South African Sunflower Crop

Quality Report
2015/2016 Season

Index

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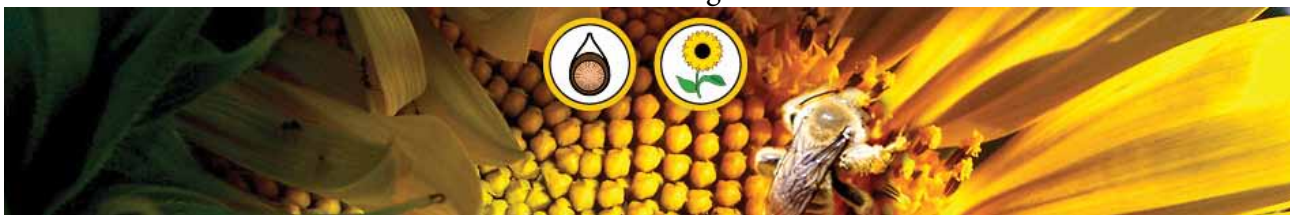


South African Commercial sunflower quality for the 2015/2016 Season

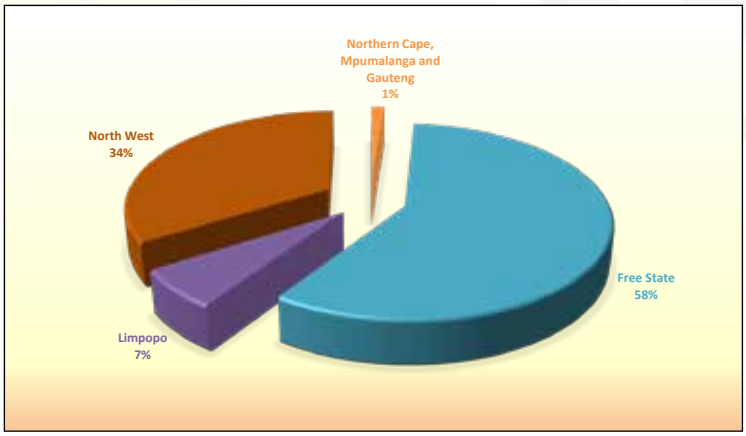
Acknowledgements
With gratitude to:

- ***The Oil & Protein Seed Development Trust for its financial support in conducting this survey.***
- *Agbiz Grain and its members for their cooperation in providing the samples to make this survey possible.*
- *The Crop Estimates Committee (CEC) of the Department of Agriculture, Forestry and Fisheries for providing production related figures.*
- *South African Grain Information Service (SAGIS) for providing supply and demand figures relating to sunflower.*

Introduction

The final commercial sunflower crop figure of the 2015/2016 season as overseen by the National Crop Estimates Liaison Committee (CELC) is 755 000 tons. The final calculated crop figure remained unchanged. This figure represents an increase of almost 14% (92 000 tons) compared to the 2014/2015 season. The major sunflower-producing provinces, namely the Free State and North West, contributed 92% of the total crop.

Graph 1: Contribution of the provinces to the production of the 2015/2016 sunflower crop



Figures provided by the CEC.

During the harvesting season, a representative sample of each delivery of sunflower 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 23. One hundred and seventy six (176) composite sunflower samples, representing the different production regions, were analysed for quality. The samples were graded, milled and analysed for moisture, crude protein, crude fat, crude fibre and ash content.

This is the fourth annual sunflower 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 a number of proficiency testing schemes, both nationally and internationally, as part of our ongoing quality assurance procedures to demonstrate technical competency and international comparability.

The goal of this crop quality survey is the compilation of a detailed database, accumulating quality data collected over several seasons on the national commercial sunflower crop, which is essential in assisting with decision making processes. The data reveal general tendencies and highlight quality differences in the commercial sunflower produced in different local production regions.

The results of this survey are available on the SAGL website (www.sagl.co.za). The hard copy reports are distributed to all the Directly Affected Groups and interested parties. The report is also available for download in a PDF format from the website.

In addition to the quality information, production figures (obtained from the Crop Estimates Committee (CEC)) relating to hectares planted, tons produced and yields obtained on a national as well as provincial basis, over an eleven season period, are provided in this report. SAGIS (South African Grain Information Service) supply and demand information, including import and export figures over several seasons are provided in table and graph format.

The report of the Evaluation of sunflower cultivars 2015/2016 season conducted by the ARC-Grain Crops Institute in collaboration with Agricol, Pannar, Pioneer and Syngenta is also included in this report, as is the national grading regulations as published in the Government Gazette No. 45 of 22 January 2016.

Production

Sunflower seed production is very suitable for South African climatic conditions as sunflower plants are drought tolerant. The deep root system of a sunflower enables the plant to perform better than other crops during dry seasons. Another advantage of sunflowers is that the plants grow much quicker than for example maize and can be planted later in the season when rainfall occurs late. Some of the crop this season was only planted in late January 2016. As a result of the drought, sunflower production this season exceeded soybean production for the first time since the 2010/2011 season.

The area utilized for sunflower production increased by almost 25%, from 576 000 hectares in the previous season, to 718 500 hectares this season. Due to the drought, production only increased by 14% as the yield decreased from 1.15 t/ha to 1.05 t/ha.

World sunflower seed production for the 2015/2016 season stands at 42 465 million tons with the Ukraine and Russia contributing 51% to this total. Please see Table 1 for the world sunflower seed supply and demand figures.

Table 1: World Sunflower Seed Supply and Demand

Season	2011/12	2012/13	2013/14	2014/15	2015/16 (Revised)	2016/17 (Forecast)
Area Harvested (1,000 Ha)	***25,856***	***25,470***	***25,730***	***24,708***	***25,143***	***26,635***
Yield (MT/Ha)	***1.53***	***1.4***	***1.68***	***1.67***	***1.69***	***1.78***
Production (1,000 MT)						
Argentina	3,775	2,850	2,250	3,000	2,850	3,550
European Union	8,323	7,018	9,105	9,006	7,586	8,251
China	1,700	1,730	2,423	2,380	2,350	2,330
Russia	9,500	8,000	10,200	9,000	9,700	11,000
Ukraine	9,500	8,387	10,941	10,250	12,100	14,000
United States	925	1,264	917	1,005	1,326	1,204
India	620	615	580	390	330	400
Turkey	940	1,100	1,450	1,350	1,350	1,480
Other	4,226	4,783	5,471	4,953	4,873	5,182
TOTAL	***39,509***	***35,747***	***43,337***	***41,334***	***42,465***	***47,397***
Import (1,000 MT)						
Turkey	844	627	581	523	436	600
European Union	291	220	329	275	576	670
Other	830	638	1,050	1,078	1,058	1,361
TOTAL	***1,965***	***1,485***	***1,960***	***1,876***	***2,070***	***2,634***
Export (1,000 MT)						
Argentina	83	85	80	63	302	400
United States	114	144	132	126	108	100
Russia	402	59	131	61	105	150
Ukraine	284	124	71	123	171	400
Other	1,097	1,128	1,536	1,462	1,439	1,546
TOTAL	***1,980***	***1,540***	***1,950***	***1,835***	***2,125***	***2,596***
Oilseed crushed	**36,145**	**32,355**	**38,360**	**36,581**	**37,933**	**42,226**

2016 U.S. Sunflower Crop Quality Report compiled by the National Sunflower Association, sources Oil World & USDA.

According to The Bureau for Food and Agricultural Policy (BFAP) Baseline, Agricultural Outlook 2016 – 2025, sunflower area is expected to decline in 2017 to around 2015 levels, assuming normal rainfall patterns, before stabilizing at around 560 000 hectares by 2025. An average production increase of 1.4% per year is expected to result in a production of 820 000 tons by 2025, driven by average annual improvements in yield of close to 3% also by 2025. The production and crushing demand for sunflower seed is projected to remain in a fine balance over the 2016 to 2025 time period, with less than 5% of the volume for domestic use being imported. From a crop and risk diversification perspective, sunflower production will remain an important alternative in years associated with pre- and post-season drought conditions.

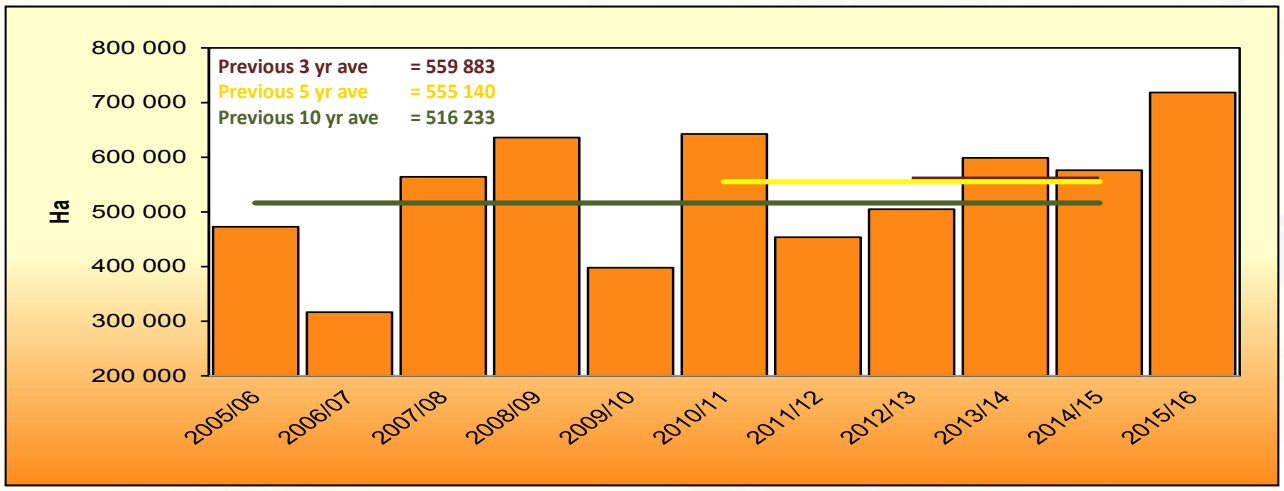
Please see Table 2 for an overview of sunflower production under dry land conditions versus irrigation in the 2015/2016 season, compared to the 2014/2015 season. Graphs 2 to 4 provide national figures with regards to hectares planted, tons produced and yields obtained over the last 11 seasons and Graphs 5 to 10 similar figures for the major sunflower producing provinces, namely the Free State, North West and Limpopo.

Table 2: Sunflower production overview over two seasons

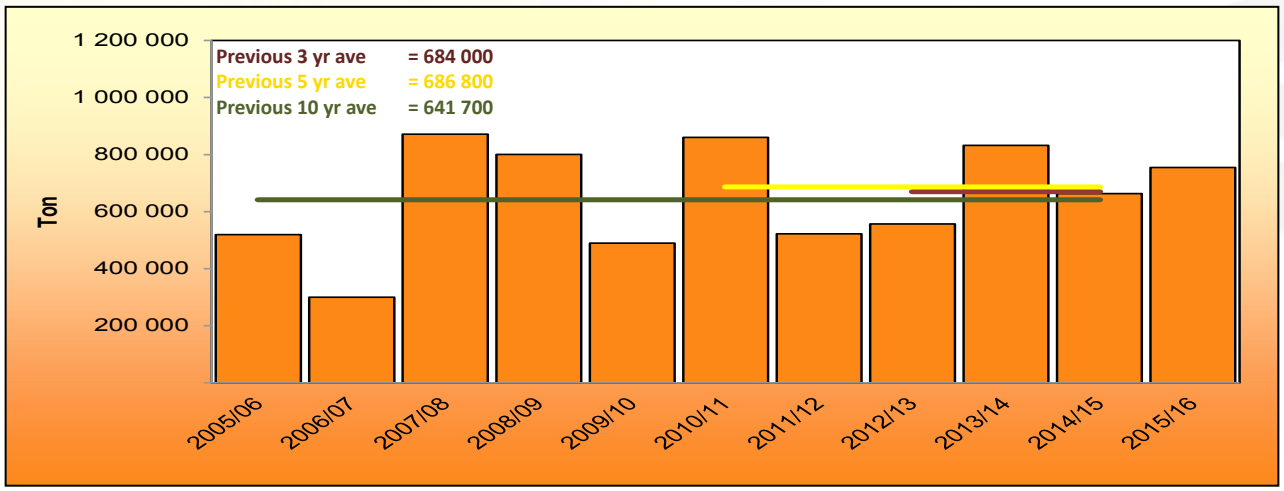
Province	Type of production	2015/2016			2014/2015		
		Hectares planted, ha	Production, tons	Yield, t/ha	Hectares planted, ha	Production, tons	Yield, t/ha
Western Cape	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Northern Cape	Dryland	-	-	-	-	-	-
	Irrigation	500	600	1.20	500	500	1.00
	Total	500	600	1.20	500	500	1.00
Free State	Dryland	398 000	438 000	1.10	283 500	367 000	1.29
	Irrigation	2 000	2 000	1.00	1 500	3 500	2.33
	Total	400 000	440 000	1.10	285 000	370 500	1.30
Eastern Cape	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
KwaZulu-Natal	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Mpumalanga	Dryland	4 000	4 400	1.10	2 500	3 300	1.32
	Irrigation	-	-	-	-	-	-
	Total	4 000	4 400	1.10	2 500	3 300	1.32
Limpopo	Dryland	63 700	46 150	0.72	81 300	59 900	0.74
	Irrigation	1 300	2 600	2.00	700	1 600	2.29
	Total	65 000	48 750	0.75	82 000	61 500	0.75
Gauteng	Dryland	3 550	3 100	0.87	5 500	5 775	1.05
	Irrigation	450	900	2.00	500	1 425	2.85
	Total	4 000	4 000	1.00	6 000	7 200	1.20
North West	Dryland	244 000	255 000	1.05	199 200	218 200	1.10
	Irrigation	1 000	2 250	2.25	800	1 800	2.25
	Total	245 000	257 250	1.50	200 000	220 000	1.10
RSA	Dryland	713 250	746 650	1.05	572 000	654 175	1.14
	Irrigation	5 250	8 350	1.59	4 000	8 825	2.21
	Total	718 500	755 000	1.05	576 000	663 000	1.15

Figures provided by the CEC.

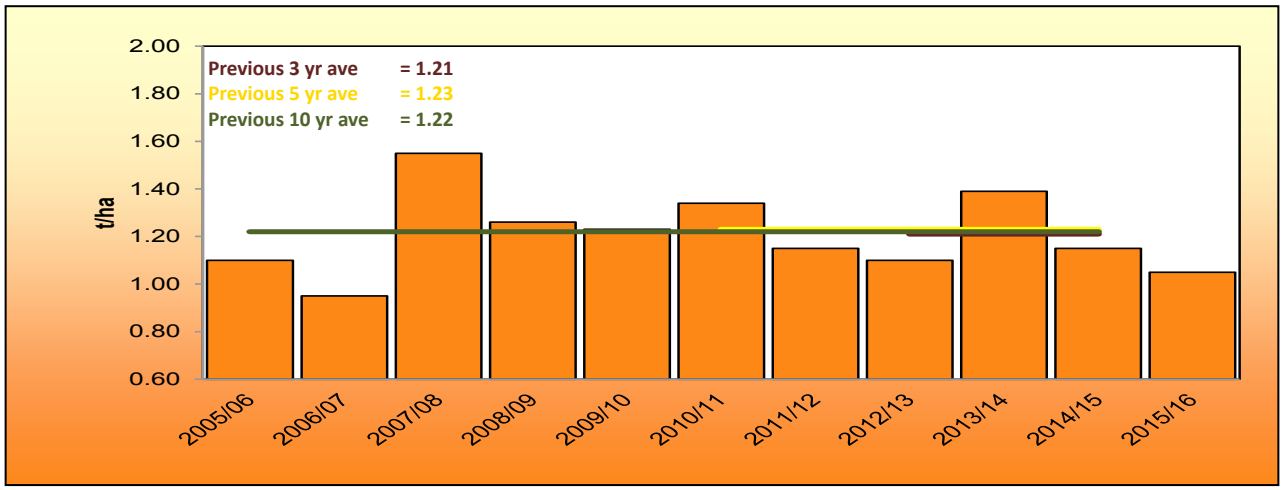
Graph 2: Total RSA area utilised for sunflower production from 2005/06 to 2015/16



Graph 3: Sunflower production in RSA from 2005/06 to 2015/16

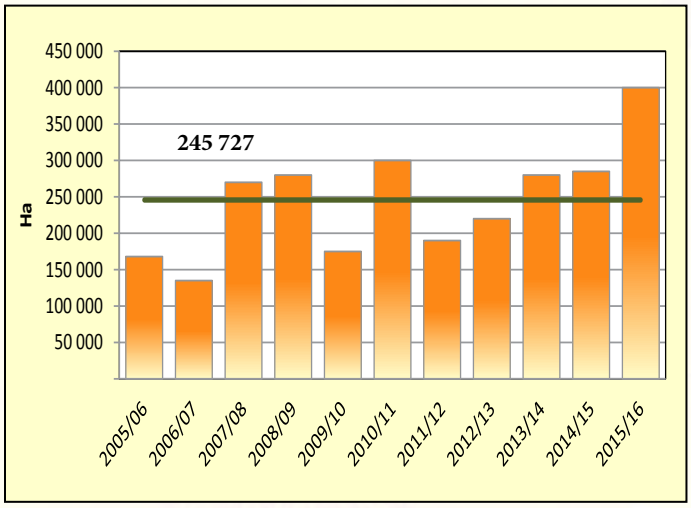


Graph 4: RSA Sunflower yield from 2005/06 to 2015/16

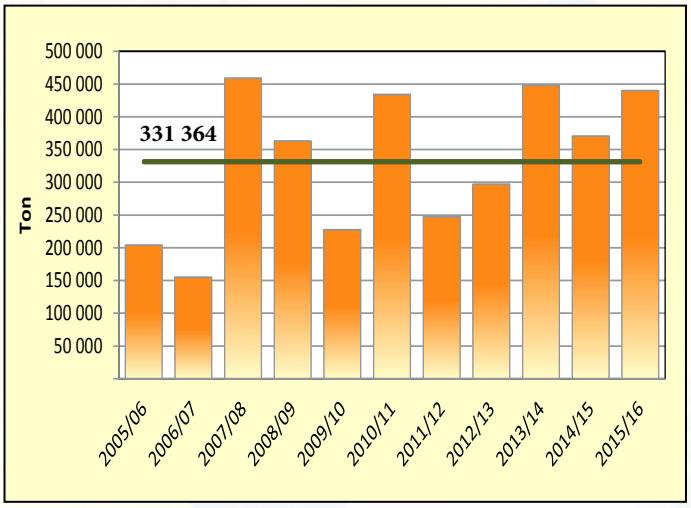


Figures provided by the CEC.

