

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**DEPARTMENT OF AGRICULTURE**  
**DEPARTEMENT VAN LANDBOU**

No. R. 225

6 March 2009

AGRICULTURAL PRODUCT STANDARDS ACT, 1990  
(ACT No. 119 OF 1990)

**REGULATIONS RELATING TO THE GRADING, PACKING AND MARKING OF SOYA BEANS  
INTENDED FOR SALE IN THE REPUBLIC OF SOUTH AFRICA**

The Minister of Agriculture has under section 15 of the Agricultural Product Standards Act, 1990 (Act No. 119 of 1990) --

- (a) made the regulations in the Schedule; and
- (b) determined that the said regulations shall come into operation on date of publication.

**SCHEDULE**

**Definitions**

1. In these regulations any word or expression to which a meaning has been assigned in the Act, shall have that meaning and, unless the context otherwise indicates --

"**bag**" means a bag manufactured from --

- (a) jute or phormium or a mixture of jute and phormium; or
- (b) polypropylene that complies with SABS specification CKS 632;

"**bulk container**" means any vehicle or container in which bulk soya beans is transported or stored;

"**consignment**" means --

- (a) a quantity of soya beans of the same class, which belongs to the same owner, delivered at any one time under cover of the same consignment note, delivery note or receipt note, or delivered by the same vehicle or bulk container, or loaded from the same bin of a grain elevator or from a ship's hold; or
- (b) in the case where a quantity referred to in paragraph (a), is subdivided into different grades, each such quantity of each of the different grades;

"**container**" means a bag or a bulk container;

"**cultivar list**" means the list of cultivars determined from time to time by the Executive Officer: Agricultural Product Standards and which is obtainable from the Executive Officer: Agricultural Product Standards, Private Bag X258, Pretoria, 0001;

"**defective soya beans**" means soya beans and pieces of beans which --

- (a) have been damaged by frost, heat or weather conditions;
- (b) have been visibly damaged by insects;
- (c) are contaminated by moulds or plant diseases;
- (d) have a distinctly immature form or which are covered with a whitish membrane or where the testa have a green discoloration; and
- (e) when the testa is removed, display discoloration, excluding green discoloration:

Provided that soya beans which were damaged by insects in the green pod stage and of which the discolouration as a result of the damaged is not larger than half of the surface of the soya beans, shall not be deemed as defective soya beans;

"**foreign matter**" means all matter other than soya beans, glass, coal, dung, sclerotinia or metal and loose seed coats of soya beans as well as pods;

"**frost damaged**" means soya beans with green to green brown seed-lobes with a waxy appearance;

"**heat damaged**" means soya beans with light to dark brown seed-lobes in a cross section;

"**insect**" in relation to soya beans, means any live insect which is injurious to stored soya beans, irrespective of the stage of development of the insect;

"**mould infected**" means soya beans that is shrivelled and deformed in appearance with a colour that varies from medium to dark brown, parts of infected beans covered in mould;

"**other grains**" means kernels or pieces of kernels of wheat, barley, oats, triticale, maize, rye and sorghum;

"**pods**" means all whole or damaged soya bean pods;

"**poisonous seeds**" means seeds or part of seeds of plant species that may, in terms of the Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972), represent a hazard to human or animal health when consumed, including seeds of *Argemone mexicana* L., *Convolvulus spp.*, *Crotalaria spp.*, *Datura spp.*, *Ipomoea spp.*, *Lolium temulentum*, *Ricinus communis* or *Xanthium spp.*;

"**sclerotinia**" *Sclerotinia sclerotiorum* is a fungus that produces hard masses of fungi tissue and is also known as sclerotinia. The sclerotinia varies in size and form and consists of a dark black exterior, a white interior and a rough surface texture;

"**soiled soya beans**" means whole soya beans which do not pass through the 4,75 mm screen and which are discoloured by soil or any other substance: Provided that if the discolouration is caused by plant material such soya beans shall not be regarded as soiled soya beans;

