Soybean Crop Quality 2020/21 – Summary of results

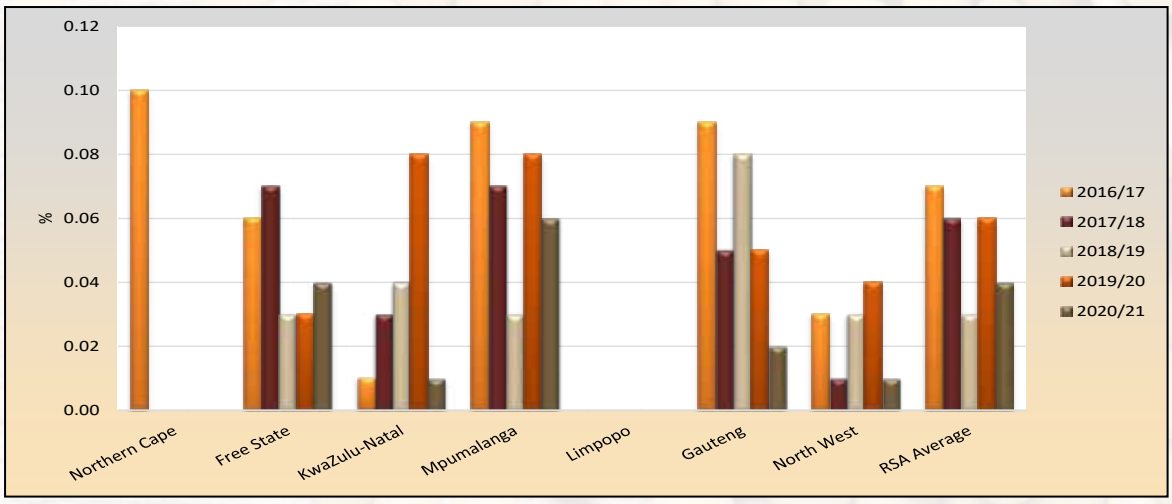
Eighty percent (120) of the 150 samples analysed for the purpose of this survey were graded as Grade SB1, while 30 (20%) of the samples were downgraded to COSB (Class Other Soya Beans). During the previous two seasons, 27% (2019/20) and 11% (2018/19) of the samples were downgraded to COSB.

- Four of the 30 samples were downgraded as a result of the percentage other grain exceeding the maximum permissible deviation of 0.5%.
- Four of the samples were downgraded as a result of the percentage defective soybeans on the 4.75 mm round-hole sieve exceeding the maximum permissible deviation of 10%.
- Five samples were downgraded as a result of the percentage soiled soybeans present in the samples exceeding the maximum permissible deviation of 10%.
- Seven samples were downgraded as a result of the number of *Crotolaria sp.* and one sample as a result of *Datura sp.* poisonous seeds present exceeding the maximum permissible number of 1 per 1000 g.
- Three samples were downgraded as a result of the number of *Ipomoea purpurea* Roth. poisonous seeds present exceeding the maximum permissible number of 7 per 1000 g.
- The remaining six samples were downgraded as a result of a combination of one or more of the following deviations exceeding the maximum permissible deviation: foreign matter, other grain, sunflower seed, defective soybeans above the 4.75 mm sieve, soiled soybeans and the presence of poisonous seeds *(Ipomoea purpurea* Roth.*)*

Wet pods were not present in any of the 150 samples received and graded.