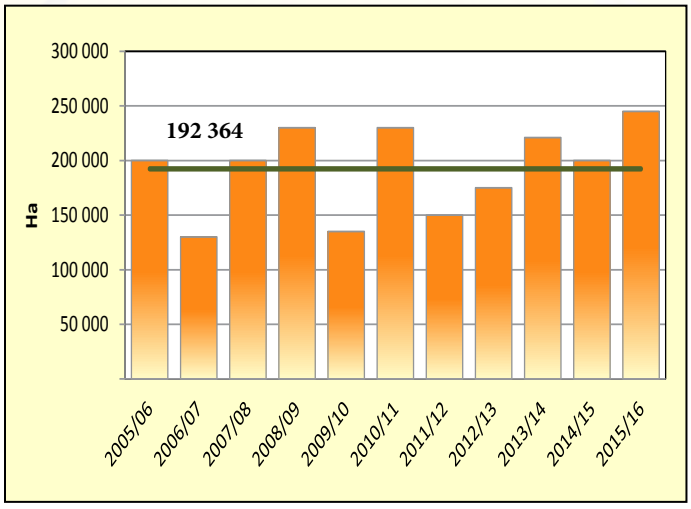
Graph 5: Area utilised for sunflower production in the Free State since 2005/06



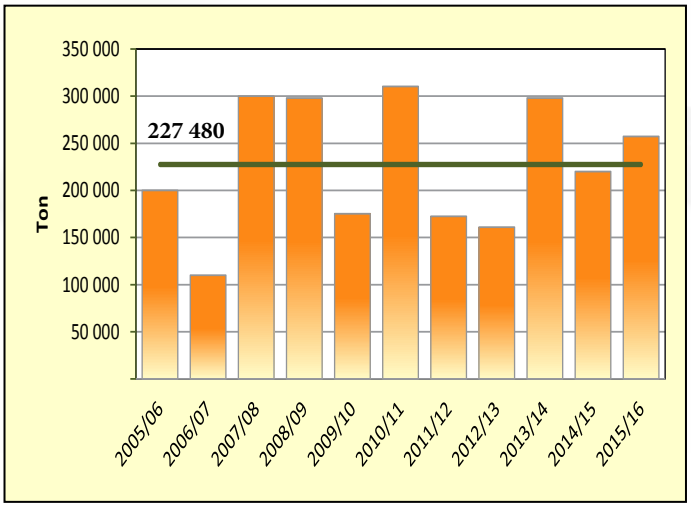
Graph 6: Sunflower production in the Free State since 2005/06



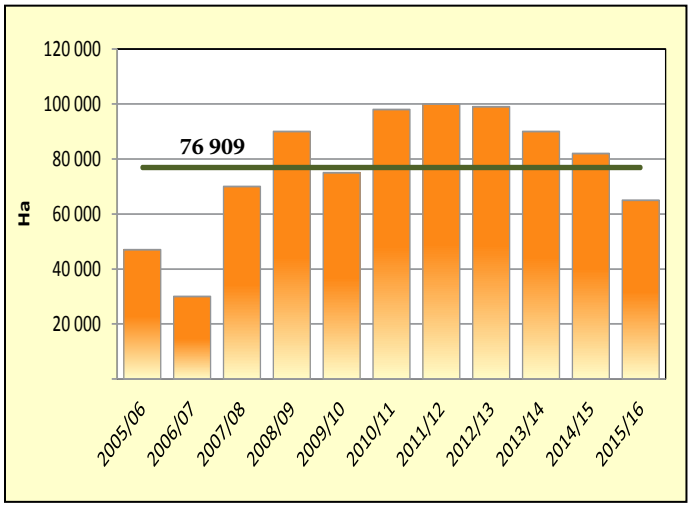
Graph 7: Area utilised for sunflower production in North West since 2005/06



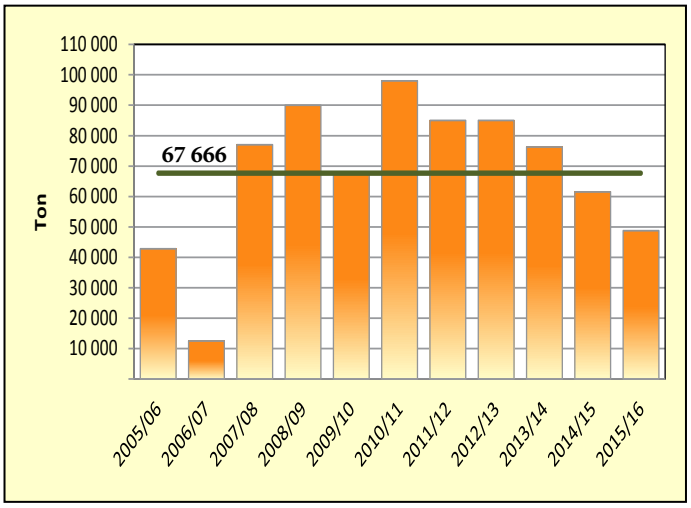
Graph 8: Sunflower production in North West since 2005/06



Graph 9: Area utilised for sunflower production in Limpopo since 2005/06



Graph 10: Sunflower production in Limpopo since 2005/06



Figures provided by the CEC.

Eleven season average

Supply and Demand

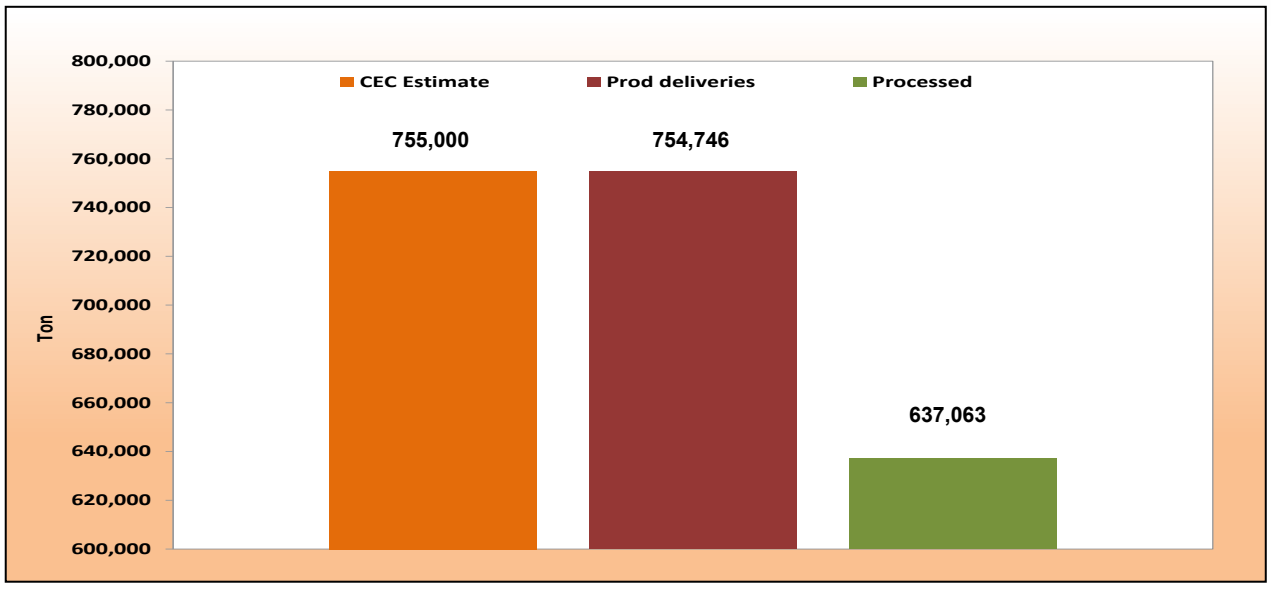
The sunflower seed marketing season dates from March to February. According to SAGIS supply and demand figures for the 2016/2017 marketing season to date (March 2016 to January 2017), opening stock decreased by more than half to 45 867 tons compared to the previous marketing season and is 53% of the ten year average.

To date 40 628 tons of sunflower and sunflower seed products were imported compared to the 36 064 and 63 180 tons of the previous two seasons respectively. South Africa is a net importer of vegetable oils. South African consumption of palm, sunflower, soya and canola oil during 2015 was estimated at more than one million tons, with palm oil comprising approximately 39%. Sunflower oil imports are projected to remain fairly constant over the coming decade at around 30 000 tons per annum *(BFAP Baseline, Agricultural Outlook 2016 – 2025)*.

Of the 637 063 tons of sunflower seeds processed so far, only 992 tons (0.2%) was used for human consumption and 9 791 tons (1.5%) for animal feed. The vast majority of sunflower seed is crushed to produce oil and oilcake. The amount of sunflower seeds crushed to date is 15.1% less than during the 2015/2016 marketing season (737 810 tons). According to BFAP, the domestic consumption of sunflower oilcake is projected to increase marginally to just over 360 000 tons by 2025, from the 315 000 tons in 2016. Additional growth in demand will be need to provided by imports. Oilcake imports are projected to supply approximately 60 000 tons by 2025. In 2016, 100 000 tons were imported.

Exports to date amount to 200 tons (256 tons during 2015/2016). Globally, Argentina, Ukraine and the United States are the largest exporters of sunflower seeds. Russia's exports are expected to increase significantly during the 2016/2017 season. Ukraine, followed by Russia and Argentina account for 81% of total sunflower oil exports worldwide. *(2016 U.S. Sunflower Crop Quality Report)*.

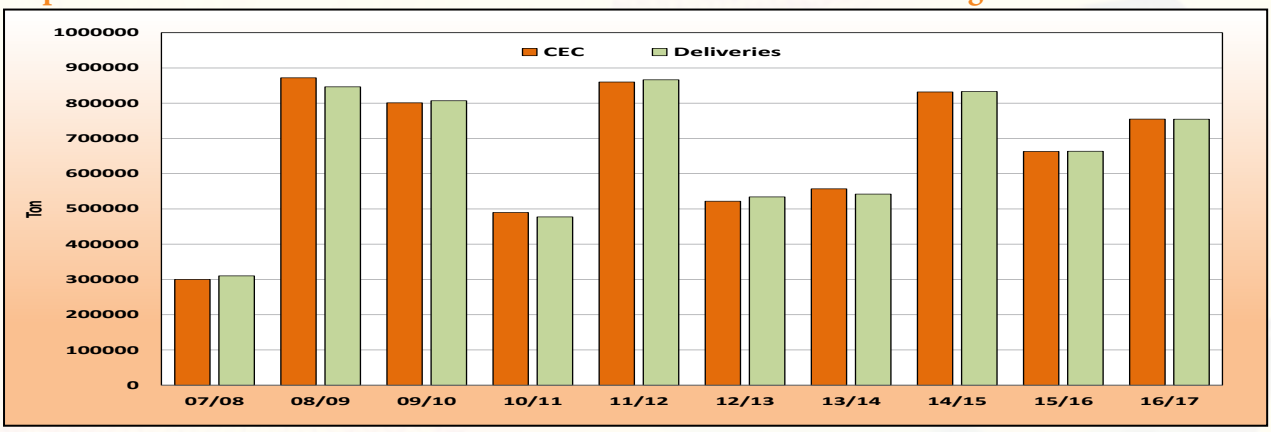
Graph 11: Sunflower supply and demand overview for the current marketing season (Mar 2016 - Feb 2017)



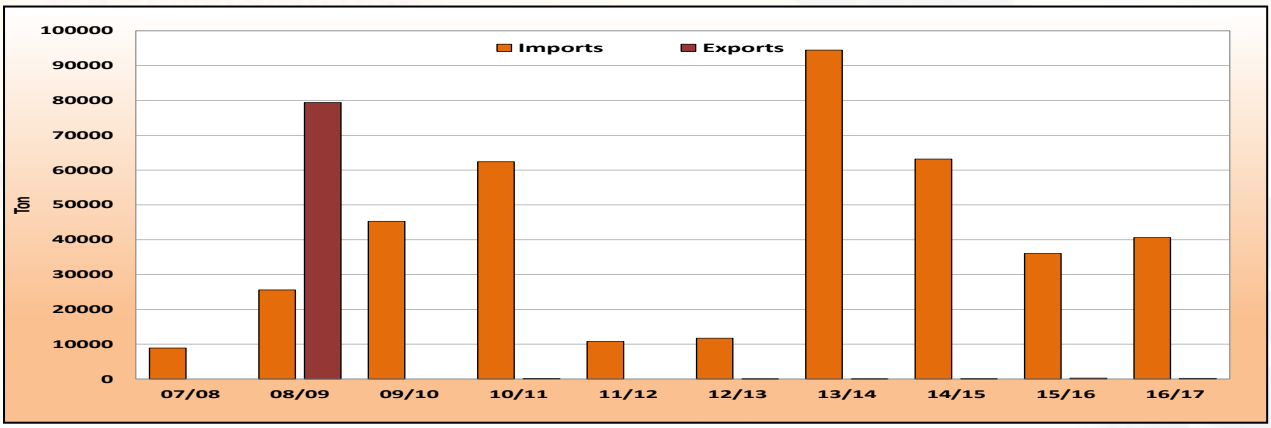
Information provided by SAGIS.

SUNFLOWERSEED: SUPPLY AND DEMAND TABLE BASED ON SAGIS' INFO (TON)											Publication date: 2017-02-24								
	Season (Mar - Feb)																	Current Season Mar-Dec	10 Year average
	99/00	00/01	01/02	02/03	03/04	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	2006-2015
																		***	
																		11	
CEC (Crop Estimate)	1,109,000	530,600	638,300	928,800	642,600	648,000	620,000	520,000	300,000	872,000	801,000	490,000	860,000	522,000	557,000	832,000	663,000	755,000	641,700
SUPPLY																			
Opening stock (1 Mar)	88,000	303,300	50,300	109,600	189,400	41,300	69,900	40,700	90,400	64,700	164,300	157,200	18,800	109,000	81,302	47,116	92,927	45,867	86,645
Prod deliveries	1,087,000	553,400	709,600	901,200	617,200	652,900	612,700	524,900	310,100	846,600	806,900	477,300	866,300	534,251	542,165	833,165	663,669	754,746	640,535
Imports	0	400	7,600	1,700	18,800	300	5,900	3,100	8,900	25,600	45,300	62,400	10,800	11,737	94,475	63,180	36,064	40,628	36,156
Surplus	6,100	0	0	0	0	0	3,800	2,300	1,500	4,100	700	2,000	3,800	5,485	4,689	5,948	9,897	3,711	4,042
Total Supply	**1,181,100**	**857,100**	**767,500**	**1,012,500**	**825,400**	**694,500**	**692,300**	**571,000**	**410,900**	**941,000**	**1,017,200**	**698,900**	**899,700**	**660,473**	**722,631**	**949,409**	**802,557**	**844,952**	767,377
DEMAND																			
Processed	837,800	776,500	622,000	748,900	762,300	616,900	644,300	472,300	339,500	685,300	847,200	671,500	782,200	572,519	666,551	847,682	747,808	637,063	663,256
-human	0	0	800	100	1,300	700	1,300	1,200	2,100	2,400	1,900	1,600	1,300	904	1,162	467	1,003	992	1,404
-animal feed	100	2,100	2,200	2,100	1,800	3,200	2,600	3,100	3,500	3,400	3,300	3,100	2,900	3,022	2,777	2,893	8,995	9,791	3,699
-crush (oil and oilcake)	837,700	774,400	619,000	746,700	759,200	613,000	640,400	468,000	333,900	679,500	842,000	666,800	778,000	568,593	662,612	844,322	737,810	626,280	658,154
Withdrawn by producers	900	14,800	19,600	16,000	8,000	2,700	1,500	2,000	1,900	4,900	5,700	1,700	3,500	2,521	2,524	1,068	1,157	605	2,697
Released to end-consumers	500	2,100	2,900	2,900	1,900	2,400	2,700	3,500	3,000	2,800	4,800	4,100	3,700	3,154	2,923	2,799	2,936	2,755	3,371
Seed for planting purposes	4,200	1,700	2,000	3,000	1,600	1,300	2,200	1,200	1,800	3,300	2,700	1,700	2,500	2,700	2,903	3,804	2,824	3,463	2,543
Net receipts(-)/disp(+)	-9,100	6,800	3,200	2,900	500	-2,000	900	1,500	0	1,000	-400	1,000	-1,200	-1,716	606	1,081	1,709	2,520	358
Deficit	0	4,600	6,900	3,900	9,600	3,100	0	0	0	0	0	0	0	0	0	0	0	0	0
Exports	56,000	300	1,300	45,500	200	200	0	100	0	79,400	0	100	0	27	8	48	256	200	7,994
Total Demand	**890,300**	**806,800**	**657,900**	**823,100**	**784,100**	**624,600**	**651,600**	**480,600**	**346,200**	**776,700**	**860,000**	**680,100**	**790,700**	**579,205**	**675,515**	**856,482**	**756,690**	**646,606**	680,219
Ending Stock (28 Feb)	**290,800**	**50,300**	**109,600**	**189,400**	**41,300**	**69,900**	**40,700**	**90,400**	**64,700**	**164,300**	**157,200**	**18,800**	**109,000**	**81,268**	**47,116**	**92,927**	**45,867**	**198,346**	87,158
- processed p/month	69,800	64,700	51,800	62,400	63,500	51,400	53,700	39,400	28,300	57,100	70,600	65,000	65,200	47,700	55,546	70,640	62,317	57,915	56,180
- months' stock	4.2	0.8	2.1	3.0	0.7	1.4	0.8	2.3	2.3	2.9	2.2	0.3	1.7	1.7	0.8	1.3	0.7	3.4	1.6

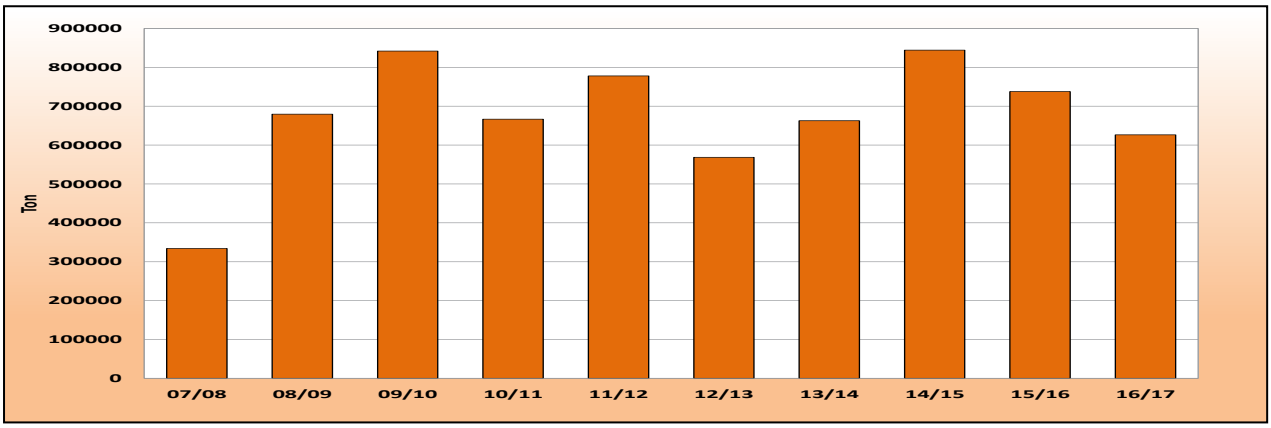
Graph 12: Sunflower: CEC Estimate vs SAGIS deliveries over 10 marketing seasons



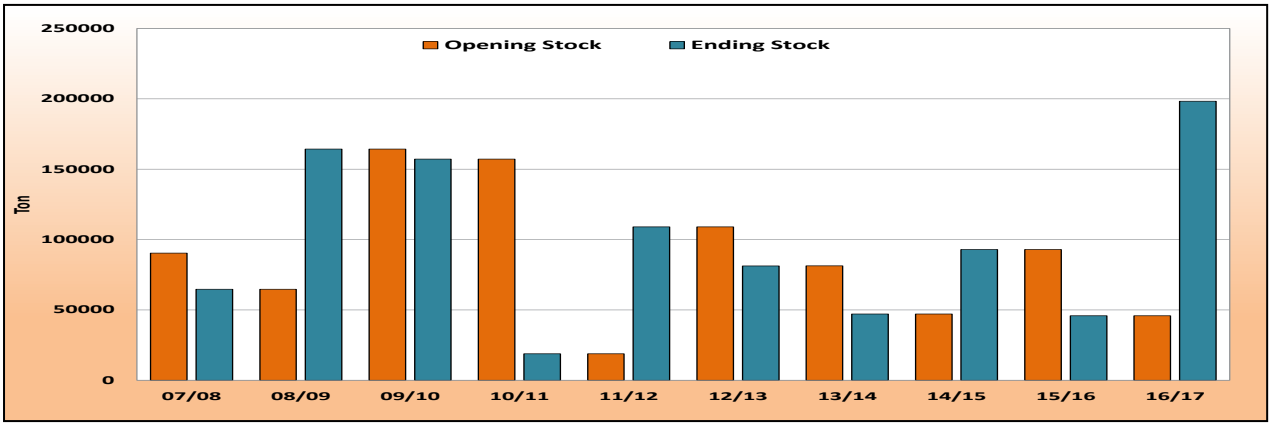
Graph 13: Sunflower: Imports and Exports over 10 marketing seasons



Graph 14: Sunflower: Crushed over 10 marketing seasons



Graph 15: Sunflower: Opening and closing stock over 10 marketing seasons



Information provided by SAGIS.

