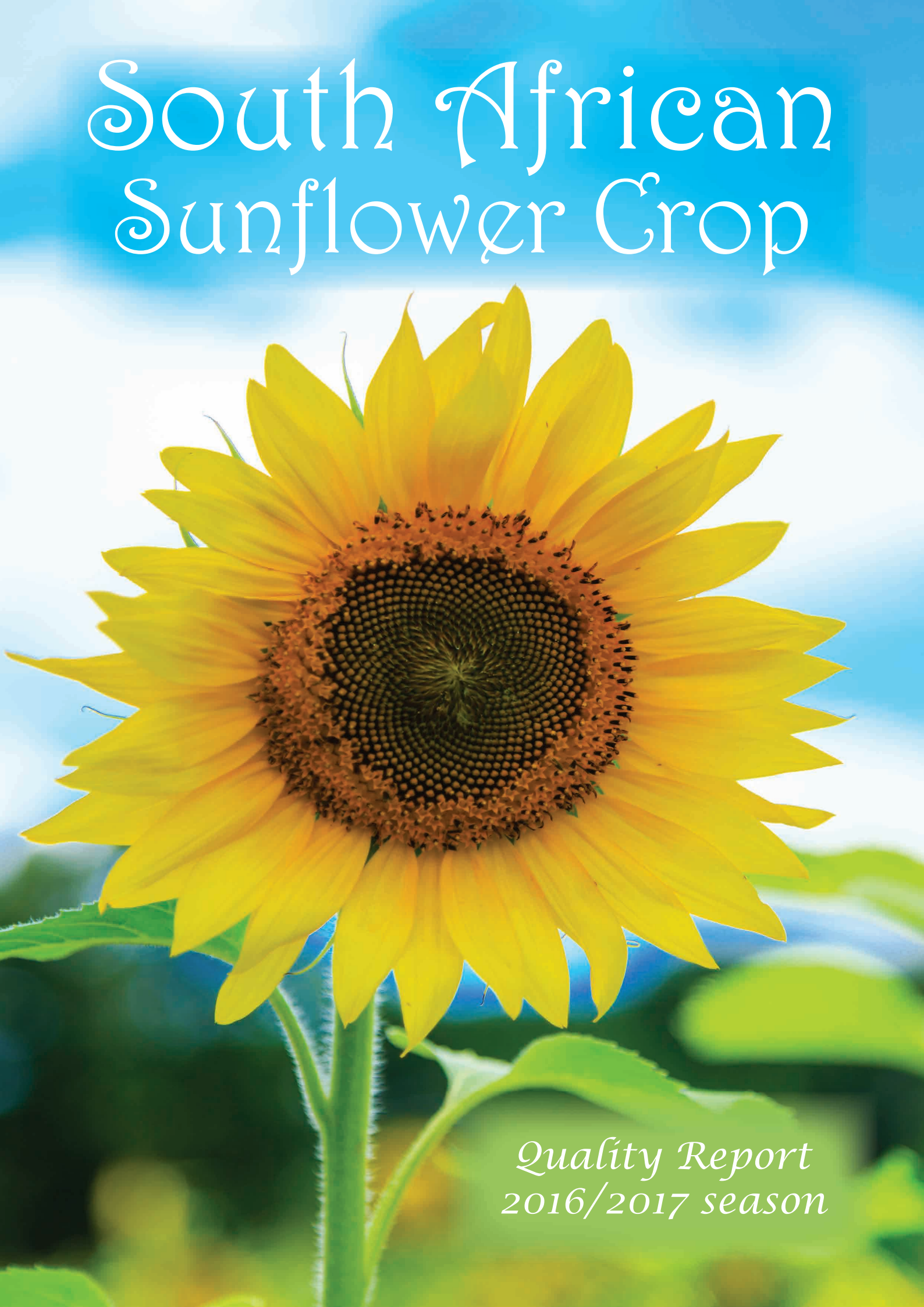
South African Sunflower Crop



Quality Report
2016/2017 season

Index

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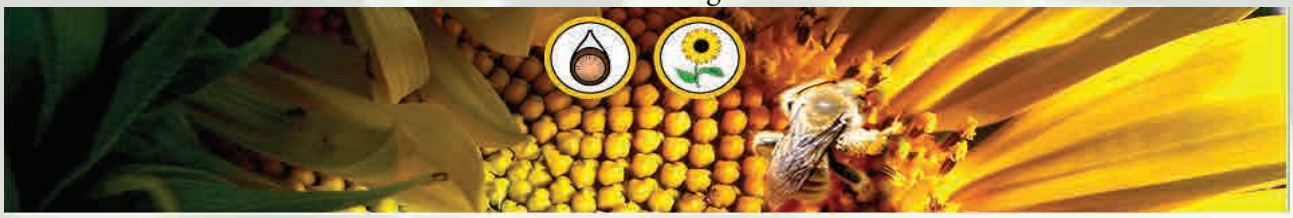


South African
Commercial sunflower quality for the 2016/2017 Season

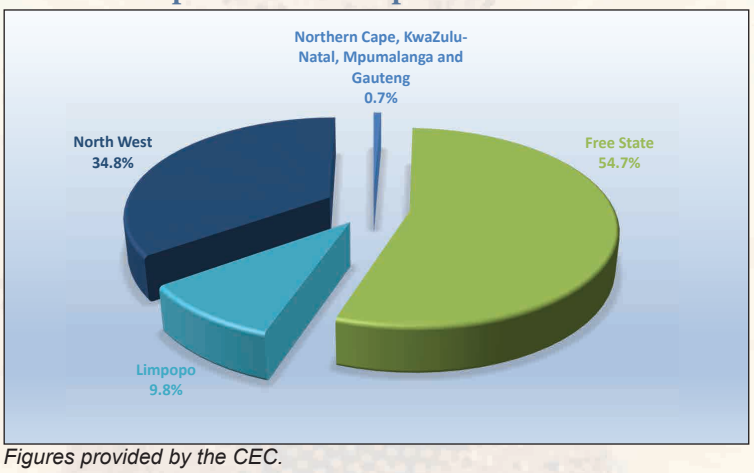
Acknowledgements
With gratitude to:

- ***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.*
- *The Bureau for Food and Agricultural Policy (BFAP) for providing research based market analysis.*

Introduction

The final commercial sunflower crop figure of the 2016/2017 season as overseen by the National Crop Estimates Liaison Committee (CELC) is 874 000 tons, this is 595 tons or 0.07% lower than the final crop estimate figure. The crop increased by almost 16% (119 000 tons) year on year. The major sunflower-producing provinces, namely the Free State and North West, contributed 89.5% of the total crop.

Graph 1: Contribution of the provinces to the production of the 2016/2017 sunflower crop



Figures provided by the CEC.

During the harvesting season, a representative sample of each delivery of sunflower seed 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 27. 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 fifth 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 is provided in table and graph format. Import and export figures over several seasons as well as information on the manufacture, import and export of oil seeds products, are also included.

The report of the Evaluation of sunflower cultivars 2016/2017 season conducted by the ARC-Grain Crops in collaboration with Agricol, Pannar, Pioneer and AGT 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. Planting sunflowers is also advantageous when rainfall occurs late in the season, due to the late planting window relative to that of maize.

The area utilized for sunflower production decreased by 11.5%, compared to the 718 500 hectares in the severely drought affected 2015/2016 season. The 635 750 hectares planted this season, is however in line with the average of the previous three seasons. Production increased by 15.8% as a result of the yield increase of 30.5%, from 1.05 t/ha last season to 1.37 t/ha this season.

World sunflower seed production for the 2016/2017 season stands at 50 053 million tons with the Ukraine and Russia contributing 54% to this total. The forecasted figure for the 2017/2018 season is 48 552 million tons. Please see Table 1 for the world sunflower seed supply and demand figures.

Table 1: World Sunflower Seed Supply and Demand (October through September)

Season	2012/13	2013/14	2014/15	2015/16	2016/17 (Revised)	2017/17 (Forecast)
Area Harvested (1 000 Ha)	***25 470***	***25 730***	***24 708***	***25 242***	***26 923***	***27 703***
Yield (MT/Ha)	***1.40***	***1.68***	***1.67***	***1.70***	***1.86***	***1.75***
Production (1 000 MT)						
Argentina	2 850	2 250	3 000	2 830	3 300	3 700
European Union	7 018	9 105	9 006	7 769	8 545	9 544
China	1 730	2 423	2 380	2 698	2 750	2 800
Russia	8 000	10 200	9 000	9 700	11 700	10 800
Ukraine	8 387	10 941	10 250	12 100	15 100	13 200
United States	1 264	917	1 005	1 326	1 203	984
South Africa	736	736	736	755	875	800
Turkey	1 100	1 450	1 350	1 350	1 470	1 700
Other	4 662	5 315	4 607	4 386	5 110	5 024
TOTAL	***35 747***	***43 337***	***41 334***	***42 914***	***50 053***	***48 552***
Import (1 000 MT)						
Turkey	627	581	523	436	611	600
European Union	220	329	275	577	632	360
Other	638	1 050	1 078	1 100	1 411	1 491
TOTAL	***1 485***	***1 960***	***1 876***	***2 113***	***2 654***	***2 451***
Export (1 000 MT)						
Argentina	85	80	63	302	74	60
United States	144	132	126	107	99	90
Russia	59	131	61	105	362	180
Ukraine	124	71	123	171	261	160
Other	1 128	1 536	1 462	1 467	1 826	1 988
TOTAL	***1 540***	***1 950***	***1 835***	***2 152***	***2 622***	***2 478***
Oilseed crushed	**32 355**	**38 360**	**36 581**	**38 177**	**44 878**	**43 722**

National Sunflower Association website www.sunflowernsa.com, Table updated January 16, 2018; Source: Oil World & USDA.

According to *The Bureau for Food and Agricultural Policy (BFAP) Baseline, Agricultural Outlook 2017 – 2026*, sunflower area is expected to decline at an average annual rate of 1.5%, to just under 530 000 by 2026. Yields are however projected to increase on average by 2.5% per annum, resulting in a crop just exceeding 810 000 tons in 2026. The production and crushing demand for sunflower seed is projected to remain in a fine balance over the 2017 to 2026 outlook period, imports of approximately 20 000 tons is projected by 2026. A temporary surplus of sunflower seeds is expected to result in net exports during 2017. Positive net imports, remaining below 10% of crushing demand is however projected going forward.