"**soya beans**" means the threshed seed and parts of seeds of the plant *Glycine max* and where the word "soya beans" is used in conjunction with the word "consignment", it includes matter other than soya beans that is included in a consignment;

"**the Act**" means the Agricultural Product Standards Act, 1990 (Act No. 119 of 1990);

"**the 4,75 mm round-hole sieve**" means a sieve --

- (a) with a flat metal sheet of 1,0 mm thickness perforated with round holes of 4,75 mm in diameter that are arranged with the centers of the holes at the points of intersection of an equilateral triangular grid with a pitch of 8 mm;
- (b) of which the upper surface of the sieve is smooth;
- (c) the frame of which is at least 40 mm high;
- (d) with the inner width of at least 200 mm and the inner length of at least 300 mm. or, in the case of a circular sieve, the inner diameter of at least 278 mm;
- (e) that fits onto a tray with a solid bottom; and must be at least 20 mm above the bottom of the tray; and

"**wet pods**" means all whole or damaged soya bean pods with a moisture content higher than the permissible moisture content.

***Restriction on sale of soya beans***

2. (1) No person shall sell soya beans in the Republic of South Africa --
- (a) unless the soya beans are sold according to the classes set out in regulation 3;
  - (b) unless the soya beans comply with the standards for the class concerned set out in regulation 4;
  - (c) unless the soya beans, where applicable, comply with the grades of soya beans and the standards for grades set out in regulation 5 and 6 respectively;
  - (d) unless the soya beans are packed in accordance with the packing requirements set out in regulation 7;
  - (e) unless the containers or sale documents, as the case may be, are marked in accordance with the marking requirements set out in regulation 8; and
  - (f) if such soya beans contains a substances that renders it unfit for human or animal consumption or for processing into or utilisation thereof as food or feed.
- (2) The Executive Officer may grant written exemption, entirely or partially to any person on such conditions as he or she may deem necessary, from the provision of subregulation (1): Provided that such exemption is done in terms of section 3(1)(c) of the Act.

**PART I  
QUALITY STANDARDS**

***Classes of soya beans***

3. There are two classes of soya beans, namely Class SB and Class Other soya beans.

***Standards for classes of soya beans***

4. (1) A consignment of soya beans shall --
- (a) be free from a musty, sour, khaki bush or other undesired odour;
  - (b) be free from any substance that renders it unsuitable for human or animal consumption or for processing into or utilisation as food or feed;
  - (c) contain no more poisonous seeds than permitted in terms of the Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972);
  - (d) shall be free from glass, metal, coal or dung;
  - (e) with the exception of Class Other soya beans, be free from insects; and
  - (f) with the exception of Class Other soya beans, have a moisture content of not more than 13 percent.
- (2) A consignment of soya beans is classified as Class SB if it --
- (a) consists of any cultivar of soya beans; and
  - (b) complies with the standards for the grade of Class SB soya beans as set out in regulation 6.
- (3) A consignment of soya beans is classified as Class Other soya beans if it does not comply

with the standards for Class SB.

**Grades for soya beans**

5. (1) Soya beans of Class SB shall be graded as Grade SB1.
- (2) No grades are determined for Class Other soya beans.

**Standards for grades of soya beans**

6. A consignment of soya beans shall be graded as --
  - (a) Grade SB1 if the nature of the deviation, specified in column 1 of Table 1 of the Annexure, in that consignment does not exceed the percentage specified in column 2 of the said table opposite the deviation concerned.

**PART II  
PACKING AND MARKING REQUIREMENTS**

**Packing requirements**

7. Soya beans of different classes and grades shall be packed in different containers or stored separately.

**Marking requirements**

8. Each container or the accompanying sales documents of a consignment of soya beans shall be marked or endorsed with the class and grade of the soya beans.