Season	SUNFLOWER: IMPORTS FOR RSA PER COUNTRY								
	Argentina	Botswana	Bulgaria	Malawi	Romania	Ukraine	United Kingdom	Zambia	Total
2014/2015	42	4,764	0	574	57,800	0	0	0	63,180
2015/2016	80	4,518	0	663	30,531	0	0	272	36,064
2016/2017	42	1,424	38,434	686	0	19	23	0	40,628

Season	SUNFLOWER: IMPORTS PER HARBOUR				
	Harbours				
	East London	Durban	Cape	Port Elizabeth	Total
2005/2006	0	18	0	0	18
2006/2007	0	0	0	0	0
2007/2008	0	19	0	0	19
2008/2009	0	0	0	0	0
2009/2010	0	66,547	0	0	66,547
2010/2011	0	50,209	0	0	50,209
2011/2012	0	0	0	0	0
2012/2013	0	0	0	0	0
2013/2014	0	92,832	0	0	92,832
2014/2015	0	57,842	0	0	57,842
2015/2016	0	30,611	0	0	30,611
2016/2017*	0	38,518	0	0	38,518

* Progressive / Progressief Mar / Mrt 2016 - Jan 2017
Note: Includes Imports/Exports for RSA and Other Countries

Season	SUNFLOWER: RSA EXPORTS PER COUNTRY					
	Australia	Botswana	Namibia	Swaziland	Zimbabwe	Total
2014/2015	22	0	0	26	0	48
2015/2016	0	10	158	88	0	256
2016/2017	0	35	48	107	10	200

Season	SUNFLOWER: EXPORTS PER HARBOUR				
	Harbours				
	East London	Durban	Cape	Port Elizabeth	Total
2005/2006	0	113	0	0	113
2006/2007	0	0	0	0	0
2007/2008	0	0	0	0	0
2008/2009	34,870	44,555	0	0	79,425
2009/2010	0	0	0	0	0
2010/2011	0	0	0	0	0
2011/2012	0	0	0	0	0
2012/2013	0	0	0	0	0
2013/2014	0	0	0	0	0
2014/2015	0	22	0	0	22
2015/2016	0	0	0	0	0
2016/2017*	0	0	0	0	0

* Progressive / Progressief Mar / Mrt 2016 - Jan 2017
Note: Includes Imports/Exports for RSA and Other Countries

RSA Production Regions

The RSA is divided into 9 provinces as illustrated in Figure 1.

Figure 1: RSA Provinces

Regional map with gratitude to SiQ.

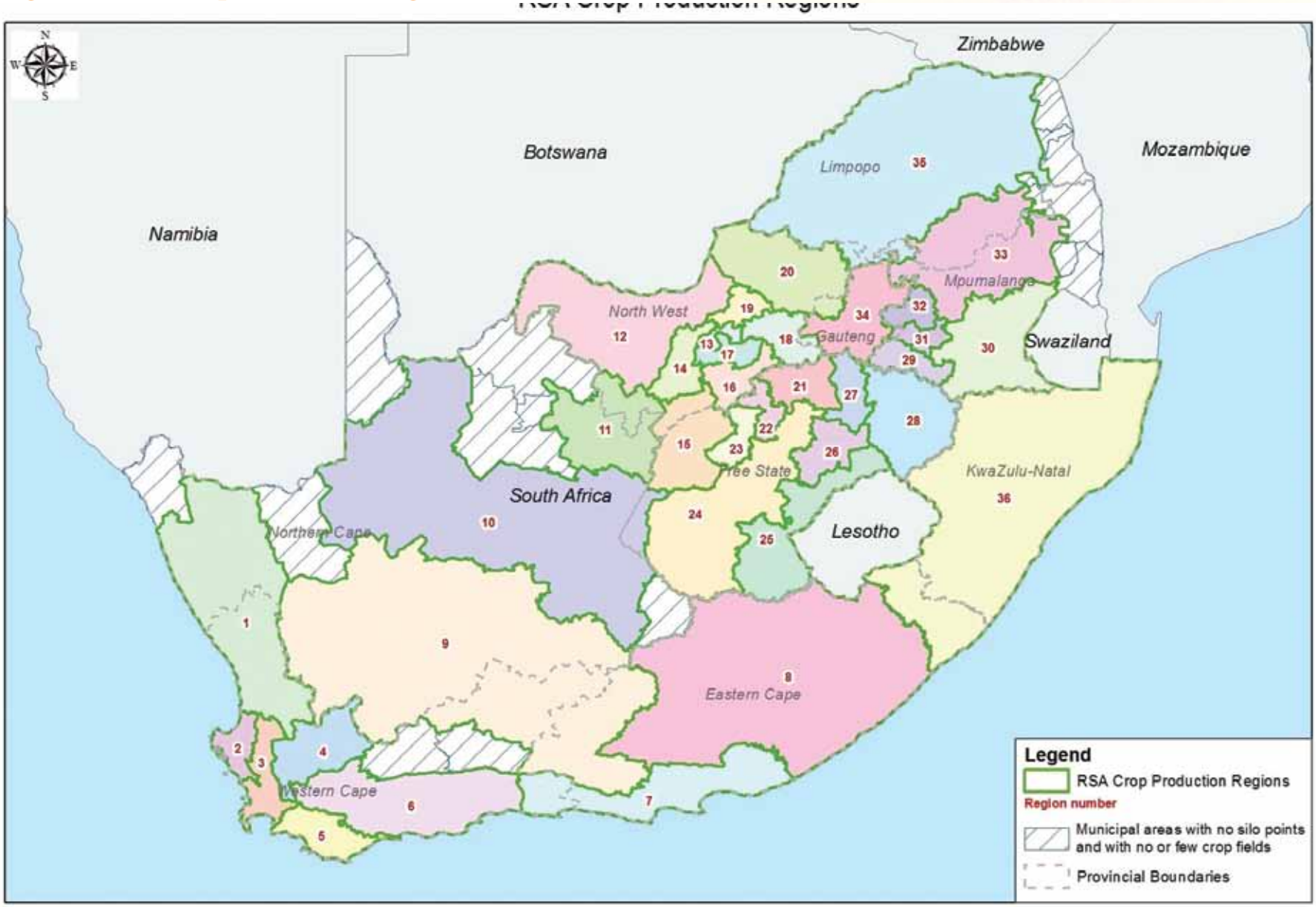
The 9 provinces are divided into 36 grain production regions.

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

Please see the Crop Production Regions map on the next page.

The production regions from which sunflower samples have been received for the crop quality survey of the 2015/2016 production season, are named and described on pages 17 to 22 (in the header of the quality data per region tables.) The silo/intake stands per region as well as the type of storage structure are provided.

Figure 2: RSA Crop Production Regions



Regional map with gratitude to Agbiz Grain and SiQ.

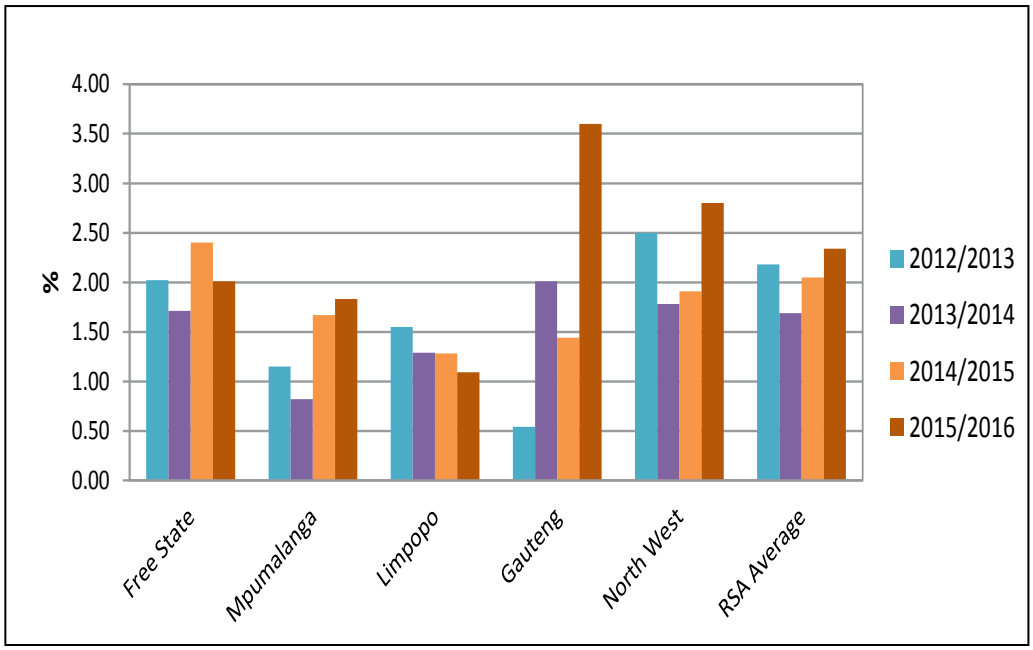
Sunflower Crop Quality 2015/2016 – Summary of results

Seventy eight percent (138) of the 176 samples analysed for the purpose of this survey were graded as Grade FH1 and 38 of the samples were downgraded to COSF (Class Other Sunflower Seed). The percentage of FH1 samples showed a decrease compared to the 86% and 82% of the 2014/2015 and 2013/2014 seasons respectively.

- Two samples were downgraded as a result of the percentage damaged sunflower seed exceeding the maximum permissible deviation of 10%.
- Fifteen of the samples were downgraded as a result of the percentage of either the screenings or the collective deviations or a combination of both exceeding the maximum permissible deviations of 4% and 6% respectively.
- Five samples were downgraded as a result of a combination of the foreign matter and collective deviations exceeding the maximum permissible deviations of 4% and 6% respectively.
- Eight of the samples were downgraded as a result of the presence of poisonous seeds (*Datura sp.*) exceeding the maximum permissible number, namely 1 per 1000 g.
- One sample was downgraded due to the presence of an undesired odour.
- The remaining seven samples were downgraded as a result of a combination of one or more of the following deviations exceeding the maximum permissible deviation: percentage damaged sunflower seed, percentage screenings, percentage foreign matter, percentage collective deviations as well as poisonous seeds (*Datura sp.*).

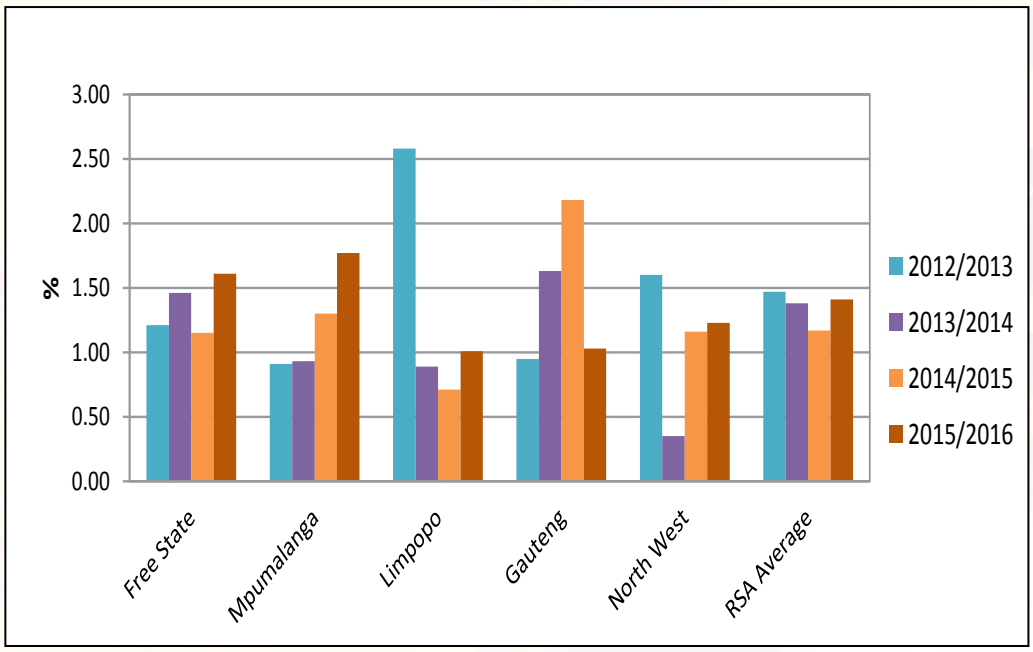
Gauteng province (two samples) reported the highest weighted average percentage screenings namely 3.60%, followed by North West (N = 80) and Free State (N = 80) provinces with 2.80% and 2.01% respectively. Limpopo (seven samples) reported the lowest average percentage screenings of 1.09%. The weighted national average was 2.34% compared to the 2.05% of the previous season.

Graph 16: Average percentage screenings per province over four seasons



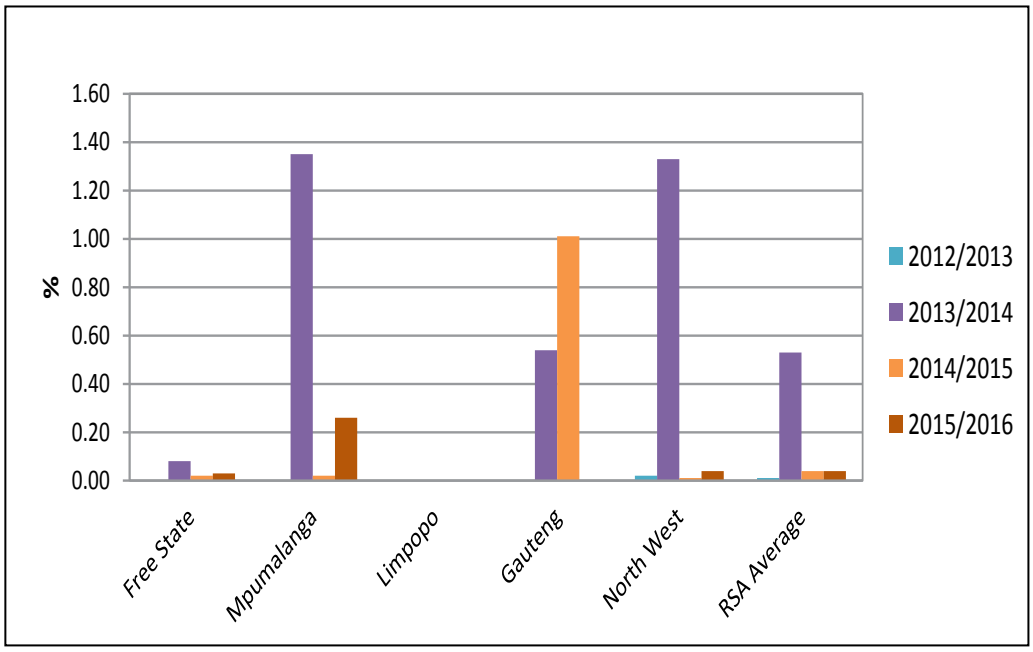
The highest weighted percentage foreign matter (1.77%) was reported for the seven samples from Mpumalanga. The Free State and North West provinces averaged 1.61% and 1.23% respectively. The lowest average percentage was found in Limpopo, namely 1.01%. The RSA average of 1.41% was the highest of the last three seasons.

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



Based on the samples received for this survey, *Sclerotinia sclerotiorum* did not pose a significant problem and was observed on 18 of the samples (10%). Fourteen of these samples originated in the North West province and three in the Free State. The highest percentage (1.80%) was present on a sample from Mpumalanga, this is however still well below the maximum allowable level of 4%. Weighted average levels ranged from 0% for the Gauteng and Limpopo provinces, 0.03% in the Free State, 0.04% in the North West to 0.26% in Mpumalanga. The national average of 0.04% was equal to the previous season.

Graph 18: Average percentage sclerotia per province over four seasons

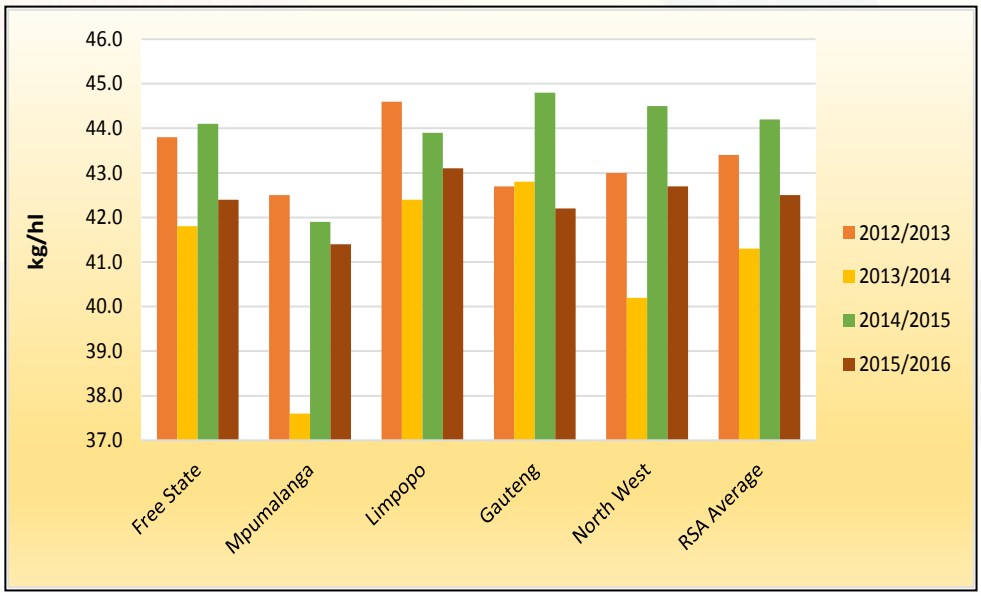


Test weight does not form part of the grading regulations for sunflower seed in South Africa. An approximation of the test weight of South African sunflower seeds is provided in Table 3 for information purposes. The g/1 L filling weight of sunflower seed were determined by means of the Kern 222 apparatus. The test weight was extrapolated by means of the following formulas obtained from the Test Weight Conversion Chart for Sunflower Seed, Oil of the Canadian Grain Commission: $y = 0.1936x + 2.2775$ (138 to 182 g/0.5 L) and $y = 0.1943x + 2.1665$ (183 to 227 g/0.5 L). Please see also Graph 19 for a comparison of the test weight per province over the last four seasons.

Table 3: Approximation of test weight per province over three seasons									
Province	Test weight, kg/hl								
	2015/2016 Season			2014/2015 Season			2013/2014 Season		
	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples
Free State (Regions 21 - 28)	42.4	36.3 - 48.1	80	44.1	38.9 - 49.9	69	41.8	36.4 - 48.2	*96
Mpumalanga (Regions 29 - 33)	41.4	35.0 - 42.2	7	41.9	35.0 - 42.2	8	37.6	35.0 - 42.2	5
Limpopo (Region 35)	43.1	42.7 - 43.8	7	43.9	42.2 - 50.5	8	42.4	37.7 - 44.0	11
Gauteng (Region 34)	42.2	41.7 - 42.8	2	44.8	42.2 - 47.6	5	42.8	41.7 - 44.6	4
North West (Region 12 - 20)	42.7	40.0 - 46.2	80	44.5	34.0 - 48.9	86	40.2	31.1 - 46.6	58
RSA	***42.5***	***35.0 - 48.1***	***176***	***44.2***	***34.0 - 50.5***	***176***	***41.3***	***31.1 - 48.2***	***174***

* Two samples with outlier values as a result of Deviations (Screenings + Sclerotinia + Foreign matter) exceeding 18%, was not taken into account for calculation purposes.

Graph 19: Comparison of the test weight per province over four seasons



The nutritional component analyses, namely crude protein, -fat, -fibre and ash are reported as % (g/100g) on an 'as received' or 'as is' basis. See Table 4 for a summary of the RSA Sunflower Crop Quality averages of the 2015/2016 season compared to those of the 2014/2015 season.