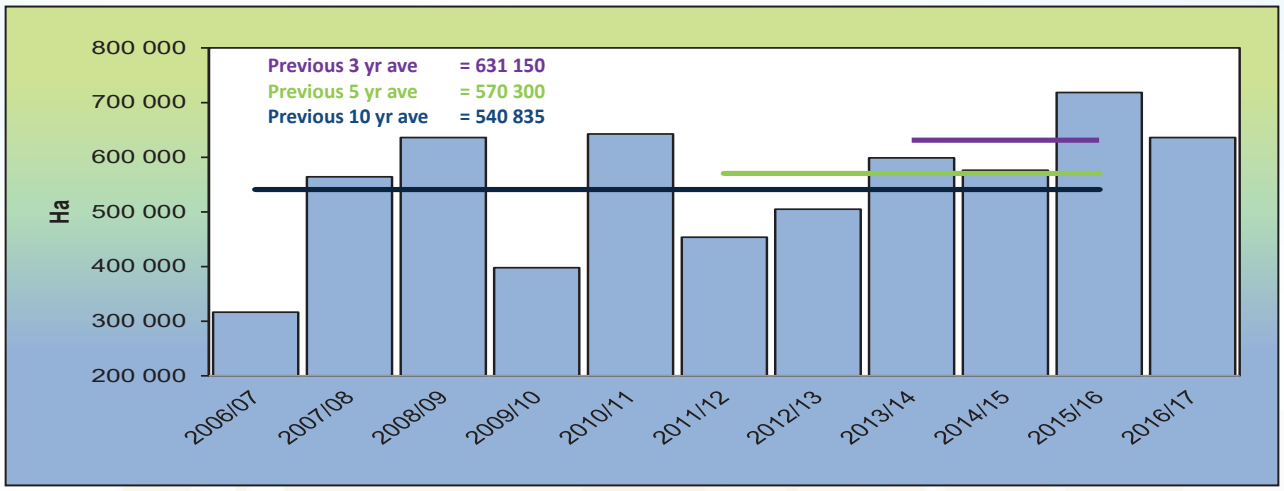
Please see Table 2 for an overview of sunflower production under dry land conditions versus irrigation in the 2016/2017 season, compared to the 2015/2016 season. Graphs 2 to 4 provide national figures with regards to hectares planted, tons produced and yields obtained over the last 11 seasons and Graphs 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

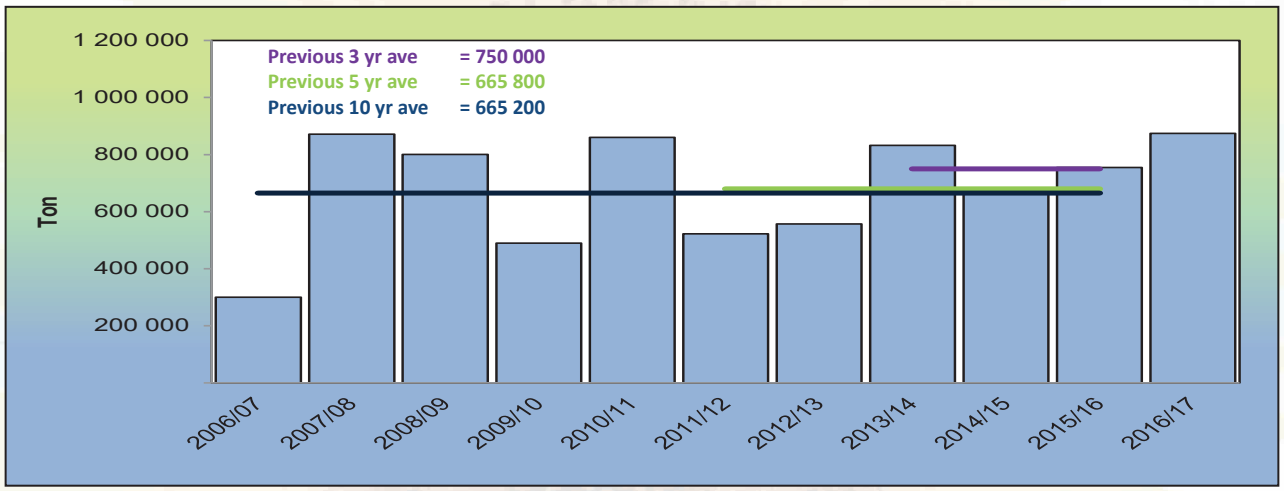
Province	Type of production	2016/2017			2015/2016		
		Hectares planted, ha	Production, tons	Yield, t/ha	Hectares planted, ha	Production, tons	Yield, t/ha
Western Cape	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Northern Cape	Dryland	-	-	-	-	-	-
	Irrigation	250	400	1.60	500	600	1.20
	Total	250	400	1.60	500	600	1.20
Free State	Dryland	328 000	475 000	1.45	398 000	438 000	1.10
	Irrigation	2 000	3 000	1.50	2 000	2 000	1.00
	Total	330 000	478 000	1.45	400 000	440 000	1.10
Eastern Cape	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
KwaZulu-Natal	Dryland	300	300	1.00	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	300	300	1.00	-	-	-
Mpumalanga	Dryland	2 200	2 300	1.05	4 000	4 400	1.10
	Irrigation	-	-	-	-	-	-
	Total	2 200	2 300	1.05	4 000	4 400	1.10
Limpopo	Dryland	87 500	82 500	0.94	63 700	46 150	0.72
	Irrigation	2 500	3 000	1.20	1 300	2 600	2.00
	Total	90 000	85 500	0.95	65 000	48 750	0.75
Gauteng	Dryland	2 600	2 500	0.96	3 550	3 100	0.87
	Irrigation	400	500	1.25	450	900	2.00
	Total	3 000	3 000	1.00	4 000	4 000	1.00
North West	Dryland	207 500	300 000	1.45	244 000	255 000	1.05
	Irrigation	2 500	4 500	1.80	1 000	2 250	2.25
	Total	210 000	304 500	1.45	245 000	257 250	1.50
RSA	Dryland	628 100	862 600	1.37	713 250	746 650	1.05
	Irrigation	7 650	11 400	1.49	5 250	8 350	1.59
	Total	635 750	874 000	1.37	718 500	755 000	1.05

Figures provided by the CEC.

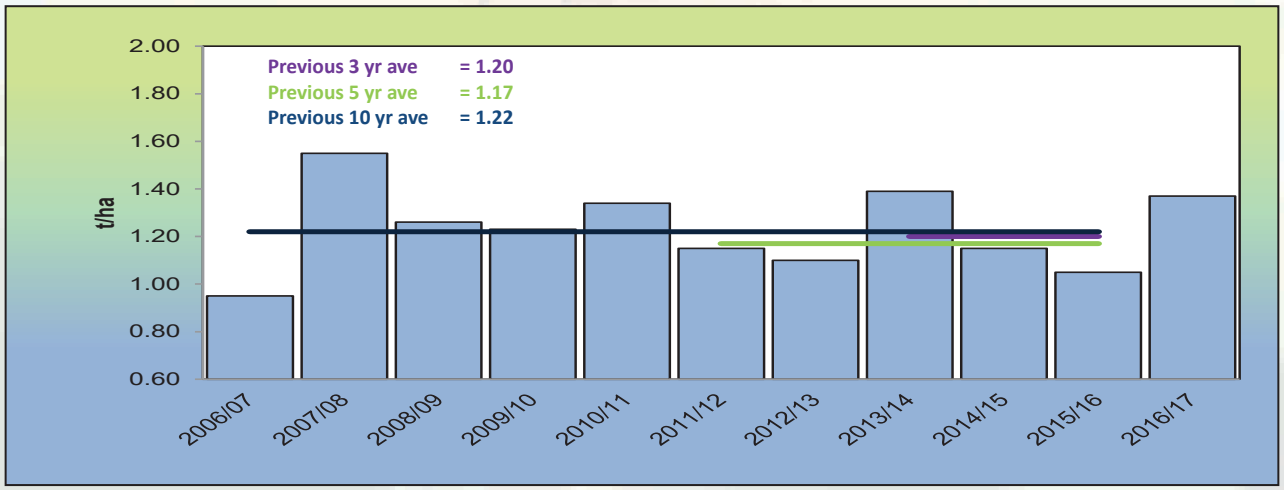
Graph 2: Total RSA area utilised for sunflower production from 2006/07 to 2016/17



Graph 3: Sunflower production in RSA from 2006/07 to 2016/17

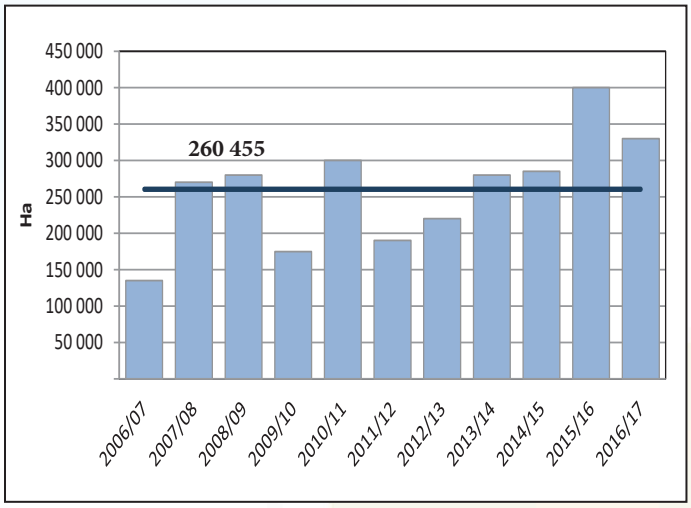


Graph 4: RSA Sunflower yield from 2006/07 to 2016/17

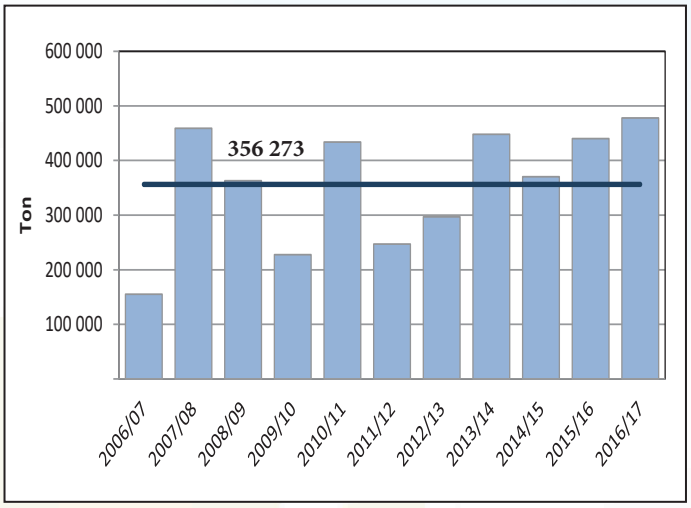


Figures provided by the CEC.