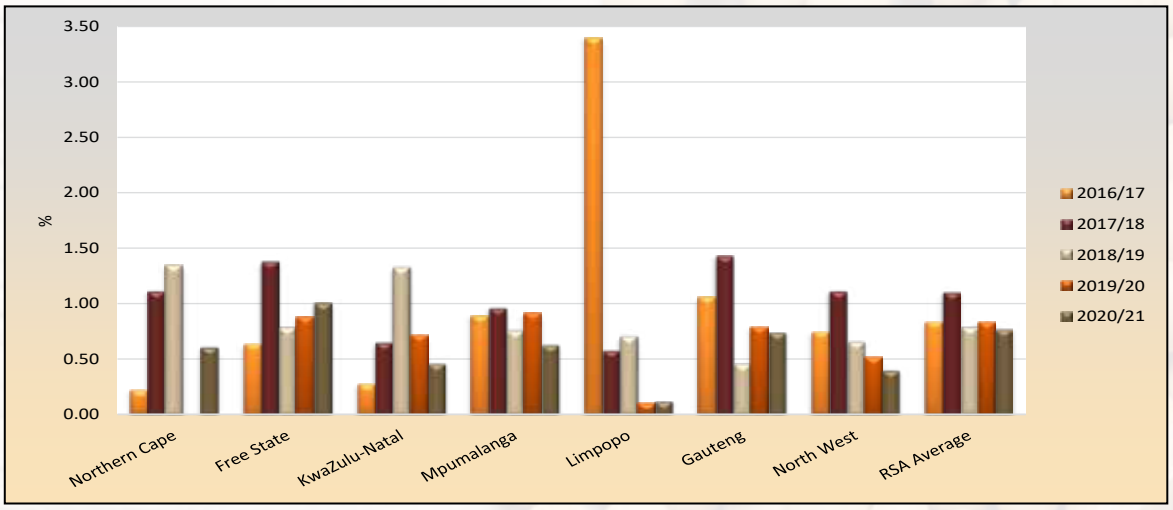
The percentage samples containing sclerotia from the fungus *Sclerotinia sclerotiorum*, showed a small increase from 41% (62 samples) in the previous season to 43% (65 samples) this season. In the 2018/19 season, 41 samples (27%) contained sclerotia. 55% of the samples that contained sclerotia this season originated in Mpumalanga and 40% originated in the Free State province. All these percentages sclerotia found to be present in the samples are however still well below the maximum permissible level of 4%. The national weighted average percentage this season was 0.04% compared to the 0.06% of the previous season. See Graph 16.

Graph 16: Average percentage sclerotia per province over five seasons



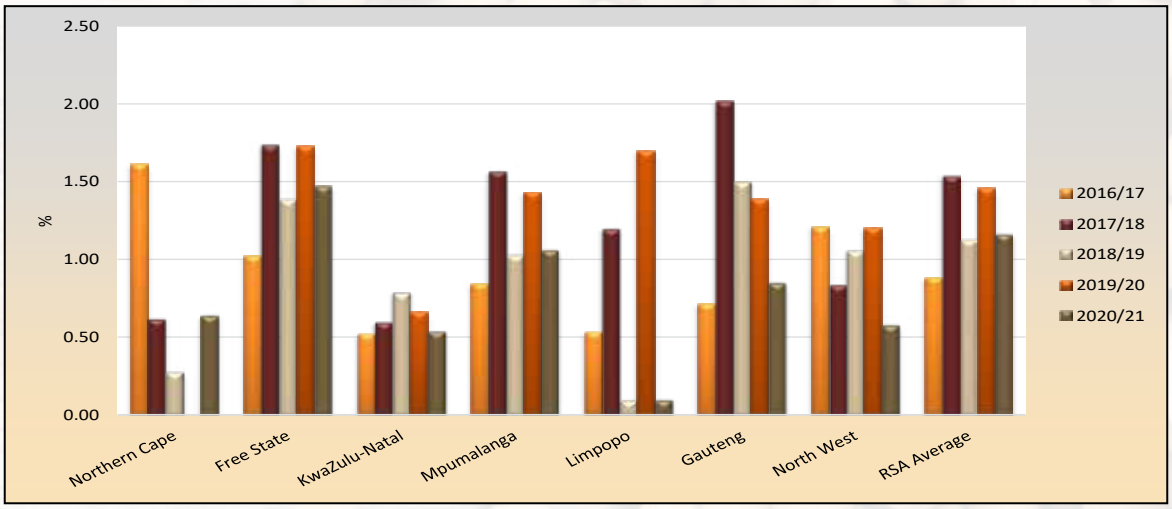
The samples received from the Free State province (61 samples) had the highest percentage foreign matter (1.01%), followed by Gauteng (5 samples) with 0.74% and Mpumalanga (66 samples) and the Northern Cape (2 samples) with 0.63% and 0.61% respectively. The lowest percentage foreign matter was observed on the single sample from Limpopo, namely 0.12%. The national weighted average of 0.77% was in line with previous seasons. Please refer to Graph 17.