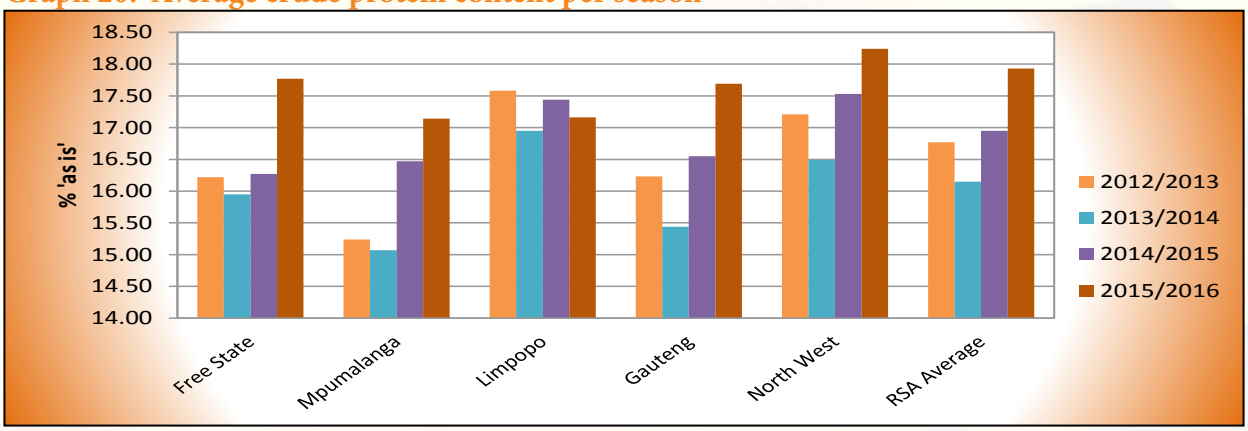
The weighted average crude protein content this season was 17.93%, almost one percent higher than the previous season and the highest average value since the start of this survey in 2012/2013. North West had the highest weighted average crude protein content of 18.24% and Mpumalanga the lowest with 17.14%. The Free State's crude protein content averaged 17.77%. The weighted average crude fat percentage of 38.2% was the lowest of the last four seasons and 1.5% lower than the previous season. Gauteng had the highest weighted average crude fat content of 40.3%. The lowest average fat content was observed in the Free State (38.0%). North West and Mpumalanga averaged 38.2% and 38.8% respectively.

The weighted average percentage crude fibre increased slightly from 20.0% in the previous season to 20.3% this season. Average values varied between 19.2% in Gauteng to 20.9% in Mpumalanga. The weighted average ash content is slightly higher (2.59%) than last season (2.55%). The provincial averages ranged from 2.49% in Mpumalanga to 2.69% in Limpopo.

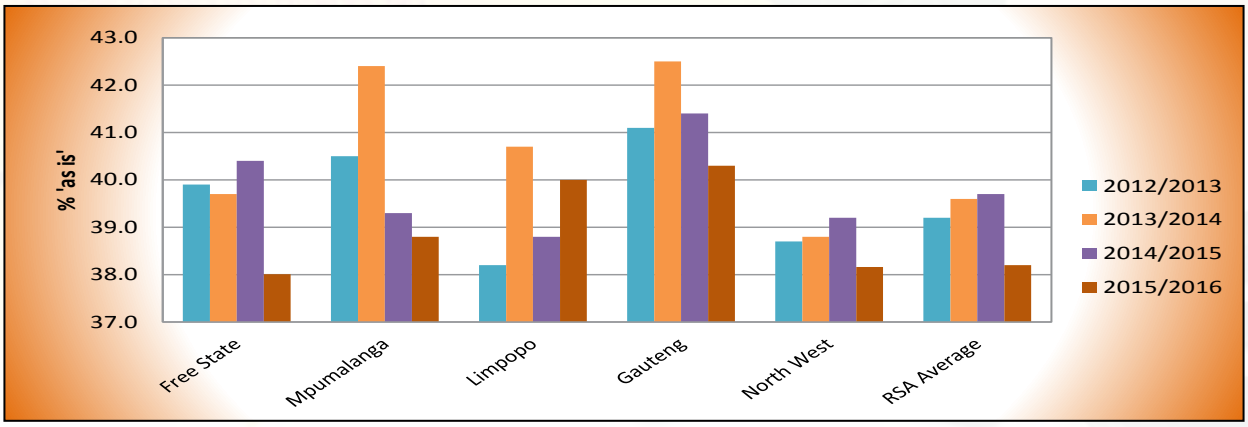
Graphs 20 to 23 on page 15 provide comparisons between provinces for the nutritional components discussed above.

Please also see pages 17 to 22 for the average sunflower quality per region.

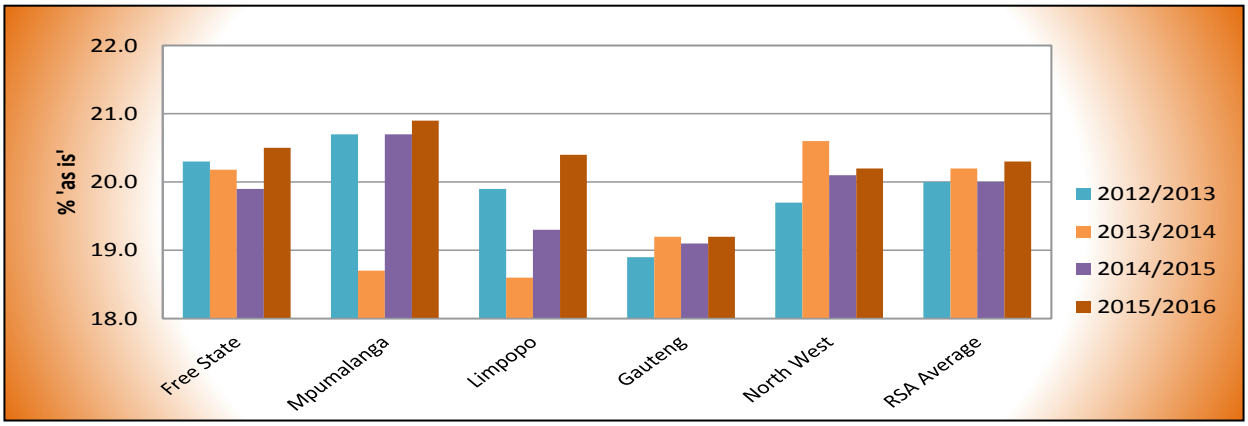
Graph 20: Average crude protein content per season



Graph 21: Average crude fat content per season



Graph 22: Average crude fibre content per season



Graph 23: Average ash content per season

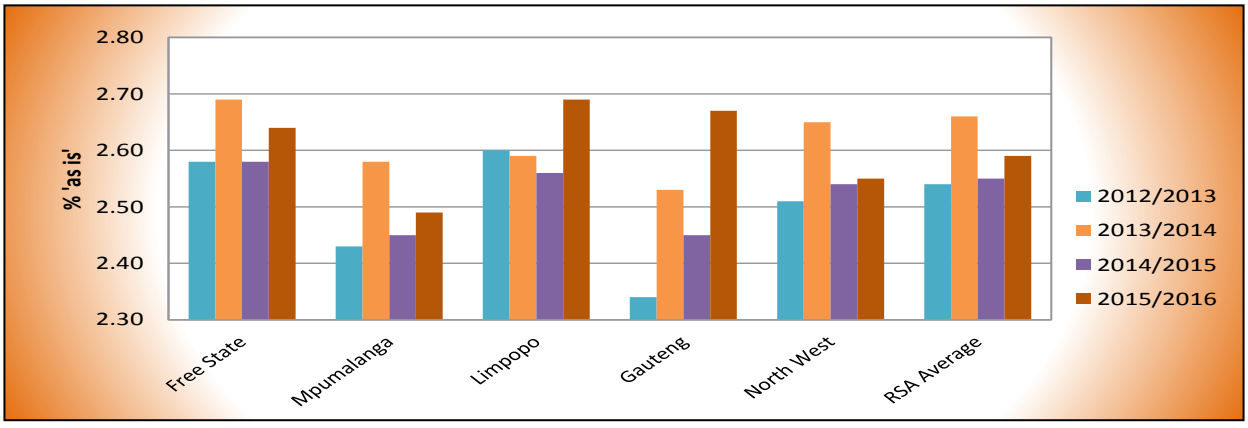


Table 4: South African Sunflower Crop Quality Averages 2015/2016 vs 2014/2015						
Class and Grade Sunflower	**2015/2016**			**2014/2015**		
	FH1	**COSF**	**Average**	**FH1**	**COSF**	**Average**
Grading:						
1. Damaged sunflower seed, %	0.30	3.27	0.94	0.17	0.93	0.27
2. Screenings, %	1.79	4.32	2.34	1.53	5.20	2.05
3. Sclerotia, %	0.03	0.11	0.04	0.05	0.00	0.04
4. Foreign Matter, %	1.16	2.34	1.41	1.08	1.70	1.17
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items.	2.98	6.77	3.80	2.66	6.90	3.26
Musty, sour, khaki bush or other undesired smell	No	No	No	No	No	No
Substance present that renders the seed unsuitable for human or animal consumption or for processing into or utilization thereof as food or feed	No	No	No	No	No	No
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	8	2	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	0
Number of samples	***138***	***38***	***176***	***151***	***25***	***176***
Nutritional analysis:						
Moisture, % (5hr, 105 °C)	5.2	5.1	5.2	4.7	4.5	4.7
Crude Protein, % (as is)	17.93	17.94	17.93	17.06	16.34	16.95
Crude Fat, % (as is)	38.3	37.9	38.2	39.5	41.1	39.7
Crude Fibre, % (as is)	20.3	20.6	20.3	20.0	19.6	20.0
Ash, % (as is)	2.60	2.56	2.59	2.56	2.52	2.55
Number of samples	***138***	***38***	***176***	***151***	***25***	***176***

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(12)				(13)				(14)			
PRODUCTION REGION	**North-West Western Region**				**North-West Central Region (Sannieshof)**				**North-West Southern Region**			
Silo/Intake stands (Type of storage)	Blaauwbank (Bins) Buhrmannsdrif (Bins) Kameel (Bins) Mareetsane (Bins) Vryburg (Bins)				Biesiesvlei (Bins) Bossies (Bins) Gerdau (Bins) Oppaslaagte (Bins) Sannieshof (Bins)				Amalia (Bins) Barberspan (Bins) Delareyville (Bins) Excelsior (Bins) Geysdorp (Bins) Hallatshope (Bins) Migdol (Bins) Nooitgedacht (Bins) Taaibospan (Bins) Schweizer-Reneke (Bins)			
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.08	0.00	0.12	0.04	0.55	0.00	3.00	0.67	0.16	0.00	1.00	0.30
2. Screenings, %	2.22	1.28	3.08	0.70	2.41	0.66	11.62	2.42	2.66	0.84	5.36	1.21
3. Sclerotia, %	0.09	0.00	0.20	0.10	0.04	0.00	0.36	0.10	0.00	0.00	0.00	0.00
4. Foreign Matter, %	0.62	0.22	1.56	0.53	1.05	0.20	3.60	0.91	0.93	0.26	1.50	0.41
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	2.93	1.70	3.56	0.71	3.50	0.86	13.10	2.76	3.59	1.68	6.84	1.46
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	10	0	22	10.76	1	0	10	2.24	0	0	0	0.00
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	***6***				***20***				***10***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	5.0	4.5	5.3	0.29	5.1	4.3	5.9	0.44	5.1	4.5	5.8	0.44
Crude Protein, % (as is)	19.04	18.60	19.50	0.35	18.29	17.01	19.20	0.50	18.28	17.24	19.29	0.65
Crude Fat, % (as is)	38.2	37.1	39.2	0.86	37.5	35.0	39.3	1.11	38.5	36.1	40.0	1.00
Crude Fibre, % (as is)	19.7	18.4	20.7	0.93	20.6	19.0	22.6	0.97	20.3	18.2	21.1	0.91
Ash, % (as is)	2.70	2.59	2.90	0.12	2.58	2.36	2.84	0.14	2.52	2.33	2.68	0.13
Number of samples	***6***				***20***				***10***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(17)				(18)				(19)			
PRODUCTION REGION	**North-West Central Northern Region (Ottosdal)**				**North-West Central Region (Ventersdorp)**				**North-West Central Region (Lichtenburg)**			
Silo/Intake stands (Type of storage)	Boschpoort (Bags/Bins/Bulk) Hartbeesfontein (Bins) Kleinharts (Bins) Melliodora (Bins) Ottosdal (Bins) Rostrataville (Bins) Vermaas (Bins) Werda (Bins)				Bodenstein (Bins) Buckingham (Bins) Coligny (Bins) Enselspruit (Bins) Makokskraal (Bins) Potchefstroom (Bins) Ventersdorp (Bins)				Grootpan (Bins) Halfpad (Bins) Hibernia (Bins) Lichtenburg (Bins/Bunkers) Lottie Halte (Bins) Lusthof (Bins)			
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.31	0.00	1.34	0.38	0.15	0.00	0.70	0.27	6.01	0.00	22.30	8.92
2. Screenings, %	2.12	0.62	3.74	0.70	1.98	0.24	3.28	1.00	3.98	1.28	6.82	1.70
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.12	0.04
4. Foreign Matter, %	1.01	0.25	3.00	0.59	1.78	0.66	5.32	1.76	2.51	0.28	15.52	4.60
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	3.13	1.48	5.50	1.03	3.77	1.09	7.24	2.10	6.51	1.56	18.76	4.81
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	***18***				***6***				***10***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	5.4	4.0	6.8	0.57	5.5	4.4	6.0	0.59	5.3	4.5	5.9	0.50
Crude Protein, % (as is)	18.37	17.10	19.34	0.62	17.83	17.21	18.22	0.40	18.09	16.78	19.12	0.70
Crude Fat, % (as is)	39.0	35.7	44.5	1.96	37.8	36.6	40.1	1.27	37.9	36.8	39.2	0.87
Crude Fibre, % (as is)	19.4	16.4	20.8	0.98	20.2	19.4	20.8	0.60	20.8	19.6	22.3	0.83
Ash, % (as is)	2.60	2.42	2.93	0.14	2.41	2.31	2.55	0.09	2.46	2.30	2.61	0.11
Number of samples	***18***				***6***				***10***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(20)				(21)				(22)			
PRODUCTION REGION	**North-West Eastern Region**				**Free State North-Western Region (Viljoenskroon)**				**Free State North-Western Region (Bothaville)**			
Silo/Intake stands (Type of storage)	Battery (Bins) Brits (Bins) Boons (Bins) Derby (Bins) Koster (Bins) Swartruggens (Bins) Syferbult (Bins)				Attie (Bins) Groenebloem (Bins) Heuningspruit (Bins) Koppies (Bins) Rooiwal (Bins) Vierfontein (Bins) Viljoenskroon (Bins) Vredefort (Bins) Weiveld (Bins)				Allanridge (Bins) Bothaville (Bins) Mirage (Bins) Misgunst (Bunkers) Odendaalsrus (Bins) Schoonspruit (Bins) Schuttesdraai (Bins)			
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	6.15	0.08	28.00	10.04	0.39	0.00	1.00	0.36	0.15	0.00	0.95	0.35
2. Screenings, %	4.59	0.20	21.40	6.18	2.64	1.70	4.72	0.94	1.32	0.32	2.34	0.75
3. Sclerotia, %	0.18	0.00	0.60	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Foreign Matter, %	1.06	0.20	2.60	0.89	2.09	1.05	3.90	0.91	1.22	0.68	1.85	0.42
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	5.83	0.40	24.00	6.77	4.73	3.25	5.80	0.86	2.54	1.00	3.64	0.89
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	5	0	20	8.62	0	0	0	0.00	11	0	80	30.24
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	***10***				***11***				***7***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	5.2	4.6	5.8	0.36	5.1	4.5	5.5	0.30	5.3	4.9	5.9	0.31
Crude Protein, % (as is)	17.75	15.96	21.32	1.61	18.22	17.24	19.39	0.67	19.63	18.84	20.42	0.53
Crude Fat, % (as is)	38.1	35.0	40.4	1.37	38.4	36.4	41.2	1.50	37.0	35.4	39.9	1.51
Crude Fibre, % (as is)	20.4	15.2	22.8	2.33	20.1	17.7	22.6	1.68	20.0	18.1	21.6	1.24
Ash, % (as is)	2.48	2.25	2.98	0.21	2.55	2.27	2.84	0.17	2.61	2.47	2.90	0.16
Number of samples	***10***				***11***				***7***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(23)				(24)				(26)			
PRODUCTION REGION	**Free State North-Western Region (Bultfontein)**				**Free State Central Region**				**Free State South-Eastern Region**			
Silo/Intake stands (Type of storage)	Bultfontein (Bins) Losdoorns (Bins) Protespan (Bins) Tierfontein (Bins) Wesselsbron (Bins) Willemsrust (Bins)				Bloemfontein (Bins) Brandfort (Bins) De Brug (Bins) Geneva (Bins) Hennenman (Bins) Kroonstad (Bins) Petrusburg (Bins) Theunissen (Bins) Van Tonder (Bins) Welgeleë (Bins) Winburg (Bins)				Arlington (Bins) Kaallaagte (Bins) Libertas (Bins) Marquard (Bins) Meets (Bins) Monte Video (Bins) Senekal (Bins) Steynsrus (Bins)			
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.29	0.00	0.92	0.24	0.13	0.00	0.30	0.12	0.26	0.00	1.35	0.38
2. Screenings, %	2.26	1.46	3.80	0.64	1.47	0.60	3.14	0.73	2.26	0.34	6.40	1.81
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00	1.48	0.30
4. Foreign Matter, %	1.63	0.68	4.30	1.05	1.13	0.34	2.06	0.70	1.32	0.12	6.30	1.25
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	3.89	2.50	6.52	1.23	2.60	1.74	5.06	1.09	3.66	0.52	12.20	2.71
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	10	0	120	34.64	0	0	0	0.00	0	0	0	0.00
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	***12***				***9***				***30***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	5.7	5.2	6.1	0.34	5.5	4.7	6.1	0.40	5.0	4.4	5.8	0.38
Crude Protein, % (as is)	19.55	18.27	20.58	0.75	16.89	15.29	17.79	0.83	16.66	13.88	18.81	1.10
Crude Fat, % (as is)	36.8	35.3	38.8	1.16	37.1	33.8	39.6	1.82	39.2	34.4	42.1	1.52
Crude Fibre, % (as is)	20.0	18.9	21.6	0.92	22.1	20.9	23.8	1.01	20.4	17.3	23.3	1.19
Ash, % (as is)	2.82	2.60	3.02	0.15	2.53	2.42	2.81	0.12	2.60	2.24	3.05	0.15
Number of samples	***12***				***9***				***30***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(27)	(28)	(29)
PRODUCTION REGION	**Free State Northern Region**	**Free State Eastern Region**	**Mpumalanga Southern Region**
Silo/Intake stands (Type of storage)	Gottenburg (Bins) Heilbron (Bins) Hoogte (Bins) Mooigeleë (Bins) Petrus Steyn (Bins) Wolwehoek (Bins)	Afrikaskop (Bins/Bunkers) Ascent (Bins) Cornelia (Bins) Daniëlsrus (Bins) Eeram (Bins) Frankfort (Bins) Harrismith (Bins) Jim Fouché (Bins) Kransfontein (Bins/Bunkers) Memel (Bins) Reitz (Bins) Tweeling (Bins) Villiers (Bins/Bulk) Vrede (Bins) Warden (Bins) Windfield (Bins)	Balfour (Bins) Greylingstad (Bins) Grootvlei (Bins) Harvard (Bins) Holmdene (Bins) Leeuspruit (Bins) Platrand (Bins) Standerton (Bins) Val (Bins)

Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.04	0.00	0.08	0.06	0.08	0.00	0.40	0.17	0.08	0.00	0.50	0.20
2. Screenings, %	0.97	0.10	1.84	1.23	1.34	0.08	2.66	0.82	1.83	1.24	3.90	1.02
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	1.80	0.73
4. Foreign Matter, %	0.92	0.76	1.08	0.23	2.87	0.00	15.84	5.00	1.68	0.55	4.65	1.52
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	1.89	1.18	2.60	1.00	4.21	0.08	16.52	4.92	3.81	1.97	6.21	1.86
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	***2***				***9***				***6***			

Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	5.0	5.0	5.0	0.00	5.3	4.7	6.2	0.52	5.2	4.7	5.6	0.33
Crude Protein, % (as is)	17.50	16.63	18.36	1.22	18.03	16.86	19.42	0.93	17.50	15.36	21.58	2.31
Crude Fat, % (as is)	37.4	36.5	38.3	1.27	37.0	33.2	41.2	2.77	38.4	36.6	39.8	1.30
Crude Fibre, % (as is)	21.0	20.8	21.1	0.21	20.3	17.7	24.3	2.13	20.9	17.8	22.8	1.89
Ash, % (as is)	2.68	2.51	2.85	0.24	2.74	2.50	2.96	0.15	2.51	2.22	3.06	0.30
Number of samples	***2***				***9***				***6***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(33)				(34)				(35)			
PRODUCTION REGION	**Mpumalanga Northern Region**				**Gauteng**				**Limpopo**			
Silo/Intake stands (Type of storage)	Arnot (Bins) Driefontein (Bins) Lydenburg (Bins) Marble Hall (Bins) Middelburg (Bins) Pan (Bins) Stoffberg (Bins) Wonderfontein (Bins)				Bloekomspruit (Bins) Bronkhorstspruit (Bins) Glenroy (Bins) Goeie Hoek (Bins) Kaalfontein (Bins) Kliprivier (Bunkers) Meyerton (Bunkers) Middelvlei (Bins) Nigel (Bins) Oberholzer (Bins) Pretoria Wes (Bins) Raathsvlei (Bins) Vogelvallei (Bunkers)				Alma (Bins) Lehau (Bins) Naboomspruit (Mookgophong) (Bins) Northam (Bins) Nutfield (Bins) Nylstroom (Modimolle) (Bins) Potgietersrus (Mokopane) (Bins) Roedtan (Bins) Settlers (Bins) Warmbad (Bela-Bela) (Bins)		
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.00	-	-	-	1.40	0.20	2.60	1.70	0.39	0.00	1.40	0.58
2. Screenings, %	1.84	-	-	-	3.60	3.20	4.00	0.57	1.09	0.60	2.36	0.62
3. Sclerotia, %	0.00	-	-	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Foreign Matter, %	2.30	-	-	-	1.03	0.50	1.55	0.74	1.01	0.50	1.50	0.40
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	4.14	-	-	-	4.63	4.50	4.75	0.18	2.10	1.12	3.86	0.95
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	-	-	-	0	0	0	0.00	0	0	0	0.00
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	-	-	-	0	0	0	0.00	0	0	0	0.00
Number of samples	***1***				***2***				***7***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.5	-	-	-	5.0	4.4	5.6	0.85	5.0	4.3	5.5	0.45
Crude Protein, % (as is)	14.97	-	-	-	17.69	16.41	18.97	1.81	17.16	14.82	18.58	1.59
Crude Fat, % (as is)	41.2	-	-	-	40.3	38.9	41.7	1.98	40.0	36.2	43.1	2.29
Crude Fibre, % (as is)	20.7	-	-	-	19.2	18.1	20.3	1.56	20.4	14.9	23.6	2.84
Ash, % (as is)	2.37	-	-	-	2.67	2.48	2.85	0.26	2.69	2.41	2.97	0.21
Number of samples	***1***				***2***				***7***			

Methods

SAMPLING PROCEDURE:

A working group determined the procedure to be followed to ensure that the crop quality samples 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 were placed in separate containers according to class and grade.

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

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

The samples were 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 were then forwarded to the SAGL.

GRADING:

Full grading was done in accordance with the Regulations relating to the Grading, Packing and Marking of Sunflower Seed intended for sale in the Republic of South Africa (No. 45 of 22 January 2016).

See pages 54 to 60 of this report.

TEST WEIGHT:

Test weight provides a measure of the bulk density of grain and oilseeds.

Test weight does not form part of the grading regulations for sunflower in South Africa. An approximation of the test weight of South African sunflower is provided in this report for information purposes. The g/1 L filling weight of the sunflower samples were determined by means of the Kern 222 apparatus. The standard working procedure were followed. The test weight was extrapolated by means of the following formulas obtained from the Test Weight Conversion Chart for Sunflower Seed, Oil of the Canadian Grain Commission: $y = 0.1936x + 2.2775$ (138 to 182 g/0.5 L) and $y = 0.1943x + 2.1665$ (183 to 227 g/0.5 L).

NUTRITIONAL ANALYSIS:

Milling

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

Moisture

The moisture content of the samples was determined as a loss in weight when dried in an oven at 105 °C for 5 hours according to AgriLASA method 2.1, latest edition.

Crude 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 crude protein content.

Crude 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 08-03.01, was used for the determination. The samples were incinerated at 600 ± 15 °C in a muffle furnace for 2 hours.

Crude Fibre

In-House method 020 was used for the determination of the crude fibre in the samples. Crude fibre is the loss on ignition of the dried residue remaining after digestion of the sample with 1.25% Sulphuric acid (H_2SO_4) and 1.25% Sodium hydroxide (NaOH) solutions under specific conditions.

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 NPC
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 AND 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

Mr R Josias
Chief Executive Officer
Effective Date: 01 November 2014
Certificate Expires: 31 October 2019

ANNEXURE A

SCHEDULE OF ACCREDITATION

Facility Number: **T0116**

Permanent Address of Laboratory:

Southern African Grain Laboratory (NPC)
Agri-Hub Office Park - Grain Building
477 Witherite Road
The Willows
Pretoria
0040

Technical Signatories:

Ms J Nortje (All Methods)
Ms M Bothma (Chemical, Excl. SOP MC23)
Ms M Hammes (Chemical)
Ms A de Jager (Nutrients & Contaminants)
Ms W Louw (In-house Methods 001, 002, 003, 010 & 026)
Ms D Moleke (Rheological)
Ms I Terblanche (Rheological)
Ms H Meyer (Chemical, Nutrients and Contaminants & Grading)
Ms J Kruger (Chemical, excl. In-house method 012)
Ms P Modiba (Chemical)
Ms M Motlanthe (In-house methods 001, 003 & 026)
Mr B van Der Linde (Grading)
Ms M Ramare (All moisture methods & In-house methods 024)

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Fax: N/A
E-mail: Paulina.Modiba@sagl.co.za

Nominated Representative:

Ms PM Modiba

Issue No.: 26
Date of Issue: 26 January 2017
Expiry Date: 31 October 2019

Material or Products Tested	Type of Tests / Properties Measured, Range of Measurement	Standard Specifications, Techniques / Equipment Used
CHEMICAL		
Ground Barley	Moisture (Oven Method)	Analytical EBC Method 3.2, latest Edition (2 hour; 130˚C)
Cereal and cereal products specifically-wheat, rice, (hulled paddy), barley, millet, rye, and oats as grain, semolina and flour	Moisture (Oven Method)	ICC Std No.110/1, Latest Edition (90 min; 130˚C) (2 hour; 130˚C)
Flour, semolina, bread, all kind of grains and cereal products and food products (except those that are sugar coated)	Moisture (Oven Method)	AACCI 44-15.02, Latest Edition (1 hour; 130˚C) (72 hour; 103˚C)

All flours, cereal grains, oilseeds and animal feeds	Nitrogen and protein (Combustion method - Dumas)	AACCI 46-30.01, Latest Edition
Cereal based food stuff	Dietary fibres (Total)	In-house method 012
Food stuff and feeds	Carbohydrates (by difference) (calculation) Energy value (calculation) Total digestible nutritional value (calculation)	SOP MC 23
Food Stuff and feeds	Determination of Ash	In-house method 011
Wheat Kernels	Moisture (Oven Method)	Government Gazette Wheat Regulation, Latest Edition (72 hour, 103°C)
Flours of grains e.g. barley, oats, triticale, maize, rye, sorghum and wheat; oilseeds like soybeans and sunflower, feeds and mixed feeds and foodstuffs	Crude fat (Ether extraction by Soxhlet)	In-house method 024
Meal and flour of wheat, rye, barley, other grains, starch containing and malted products	Falling number	ICC Std 107/1, Latest Edition
NUTRIENTS AND CONTAMINANTS		
Vitamin fortified food and feed products and fortification mixes grain based	Vitamin A as all trans Retinol (Saponification) (HPLC)	In-house method 001
	Thiamine Mononitrate (HPLC) Riboflavin (HPLC) Nicotinamide (HPLC) Pyridoxine Hydrochloride (HPLC)	In-house method 002
	Folic Acid (HPLC)	In-house method 003
Grain based food and feed products (fortified and unfortified) and fortification mixes	Total Sodium (Na) Total Iron (Fe) Total Zinc (Zn)	In-house method 010
Food and feed	Multi-Mycotoxin: -Aflatoxin G_1, B_1, G_2, B_2 and total -Deoxynivalenol (DON), 15-ADON -Fumonisin B_1, B_2, B_3 -Ochratoxin A -T2, HT-2 - Zearalenone	In-house method 026

GRADING		
Maize	Defective kernels (White maize/ yellow maize)	Government Gazette Maize Regulation, Latest Edition
Cereal as grains (Wheat, barley, rye and oats)	Hectolitre mass (Kern222)	ISO 7971-3, Latest edition
Wheat	Screenings	Government Gazette Wheat Grading Regulation, Latest Edition
RHEOLOGICAL		
Wheat flour	Alveograph (Rheological properties)	ICC Std.121, Latest Edition
Flours	Farinograph (Rheological properties)	AACCI 54.02, Latest Edition (Rheological behaviour of flour Farinograph: Constant Flour Weight procedure)
Hard, soft and durum wheat (flour and whole wheat flour)	Mixograph (Rheological properties)	Industry accepted method 020 (Based on AACCI 54-40.02, Latest Edition Mixograph Method)

Original Date of Accreditation: 01 November 1999

ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM

Accreditation Manager

AACC INTERNATIONAL

RECOGNITION OF ANALYTICAL PERFORMANCE

Analysis of Feed

Southern African Grain Laboratory
Pretoria, SOUTH AFRICA

Achieved Outstanding Accuracy and Precision for the year 2015
in check samples including the following analyses:

Moisture, Protein, Ash, Fat (EE), Crude Fiber, Calcium

Executive Vice President

President

CERTIFICATE
SERTIFIKAAT

IT IS HEREBY CERTIFIED THAT
HIERMEE WORD GESERTIFISEER DAT

Southern African Grain Laboratory NPC

The Willows, Pretoria

Feeds / Voere

FOR THE PERIOD OF / VIR DIE TYDPERK VAN ***27 April 2015*** TO / TOT ***22 February 2016***

PARTICIPATED IN THE PROFICIENCY TEST SCHEME AND THE FOLLOWING ANALYTES HAVE CONFORMED TO 83% PARTICIPATION WITH A Z VALUE <=2, AS SET BY AgriLASA:

DEELGENEEM HET AAN DIE INTERLAB-KONTROLESKEMA EN DIE VOLGENDE ONTLEDINGS HET AAN DIE AgriLASA VOORGESKREWE 83% DEELNAME MET N Z WAARDE VAN <=2 VOLDOEN:

Ash ***Crude Fibre*** ***Dietary Fibre*** ***Fat***

Moisture ***Nx6.25-Protein*** ***Zn***

FOR AGRILASA

AgriLASA
AGRI LABORATORY ASSOCIATION OF SOUTHERN AFRICA
AGRI LABORATORIUM ASSOSIASIE VAN SUIDELIKE AFRIKA

Prepared and published by Thistle QA on behalf of, and under direction of, AGRILASA. Printed: 31/03/2016

Report

Evaluation of commercially available sunflower cultivars (M101/101-100407) 2015/2016 season

ARC–Grain Crops Institute in collaboration with the following seed companies: Agricol, Pannar, Pioneer and Syngenta

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INTRODUCTION

Optimisation of crop production requires, among a number of inputs, the selection of a well performing cultivar. Sunflower cultivar trials, which are done since the nineteen seventies in South Africa, have the aim to enable farmers to optimise sunflower production through sound cultivar selection.

In this project, commercially available cultivars are evaluated in order to predict their future yield performances and to assess their seed composition. This project is the only unbiased effort in South Africa that strives to evaluate important cultivars in the main areas of production. The information generated in these field trials on grain yield and seed quality is not only available to farmers but to all interested parties.

MATERIALS AND METHODS

This project was conducted during the 2015/2016 season with the voluntary collaboration of Agricol, Pannar, Pioneer and Syngenta. Seed companies entered 21 cultivars for evaluation (Table 1) and supplied seed to the ARC-GCI which planned the field trials with randomised complete-block design layouts with three replicates. Germination tests, according to ISTA rules, were done on the supplied seed by a service provider (Senwes Grainlink). With the exception of one cultivar (P 65LC54), seed germination from all cultivars exceeded the 80% requirement (Table 1). Seed from cultivars were packed according to trial plans and send to co-operators before the onset of the growing season.

Six of the 21 cultivars were Clearfield types on which the use of the post emergence broad leaf weed controlling herbicide mixture, imazapyr + imazamox (Euro-Lightning®), is possible. In the field trials these cultivars were treated in the same way as the regular cultivars and received no Euro-Lightning®.

Each collaborating seed company had to conduct at least one trial for each cultivar entry. Agricol was supplied with seed for nine trials, Pannar with 11, Pioneer with five and Syngenta with four. Five trials were planted by the ARC-GCI. Trial sites were selected by collaborators and the co-workers involved are listed in Table 2.

Due to extreme drought some trials could not be planted as intended, while others failed after planting. Planting dates, amount of fertiliser applied, soil analyses and other agronomic details from some successfull field trials are reported in Table 3. Grain yields

were recorded on these trials, while the period from planting to 50% flowering was recorded on three trials at Potchefstroom.

Yield data and seed samples were send by collaborators to ARC-GCI for analyses. Seed from selected trials were sent to SAGL for oil and protein content analyses. Yield data from 17 field trials were subjected to analyses of variance. Results from six trials were rejected due to coefficients of variation exceeding the 20% limit. The regression line technique as described by Loubser and Grimbeek (1984) was used to calculate yield probabilities for cultivars at different yield potentials from the remaining 11 trials.

Yield probabilities were also calculated for 14 cultivars that were evaluated in 32 trials during 2014/2015 and 2015/2016.

RESULTS

Days from planting to flowering

The mean number of days from planting to 50% flowering of cultivars (Table 4) ranged from 56 (SY 4045, planting date 11 January 2016) to 70 days (P 65LL02, planting date 11 November 2015). Calculated across cultivars and planting dates, the period from planting to flowering was 65 days. Among cultivars, SY 4045 had the shortest period of 60 days and P 65LL02 the longest period from planting to flowering at 68 days.

Oil and protein concentration

The moisture free oil and protein concentrations of seed from eight trial localities, as analysed by the Southern African Grain Laboratory NPC, are shown in Tables 5 and 6 respectively. The oil analyses were done with a Soxhlet apparatus while the protein analyses were done according to the Dumas method.

The oil content for cultivars at the various localities varied from 33 to 54% with an overall mean of 41%. Adjusted for a moisture content of 9% at which sunflower grain is traded, the overall mean would be about 37%.

The highest mean oil concentration among localities was at Potchefstroom (planting date 11 January 2016) with 46%. The locality with the lowest mean oil content of 37% was Delmas. The highest oil concentration among cultivars and calculated across localities, was SY 3970 CL at 46%.

The protein content varied from 14 to 25% among cultivars at the different localities.

Among localities, Boskop had the highest and Reitz the lowest protein content of 22 and 15% respectively. Calculated across localities, NK Adagio CL and AGSUN 8251 had the highest protein content (20%) and PAN 7049 the lowest (18%).

Oil yield

Oil yield per unit area is the product of grain yield and seed oil content and it is presented in Table 8. The performance of cultivars regarding oil yield is important to farmers who are compensated for seed oil concentration.

The oil yield for cultivars at the eight localities varied from 0.2 to 1.4 t ha^{-1} with an overall mean of 0.8 t ha^{-1}. The locality with the highest mean oil yield was Boskop at 1.3 t ha^{-1}. Among cultivars, P65LL02, P65LL14, PAN 7049, PAN 7080, PAN 7160 CLP and PHB 65A70 had equally high values of 0.9 t ha^{-1}.

Seed yield

The mean seed yield of cultivars at the respective localities is presented in Table 7. The highest locality mean yield of 3.12 t ha^{-1} was obtained at Boskop planted on 1st October 2015 and the lowest of 0.79 t ha^{-1}, at Reitz.

The six best performing cultivars, in terms of average yield calculated over localities, were PAN 7080, P 65LL14, P 65LC54, PAN 7160 CLP, P 65LL02 and PAN 7095 CL. The overall mean yield for 2015/2016 was 1.96 t ha^{-1}, 11% lower than the mean yield of 2014/2015.

No high oleic cultivars were entered for evaluation in 2015/2016. Six Clearfield cultivars, NK ADAGIO CL, P 65LC54, PAN 7095 CL, PAN 7102 CLP, PAN 7160 CLP and SY 3970 CL were entered. Four of these cultivars namely, P 65LC54, PAN 7095 CL, PAN 7102 CLP and PAN 7160 CLP had yields higher than the overall mean yield of all cultivars.

Parameters calculated from the analysis of variance

The trial mean yield, standard error of the trial mean and other parameters, calculated for each locality, are shown in Table 9. These parameters are presented for the evaluation of individual trials.

Regression line coordinates at different yield targets

Regression line coordinates at different yield targets, the overall mean yield, the intercept

and slope from the regression line and yield stability (D-parameter) are shown in Table 10. The coordinate values of a particular cultivar are estimates of the mean expected yield at corresponding yield potentials. These values take the cultivar x environment interaction into account but not the yield stability. These values are accordingly not reliable for cultivar selection. Individual cultivar regression lines for 2015/16 are shown in Figure 1, and for the 14 cultivars evaluated in 2014/15 and 2015/16 in Figure 2.

The yield stability of cultivars varied up to 13 fold among cultivars (Table 10). Cultivars, which had exceptionally high stabilities (D-parameter ≤ 0.02) were, AGSUN 5264, Agsun 5270, Agsun 8251, PAN 7049, PAN 7100 and PAN 7102 CLP.

Yield probability

The yield probability of a cultivar, is the probability of exceeding the mean yield of all cultivars, at a particular yield potential. The yield probabilities of all 21 cultivars for 2015/16 are shown in Table 11. It takes account of both the cultivar x environment interaction and the yield stability and is therefore a reliable measure for cultivar choice. Yield probabilities higher than or equal to 60% in Table 11 indicates which cultivars would be sensible choices at the various yield potentials.

The yield probabilities of 14 cultivars evaluated in 32 trials in 2013/14 and 2014/15, are shown in Table 12. Tables 11 and 12 should be used jointly for cultivar selection.

Acknowledgements

Funding from the Oil and Protein Seed Development Trust and the participation of Agricol, Pannar, Pioneer and Syngenta are gratefully acknowledged.

References

LOUBSER, H.L. & GRIMBEEK, C.L., 1984. Cultivarevaluasie: ‘n vergelyking tussen verskillende tegnieke. In: Notule van vergadering gehou deur die ondersoekkomitee na cultivarprogramme by die NIGG te Potchefstroom.