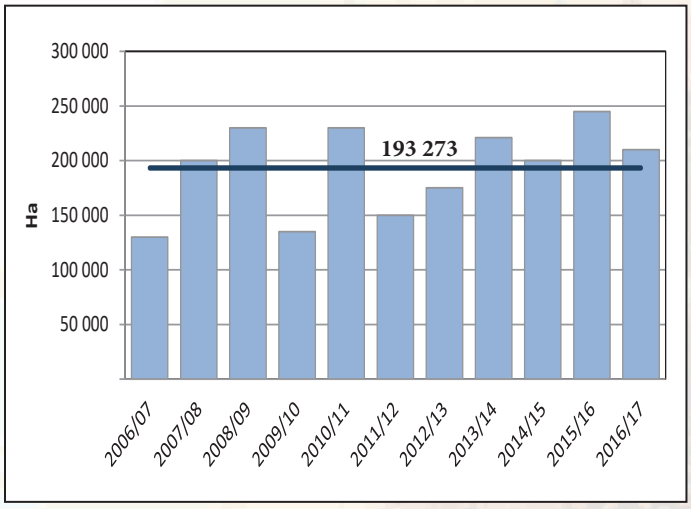
Graph 5: Area utilised for sunflower production in the Free State since 2006/07



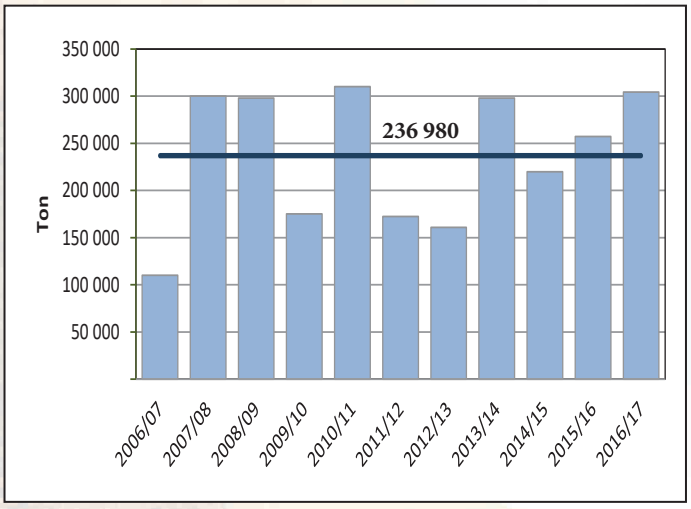
Graph 6: Sunflower production in the Free State since 2006/07



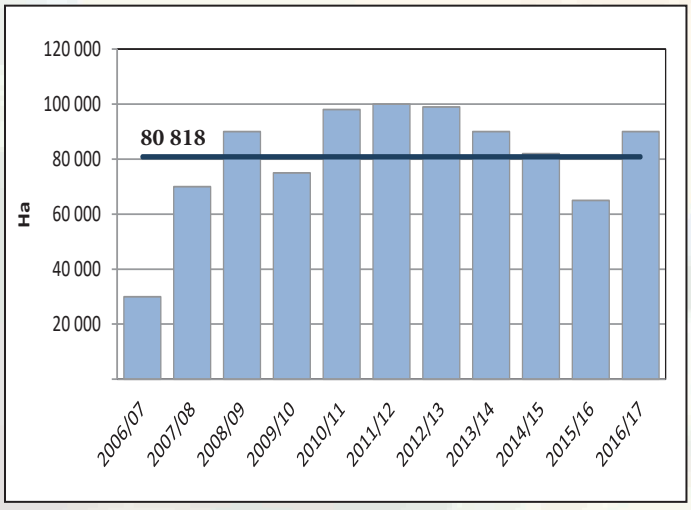
Graph 7: Area utilised for sunflower production in North West since 2006/07



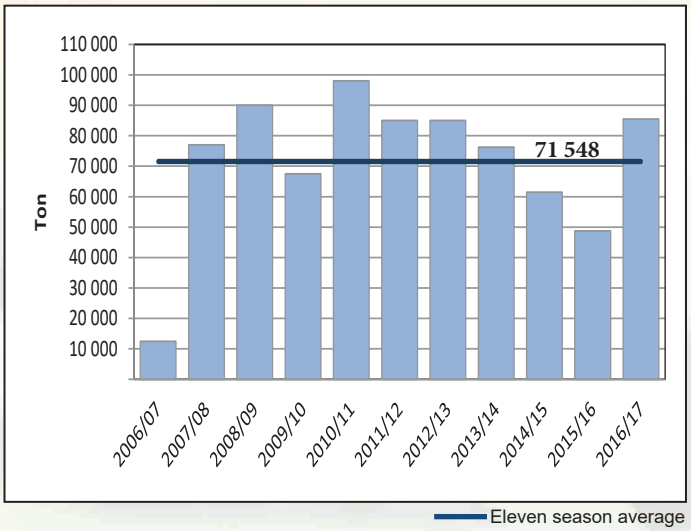
Graph 8: Sunflower production in North West since 2006/07



Graph 9: Area utilised for sunflower production in Limpopo since 2006/07



Graph 10: Sunflower production in Limpopo since 2006/07



Figures provided by the CEC.

Eleven season average

Supply and Demand

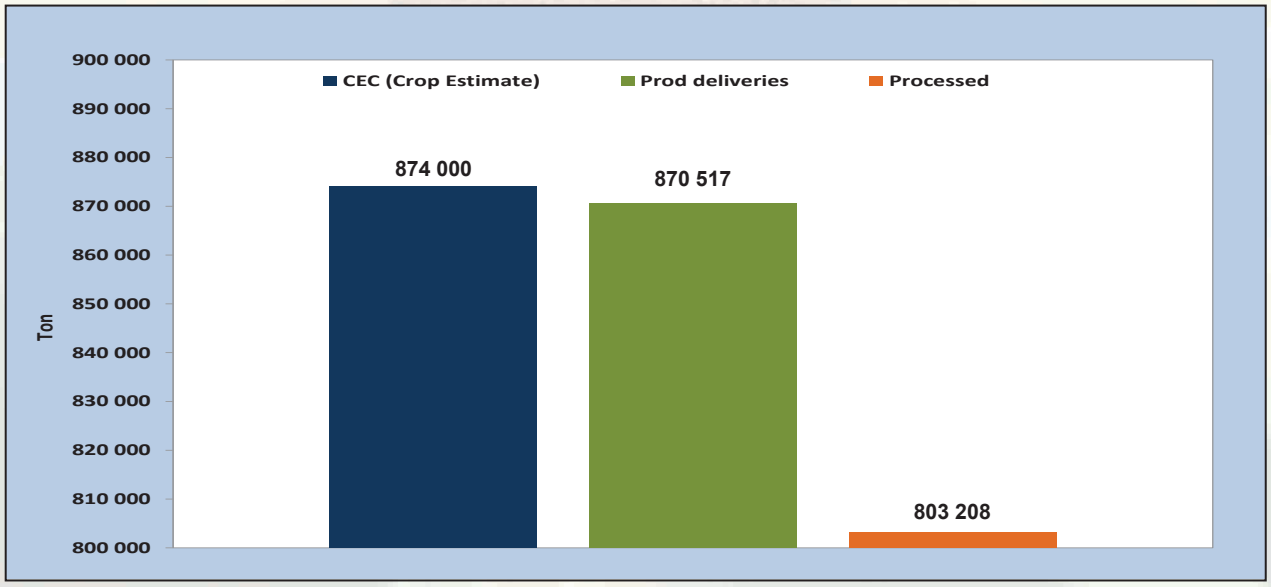
The sunflower seed marketing season dates from March to February. According to SAGIS supply and demand figures for the 2017/2018 marketing season to date (March 2017 to January 2018), opening stock more than tripled compared to the previous marketing season and is also almost double the ten year average.

To date, only 554 tons of sunflower and sunflower seed products have been imported compared to the 70 643 and 36 064 tons of the previous two seasons respectively. According to *BFAP Baseline*, South Africa remains a net importer of vegetable oils. Domestic production of vegetable oils is projected to increase over the outlook period by an annual average of 1.7%. Domestic consumption of palm, sunflower, soybean and canola oil during 2016 was estimated at more than one million tons, with palm oil comprising approximately 41%. The significant increase in sunflower seed production, resulted in a significant sunflower oil production increase in 2017. The share of soybean oil in domestically produced vegetable oils however, is expected to increase at the expense of sunflower oil, as soybean production and crushing expands over the outlook period.

Of the 803 208 tons of sunflower seeds processed so far, only 1 390 tons (0.2%) was used for human consumption and 5 350 tons (0.7%) 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 14.5% more than during the whole of the 2016/2017 marketing season. According to *BFAP*, the domestic production of sunflower oilcake is projected to increase to 350 000 tons in 2017, increasing year on year by 25%. Oilcake production is projected to be just under 350 000 by 2026. Additional growth in demand will have to be supplied by imports. Oilcake imports are projected to reach 70 000 tons by 2026.

Exports to date amount to 230 tons (205 tons during 2016/2017). Globally, Russia and the Ukraine were the largest exporters of sunflower seeds during 2016/2017. The Ukraine, followed by Russia accounted for 76% of total sunflower oil exports worldwide in the corresponding period *(National Sunflower Association website www.sunflowernsa.com, Table updated January 16, 2018; Source: Oil World & USDA).*

Graph 11: Sunflower supply and demand overview for the current marketing season (Mar 2017 - Feb 2018)

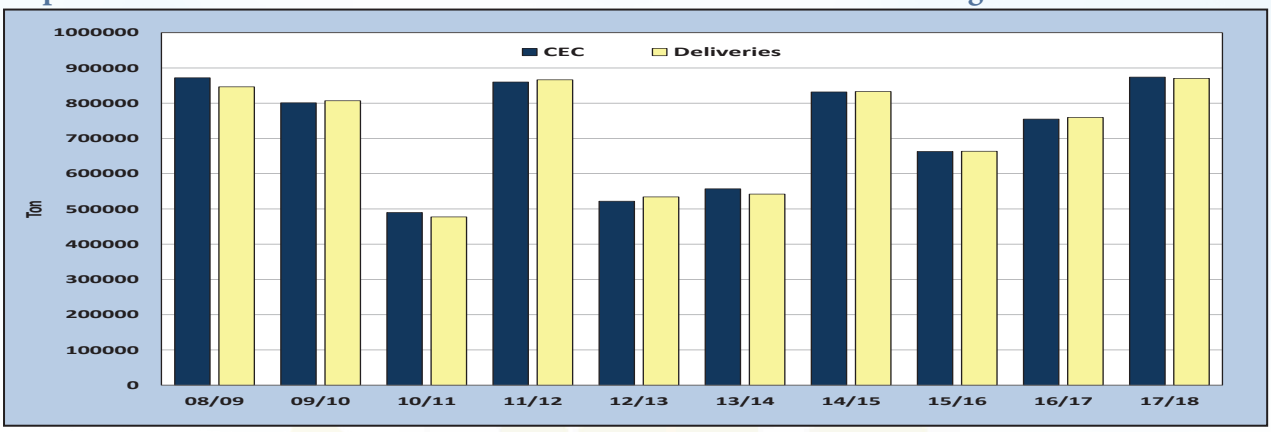


Information provided by SAGIS.