**PART III  
SAMPLING**

**Obtaining sample**

9. (1) A representative sample of a consignment of soya beans shall --
  - (a) in the case of soya beans delivered in bags and subject to regulation 10, be obtained by sampling at least ten per cent of the bags, chosen from that consignment at random, with a bag probe: Provided that at least 25 bags in a consignment shall be sampled and where a consignment consists of less than 25 bags, all the bags in that consignment shall be sampled; and
  - (b) in the case of soya beans delivered in bulk and subject to regulation 10, be obtained by sampling that consignment throughout the whole depth of the layer, in at least six different places, chosen at random in that bulk quantity, with a bulk sampling apparatus.
- (2) The collective sample obtained in subregulation (1)(a) or (b) shall --
  - (a) have a total mass of at least 10 kg; and
  - (b) be thoroughly mixed by means of dividing before further examination.
- (3) If it is suspected that the sample referred to in subregulation (1)(a) is not representative of that consignment, an additional five per cent of the remaining bags, chosen from that consignment at random, shall be emptied into a suitable bulk container and sampled in the manner contemplated in subregulation (1)(b).
- (4) A sample taken in terms of these regulations shall be deemed to be representative of the

consignment from which it was taken.

***Sampling if contents differ***

10. (1) If, after an examination of the soya beans taken from different bags in a consignment in terms of regulation 9(1), it appears that the contents of those bags differ substantially --

- (a) all the bags in the consignment concerned shall be sampled in order to do such separation;
- (b) the bags concerned shall be placed separately; and
- (c) each group of bags with a similar contents in that consignment shall for the purpose of these regulations be deemed to be a separate consignment.

(2) If, after the discharge of a consignment of soya beans in bulk has commenced, it is suspected that the consignment could be of a grade other than that determined by means of the initial sampling, the discharge shall immediately be stopped and the part of the consignment remaining in the bulk container, as well as the soya beans that is already in the collecting tray, shall be sampled anew with a bulk sampling apparatus or by catching at least 20 samples at regular intervals throughout the whole off loading period with a suitable container from the stream of grain that is flowing in bulk.

***Working sample***

11. A working sample shall be obtained by dividing the representative sample of the consignment according to the ICC 101/1 method.

**PART IV  
INSPECTION METHODS**

***Determination of undesired odours, harmful substances, poisonous seeds, glass, metal, coal, dung and insects***

12. A consignment or a sample of a consignment of soya beans shall be sensorially assessed or chemically analysed in order to determine --

- (a) whether it has musty, sour, khaki bush or other undesired odour;
- (b) whether it contains soya beans in which or on which a substance is found, that renders it unfit for human or animal consumption or for processing into or for utilisation as food or feed;
- (c) whether it contains poisonous seeds;
- (d) whether it contains glass, metal, coal or dung; and
- (e) whether it contains any insects.

***Determination of moisture content***

13. The moisture content of a consignment of soya beans may be determined according to any suitable method: Provided that the result thus obtained is in accordance with the maximum permitted deviation for a class 1 moisture meter as detailed in ISO 7700/2, based on results of the 72 hour, 103°C oven dried method (AACC Method 44-15A).

***Determination of percentage of wet pods***

14. The percentage of wet pods in a consignment of soya beans shall be determined as follows:

- (a) Obtain a working sample of at least 10 kg of soya beans from a representative sample of the



consignment.

- (b) Remove all wet pods by hand from the working sample and determine the mass thereof.
- (c) Express the mass thus determined as a percentage of the mass of the working sample concerned.
- (d) Such percentage represents the percentage of wet pods in the consignment concerned.

***Determination of percentage of other grains, sunflower seed, stones and foreign matter***

15. The percentage of other grains, sunflower seed, stones and foreign matter in a consignment of soya beans shall be determined as follows:

- (a) Obtain a working sample of at least 200g from a representative sample of the consignment.
- (b) Remove all other grains, sunflower seed, stones and foreign matter by hand from the working sample and determine the mass of the other grain, sunflower seed, stones and foreign matter separately.
- (c) Express the respective masses thus determined as a percentage of the mass of the working sample concerned.
- (d) Such percentages represent the percentage of other grains, sunflower seed, stones and foreign matter respectively in the consignment concerned.