Table 1 Cultivars evaluated, seed germination rate and supplier company 2015/2016

Cultivar	Germinated (%)*			Company
	Normal	*Abnormal*	*Dormant/dead*	
AGSUN 5264	93	5	2	Agricol ♠
AGSUN 5270	98	1	1	
AGSUN 5272	99	0	1	
AGSUN 5273	99	0	1	
AGSUN 5278	98	2	0	
AGSUN 5279	95	4	1	
AGSUN 8251	99	1	0	
PAN 7049	99	1	0	Pannar ●
PAN 7080	97	2	1	
PAN 7095 CL	97	2	1	
PAN 7098	97	2	1	
PAN 7100	96	2	2	
PAN 7102 CLP	99	1	0	
PAN 7160 CLP	96	3	1	
PHB 65A70	94	4	2	Pioneer ♟
P 65LC54	65	4	31	
P 65LL02	95	4	1	
P 65LL14	86	7	7	
NK ADAGIO CL	91	6	3	Syngenta ◘
SY 3970 CL	94	4	2	
SY 4045	95	4	1	

Table 2 Collaborating company, trial localities and responsible co-workers 2015/2016

Company	Localities	Planting dates	Co-workers	E-mail address of co-worker
Agricol ♠	Boskop x 2	01/11/15, 01/12/15	J Swanepoel	Jouberts@agricol.co.za
ARC-GCI ▲	Potchefstroom x 2	11/11/2015, 11/1/16	W Deale & J Erasmus	Erasmusj@arc.agric.za
PANNAR ●	Delmas	26/11/15	L Schoonraad & TC Lochner	Louis.schoonraad@pannar.co.za Ruaan.lochner@pannar.co.za
	Kroonstad	14/01/16		
	Senekal	14/01/16		
Pioneer	Reitz	09/12/15	Martin Brandt	Martin.brandt@pioneer.com
Syngenta ◘	Bethlehem	15/1/16	F van Deventer J Viljoen	Francois.van_deventer@syngenta.com Johannes.viljoen@syngenta.com
	Bothaville	18/12/15		
	Marquart	26/1/16		

Table 3 Trial site information 2015/2016

Locality*	Planting date	Plant population ha^{-1}	Soil classification	Top soil analysis (mg kg^{-1})					Fertiliser applied (kg ha^{-1})	Row width (cm)	Weed contol and insecticides	Nett plot size (m^2)
				pH (KCl)	P	K	Ca	Mg				
Bethlehem ◘	15/01/16	-	-						25 N, 8 P, 4 K	-	Cruiser, Metolachlor, Boron	12.7
Boskop ♠	01/11/15											11.5
Boskop ♠	01/12/15											11.5
Bothaville ◘	18/12/15								80 N, 20 P, 12 K		Alanex, Razer	14.0
Delmas ●	26/11/15											13.7
Kroonstad ●	14/01/16											13.7
Marquart ◘	26/01/16	43 000	Clovelly	-	-	-	-	-		-	-	11.9
Potchefstroom ▲	11/11/15	38 000	Westleigh	6.14	27	110	905	385	N 41; P 9; K 4	90	Alanex 480 CS, Razer, Karate	14.4
Potchefstroom ▲	11/01/16	40 000	Clovelly	6.54	24	143	1020	513	N 41; P 9; K 4	90	Alanex 480 CS, Razer, Karate	14.4
Reitz ♠	09/12/15	40 000	Loam						N 58, P 16, K 8, S38	-	Guardian, Super Metrin	13.2
Senekal ●	14/01/16											17.3

* ♠ *Agricol;* ▲ *ARC-GCI;* ● *Pannar;* ◘ *Syngenta*

Table 4 Number of days from planting to 50 percent flowering of cultivars at selected localities and planting dates

Cultivar	Potchefstroom ▲ 11/11/2015	Potchefstroom ▲ 11/1/16	Potchefstroom ▲ 15/1/16	Mean
AGSUN 5264	68	62	60	63
AGSUN 5270	64	63	62	63
AGSUN 5272	67	66	64	66
AGSUN 5273	69	65	65	66
AGSUN 5278	69	65	66	67
AGSUN 5279	64	63	62	63
AGSUN 8251	68	66	66	67
NK ADAGIO CL	67	64	64	65
P 65LC54	64	66	66	65
P 65LL02	70	67	66	68
P 65LL14	67	66	63	65
PAN 7049	66	66	65	66
PAN 7080	66	67	66	66
PAN 7095 CL	68	62	65	65
PAN 7098	66	63	64	64
PAN 7100	65	65	66	65
PAN 7102 CLP	63	62	66	64
PAN 7160 CLP	65	64	66	65
PHB 65A70	65	63	63	64
SY 3970 CL	69	67	65	67
SY 4045	65	56	60	60
Mean	66	64	64	

Table 5 The moisture free seed oil concentration (%) of cultivars at selected localities 2015/2016

Cultivar	Bethlehem ▫ 15/1/16	Boskop ♣ 01/11/15	Boskop ♣ 01/12/15	Bothaville ▫ 18/12/15	Delmas ● 26/11/15	Kroonstad ● 14/01/16	Potchefstroom ◀ 11/11/2015	Potchefstroom ◀ 11/1/16	Reitz ♟ 09/12/15	Senekal ● 14/01/16	Mean
AGSUN 5264	38.9	41.8	40.7	41.3	40.4	45.7	46.7	48.7	47.8	44.5	43.7
AGSUN 5270	36.0	41.1	38.2	45.3	36.5	43.1	44.4	48.8	44.1	40.3	41.8
AGSUN 5272	37.2	37.1	36.7	39.2	36.6	42.2	41.3	45.0	43.0	38.8	39.7
AGSUN 5273	43.5	37.2	37.8	42.6	37.8	43.4	42.5	40.0	42.9	39.1	40.7
AGSUN 5278	35.2	39.2	37.7	42.9	38.4	38.7	41.9	44.1	41.1	37.0	39.6
AGSUN 5279	39.0	40.1	36.3	39.9	36.4	42.3	41.8	46.1	42.3	40.0	40.4
AGSUN 8251	42.1	39.0	36.7	40.1	35.7	41.0	39.8	42.6	41.3	37.4	39.6
NK ADAGIO CL	42.3	39.7	40.0	41.2	38.4	40.2	44.0	46.1	44.1	40.7	41.7
P 65LC54	45.3	37.7	38.1	39.6	33.2	40.0	41.8	42.2	40.4	40.0	39.8
P 65LL02	35.7	43.2	42.7	37.6	42.5	43.6	46.0	47.2	49.1	43.0	43.1
P 65LL14	38.1	43.2	39.4	40.4	36.4	43.7	45.6	48.7	44.3	38.6	41.8
PAN 7049	38.0	39.9	36.6	50.1	39.0	40.5	43.9	44.4	43.3	39.8	41.6
PAN 7080	37.9	41.1	37.0	39.8	34.2	41.6	41.3	45.2	41.5	37.2	39.7
PAN 7095 CL	39.5	42.1	40.0	37.8	36.8	41.9	39.7	49.1	42.3	39.8	40.9
PAN 7098	36.8	37.3	36.2	39.9	37.2	38.7	41.5	48.2	41.7	38.9	39.6
PAN 7100	38.7	41.6	38.2	40.6	37.0	41.4	46.9	47.0	45.5	42.2	41.9
PAN 7102 CLP	37.4	39.1	36.1	36.4	32.5	42.5	41.4	46.0	41.4	40.3	39.3
PAN 7160 CLP	35.9	42.8	39.0	42.0	36.1	42.6	45.0	40.4	44.1	40.7	40.9
PHB 65A70	36.4	42.0	37.7	45.2	38.8	40.9	43.3	47.0	43.4	41.4	41.6
SY 3970 CL	36.7	48.8	47.2	40.4	40.3	43.7	48.7	54.3	50.4	45.7	45.6
SY 4045	41.0	41.1	36.9	39.8	35.6	44.0	44.9	40.7	44.0	41.6	41.0
Mean	38.6	40.7	38.5	41.1	37.1	42.0	43.4	45.8	43.7	40.3	

Table 6 The moisture free seed protein concentration (%) of cultivars at selected localities 2015/2016

Cultivar	Bethlehem ▫ 15/1/16	Boskop ♣ 01/11/15	Boskop ♣ 01/12/15	Bothaville ▫ 18/12/15	Delmas ● 26/11/15	Kroonstad ● 14/01/16	Potchefstroom ◀ 11/11/2015	Potchefstroom ◀ 11/1/16	Reitz ♟ 09/12/15	Senekal ● 14/01/16	Mean
AGSUN 5264	17.9	21.8	23.3	17.3	21.3	17.0	16.4	20.6	16.3	24.1	19.6
AGSUN 5270	17.1	20.9	22.5	18.2	19.2	18.3	15.4	18.9	15.0	22.7	18.8
AGSUN 5272	18.3	20.5	22.2	19.1	20.5	17.8	15.5	19.0	13.6	19.3	18.6
AGSUN 5273	18.8	22.2	23.2	17.8	20.8	17.9	16.8	20.6	16.0	21.0	19.5
AGSUN 5278	18.8	21.0	22.1	19.8	19.2	19.1	14.7	18.6	15.8	21.4	19.0
AGSUN 5279	17.2	20.8	22.4	16.8	20.8	18.8	16.8	19.5	13.8	21.9	18.9
AGSUN 8251	19.6	20.8	22.5	21.5	21.8	17.0	17.1	19.0	16.9	21.3	19.8
NK ADAGIO CL	17.5	23.6	24.5	17.3	20.8	21.3	16.3	20.1	14.6	22.2	19.8
P 65LC54	18.4	21.5	22.3	17.8	22.1	17.8	14.8	19.2	14.6	19.1	18.8
P 65LL02	17.3	21.0	21.5	20.1	19.4	18.2	14.8	20.3	13.3	21.0	18.7
P 65LL14	17.0	20.8	23.1	19.1	21.5	17.3	13.7	16.7	15.3	21.4	18.6
PAN 7049	18.2	19.6	21.7	17.6	19.5	17.5	13.5	18.0	12.7	20.4	17.9
PAN 7080	18.1	20.4	22.2	18.1	20.4	17.7	15.1	19.1	14.1	21.7	18.7
PAN 7095 CL	17.7	19.4	21.0	17.8	21.8	17.3	16.2	17.9	14.7	19.7	18.4
PAN 7098	18.5	19.3	21.5	17.5	20.4	18.6	14.5	19.5	14.6	20.7	18.5
PAN 7100	18.0	20.4	21.9	16.8	20.5	17.6	14.3	17.6	13.4	19.4	18.0
PAN 7102 CLP	17.0	19.4	23.0	18.0	21.5	17.3	16.5	17.4	14.2	18.6	18.3
PAN 7160 CLP	19.0	19.9	22.1	17.8	20.5	17.5	14.7	18.3	13.5	19.5	18.3
PHB 65A70	17.3	18.8	22.0	18.0	19.0	18.6	14.2	17.3	14.3	20.4	18.0
SY 3970 CL	18.0	18.6	21.7	17.6	21.1	19.1	16.3	19.3	15.4	23.3	19.0
SY 4045	18.2	19.5	21.8	18.9	21.8	18.3	14.2	19.7	14.0	21.0	18.7
Mean	18.0	20.5	22.3	18.2	20.7	18.1	15.3	18.9	14.6	21.0	

Table 7 **Mean seed yield (t ha^{-1}) of cultivars at each locality**

Cultivar	Bethlehem ◘ 15/1/16	Boskop ♣ 01/11/15	Boskop ♣ 01/12/15	Bothaville ◘ 18/12/15	Delmas ● 26/11/15	Kroonstad ● 14/01/16	Marquard ◘ 26/1/16	Potchefstroom ▲ 11/11/2015	Potchefstroom ▲ 11/1/16	Reitz ♣ 09/12/15	Senekal ● 14/01/16
AGSUN 5264	1.57	2.77	2.78	2.32	1.51	1.70	1.62	2.21	1.29	0.84	0.98
AGSUN 5270	1.74	3.16	2.99	3.07	1.69	1.93	1.89	2.29	1.30	0.73	0.98
AGSUN 5272	1.61	3.50	3.26	2.49	1.43	2.33	1.85	2.22	1.49	0.85	1.04
AGSUN 5273	1.61	3.03	2.92	3.12	1.34	2.23	1.58	2.24	1.41	0.75	1.06
AGSUN 5278	1.45	3.53	2.90	1.79	1.73	1.82	1.85	2.37	1.46	0.87	1.07
AGSUN 5279	1.78	3.05	2.86	2.16	1.56	1.77	1.55	2.31	1.28	0.65	1.11
AGSUN 8251	1.67	3.31	3.01	2.76	1.59	1.89	1.74	2.37	1.43	0.89	1.08
NK ADAGIO CL	1.96	2.95	2.53	1.91	1.52	1.74	1.51	1.92	1.45	0.59	0.90
P 65LC54	1.87	2.66	2.73	3.02	2.07	2.17	2.12	2.60	1.66	0.90	1.24
P 65LL02	1.93	3.35	3.00	3.03	1.32	2.29	2.12	2.46	1.27	0.91	1.18
P 65LL14	2.15	3.00	2.64	3.47	1.69	2.37	1.80	2.66	1.57	0.75	1.00
PAN 7049	1.71	3.31	2.82	3.16	1.42	2.07	1.67	2.72	1.45	0.74	1.12
PAN 7080	1.75	3.29	2.97	3.60	1.70	2.40	1.58	2.61	1.38	0.95	1.20
PAN 7095 CL	1.81	3.24	2.79	3.38	1.42	2.17	1.94	2.61	1.39	1.03	0.93
PAN 7098	1.81	3.06	2.92	2.71	1.81	2.55	1.45	2.39	1.55	0.88	1.16
PAN 7100	1.94	2.92	2.87	2.79	1.70	1.97	1.66	2.58	1.53	0.69	1.12
PAN 7102 CLP	1.95	3.14	2.91	2.84	1.52	2.24	1.95	2.45	1.84	0.67	1.09
PAN 7160 CLP	1.81	3.55	2.96	3.06	1.63	2.39	1.70	2.20	1.61	0.87	1.16
PHB 65A70	1.95	2.91	2.83	3.10	1.73	2.08	1.65	2.65	1.66	0.73	0.88
SY 3970 CL	1.30	2.65	2.80	2.79	1.17	1.84	1.69	2.15	1.15	0.64	0.47
SY 4045	1.27	3.08	2.62	1.85	1.34	1.36	1.41	2.80	1.31	0.64	0.75
Mean	1.75	3.12	2.86	2.78	1.57	2.06	1.73	2.42	1.45	0.79	1.02
CV%	16.0	16.0	12.2	16.8	11.2	9.2	10.8	9.3	19.7	12.0	9.8

Table 8 Oil yield (t ha-1) of cultivars at selected localities 2015/2016

Cultivar	Bethlehem ◘ 15/1/16	Boskop ♣ 01/11/15	Boskop ♣ 01/12/15	Bothaville ◘ 18/12/15	Delmas ● 26/11/15	Kroonstad ● 14/01/16	Potchefstroom ◄ 11/11/2015	Potchefstroom ◄ 11/1/16	Reitz ♣ 09/12/15	Senekal ● 14/01/16	Mean
AGSUN 5264	0.6	1.2	1.1	1.0	0.6	0.8	1.0	0.6	0.4	0.4	0.8
AGSUN 5270	0.6	1.3	1.1	1.4	0.6	0.8	1.0	0.6	0.3	0.4	0.8
AGSUN 5272	0.6	1.3	1.2	1.0	0.5	1.0	0.9	0.7	0.4	0.4	0.8
AGSUN 5273	0.7	1.1	1.1	1.3	0.5	1.0	1.0	0.6	0.3	0.4	0.8
AGSUN 5278	0.5	1.4	1.1	0.8	0.7	0.7	1.0	0.6	0.4	0.4	0.8
AGSUN 5279	0.7	1.2	1.0	0.9	0.6	0.7	1.0	0.6	0.3	0.4	0.7
AGSUN 8251	0.7	1.3	1.1	1.1	0.6	0.8	0.9	0.6	0.4	0.4	0.8
NK ADAGIO CL	0.8	1.2	1.0	0.8	0.6	0.7	0.8	0.7	0.3	0.4	0.7
P 65LC54	0.8	1.0	1.0	1.2	0.7	0.9	1.1	0.7	0.4	0.5	0.8
P 65LL02	0.7	1.4	1.3	1.1	0.6	1.0	1.1	0.6	0.4	0.5	0.9
P 65LL14	0.8	1.3	1.0	1.4	0.6	1.0	1.2	0.8	0.3	0.4	0.9
PAN 7049	0.6	1.3	1.0	1.6	0.6	0.8	1.2	0.6	0.3	0.4	0.9
PAN 7080	0.7	1.4	1.1	1.4	0.6	1.0	1.1	0.6	0.4	0.4	0.9
PAN 7095 CL	0.7	1.4	1.1	1.3	0.5	0.9	1.0	0.7	0.4	0.4	0.8
PAN 7098	0.7	1.1	1.1	1.1	0.7	1.0	1.0	0.7	0.4	0.5	0.8
PAN 7100	0.8	1.2	1.1	1.1	0.6	0.8	1.2	0.7	0.3	0.5	0.8
PAN 7102 CLP	0.7	1.2	1.1	1.0	0.5	1.0	1.0	0.8	0.3	0.4	0.8
PAN 7160 CLP	0.6	1.5	1.2	1.3	0.6	1.0	1.0	0.7	0.4	0.5	0.9
PHB 65A70	0.7	1.2	1.1	1.4	0.7	0.9	1.1	0.8	0.3	0.4	0.9
SY 3970 CL	0.5	1.3	1.3	1.1	0.5	0.8	1.0	0.6	0.3	0.2	0.8
SY 4045	0.5	1.3	1.0	0.7	0.5	0.6	1.3	0.5	0.3	0.3	0.7
Mean	0.7	1.3	1.1	1.1	0.6	0.9	1.0	0.7	0.3	0.4	

Table 9 Parameters calculated from the analysis of variance for yield data at each locality

Locality	Mean (t ha^{-1})	SE	CV(%)	GCV	t	SE(t)	tn
Bethlehem ◘ 15/01/2016	1.745	0.16	16	8.6	0.23	0.145	0.47
Boskop ♠ 01/11/2015	3.117	0.29	16	<0.1	-0.06	0.120	-0.2
Boskop ♠ 01/12/2015	2.862	0.20	12	<0.1	-0.14	0.106	-0.58
Bothaville ◘ 18/12/2015	2.782	0.27	17	16	0.48	0.132	0.73
Delmas ● 26/11/2015	1.566	0.10	11	11.2	0.50	0.129	0.75
Kroonstad ●14/01/2016	2.062	0.11	9	13.3	0.68	0.097	0.86
Marquard ◘ 26/01/2016	1.728	0.11	11	9.6	0.44	0.136	0.7
Potchefstroom ▲ 11/11/2015	2.420	0.13	9	7.5	0.40	0.139	0.67
Potchefstroom ▲ 11/01/2016	1.451	0.17	20	<0.1	-0.01	0.128	-0.03
Reitz ✪ 09/12/15	0.789	0.05	12	13.7	0.56	0.120	0.79
Senekal ● 14/01/2016	1.024	0.06	10	15.9	0.73	0.086	0.89

♠ Agricol; ▲ ARC-GCI; ● Pannar; ✪ Pioneer, ◘ Syngenta

Table 10 Regression line coordinates at different yield potentials 2015/2016

Cultivar	Yield potential (t ha^{-1})						Average	Intercept	Slope	D-parameter
	1	1.5	2	2.5	3	3.5				
AGSUN 5264	0.97	1.40	1.83	2.26	2.69	3.12	1.78	0.11	0.86	0.01
AGSUN 5270	0.94	1.48	2.01	2.55	3.08	3.62	1.98	-0.13	1.07	0.02
AGSUN 5272	0.98	1.52	2.06	2.60	3.14	3.68	2.01	-0.10	1.08	0.06
AGSUN 5273	0.92	1.45	1.98	2.51	3.04	3.57	1.94	-0.14	1.06	0.03
AGSUN 5278	1.02	1.48	1.93	2.39	2.84	3.30	1.89	0.11	0.91	0.14
AGSUN 5279	0.94	1.40	1.86	2.32	2.78	3.24	1.83	0.02	0.92	0.04
AGSUN 8251	0.99	1.50	2.01	2.52	3.03	3.54	1.98	-0.03	1.02	0.01
NK ADAGIO CL	0.95	1.36	1.76	2.17	2.57	2.98	1.73	0.14	0.81	0.07
P 65LC54	1.32	1.73	2.13	2.54	2.94	3.35	2.09	0.51	0.81	0.05
P 65LL02	1.05	1.59	2.12	2.66	3.19	3.73	2.08	-0.02	1.07	0.04
P 65LL14	1.10	1.62	2.14	2.66	3.18	3.70	2.10	0.06	1.04	0.07
PAN 7049	0.95	1.51	2.07	2.63	3.19	3.75	2.02	-0.17	1.12	0.02
PAN 7080	1.05	1.62	2.18	2.75	3.31	3.88	2.13	-0.08	1.13	0.06
PAN 7095 CL	1.03	1.58	2.12	2.67	3.21	3.76	2.06	-0.06	1.09	0.05
PAN 7098	1.13	1.60	2.07	2.54	3.01	3.48	2.03	0.19	0.94	0.04
PAN 7100	1.06	1.54	2.02	2.50	2.98	3.46	1.98	0.10	0.96	0.02
PAN 7102 CLP	1.10	1.60	2.09	2.59	3.08	3.58	2.05	0.11	0.99	0.02
PAN 7160 CLP	1.06	1.60	2.13	2.67	3.20	3.74	2.09	-0.01	1.07	0.03
PHB 65A70	1.04	1.55	2.06	2.57	3.08	3.59	2.02	0.02	1.02	0.03
SY 3970 CL	0.67	1.20	1.73	2.26	2.79	3.32	1.70	-0.39	1.06	0.04
SY 4045	0.74	1.23	1.71	2.20	2.68	3.17	1.68	-0.23	0.97	0.13