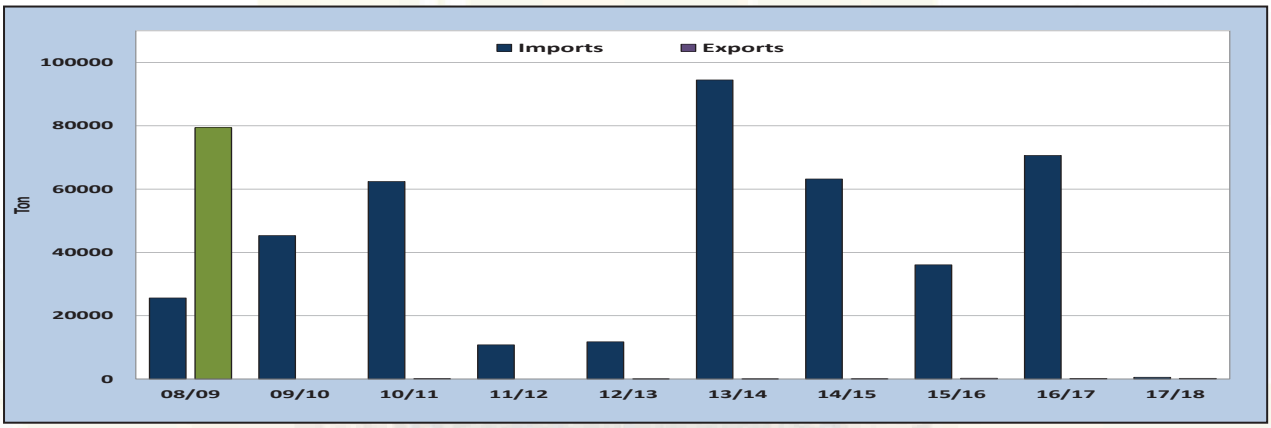
SAGIS South African Grain Information Service
Suid-Afrikaanse Graan Inligtingsdiens

SUNFLOWERSEED: SUPPLY AND DEMAND TABLE BASED ON SAGIS' INFO (TON)																		Publication date: 2018-02-26	
	Season (Mar - Feb)																	Current Season Mar-Jan	10 Year average
	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	17/18	2007-2016
																		***	
																		11	
CEC (Crop Estimate)	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	874 000	665 200
SUPPLY																			
Opening stock (1 Mar)	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	163 086	87 161
Prod deliveries	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	759 614	870 517	664 006
Imports	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	70 643	554	42 910
Surplus	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	4 268	11 070	4 239
Total Supply	**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**	**880 392**	**1 045 227**	**798 316**
DEMAND																			
Processed	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	707 327	803 208	686 759
-human	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	1 192	1 390	1 403
-animal feed	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	10 665	5 350	4 455
-crush (oil and oilcake)	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	695 470	796 468	680 901
Withdrawn by producers	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	442	2 558
Released to end-consumers	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	2 867	2 432	3 308
Seed for planting purposes	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	3 474	3 026	2 771
Net receipts(-)/disp(+)	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	2 828	2 560	491
Deficit	4 600	6 900	3 900	9 600	3 100	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exports	300	1 300	45 500	200	200	0	100	0	79 400	0	100	0	27	8	48	256	205	230	8 004
Total Demand	**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**	**717 306**	**811 898**	**703 890**
Ending Stock (28 Feb)	**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**	**163 086**	**233 329**	**94 426**
- processed p/month	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	58 944	73 019	58 135
- months' stock	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	2.8	3.2	1.6

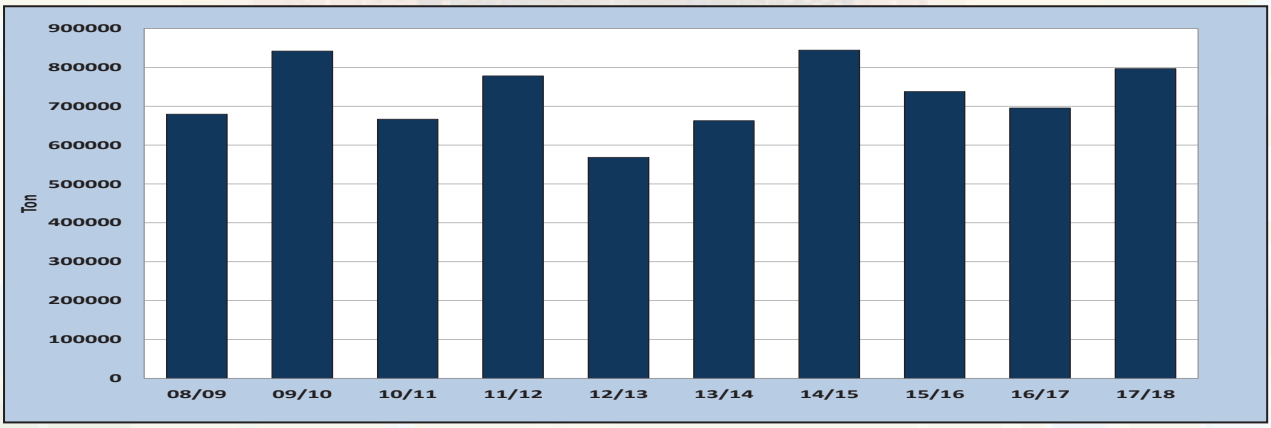
Graph 12: Sunflower: CEC Estimate vs SAGIS deliveries over 10 marketing seasons



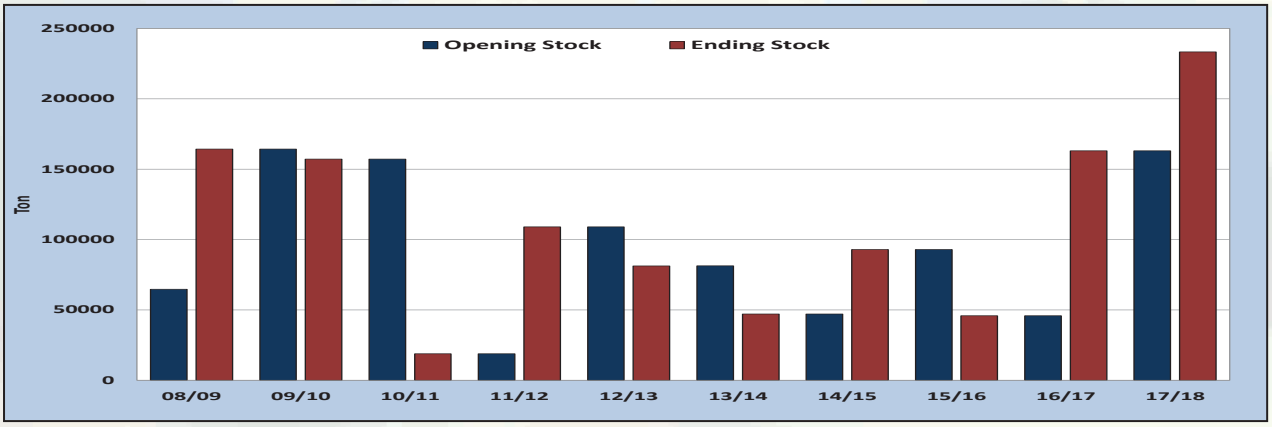
Graph 13: Sunflower: Imports and Exports over 10 marketing seasons



Graph 14: Sunflower: Crushed over 10 marketing seasons



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



Information provided by SAGIS.

Season	WHOLE SUNFLOWER: IMPORTS FOR RSA PER COUNTRY											
	Argentina	Botswana	Bulgaria	China	Egypt	Malawi	Mozambique	Romania	Ukraine	United Kingdom	Zambia	Total
2014/2015	42	4 764	0	0	0	574	0	57 800	0	0	0	63 180
2015/2016	80	4 518	0	0	0	663	0	30 531	0	0	272	36 064
2016/2017	42	1 424	38 434	0	0	686	0	30 015	19	23	0	70 643
2017/2018	21	0	0	18	44	429	19	0	0	23	0	554

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	68 533	0	0	68 533
2017/2018*	0	44	62	0	106

* Progressive / Progressief Mar / Mrt 2017 - Jan 2018
Note: Includes Imports/Exports for RSA and Other Countries

Season	WHOLE 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	40	48	107	10	205
2017/2018	0	23	99	108	0	230

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
2017/2018*	0	0	0	0	0

* Progressive / Progressief Mar / Mrt 2017 - Jan 2018

All figures are reported in Tons

SAGIS South African Grain Information Service NPC
Suid Afrikaanse Graaninligtingsdiens NWM
Reg no. 1997/019186/08

	OIL SEEDS PRODUCTS PER MONTH MANUFACTURED															
	Nov 2016 Tons	Dec 2016 Tons	Jan 2017 Tons	Feb 2017 Tons	Mar 2017 Tons	Apr 2017 Tons	May 2017 Tons	Jun 2017 Tons	Jul 2017 Tons	Aug 2017 Tons	Sep 2017 Tons	Oct 2017 Tons	Nov 2017 Tons	Dec 2017 Tons	Jan 2018 Tons	Progressive: Nov 2016 - Jan 2018 Tons
Palm Oil and Derivatives	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Soybean Oil	10 722	11 202	10 027	6 715	6 108	10 800	15 551	12 536	14 669	13 853	14 471	10 445	15 405	11 045	14 045	**177 594**
Sunflower Oil	21 617	16 712	21 987	25 916	23 378	13 323	16 031	24 349	30 315	32 939	29 794	35 381	33 694	22 268	28 678	**376 382**
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Coconut Oil/ Groundnut Oil/ Canola Oil/ Corn (Maize) Oil/ Blends or mixes of Oils which includes one of the above Oils/ Biodiesel	110	3 542	4 042	4 338	4 469	4 001	4 921	4 536	5 203	5 388	4 728	5 193	5 279	2 602	4 768	**63 120**
Cottonseed Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Sunflower Oilcake	23 467	19 323	26 889	30 123	26 252	16 291	19 612	28 293	33 149	35 372	35 006	40 002	38 937	26 420	33 208	**432 344**
Coconut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Palmnut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Soybean Oilcake/ Canola Oilcake	45 709	50 111	46 132	33 095	31 060	50 354	74 646	58 193	69 535	66 311	66 509	51 117	74 761	51 238	66 183	**834 954**
Soybean Flours and Meals/ Textured Vegetable Protein	1 737	925	1 646	1 640	1 337	2 142	3 067	3 189	3 094	3 298	3 314	3 839	3 614	2 137	2 947	**37 926**
Soybean Fullfat	7 876	6 402	6 056	6 296	8 123	10 595	11 821	14 533	13 464	13 834	12 683	12 420	14 675	13 972	14 483	**167 233**
Peanut Butter and Paste	3 027	2 134	2 534	2 553	2 643	1 596	1 887	3 355	2 524	3 275	3 113	2 855	2 897	2 471	1 471	**38 335**
Total	**114 265**	**110 351**	**119 313**	**110 676**	**103 370**	**109 102**	**147 536**	**148 984**	**171 953**	**174 270**	**169 618**	**161 252**	**189 262**	**132 153**	**165 783**	**2 127 888**

Oilseed Information: Figures were only verified from February 2017.