Graph 17: Average percentage foreign matter per province over five seasons



The Free State reported the highest weighted average percentage soybeans and parts of soybeans above the 1.8 mm slotted sieve which pass through the 4.75 mm round hole sieve, namely 1.47%, followed by the 1.06% from Mpumalanga. The lowest weighted average value reported was 0.10% on the sample from Limpopo. The national weighted average percentage decreased from 1.46 % the previous season to 1.16% this season. The 2018/19 season's average was 1.13%. Please see Graph 18.

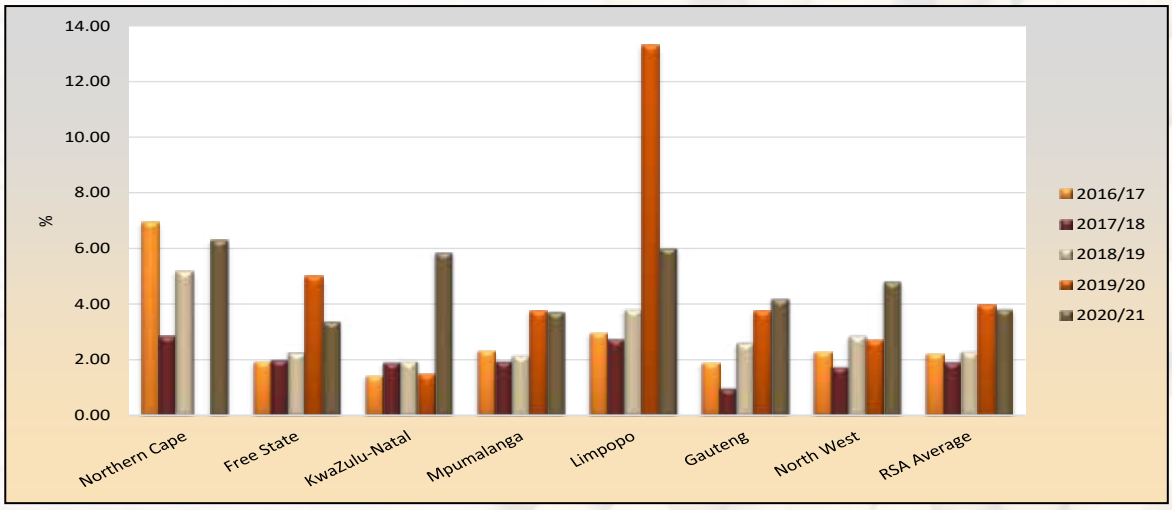
Graph 18: Average percentage soybeans and parts of soybeans above the 1.8 mm slotted sieve which pass through the 4.75 mm round hole sieve per province over five seasons