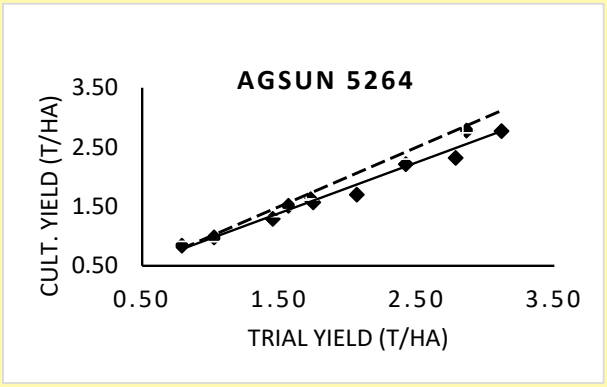
Table 11 Yield probability (%) of cultivars 2015/2016 at different yield potentials

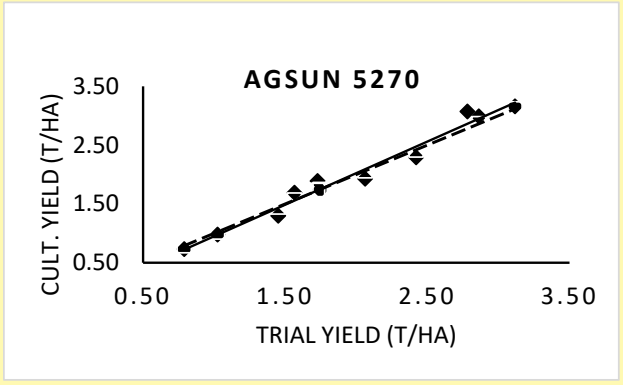
Cultivar	Yield potential (t ha^{-1})					
	1	1.5	2	2.5	3	3.5
AGSUN 5264	41	20	8	2	1	0
AGSUN 5270	35	45	53	63	70	76
AGSUN 5272	47	53	60	65	70	73
AGSUN 5273	33	39	45	52	58	63
AGSUN 5278	52	48	43	39	35	33
AGSUN 5279	39	31	25	19	16	14
AGSUN 8251	47	50	53	57	60	62
NK ADAGIO CL	43	30	19	11	7	5
P 65LC54	90	84	71	57	41	29
P 65LL02	59	67	73	78	81	84
P 65LL14	63	66	69	71	72	73
PAN 7049	38	53	68	80	88	92
PAN 7080	57	68	76	83	87	90
PAN 7095 CL	55	64	71	77	81	84
PAN 7098	72	68	63	58	52	47
PAN 7100	66	62	56	50	44	40
PAN 7102 CLP	73	74	72	72	68	67
PAN 7160 CLP	62	70	76	82	84	87
PHB 65A70	58	60	62	64	65	65
SY 3970 CL	6	7	9	12	17	22
SY 4045	26	24	22	22	22	23

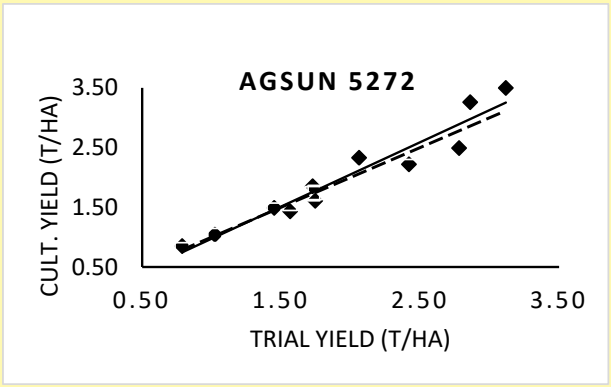
Table 12 Yield probability (%) of cultivars 2014/2015 and 2015/2016 at different yield potentials

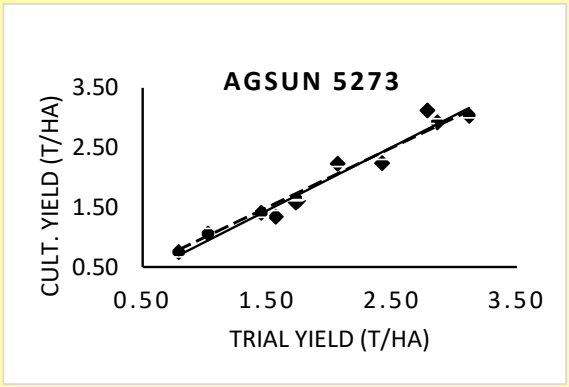
Cultivar	Yield potential (t ha^{-1})					
	1	1.5	2	2.5	3	3.5
AGSUN 5264	31	26	22	18	15	12
AGSUN 5272	48	48	48	48	48	48
AGSUN 5278	39	44	48	53	58	62
AGSUN 5279	44	48	50	54	56	60
AGSUN 8251	42	48	54	60	66	71
NK ADAGIO CL	30	19	11	6	3	2
PAN 7049	53	65	77	85	91	95
PAN 7080	72	75	78	80	82	83
PAN 7095 CL	75	74	71	70	66	65
PAN 7098	82	83	82	82	80	80
PAN 7102 CLP	72	75	77	79	81	82
PHB 65A70	67	68	69	70	70	71
SY 3970 CL	18	19	18	20	20	22
SY 4045	34	30	26	23	21	19

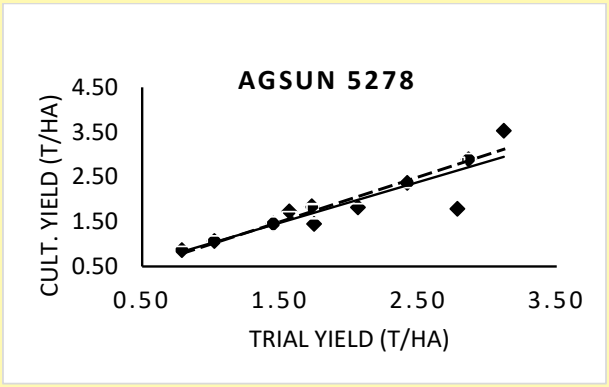
Figure 1 Regression lines for cultivars 2015/2016

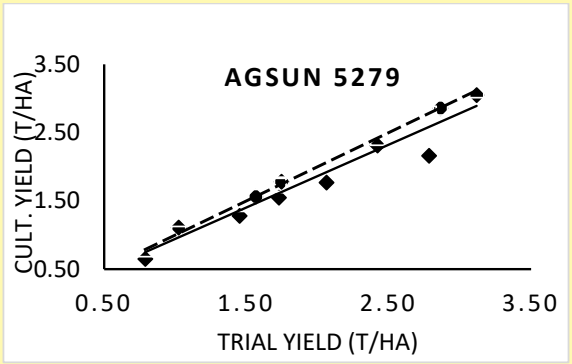


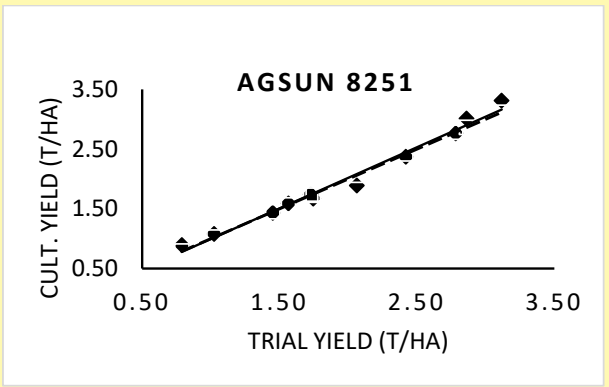


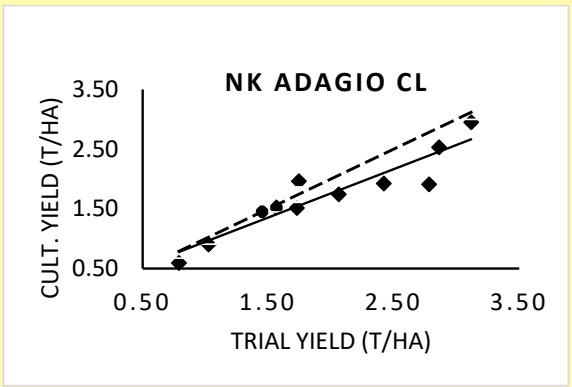


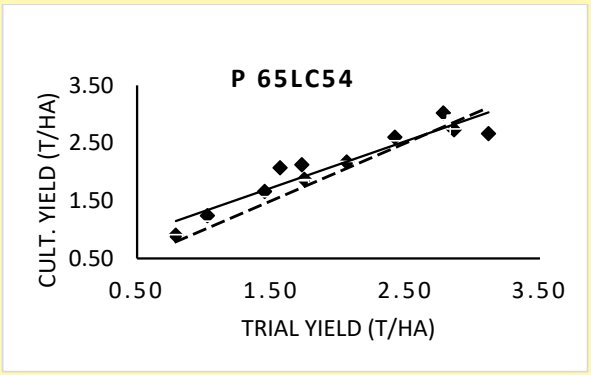











P 65LC54
CULT. YIELD (T/HA)
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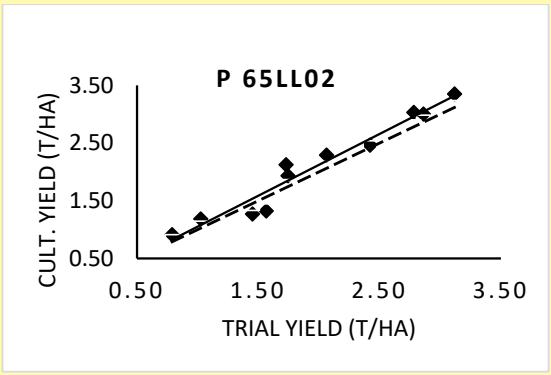
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


P 65LL02
CULT. YIELD (T/HA)
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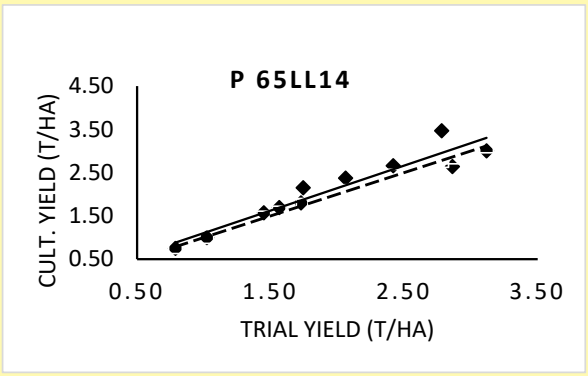
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


P 65LL14
CULT. YIELD (T/HA)
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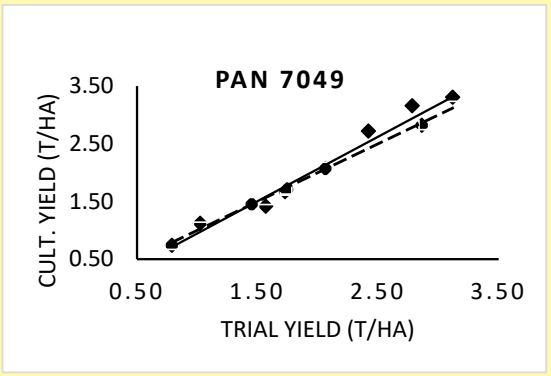
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7049
CULT. YIELD (T/HA)
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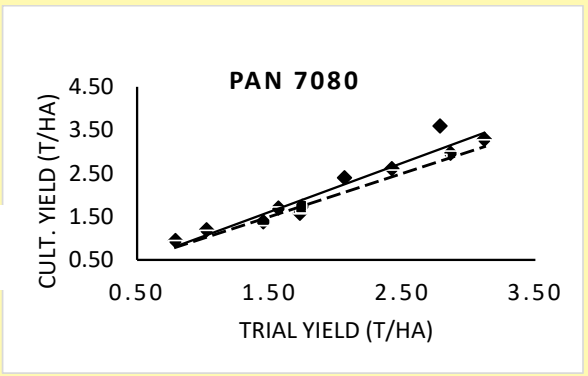
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7080
CULT. YIELD (T/HA)
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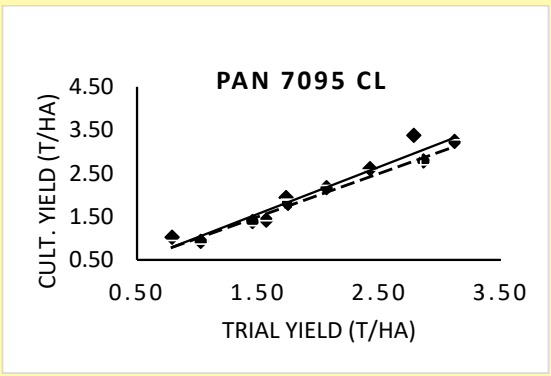
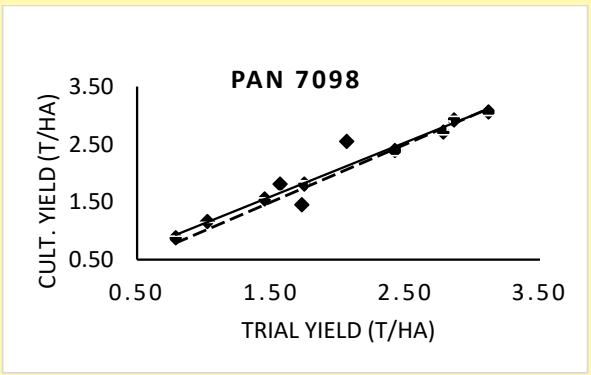
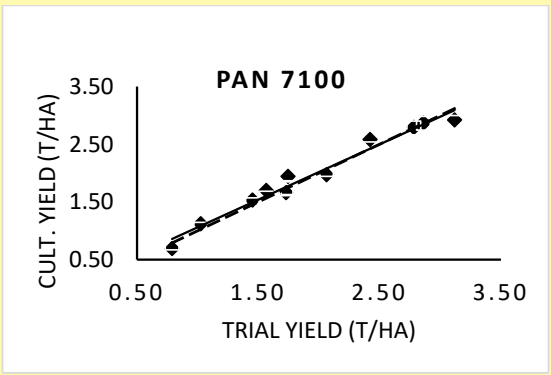
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7095 CL
CULT. YIELD (T/HA)
4.50
3.50
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7098
CULT. YIELD (T/HA)
3.50
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7100
CULT. YIELD (T/HA)
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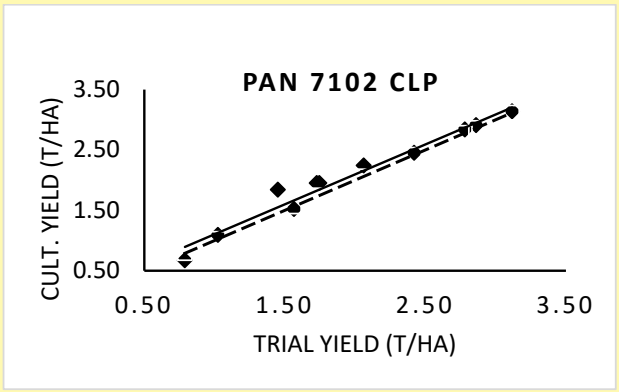
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7102 CLP
CULT. YIELD (T/HA)
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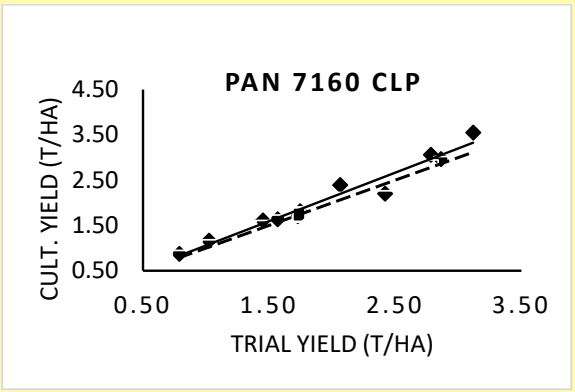
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PAN 7160 CLP
CULT. YIELD (T/HA)
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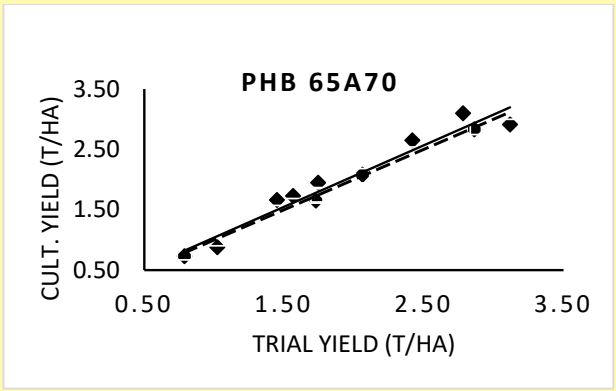
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


PHB 65A70
CULT. YIELD (T/HA)
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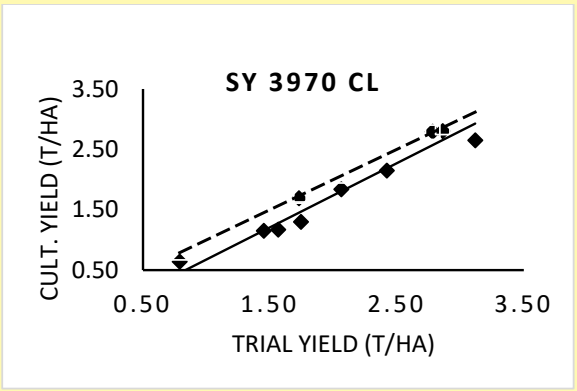
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)


SY 3970 CL
CULT. YIELD (T/HA)
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2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)