SAGIS South African Grain Information Service NPC
Suid Afrikaanse Graaninligtingsdiens NWM
Reg no. 1997/019186/08

	OIL SEEDS PRODUCTS PER MONTH IMPORTED															
	Nov 2016 Tons	Dec 2016 Tons	Jan 2017 Tons	Feb 2017 Tons	Mar 2017 Tons	Apr 2017 Tons	May 2017 Tons	Jun 2017 Tons	Jul 2017 Tons	Aug 2017 Tons	Sep 2017 Tons	Oct 2017 Tons	Nov 2017 Tons	Dec 2017 Tons	Jan 2018 Tons	Progressive: Nov 2016 - Jan 2018 Tons
Palm Oil and Derivatives	33 591	27 204	37 457	25 525	17 892	32 028	24 414	25 746	24 327	32 451	19 787	49 011	22 794	32 947	18 389	**423 563**
Soybean Oil	17 427	14 406	12 179	7 000	505	5 000	6 590	5 050	11 867	5 000	3 591	12 030	2 000	0	4 000	**106 645**
Sunflower Oil	4 000	18 769	18 446	15 459	5 268	13 110	3 521	6 425	44	9 019	2 029	2 066	12 027	1 966	17 527	**129 676**
Cottonseed Oil	3 929	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3 929**
Coconut Oil/ Groundnut Oil/ Canola Oil/ Corn (Maize) Oil/ Blends or mixes of Oils which includes one of the above Oils/ Biodiesel	697	326	608	122	200	551	280	400	427	300	1 680	100	20	401	30	**6 142**
Cottonseed Oilcake (Including Pellets)	0	0	0	0	0	0	84	83	0	0	0	0	0	0	0	**167**
Sunflower Oilcake (Including Pellets)	0	0	0	6 505	1 570	9 145	0	7 633	0	0	5 818	0	0	0	0	**30 671**
Coconut Oilcake (Including Pellets)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Palmnut Oilcake (Including Pellets)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Soybean Oilcake/ Canola Oilcake (Including Pellets)	30 504	62 096	89 756	15 574	26 478	66 549	38 838	30 914	41 202	0	71 599	58 919	13 646	39 057	12 799	**597 931**
Soybean Flours and Meals/ Textured Vegetable Protein	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Soybean Fullfat	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Peanut Butter and Paste	30	164	91	45	16	175	32	164	139	156	99	132	93	47	181	**1 564**
Total	**90 178**	**122 965**	**158 537**	**70 230**	**51 929**	**126 558**	**73 759**	**76 415**	**78 006**	**46 926**	**104 603**	**122 258**	**50 580**	**74 418**	**52 926**	**1 300 288**

Oilseed Information: Figures were only verified from February 2017.

SAGIS South African Grain Information Service NPC
Suid Afrikaanse Graaninligtingsdiens NWM
Reg no. 1997/019186/08

	OIL SEEDS PRODUCTS PER MONTH EXPORTED															
	Nov 2016 Tons	Dec 2016 Tons	Jan 2017 Tons	Feb 2017 Tons	Mar 2017 Tons	Apr 2017 Tons	May 2017 Tons	Jun 2017 Tons	Jul 2017 Tons	Aug 2017 Tons	Sep 2017 Tons	Oct 2017 Tons	Nov 2017 Tons	Dec 2017 Tons	Jan 2018 Tons	Progressive: Nov 2016 - Jan 2018 Tons
Palm Oil and Derivatives	1 919	1 157	1 007	1 003	1 955	1 203	1 327	1 009	1 681	2 920	3 408	2 192	2 407	1 908	1 887	**26 983**
Soybean Oil	5 967	9 539	4 278	2 976	4 404	3 188	3 890	2 475	3 209	4 569	1 423	1 452	2 033	2 289	2 538	**54 230**
Sunflower Oil	22	1 380	0	604	536	38	96	74	36	117	94	188	134	450	297	**4 066**
Cottonseed Oil	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Coconut Oil/ Groundnut Oil/ Canola Oil/ Corn (Maize) Oil/ Blends or mixes of Oils which includes one of the above Oils/ Biodiesel	1 228	306	414	76	48	22	37	91	791	625	310	22	47	115	36	**4 168**
Cottonseed Oilcake (Including Pellets)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Sunflower Oilcake (Including Pellets)	721	386	333	196	274	137	136	392	377	209	151	128	240	133	98	**3 911**
Coconut Oilcake (Including Pellets)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Palmnut Oilcake (Including Pellets)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Soybean Oilcake/ Canola Oilcake (Including Pellets)	2 050	1 418	2 049	604	692	855	293	1 397	2 213	1 730	1 985	1 174	845	371	638	**18 314**
Soybean Flours and Meals/ Textured Vegetable Protein	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**27**
Soybean Fullfat	1 504	542	503	341	166	308	342	271	510	344	339	578	866	837	244	**7 695**
Peanut Butter and Paste	0	292	0	0	29	27	36	26	21	35	35	27	23	44	23	**618**
Total	**13 438**	**15 020**	**8 584**	**5 800**	**8 104**	**5 778**	**6 157**	**5 735**	**8 838**	**10 549**	**7 745**	**5 761**	**6 595**	**6 147**	**5 761**	**120 012**

Oilseed Information: Figures were only verified from February 2017.

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.

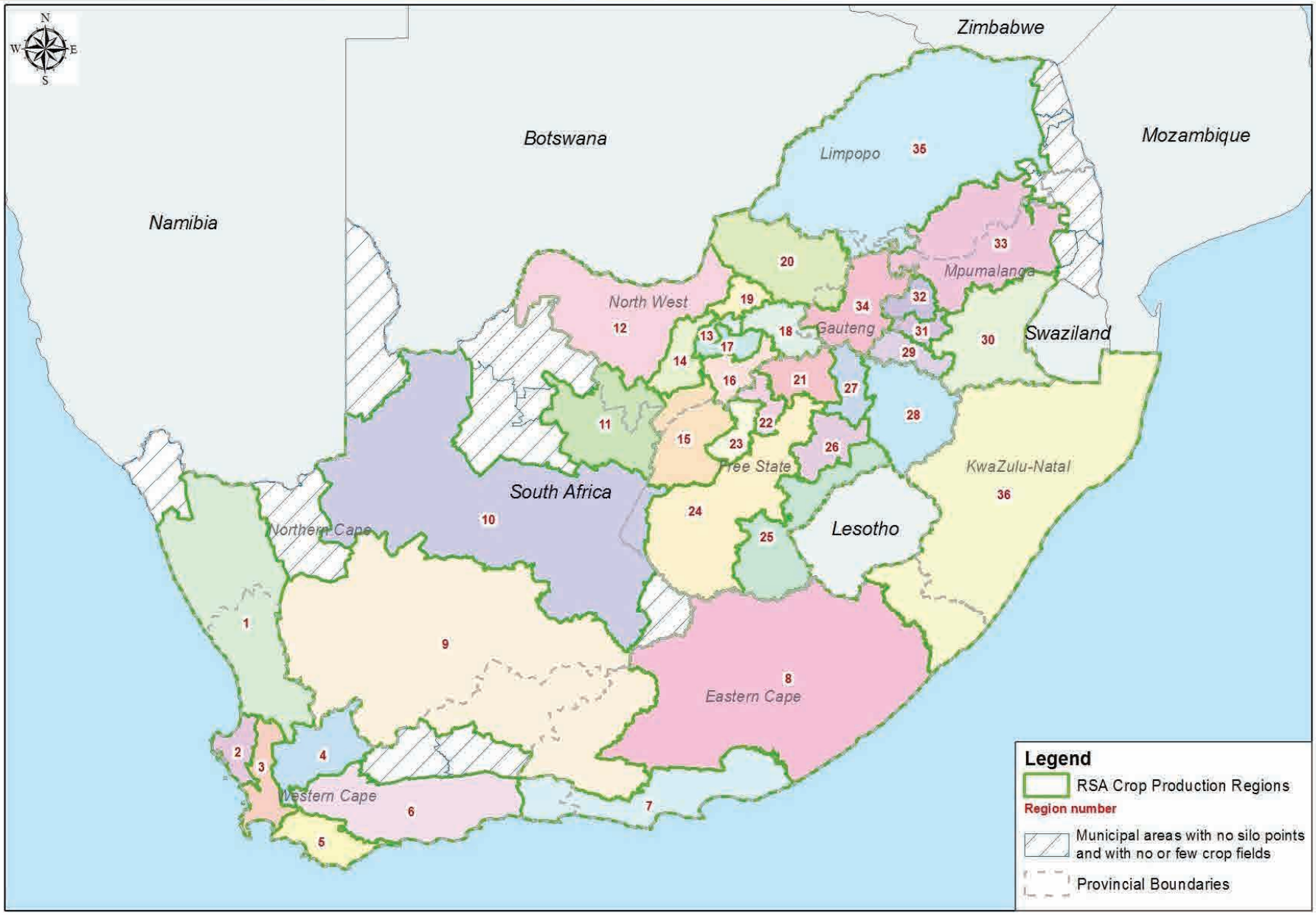
The 9 provinces are divided into 36 grain production regions.

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 2016/2017 production season, are named and described on pages 20 to 26 (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.

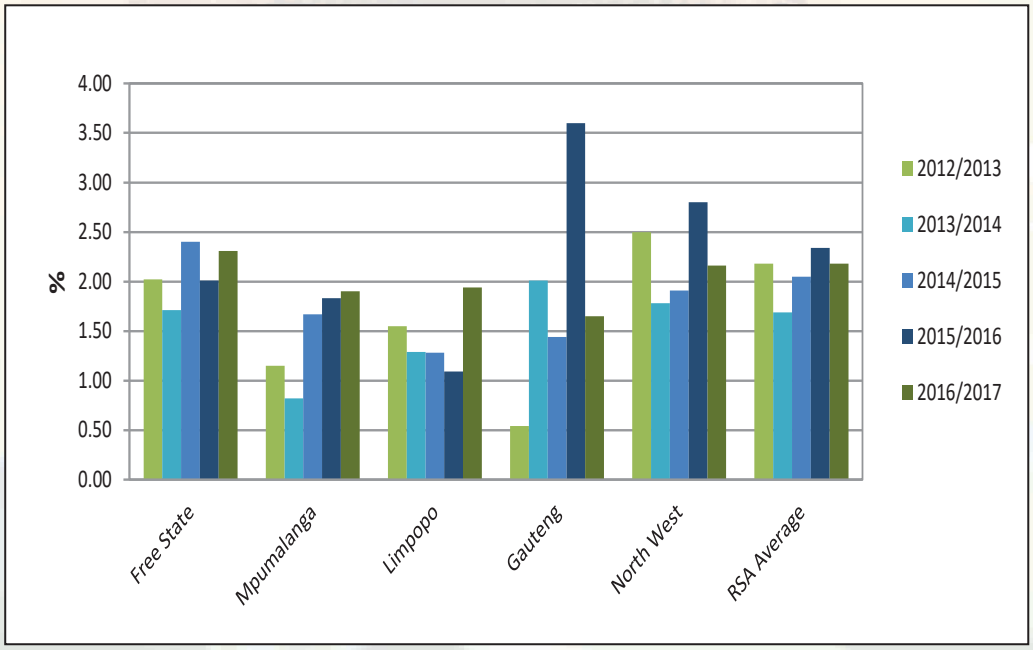
Sunflower Crop Quality 2016/2017 – Summary of results

Eighty five percent (150) of the 176 samples analysed for the purpose of this survey were graded as Grade FH1, with 26 of the samples downgraded to COSF (Class Other Sunflower Seed). The percentage of FH1 samples increased compared to the 78% of the previous season and is similar to the 86% of the 2014/2015 season.

