

# Soya bean crop quality survey results: 2018/19 production season

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The first and very crucial step in any crop survey is obtaining the samples that will provide information about the quality of the crop. Without the co-operation of the commercial grain silo owners, members of Agbiz Grain who supply these samples to the Southern African Grain Laboratory NPC (SAGL) at no cost, these surveys would not have been possible.

Each delivery of soya beans at the various delivery points throughout the soya bean production regions, is sampled as per the grading regulations for grading purposes. After grading, the graded samples are placed in separate containers according to class and grade, per silo bin/bag/bunker at each delivery point. Once 80% of the expected harvest has been received, the content of each container is divided with a multi-slot divider to obtain a 3kg sample.

If there is more than one container per class and grade per bin/bag/bunker, the combined contents of the containers are mixed thoroughly before dividing it with a multi-slot divider to obtain the required 3kg 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 then forwarded to the SAGL.

The samples received at the SAGL are selected to proportionally resemble the Crop Estimates Committee's production estimate figures per province, as closely as possible.

## Grading of samples

All 150 samples selected for the 2018/19 survey were graded according to the *Regulations relating to the grading, packing and marking of soya beans intended for sale in the Republic of South*

**Table 1: Comparison between the moisture, crude protein and crude fat results of the crop quality and ARC cultivar trial samples of the 2018/19 season.**

Analysis	Moisture % (17hr, 103°C)	Crude protein % (as is)	Crude fat % (as is)	Crude protein % (db)	Crude fat % (db)
<b>Soya bean crop quality survey results</b>					
Average	7	37,60	17,8	40,43	19,1
Minimum	6	33,13	15,3	35,43	16,5
Maximum	11,4	41,84	20,4	45,09	22,0
Standard deviation	0,67	1,20	1,16	1,30	1,24
Number of samples	150	150	150	150	150
<b>ARC Grain Crops cultivar trial sample results</b>					
Average	8	37,32	18,9	40,54	20,5
Minimum	7,3	33,08	16,1	36,01	17,4
Maximum	8,5	42,24	21,9	46,05	23,8
Standard deviation	0,29	1,40	1,23	1,55	1,34
Number of samples	180	180	180	180	180
% difference between crop and cultivar samples	-1,0	0,3	-1,1	-0,1	-1,4

*Africa (Government Notice No R 370 of 21 April 2017)*. A total of 134 (89%) of the samples were graded as grade SB1 – during the previous two seasons this figure was 87 and 88%, respectively. The main reasons for downgrading the samples were the percentage other grain, the percentage soiled soya beans, as well as the number of *Datura* sp. and *Convolvulus* sp. seeds exceeding the maximum permissible percentage or number according to the regulations.

Other grains are defined as grains or pieces of grains of wheat, barley, oats, triticale, maize, rye and sorghum. Soiled soya beans means whole soya beans that do not pass through the 4,75mm screen and that are discoloured by soil or other substances (if the discolouration is caused by plant material, such soya beans shall not be regarded as soiled).

## National weighted averages

The national weighted average percentage of soiled soya beans was 3,1%, compared to the 1,53% of the previous season. Six samples exceeded and one sample equalled the maximum permissible deviation of 10%. The highest percentage reported was 36%. All these samples originated in Mpumalanga. Last season, three samples exceeded this grading limit.

The percentage of samples containing sclerotia from the fungus *Sclerotinia sclerotiorum* decreased from 59% (88 samples) in the previous season to 27% (41 samples) this season. The five highest percentages sclerotia observed ranged from 0,44% (sample from Gauteng) to 0,24% (samples from Mpumalanga and the Free State). These percentages are, however, still well below the maximum permissible level. The national weighted average percentage



this season was 0,03% compared to the 0,06% of the previous season.

The national weighted average percentage of soya beans and parts of soya beans above the 1,8mm slotted sieve, which passed through the 4,75mm round hole sieve, decreased from 1,54% the previous season to 1,13% this season. The weighted average percentage defective soya beans on the 4,75mm sieve increased from 1,91% last season to 2,3% this season. Wet pods were not present in any of the samples.

**Notable results**

The 2018/19 season is the first season in which the SAGL conducted moisture, crude protein and crude fat analyses on the soya bean cultivar trial samples of the ARC Grain Crops. *Table 1* contains a comparison of the results of the crop survey and cultivar trial samples.