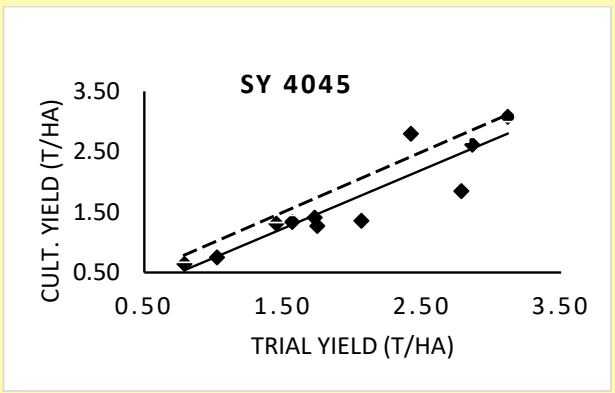
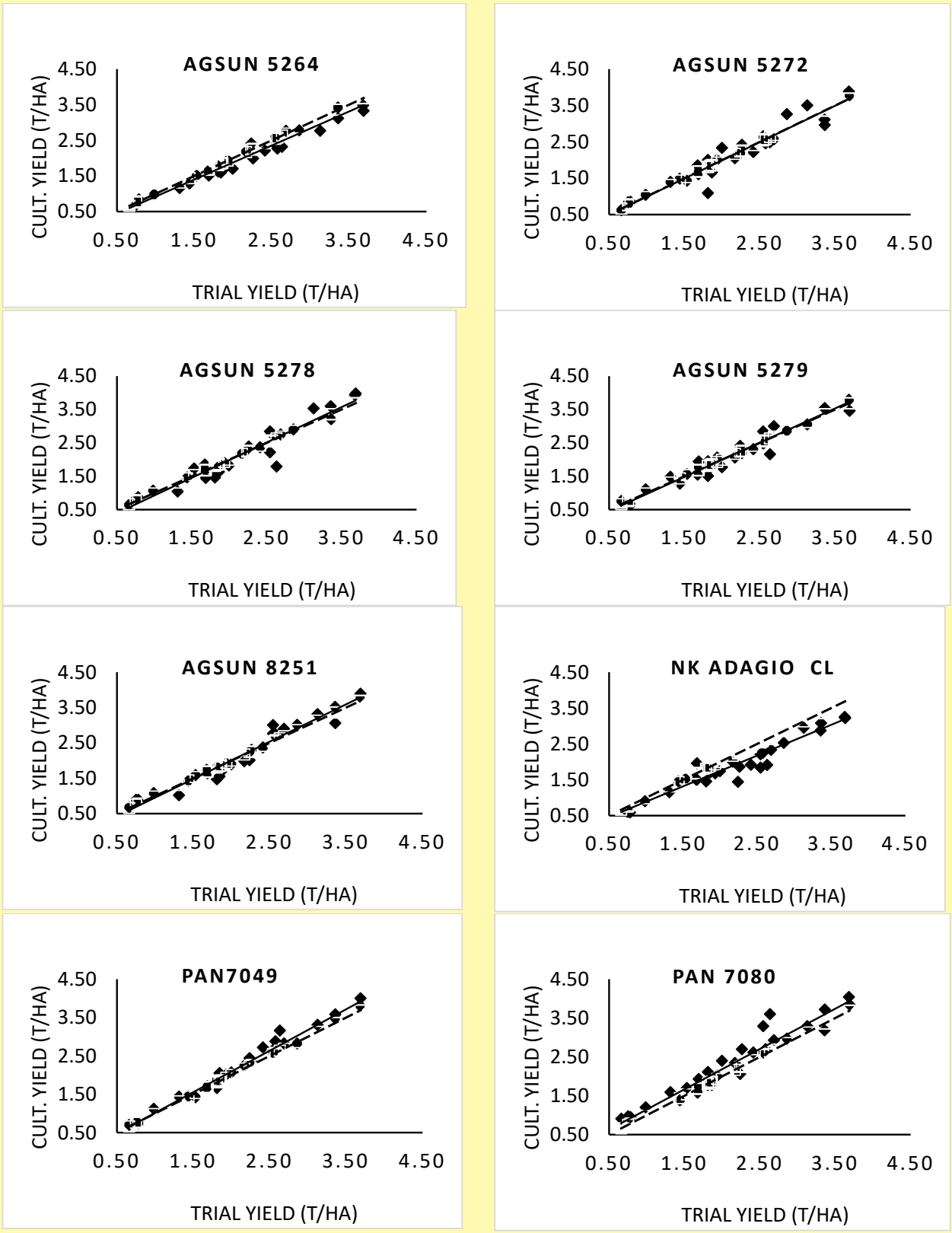
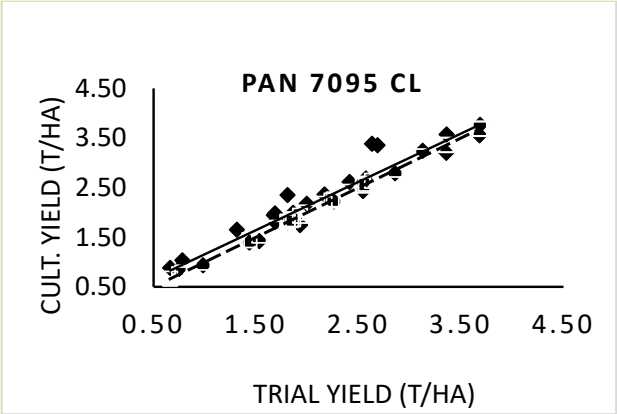

SY 4045
CULT. YIELD (T/HA)
3.50
2.50
1.50
0.50
0.50
1.50
2.50
3.50
TRIAL YIELD (T/HA)

Figure 2 Regression lines for cultivars 2014/2015 and 2015/2016




PAN 7095 CL
CULT. YIELD (T/HA)
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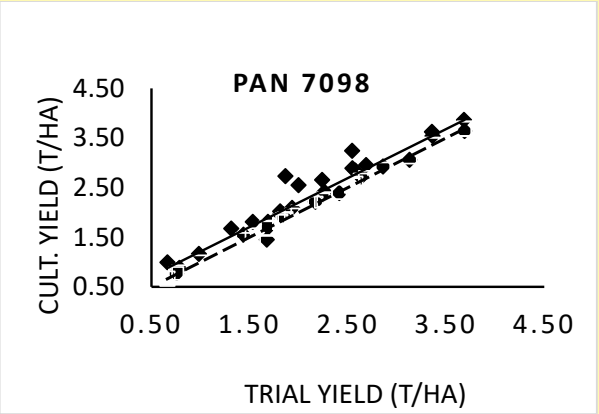
3.50
2.50
1.50
0.50
0.50 1.50 2.50 3.50 4.50
TRIAL YIELD (T/HA)


PAN 7098
CULT. YIELD (T/HA)
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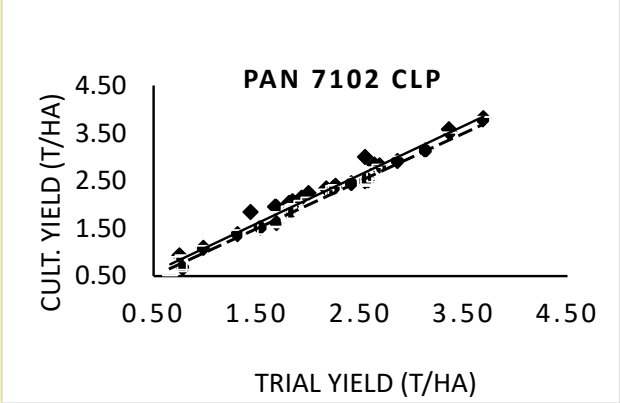
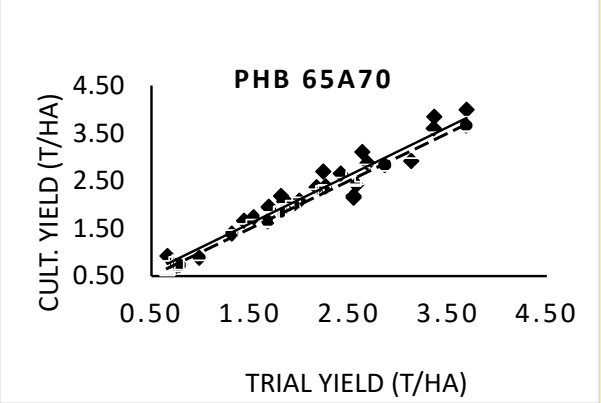
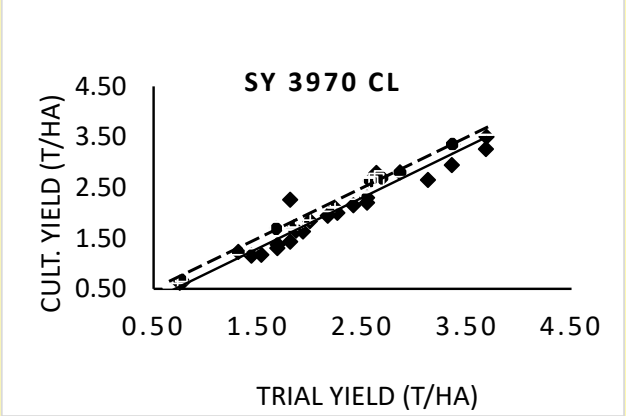
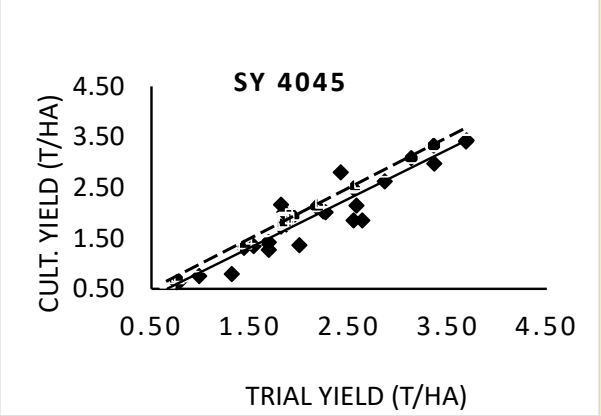
3.50
2.50
1.50
0.50
0.50 1.50 2.50 3.50 4.50
TRIAL YIELD (T/HA)


PAN 7102 CLP
CULT. YIELD (T/HA)
4.50
3.50
2.50
1.50
0.50
0.50 1.50 2.50 3.50 4.50
TRIAL YIELD (T/HA)


PHB 65A70
CULT. YIELD (T/HA)
4.50
3.50
2.50
1.50
0.50
0.50 1.50 2.50 3.50 4.50
TRIAL YIELD (T/HA)


SY 3970 CL
CULT. YIELD (T/HA)
4.50
3.50
2.50
1.50
0.50
0.50 1.50 2.50 3.50 4.50
TRIAL YIELD (T/HA)


SY 4045
CULT. YIELD (T/HA)
4.50
3.50
2.50
1.50
0.50
0.50 1.50 2.50 3.50 4.50
TRIAL YIELD (T/HA)

DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES

NO. 45 **22 JANUARY 2016**

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

REGULATIONS RELATING TO THE GRADING, PACKING AND MARKING OF SUNFLOWER SEED INTENDED FOR SALE IN THE REPUBLIC OF SOUTH AFRICA

The Minister of Agriculture, Forestry and Fisheries under section 15 of the Agricultural Product Standards Act 119 of 1990, has

(a) made the regulations in the Schedule;

(b) determined that the said regulations shall come into operation on the date of publication thereof; and

(c) read together with section 3(1) of the said Act, repealed the Regulations published by Government Notice No. R 477 of 20 June 2014.

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--

"animal filth" means dead rodents, dead birds and dung;

"bag" means a bag manufactured from--

(a) jute or phormium or a mixture of jute and phormium; or

(b) polypropylene that compiles with SANS specification CKS632 1246: 2012;

"bulk container" means any vehicle or container in which bulk sunflower seed is transported or stored;

"consignment" means--

(a) a quantity of sunflower seed of the same class, which belongs to the same owner, delivered at any one time under the same consignment note, delivery note or receipt note, or delivered by the same vehicle or bulk container, or loaded from the same bulk storage structure or from a ship's hold; or

(b) in the case where a quantity referred to in paragraph (a), is subdivided into a grade, each such quality of such grade.

"container" means a bag or a bulk container;

"damaged sunflower seed" means sunflower seed or portion thereof which is visibly discoloured as a result of external heat or heating due to internal fermentation;

"foreign matter" means--

(a) loose and empty shells above the sieve that occur in the consignment concerned; and

(b) all matter other than sunflower seed and the achene of sunflower seed above the standard sieve. Coal, dung, glass and metal shall not be present in the consignment at all.

"insect" means any live grain insect that is injurious to stored sunflower seed as well as other grain, irrespective of the stage of development of that insect;

"poisonous seeds" mean seeds or part of seeds of plant species that in terms of the Foodstuffs Cosmetics and Disinfectants Act 64 of 1972, may 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;*

"sclerotia" means hard masses of fungal tissue produced by fungus *Sclerotinia sclerotiorum*. The sclerotia vary in size and form and consist of a dark black exterior, a white interior and a rough surface texture;

"screenings" means all material that passes through a standard sieve;

"standard sieve" means a slotted sieve--

(a) with a flat bottom of metal sheet of 1,0 mm thickness with apertures 12.7 mm long and 1.8 mm wide with rounded ends (±0.03 mm). The spacing between the slots in the same row must be 2.43 mm wide and the spacing between the rows of slots must be 2.0 mm wide. The slots must be alternately oriented with a slot always opposite the solid inter segment of the next row of slots;

(b) of which the upper surface of the sieve is smooth;

(c) with a round frame of suitable material with an inner diameter of at least 300 mm and at least 50 mm high; and

(d) that fits onto a tray with a solid bottom and must be at least 20 mm above bottom of the tray.

"sunflower seed" means the seed of the plant species of *Helianthus annuus (L); and*

"the Act" means the Agricultural Product Standards Act 119 of 1990.

Restrictions on sale of sunflower seed

2. (1) No person shall sell sunflower seed in the Republic of South Africa--

(a) unless the sunflower seed are sold according to the classes set out in regulation 3;

(b) unless the sunflower seed comply with the standards for the classes concerned set out in regulation 4;

(c) unless the sunflower seed, where applicable, comply with the grades of sunflower seed and the standards for grades set out in regulation 5 and 6 respectively;

(d) unless the sunflower seed are packed in accordance with the packing requirements set out in regulation 7;

(e) unless the container 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 sunflower seed contains a substance 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 provisions of sub-regulation (1): Provided that such exemption is done in terms of section 3(1) (c) of the Act.

PART I

QUALITY STANDARDS

Classes of sunflower seed

3. Sunflower seed shall be classified as--

(a) Class FH;

(b) Class FS; and

(c) Class Other Sunflower Seed.

Standards for classes of sunflower seed

4. (1) A consignment of sunflower seed 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) not contain more poisonous seeds than permitted in terms of the Foodstuffs, Cosmetics and Disinfectants Act 54 of 1972;

(d) shall be free from stones, glass, metal, coal or dung;

(e) with the exception of Class Other Sunflower seed, be free from insects;

(f) with the exception of Class Other Sunflower seed, have a moisture content of not more than 10 percent; and

(g) be free from animal filth.

(2) A consignment of sunflower seed shall be classified as --

(a) Class FH if it--

(i) consist of at least 80 percent (m/m) sunflower seed of a cultivar with a high oil content; and

(ii) complies with the standard for Grade 1 set out in regulation 6.

(b) Class FS if it--

(i) consist of at least 80 percent (m/m) sunflower seed of a cultivar with a low oil content; and

(ii) complies with the standards for Grade 1 set out in regulation 6.

(c) Class Other Sunflower Seed if it does not comply with the requirements for Class FH or Class FS.

Grades for sunflower seed

5. (1) There is only one grade for the Classes FH and FS Sunflower Seed, namely Grade 1.

(2) No grades are determined for Class Other Sunflower seed.

Standards for grades of sunflower seed

6. A consignment of Grade 1 sunflower seed shall be graded as Grade 1 if the nature of 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. Sunflower seed of different classes and grades shall be packed in different containers or stored separately.

Marking requirements

8. Every container or the accompanying sale documents of a sunflower seed shall be marked or endorsed with the class and, where applicable, the grade of the sunflower seed.

PART III

SAMPLING

Obtaining a sample

9. (1) A representative sample of a consignment of sunflower seed shall--

(a) in the case of sunflower seed delivered in bags and subject to regulation 10, be obtained by sampling at least 10 percent 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 sunflower seed 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 sub-regulation (1) (a) or (b) shall--

(a) have a total mass of at least 5 kg; and

(b) be thoroughly mixed by means of dividing before further examination.

(3) If it is suspected that the sample referred to in sub regulation (1)(a) is not representative of that consignment, an additional five percent 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 sub regulation(1)(b).

(4) If it is suspected that the sample referred to in sub-regulation (1) (b) is not representative of that consignment, an additional representative sample shall be obtained by using an alternative sampling pattern, apparatus or method.

(5) 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 sunflower seed taken from different bags in a consignment in terms of regulation 9(1), it appears that the contents of those bags differ substantially--

(a) the bags concerned shall be separated from each other;

(b) all the bags in the consignment concerned shall be sampled in order to do such separation; and

(c) each group of bags with similar contents in that consignment shall for the purpose of these regulations be deemed to be separate consignment.

(2) If, after the discharge of a consignment of sunflower seed in bulk has commenced, it is suspected that the consignment could be of a class or grade other than that determined by means of the initial sampling, the discharge shall immediately be stopped and that part of the consignment remaining in the bulk container, as well as the sunflower seed 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 sunflower seed that is flowing in bulk.

Working sample

11. (1) A working sample of sunflower seed shall be obtained by dividing the representative sample of the consignment according to the latest revision of the ICC (International Association for Science and Technology) 101/1 method.

PART IV

INSPECTION METHODS

Determination of undesired odour, harmful substances, poisonous seeds, stones, glass, metal, coal, dung, insect and animal filth

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

(a) has a musty, sour, khaki bush or other undesired odour;

(b) contains a substance that renders it unsuitable for human or animal consumption or processing into or utilization thereof as food or feed;

(c) contains poisonous seeds;

(d) contains stones, glass, metal, coal or dung;

(e) contains any insects; and

(f) contains animal filth.

Determination of moisture content

13. The moisture content of a consignment of sunflower seed may be determined according to any suitable method: Provided that the result thus obtained is in accordance with the maximum permissible deviation for a class 1 moisture meter as detailed in ISO 7700/2, based upon result of the 3 hour, 103°C oven dried method [the latest revision of the AACCI ("American Association of Cereal Chemists International") Method 44-15].

Determination of percentage screenings

14. The percentage screenings in a consignment of sunflower seed is determined as follows:

(a) Obtain a working sample of at least 50g from a representative sample of the consignment.

(b) Place the sample on a standard sieve; screen the sample by moving the sieve 50 strokes to and fro, alternately away from and towards the operator of the sieve, in the same direction as the long axes of the slots of the sieve. Move the sieve, which rests on a table or other suitable smooth surface, 250 mm to 460 mm away from and towards the operator with each stroke. The prescribed 50 strokes must be completed within 50 to 60 seconds: Provided that the screening process may also be performed in some or other container or an automatic sieving apparatus.

(c) Determine the mass of the material that has passed through the sieve and express it that as a percentage of the mass of the working sample.

(d) Such percentage represents the percentage screenings in the consignment.

Determination of percentage foreign matter

15. The percentage foreign matter in a consignment of sunflower seed shall be determined as follows:

(a) Obtain a working sample of at least 20g of a screened sample.

(b) Remove all foreign matter by hand and determine the mass thereof.

(c) Express the mass thus determined as a percentage of the mass of the working sample.

(d) Such a percentage represents the percentage foreign matter in the consignment.

Determination of percentage sclerotia

16. The percentage sclerotia in a consignment of sunflower seed is determined as follows:

(a) Remove all sclerotia in the working sample in 15(a) obtained by hand and determine the mass thereof.

(b) Express the mass thus determined as a percentage of the working sample in regulation 15(a) obtained.

(c) Such a percentage represents the percentage sclerotia in the consignment.

Determination of percentage sunflower seed of another class

17. The percentage sunflower seed of another class in a consignment of sunflower seed shall be determined as follows:

(a) Obtain a working sample of at least 20g from a screened sample free of foreign matter and sclerotia.

(b) Remove all sunflower seeds of another class from the working sample by hand and determine the mass thereof.

(c) Express the mass thus determined as a percentage of the working sample.

(d) Such a percentage represents the percentage sunflower seed of another class in the consignment.

Determination of the percentage damaged sunflower seed

18. The percentage damaged sunflower seed in a consignment of sunflower seed, shall be determined as follows:

(a) Obtain a working sample of at least 20 g from a screened sample free of foreign matter and sclerotia.

(b) Shell the seed in the working sample by hand or with a machine so that nucleus portions thereof are retained.

(c) Remove all damaged sunflower seed from the quantity thus shelled and determine the mass thereof.

(d) Express the mass thus determined as a percentage of the working sample.

(e) Such a percentage represents the percentage damaged sunflower seed in the consignment.

PART V

MASS DETERMINATION

19. The mass of sunflower seed shall be determined by deducting the actual percentage sclerotia, screenings and foreign matter found during the inspection process from the total mass of the consignment: Provided that the weighing instruments used for the determination of mass shall comply with the requirements of SANS 1649:2001 published in terms of the Trade Metrology Act 77 of 1973 for the specific class of instrument.

PART VI

OFFENCE AND PENALTIES

20. Any person who contravenes or 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 terms of section 11 of the Act.

ANNEXURE

TABLE 1

STANDARDS FOR GRADES OF SUNFLOWER SEED

DEVIATIONS		**Maximum permissible deviations**	
		Class FH	**Class FS**
		Grade1	
1.	Damaged sunflower seed	10%	
2.	Screenings	4%	
3.	Sclerotia	4%	
4.	Foreign Matter	4%	
5.	Deviation in 2,3 and 4 collectively: Provided that such deviations are individually within the limits of said items.	6%