- Five samples were downgraded as a result of a combination of the percentage damaged sunflower seed exceeding the maximum permissible deviation of 10% as well as the presence of an undesired odour.
- Seventeen 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.
- Two 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.
- The remaining two 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 sclerotia, percentage collective deviations as well as the presence of an undesired odour.

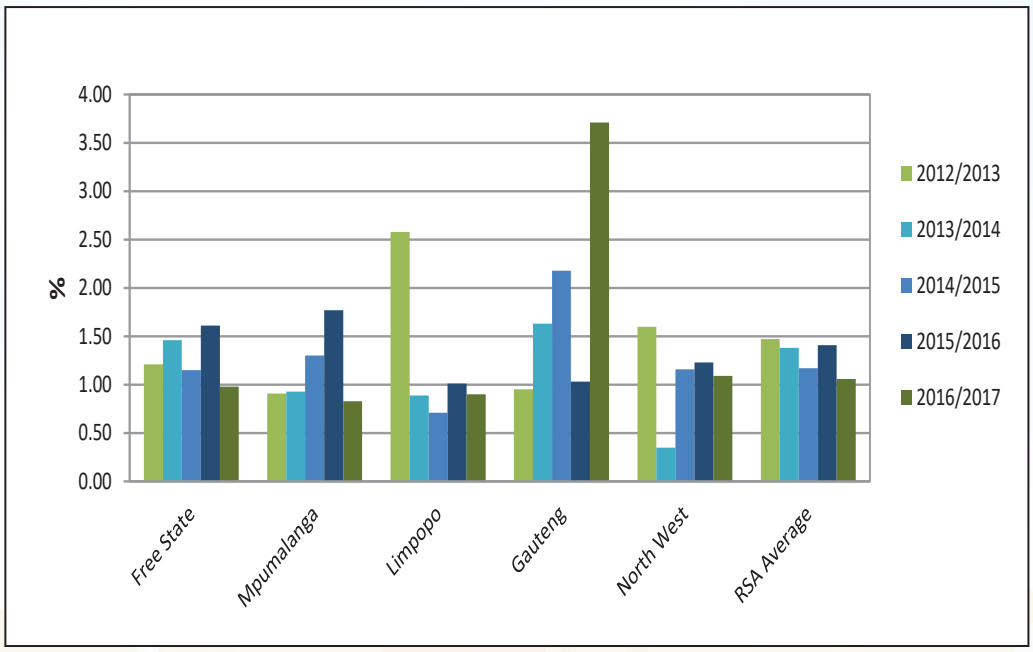
The Free State province (76 samples) reported the highest weighted average percentage screenings namely 2.31%, followed by North West (N = 76) and Limpopo (N = 11) provinces with 2.16% and 1.94% respectively. Gauteng (three samples) reported the lowest average percentage screenings of 1.65%. Last season, Gauteng reported the highest average percentage screenings. The weighted national average was 2.18% compared to the 2.34% of the previous season.

Graph 16: Average percentage screenings per province over five seasons



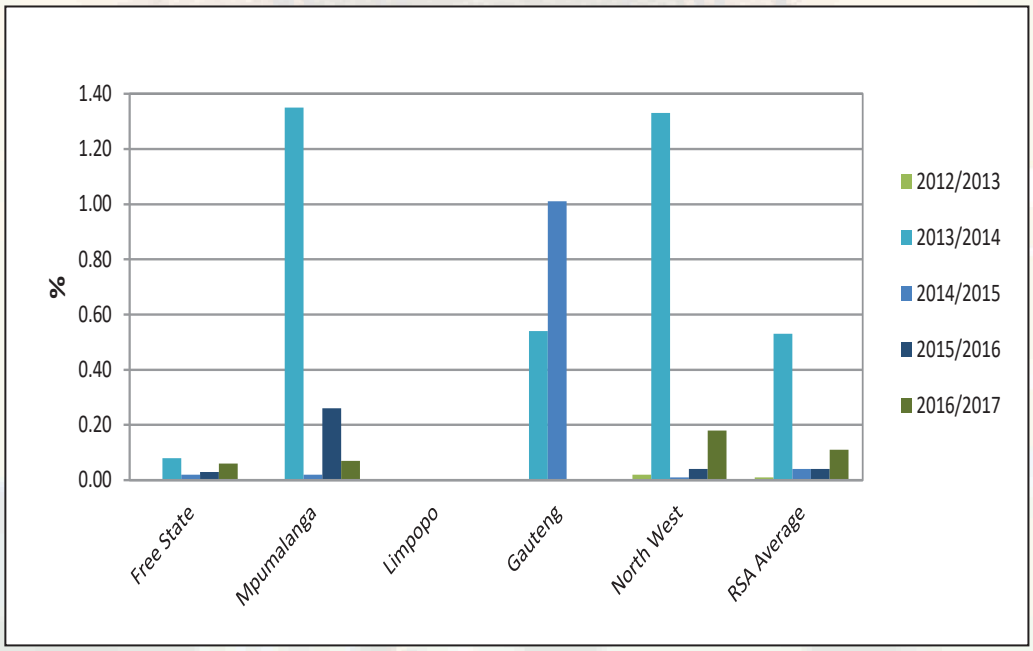
The highest weighted percentage foreign matter (3.71%) was reported on the samples from Gauteng. The Free State and North West provinces averaged 0.98% and 1.09% respectively. The lowest average percentage was found in Mpumalanga, namely 0.83%. The RSA average of 1.06% was the lowest of the five seasons for which the crop quality survey has been conducted.

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



The number of samples received for this survey that contained sclerotia from the fungus *Sclerotinia sclerotiorum*, increased from 18 samples (10%) in the previous season, to 28 samples (16%) this season. Fourteen of these samples originated in the Free State province, 13 in North West and one in Mpumalanga. The highest percentage (5.52%) was present on a sample from North West, this was the only sample that exceeded the maximum permissible deviation of 4%. Weighted average levels ranged from 0.06% in the Free State to 0.18% in North West. The national average of 0.11% was slightly higher than the 0.04% of the previous two seasons.

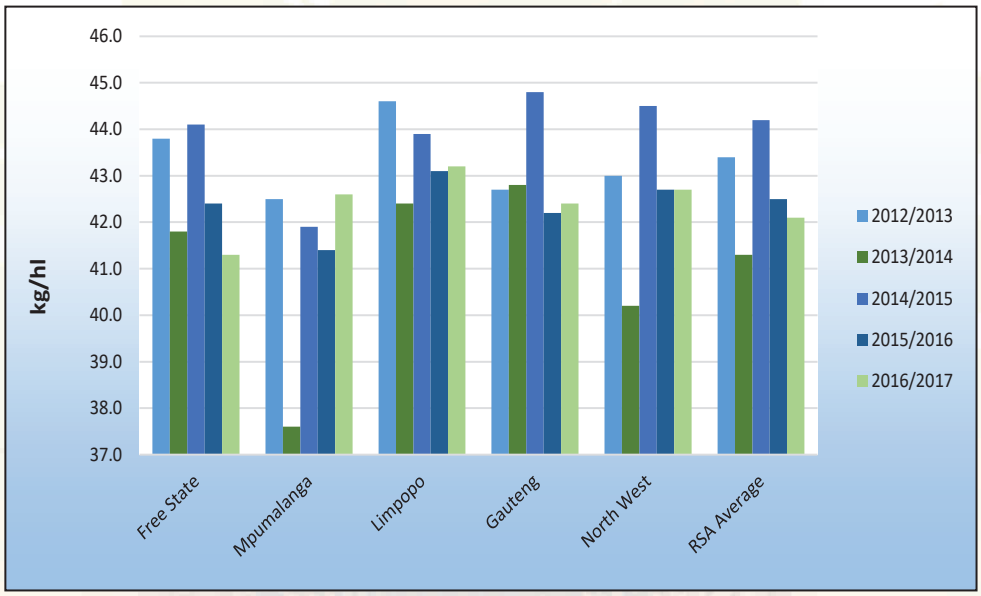
Graph 18: Average percentage sclerotia per province over five seasons



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 five seasons.

Table 3: Approximation of test weight per province over three seasons									
Province	Test weight, kg/hl								
	2016/2017 Season			2015/2016 Season			2014/2015 Season		
	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples
Free State (Regions 21 - 28)	41.3	34.2 - 45.1	76	42.4	36.3 - 48.1	80	44.1	38.9 - 49.9	69
Mpumalanga (Regions 29 - 33)	42.6	35.0 - 42.2	10	41.4	35.0 - 42.2	7	41.9	35.0 - 42.2	8
Limpopo (Region 35)	43.2	40.4 - 45.5	11	43.1	42.7 - 43.8	7	43.9	42.2 - 50.5	8
Gauteng (Region 34)	42.4	41.2 - 43.7	3	42.2	41.7 - 42.8	2	44.8	42.2 - 47.6	5
North West (Region 12 - 20)	42.7	39.1 - 45.1	76	42.7	40.0 - 46.2	80	44.5	34.0 - 48.9	86
RSA	***42.1***	***34.2 - 45.5***	***176***	***42.5***	***35.0 - 48.1***	***176***	***44.2***	***34.0 - 50.5***	***176***

Graph 19: Comparison of the test weight per province over five 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 2016/2017 season compared to those of the 2015/2016 season.