The weighted average crude protein content of the crop samples this season was 37,6% compared to the 37,4% of the previous season. As in the previous two seasons, Limpopo had the highest weighted average crude protein content (38,74%); the Free State (36,9%) reported the lowest average. The weighted average crude fat percentage of 17,8% was slightly lower than the 18% in the previous season and also the lowest of the last six seasons.

The samples from KwaZulu-Natal had the highest weighted average crude fat content, namely 19,2%. The lowest average fat contents were observed in the Free State and Northern Cape with 17,3 and 17,4%, respectively.

The weighted average percentage crude fibre varied from 5,8% in KwaZulu-Natal to 7% in the Northern Cape. The South African weighted average, 6,3%, was the second highest of the annual surveys since the 6,8% reported in the 2015/16 season. This season, the average ash content was 4,34%, the highest of the eight seasons since commencement of the crop surveys and 0,07% higher than the previous season.

Samples from the Northern Cape and Limpopo, as well as the North West to a lesser extent, tend to show higher ash contents over seasons compared to the other provinces. The nutritional component analyses results in this article are reported on an as is/as received basis.

**Fatty acid profile analyses**

An exciting and important addition to the quality survey this season is the inclusion of fatty acid profile analyses. Fatty acid profiles are the most important tool for identifying the authenticity of vegetable fats and oils. All types of oil have their own specific fatty acid profile that is unique to that product. The unique fatty acid profile of each product/crop is a combination of saturated, monounsaturated and polyunsaturated oils and is specific to that type of oil.

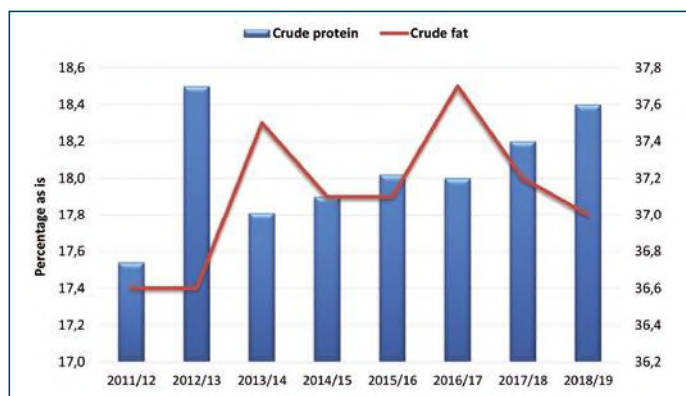
The fatty acid profiles of every crop, however, are subject to variation. The variation or typical pattern of fatty acids in a specific oil not only influences the stability and physical properties of the oil, but also aids in distinguishing one type of oil from another. The variation of fatty

acids within the same product depends on climate, latitude, soil type, cultivar, rainfall as well as seasonal variation. These variations should be included when ranges for identifying authenticity are determined. It is imperative to include ranges in which fatty acids

vary in order to successfully validate the authenticity of a specific vegetable oil. Building a database requires gathering of information over different seasons, areas and cultivars in order to give a true reflection of the ranges wherein fatty acids can differ. There is currently no national updated database for the fatty acid composition of soya bean oil. It is important that South Africa, as a soya bean producing country, develops and maintains a national fatty acid profile database to the benefit of the oilseeds industry. Annual analysis of crop and cultivar samples will ensure that the natural variation caused by different cultivars, as well as the influence of climate and locality, are included in the database values. Seasonal variations will also be addressed. Recording all variations applicable to the crops in the database will enable the annual review of the specified ranges.

Precision Oil Laboratories was subcontracted to perform fatty acid profile analyses on 20 composite crop samples representing different production regions, as well as 21 cultivar samples from different localities supplied by the ARC Grain Crops. A total of 20 different fatty acids were included in the profile analysis. 📍

**Figure 1: Crude protein and crude fat results of the soya bean crop samples over the last eight seasons.**



With gratitude to the Oil and Protein Seeds Development Trust for financial support of these annual surveys and to the members of Agbiz Grain for providing the crop samples. For more information, contact the Southern African Grain Laboratory NPC on 012 807 4019 or visit [www.sagl.co.za](http://www.sagl.co.za).