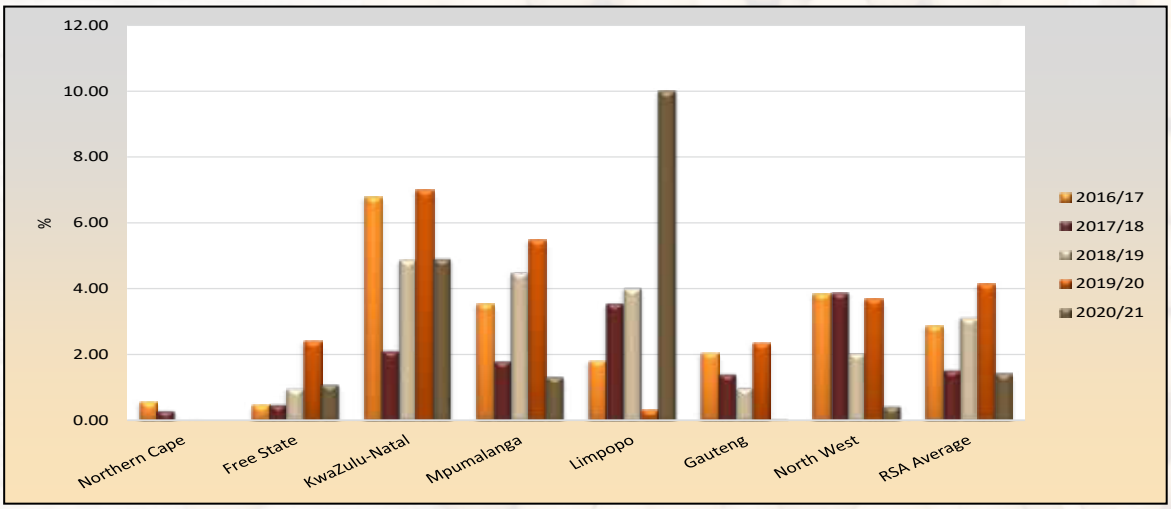
The lowest weighted average percentage defective soybeans on the 4.75 mm sieve, namely 3.37%, was observed on the samples from the Free State. The highest percentage, namely 6.30% was observed on the Northern Cape samples. The averages in the other provinces ranged from 3.72% in Mpumalanga to 6.00% in Limpopo. The national weighted average decreased from 3.98% last season to 3.82% this season. Please see Graph 19.

The national weighted average percentage soiled soybeans was 1.44%, the lowest average since the 2014/15 season. The previous two seasons averaged 4.13% and 3.10% respectively. Weighted average percentages per province ranged from 0% in the Northern Cape to 10.00% in Limpopo. Please see Graph 20. Six samples exceeded the maximum permissible deviation of 10% according to the grading regulations. The highest percentage reported was 14.54% on a sample from the Free State. The rest of these samples originated in Mpumalanga, KwaZulu-Natal and the Free State. Last season, 17 samples, originating from these same provinces, exceeded the grading limit.

Graph 19: Average percentage defective soybeans on the 4.75 mm round hole sieve per province over five seasons



Graph 20: Average percentage soiled soybeans per province over five seasons



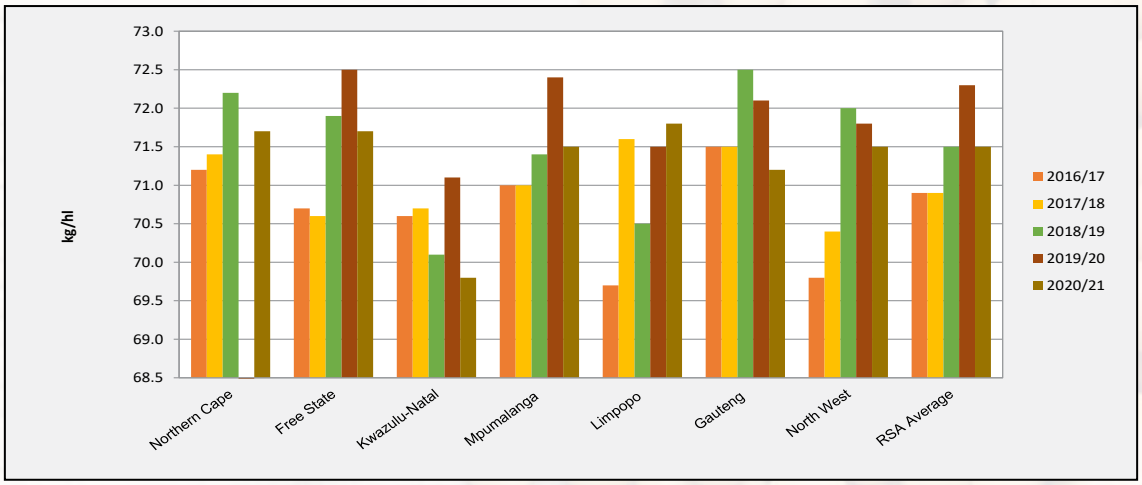
Test weight does not form part of the grading regulations for soybeans in South Africa. An approximation of the test weight of South African soybeans is provided in Table 2 for information purposes. The standard working procedure of the Kern 222 instrument, as described in ISO 7971-3:2019, was followed. The g/1 L filling mass of the soybean samples was determined and divided by two. The test weight was then extrapolated by means of the following formulas obtained from the Test Weight Conversion Chart for Soybean of the Canadian Grain Commission: $y = 0.1898x + 2.2988$ (291 to 350 g/0.5 L) and $y = 0.1895x + 2.3964$ (351 to 410 g/0.5 L). Please see Graph 21 for a comparison of the test weight per province over the last five seasons.