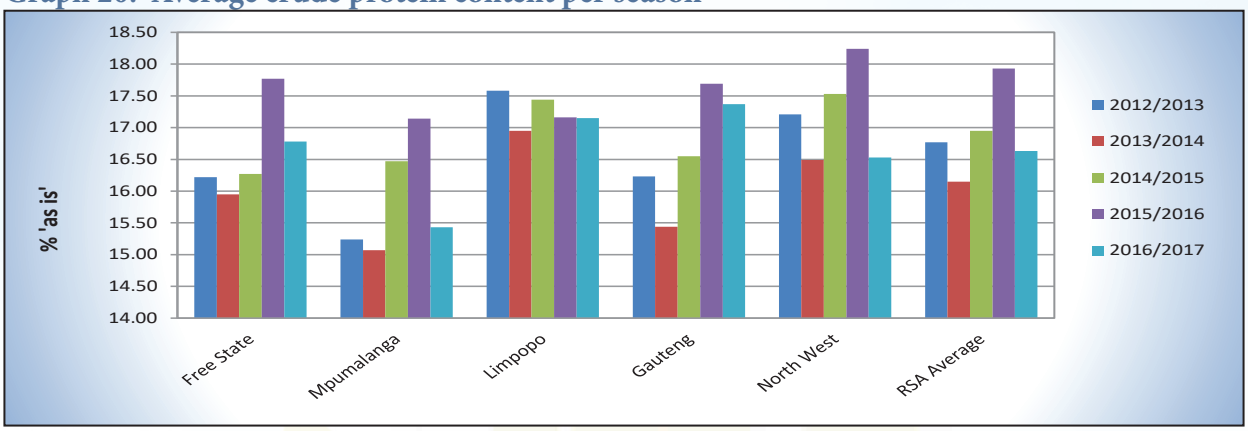
The weighted average crude protein content this season was 16.63%. This average is 1.30% lower than the previous season but equal to the average of the first three seasons of this survey. Gauteng had the highest weighted average crude protein content of 17.37% and Mpumalanga the lowest with 15.43%. Mpumalanga has consistently reported the lowest average protein content over the last five seasons. The Free State's crude protein content averaged 16.78% and that of North West 16.53%. The weighted average crude fat percentage of 38.6% was the second lowest of the last five seasons and 0.4% higher than the previous season. Mpumalanga had the highest weighted average crude fat content of 40.2%. The lowest average fat contents were observed in North West and the Free State with 38.4% and 38.5% respectively.

The weighted average percentage crude fibre is the highest of the five seasons at 21.0%. Average values varied between 19.4% in Gauteng to 21.6% in North West. The weighted average ash content is slightly lower (2.52%) than last season (2.59%). The provincial averages ranged from 2.29% in Mpumalanga to 2.67% in both Limpopo and the Free State.

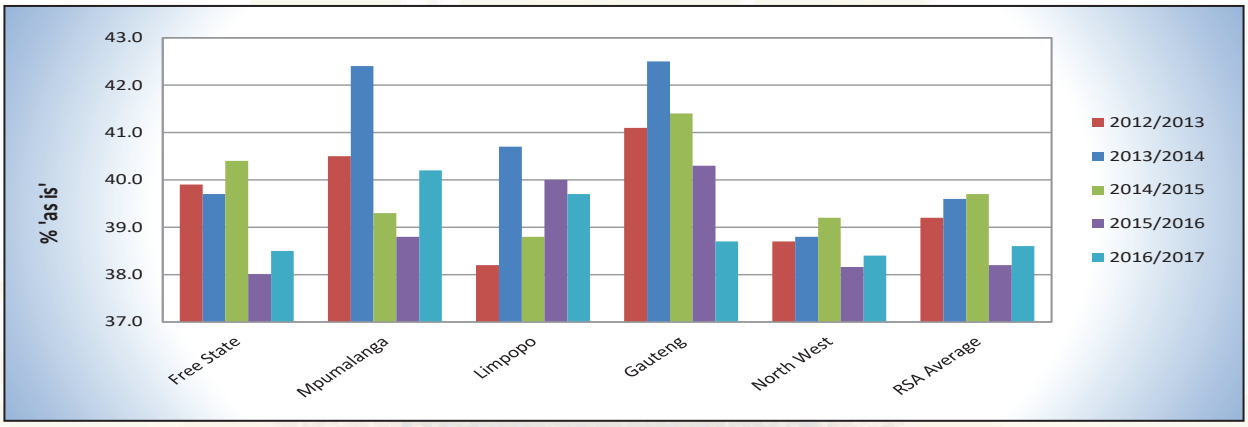
Graphs 20 to 23 on page 18 provide comparisons between provinces for the nutritional components discussed above.

Please also see pages 20 to 26 for the average sunflower quality per region.

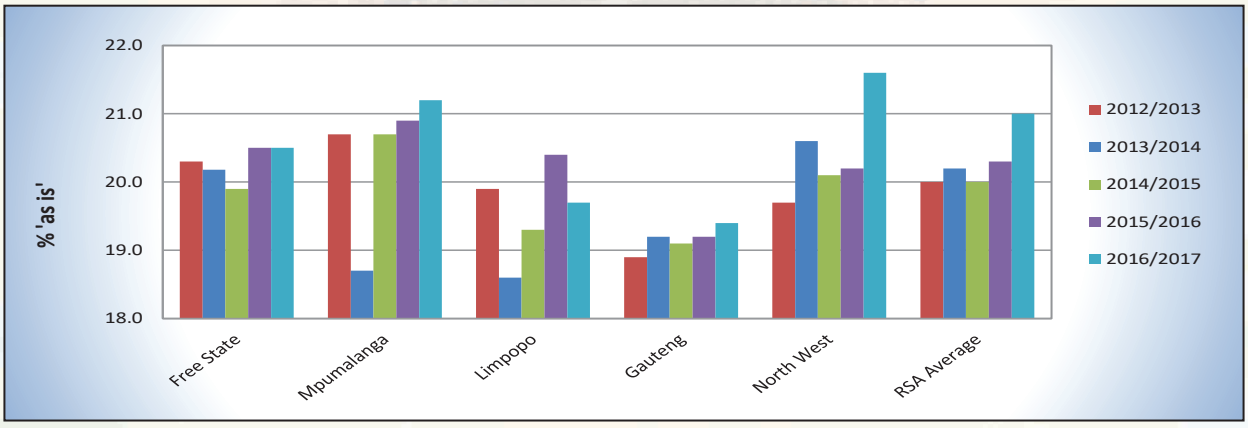
Graph 20: Average crude protein content per season



Graph 21: Average crude fat content per season



Graph 22: Average crude fibre content per season



Graph 23: Average ash content per season

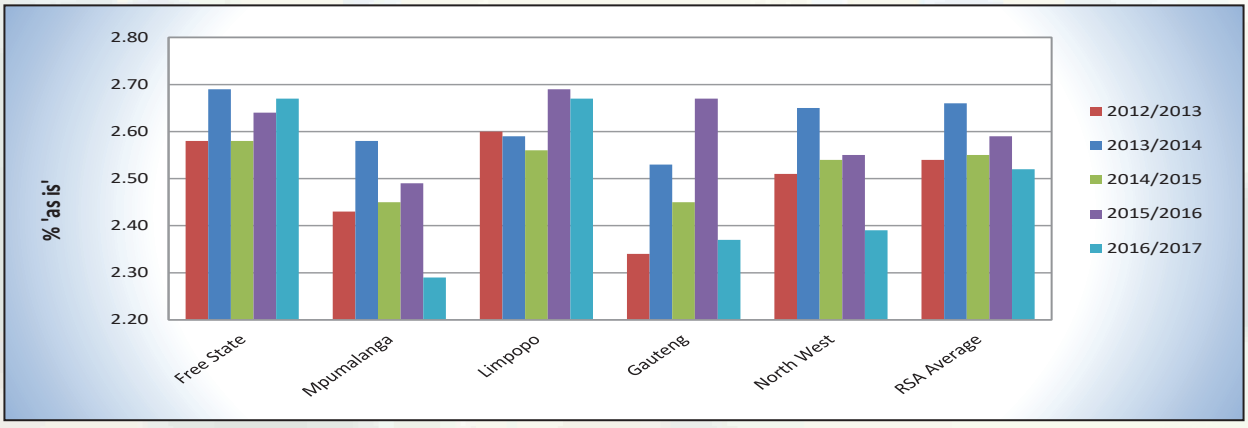


Table 4: South African Sunflower Crop Quality Averages 2016/2017 vs 2015/2016						
Class and Grade Sunflower	**2016/2017**			**2015/2016**		
	FH1	**COSF**	**Average**	**FH1**	**COSF**	**Average**
Grading:						
1. Damaged sunflower seed, %	0.40	4.39	0.99	0.30	3.27	0.94
2. Screenings, %	1.73	4.78	2.18	1.79	4.32	2.34
3. Sclerotia, %	0.06	0.38	0.11	0.03	0.11	0.04
4. Foreign Matter, %	1.01	1.35	1.06	1.16	2.34	1.41
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	2.80	6.52	3.35	2.98	6.77	3.80
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	0	0	0	8	2
Poisonous seeds (*Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.*)	0	0	0	0	0	0
Number of samples	***150***	***26***	***176***	***138***	***38***	***176***
Nutritional analysis:						
Moisture, % (5 hr, 105 °C)	4.8	4.7	4.8	5.2	5.1	5.2
Crude Protein, % (as is)	16.57	17.02	16.63	17.93	17.94	17.93
Crude Fat, % (as is)	38.7	38.5	38.6	38.3	37.9	38.2
Crude Fibre, % (as is)	21.0	21.0	21.0	20.3	20.6	20.3
Ash, % (as is)	2.52	2.56	2.52	2.60	2.56	2.59
Number of samples	***150***	***26***	***176***	***138***	***38***	***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) Schweizer-Reneke (Bins) Taaibospan (Bins)			
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.23	0.00	0.95	0.29	0.25	0.00	2.40	0.61
2. Screenings, %	2.31	0.56	4.44	1.28	1.54	0.46	4.50	1.09	1.78	0.82	4.88	0.96
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.04	0.00	0.22	0.08	0.00	0.00	0.00	0.00
4. Foreign Matter, %	0.78	0.26	1.56	0.46	0.83	0.36	1.28	0.29	1.37	0.28	4.00	1.15
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	3.08	1.28	4.70	1.16	2.40	1.28	5.04	0.97	3.15	1.52	5.74	1.48
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0	0	0	0	0	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	0	0	0	0	0	0	0
Number of samples	***10***				***12***				***16***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	5.1	4.6	6.2	0.46	5.2	4.4	5.9	0.44	5.1	4.7	5.7	0.29
Crude Protein, % (as is)	17.47	16.82	18.40	0.40	16.81	15.74	17.89	0.63	16.00	15.14	17.06	0.61
Crude Fat, % (as is)	36.9	33.3	39.7	2.25	38.0	31.2	41.3	2.46	38.0	34.5	40.9	1.96
Crude Fibre, % (as is)	21.4	17.9	24.6	1.75	21.9	20.0	24.0	1.13	21.9	20.5	24.5	1.20
Ash, % (as is)	2.28	2.11	2.47	0.12	2.43	2.24	3.03	0.21	2.29	2.08	2.60	0.16
Number of samples	***10***				***12***				***16***			