***Determination of the percentage defective soya beans***

16. The percentage of defective soya beans shall be determined as follows:

- (a) Obtain a working sample of at least 100g soya beans, which is free of other grains, sunflower seed, stones and foreign matter, from the representative sample of the consignment
- (b) Sieve the working sample over the 4, 75 mm round hole sieve and a pan.
- (c) Sort the soya beans on the 4, 75 mm round hole sieve so that the defective soya beans retained.
- (d) Determine the mass of the defective soya beans on the 4, 75 mm round hole sieve and express it as a percentage of the mass of the working sample concerned.
- (e) Such percentage represents the percentage of defective soya beans in the consignment.

***Determination of the soya beans and pieces of soya beans which pass through the 4,75 mm round hole sieve***

17. The percentage of soya beans and pieces of soya beans which pass through the 4, 75 mm round hole sieve shall be determined as follows:

- (a) Determine the mass of the soya beans and pieces of soya beans in the pan as obtained according to 16(a) and (b) and express it as a percentage of the mass of the working sample obtained in 16(a).
- (b) Such percentage represents the percentage soya beans and pieces of soya beans in the consignment which passes through the 4, 75 mm round hole sieve.

***Determination of percentage of soiled soya beans***

18. The percentage of soiled soya beans in a consignment of soya beans shall be determined as follows:

- (a) Remove all soiled soya beans from the working sample obtained in 16(a) by hand and determine the mass thereof.
- (b) Express the mass thus determined, as a percentage of the mass of the working sample in 16(a) obtained.
- (c) Such percentage represents the percentage of soiled soya beans in the consignment concerned.

***Determination of percentage sclerotinia***

19. The percentage sclerotinia in a consignment of soya beans shall be determined as follows:
- (a) Remove all sclerotinia in the working sample in 16(a) obtained by hand and determine the mass thereof.
  - (b) Express the mass thus determined as a percentage of the working sample in 16(a) of the consignment.
  - (c) Such percentage represents the percentage sclerotinia in the consignment.

**PART V  
OFFENCES AND PENALTIES**

20. Any person who fails to comply with any provision of these regulations shall be guilty of an offence and upon conviction be liable to a fine or imprisonment in accordance with article 11 of the Act.

## ANNEXURE/AANHANGSEL

## TABLE/TABEL

## STANDARDS FOR GRADES OF SOYA BEANS/STANDAARDE VIR GRADE VAN SOJABONE

Nature of deviation/Aard van afwyking	Maximum percentage permissible deviation (m/m)/ Maksimum persentasie toelaatbare afwyking (m/m)
1	Grade/Graad SB1
	2
(a) Wet pods/Nat peule	0,2%
(b) Foreign matter, including stones, other grain and sunflower seeds: Provided that such deviations are individually within the limits specified in items (c), (d), (e) and (f)/Vreemde voorwerpe, insluitende klip-pies, ander graan en sonneblomsaad: Met dien verstande dat sodanige afwykings individueel binne die perke gespesifiseer in items (c), (d), (e) en (f) is	4%
(c) Other grain/Ander graan	0,5%
(d) Sunflower seed/Sonneblomsaad	0,1%
(e) Stones/Klippies	1%
(f) Sclerotinia	4%
(g) Soya beans and parts of soya beans which pass through the 4,75 mm round hole screen/Sojabone en gedeeltes van sojabone wat deur die 4,75 mm-rondegatsif gaan	10%
(h) Defective soya beans on the 4,75 mm round hole screen/Gebrekkige sojabone op die 4,75 mm-rondegatsif	10%
(i) Soiled soya beans/Vuilgesmeerde sojabone	10%
(j) Deviation in (b) and (f) collectively: Provided that such deviations are individually within the limits of said items/Afwykings in (b) en (f) gesamentlik: Met dien verstande dat sodanige afwykings individueel binne die perke van genoemde items is	6%