Table 2: Approximation of test weight per province over three seasons

Province	Test weight, kg/hl								
	2020/21 Season			2019/20 Season			2018/19 Season		
	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples
Northern Cape (Regions 10 - 11)	71.7	71.6 - 71.7	2	-	-	-	72.2	-	1
Free State (Regions 21 - 28)	71.7	68.9 - 75.0	**59	72.5	70.3 - 74.4	51	71.9	69.4 - 74.2	42
KwaZulu-Natal (Region 36)	69.8	67.7 - 71.2	10	71.1	70.0 - 72.3	9	70.1	68.2 - 72.4	12
Mpumalanga (Regions 29 - 33)	71.5	66.5 - 73.2	*65	72.4	70.2 - 74.0	*64	71.4	67.8 - 74.6	73
Limpopo (Region 35)	71.8	-	1	71.5	-	1	70.5	68.9 - 73.2	3
Gauteng (Region 34)	71.2	70.3 - 71.8	5	72.1	71.0 - 73.2	8	72.5	71.7 - 73.8	12
North West (Region 12 - 20)	71.5	70.8 - 71.9	5	71.8	68.7 - 73.3	16	72.0	72.1 - 73.5	**5
RSA	***71.5***	***66.5 - 75.0***	***147***	***72.3***	***68.7 - 74.4***	***149***	***71.5***	***67.8 - 74.6***	***148***

** One sample with an outlier value was not taken into account for calculation purposes.*
***Two samples with outlier values were not taken into account for calculation purposes.*

Graph 21: Comparison of the test weight per province over five seasons



The nutritional component analyses, namely crude protein, - fat, - fibre and ash are reported on a dry/moisture-free basis (db) for the current as well as the previous surveys. For comparison purposes the national average 'as is' or wet basis results for the last five seasons are provided in Table 3. These 'as is' average values were calculated by converting each individual value from dry basis to 'as is'.

Table 3: Comparison of weighted average nutritional component values on a dry and 'as is' basis over five seasons

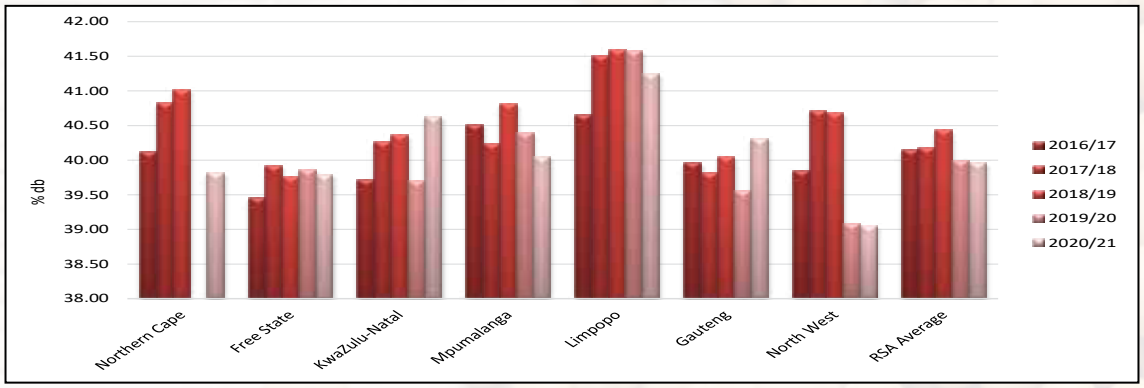
Season	2020/21		2019/20		2018/19		2017/18		2016/17	
Moisture, % (17hr, 103°C)	7.5		7.2		7.0		7.4		7.4	
Moisture basis	**Dry basis**	**As is**	**Dry basis**	**As is**	**Dry basis**	**As is**	**Dry basis**	**As is**	**Dry basis**	**As is**
Crude protein, %	39.96	36.95	39.99	37.12	40.43	37.60	40.18	37.40	40.15	37.20
Crude fat, %	19.5	18.0	18.0	16.7	19.1	17.8	19.3	18.0	19.8	18.5
Crude fibre, %	6.8	6.3	7.0	6.5	6.8	6.3	5.9	5.5	5.9	5.4
Ash, %	4.55	4.21	4.63	4.19	4.67	4.34	4.59	4.27	4.58	4.24
No. of samples	***150***		***150***		***150***		***150***		***150***	

The weighted average crude protein content this season was 39.96% compared to the 39.99% of the previous season. As in the previous four seasons, Limpopo had the highest weighted average crude protein content (41.25%). North West (5 samples) reported the lowest average namely 39.05%. The weighted average crude fat percentage of 19.5% was the highest since the 2016/17 season. The samples from KwaZulu-Natal (N = 10) had the highest weighted average crude fat content (as in the previous two seasons), namely 21.5%. The lowest fat averages were observed in the Free State and Gauteng provinces, with 19.1% and 19.2% respectively.

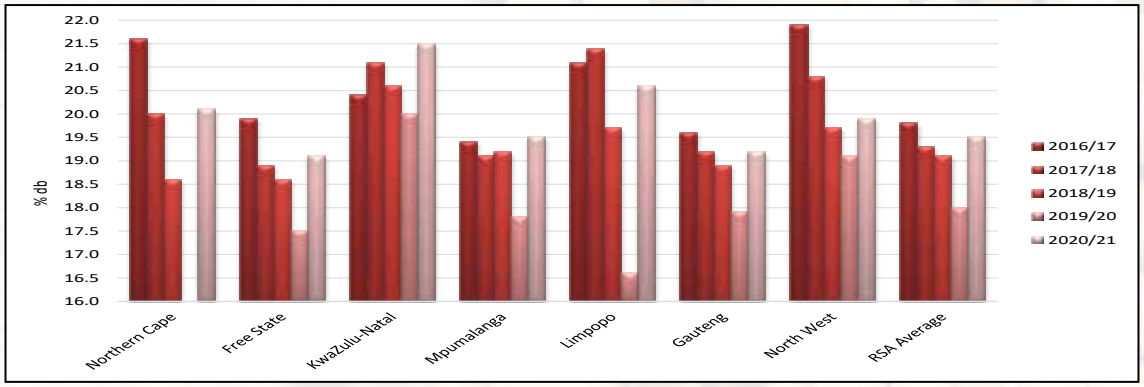
The weighted average percentage crude fibre varied from 5.8% in the Northern Cape to 7.2% in North West. The RSA weighted average was 6.8% compared to the 7.0% of the previous season. A small variation of only 0.12% is observed with regards to the national weighted average ash content over the ten seasons that this survey has been conducted. This season, the average ash content was 4.55%, the lowest average of the 10 seasons. Last season this value was 4.63%.

Graphs 22 to 25 on page 18 provide comparisons between provinces over seasons for the nutritional components mentioned above.

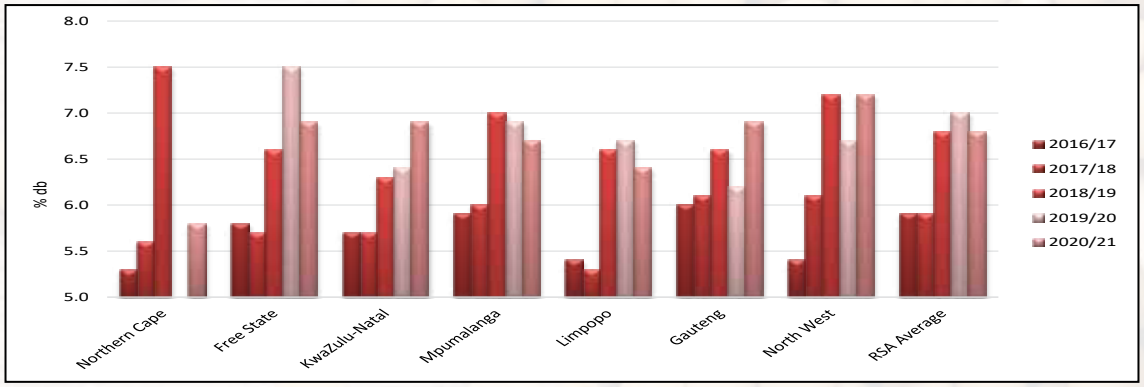
Graph 22: Average crude protein content per province over five seasons



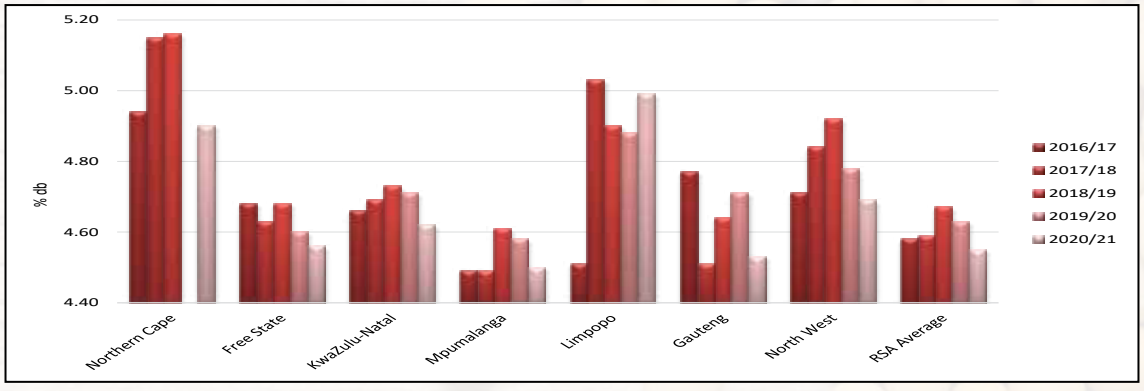
Graph 23: Average crude fat content per province over five seasons



Graph 24: Average crude fibre content per province over five seasons



Graph 25: Average ash content per province over five seasons



The 2020/21 season is the third season that the SAGL conducted the moisture, crude protein and crude fat analyses on the ARC Grain Crops soybean cultivar trials' samples. Please see a comparison of the results between the crop survey and cultivar samples in Table 4.

Table 4: Comparison between the moisture, crude protein and crude fat results of the soybean crop quality and ARC cultivar trial samples of the 2020/21 season

Analysis	Moisture, % (17hr, 103°C)	Crude Protein, % (db)	Crude Protein, % (as is)	Crude Fat, % (db)	Crude Fat, % (as is)
Soybean Crop Quality Survey results					
Average	**7.5**	**39.96**	**36.95**	**19.5**	**18.0**
Minimum	6.2	33.81	31.11	16.7	15.4
Maximum	9.4	42.77	39.48	23.2	21.5
Standard Deviation	0.60	1.77	1.58	1.16	1.10
No. of samples	*150*	*150*	*150*	*150*	*150*
ARC Grain Crops Cultivar trial sample results					
Average	**7.2**	**41.39**	**38.41**	**19.6**	**18.2**
Minimum	6.5	36.89	34.49	16.6	15.5
Maximum	8.5	44.61	40.82	23.6	21.6
Standard Deviation	0.48	1.47	1.46	1.53	1.5
No. of samples	*90*	*90*	*90*	*90*	*90*
% Difference between crop and cultivar samples	***0.3***	***-1.4***	***-1.5***	***-0.1***	***-0.2***

All fifteen samples tested for genetic modification (GM), tested positive for the presence of the CP4 EPSPS trait (Roundup Ready®). Please refer to the results in Table 5 on page 20 of this report.

A summary of the RSA Soybean Crop Quality averages of the 2020/21 season compared to those of the 2019/20 season, is provided in Table 6 on page 21.

Please see pages 25 to 31 for the average soybean quality per region.