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, %	1.21	0.00	3.40	1.04	3.31	0.00	14.80	5.87	2.32	0.00	12.58	3.42
2. Screenings, %	3.51	1.34	5.94	1.77	2.98	2.16	4.00	0.70	1.83	0.50	3.90	1.10
3. Sclerotia, %	0.20	0.00	0.66	0.25	1.05	0.00	5.52	1.98	0.01	0.00	0.10	0.03
4. Foreign Matter, %	0.82	0.40	1.64	0.37	1.37	0.80	3.12	0.70	1.20	0.54	2.24	0.50
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	4.52	2.44	6.74	1.52	5.41	3.45	10.52	2.36	3.04	1.36	6.04	1.45
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0	0	0	0	0	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	0	0	0	0	0	0	0
Number of samples	***9***				***9***				***16***			

Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.6	3.3	5.8	0.70	4.9	4.0	5.7	0.56	5.0	3.7	5.6	0.46
Crude Protein, % (as is)	16.71	14.74	17.74	0.85	15.36	14.66	15.90	0.37	16.76	14.72	18.14	0.93
Crude Fat, % (as is)	39.4	38.1	41.5	1.35	39.6	37.8	42.0	1.54	38.5	33.4	41.6	2.07
Crude Fibre, % (as is)	21.3	19.0	24.1	1.38	22.2	20.8	24.1	1.02	21.4	19.3	24.7	1.56
Ash, % (as is)	2.52	2.36	2.87	0.16	2.37	2.15	2.61	0.14	2.45	2.13	2.74	0.16
Number of samples	***9***				***9***				***16***			

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, %	0.41	0.00	0.85	0.37	0.33	0.00	2.60	0.68	0.14	0.00	0.24	0.12
2. Screenings, %	1.63	1.34	2.00	0.29	2.63	1.00	4.50	1.07	2.48	1.02	3.32	1.27
3. Sclerotia, %	0.41	0.00	1.00	0.50	0.02	0.00	0.28	0.07	0.00	0.00	0.00	0.00
4. Foreign Matter, %	1.07	0.88	1.47	0.27	0.93	0.44	2.56	0.59	1.59	0.42	3.42	1.60
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	3.11	2.36	4.47	0.94	3.58	1.70	5.54	1.31	4.07	1.44	6.74	2.65
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0	0	0	0	0	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	0	0	0	0	0	0	0
Number of samples	***4***				***18***				***3***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.5	4.3	4.8	0.22	4.5	3.6	5.2	0.52	4.3	3.5	5.1	0.80
Crude Protein, % (as is)	16.82	15.72	17.30	0.75	17.42	15.88	18.24	0.63	17.17	16.07	17.85	0.96
Crude Fat, % (as is)	39.9	39.2	40.5	0.68	38.2	35.0	42.7	1.92	37.2	34.7	39.9	2.61
Crude Fibre, % (as is)	21.0	19.9	22.4	1.09	20.4	18.0	23.0	1.61	21.0	20.2	21.9	0.85
Ash, % (as is)	2.50	2.27	2.67	0.19	2.68	2.35	2.87	0.15	2.59	2.30	2.90	0.30
Number of samples	***4***				***18***				***3***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(23)				(24)				(25)			
PRODUCTION REGION	**Free State North-Western Region (Bultfontein)**				**Free State Central Region**				**Free State South-Western 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)				Bethlehem (Bins) Clocolan (Bins) Ficksburg (Bins) Fouriesburg (Bins) Marseilles (Bins) Modderpoort (Bins) Slabberts (Bins) Tweespruit (Bins) Westminster (Bins)			
Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	2.60	0.00	11.28	4.04	0.00	0.00	0.00	0.00	0.51	0.00	2.02	0.71
2. Screenings, %	3.52	0.22	28.24	7.53	1.86	1.00	2.46	0.61	1.60	0.46	3.50	1.03
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00	0.86	0.27
4. Foreign Matter, %	0.93	0.24	1.54	0.39	0.84	0.50	1.06	0.23	1.18	0.22	2.60	0.76
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	4.45	0.70	29.74	7.73	2.70	1.50	3.40	0.73	3.03	0.92	6.06	1.87
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0	0	0	0	0	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	0	0	0	0	0	0	0
Number of samples	***13***				***5***				***10***			
Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.6	3.7	5.2	0.40	4.4	3.9	4.8	0.41	4.9	4.4	5.8	0.43
Crude Protein, % (as is)	17.72	15.66	19.97	1.13	16.90	15.77	17.81	0.98	16.03	12.74	18.35	1.82
Crude Fat, % (as is)	37.5	34.6	38.8	1.22	37.6	36.3	39.5	1.55	39.5	34.3	46.4	3.17
Crude Fibre, % (as is)	20.9	18.3	22.1	1.15	21.4	20.8	21.9	0.42	20.7	14.1	24.4	2.87
Ash, % (as is)	2.69	2.43	3.09	0.22	2.41	2.35	2.53	0.07	2.76	2.47	3.22	0.22
Number of samples	***13***				***5***				***10***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(26)	(28)	(29)
PRODUCTION REGION	**Free State South-Eastern Region**	**Free State Eastern Region**	**Mpumalanga Southern Region**
Silo/Intake stands (Type of storage)	Arlington (Bins) Kaallaagte (Bins) Libertas (Bins) Marquard (Bins) Meets (Bins) Monte Video (Bins) Senekal (Bins) Steynsrus (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, %	0.18	0.00	2.35	0.52	0.11	0.00	0.34	0.20	0.06	0.00	0.18	0.08
2. Screenings, %	1.88	0.54	5.54	1.33	1.41	0.28	3.56	1.87	1.40	0.20	2.54	0.84
3. Sclerotia, %	0.07	0.00	0.76	0.18	0.00	0.00	0.00	0.00	0.14	0.00	0.70	0.31
4. Foreign Matter, %	0.98	0.06	4.40	0.89	0.41	0.34	0.46	0.06	1.04	0.36	2.00	0.63
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	2.93	0.60	7.50	1.86	1.81	0.70	4.02	1.91	2.58	1.70	3.26	0.58
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0	0	0	0	0	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	0	0	0	0	0	0	0
Number of samples	***24***				***3***				***5***			

Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.8	4.3	5.4	0.28	4.7	4.5	5.0	0.25	4.4	4.0	4.8	0.34
Crude Protein, % (as is)	16.17	14.15	18.93	1.38	15.76	14.72	16.32	0.90	15.19	14.73	16.24	0.61
Crude Fat, % (as is)	38.8	32.2	41.7	2.10	42.0	41.6	42.3	0.36	41.7	39.7	42.7	1.30
Crude Fibre, % (as is)	20.2	17.0	25.3	1.82	20.1	18.3	22.4	2.11	19.8	19.1	20.8	0.63
Ash, % (as is)	2.68	1.99	3.05	0.23	2.68	2.67	2.71	0.02	2.21	2.00	2.57	0.26
Number of samples	***24***				***3***				***5***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(31)	(33)	(34)
PRODUCTION REGION	**Mpumalanga Central Region**	**Mpumalanga Northern Region**	**Gauteng**
Silo/Intake stands (Type of storage)	Bakenlaagte (Bunkers) Bethal (Bins) Brakfontein (Bunkers) Devon (Bins) Kinross (Bins/Bunkers) Klipfontein (Bunkers) Leslie (Bins) Palmietfontein (Bunkers) Trichardt (Bins) Vaalkrantz (Bunkers)	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)

Grading:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	0.06	0.00	0.12	0.07	0.12	-	-	-	0.09	0.00	0.16	0.08
2. Screenings, %	2.87	2.48	3.36	0.38	0.48	-	-	-	1.65	1.40	2.00	0.31
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	-	-	-	0.00	0.00	0.00	0.00
4. Foreign Matter, %	0.72	0.68	0.76	0.03	0.26	-	-	-	3.71	1.70	5.54	1.93
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	3.58	3.24	4.04	0.34	0.74	-	-	-	5.36	3.10	7.54	2.22
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0	0	-	-	-	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0	0	-	-	-	0	0	0	0
Number of samples	***4***				***1***				***3***			

Nutritional analysis:	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.6	4.6	4.6	0.00	4.4	-	-	-	5.1	4.9	5.3	0.21
Crude Protein, % (as is)	16.42	16.08	16.65	0.24	12.69	-	-	-	17.37	16.87	18.23	0.75
Crude Fat, % (as is)	38.1	37.7	38.4	0.29	40.9	-	-	-	38.7	38.2	39.4	0.61
Crude Fibre, % (as is)	22.5	22.1	22.9	0.33	22.9	-	-	-	19.4	18.2	20.0	1.01
Ash, % (as is)	2.36	2.30	2.42	0.06	2.37	-	-	-	2.37	2.34	2.40	0.03
Number of samples	***4***				***1***				***3***			

SOUTH AFRICAN
REGIONAL SUNFLOWER QUALITY

	(35)
PRODUCTION REGION	**Limpopo**
Silo/Intake stands (Type of storage)	Alma (Bins) Lehau (Bins) Naboomspruit (Mookgophong) (Bins) Northam (Bins) Nylstroom (Modimolle) (Bins) Nutfield (Bins) Potgietersrus (Mokopane) (Bins) Roedtan (Bins) Settlers (Bins) Warmbad (Bela-Bela) (Bins)

Grading:	***ave***	***min***	***max***	***stdev***
1. Damaged sunflower seed, %	3.31	0.00	18.00	7.07
2. Screenings, %	1.94	0.72	6.86	1.70
3. Sclerotia, %	0.00	0.00	0.00	0.00
4. Foreign Matter, %	0.90	0.44	1.44	0.36
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	2.84	1.72	8.06	1.81
Poisonous seeds *(Crotalaria sp., Datura sp., Ricinis communis)*	0	0	0	0
Poisonous seeds *(Argemone mexicana L., Convolvulus sp., Ipomoea purpurea Roth., Lolium temulentum, Xanthium sp.)*	0	0	0	0
Number of samples	***11***			

Nutritional analysis:	***ave***	***min***	***max***	***stdev***
Moisture, % (5 hr, 105 °C)	4.6	4.1	5.1	0.38
Crude Protein, % (as is)	17.15	14.80	18.89	1.36
Crude Fat, % (as is)	39.7	36.3	41.8	1.71
Crude Fibre, % (as is)	19.7	18.2	21.4	1.00
Ash, % (as is)	2.67	2.40	2.86	0.17
Number of samples	***11***			

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, per silo bin at each silo.

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.

If there were more than one container per class and grade per silo bin, 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 56 to 63 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.

sanas
South African National Accreditation System

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 (All Chemical Methods)
Ms M Hammes (All Chemical Methods)
Ms A de Jager (Nutrients & Contaminants)
Ms W Louw (In-house Methods 001, 002, 003, 010 & 026)
Ms D Moleke (Rheological Methods)
Ms I Terblanche (Rheological Methods)
Ms H Meyer (All Chemical, Nutrients and Contaminants & Grading Methods)
Ms J Kruger (All Chemical Methods)
Ms P Modiba (All Chemical Methods)
Ms M Motlanthe (In-house Methods 001, 003 & 026)
Mr B van Der Linde (Grading)
Ms M Ramare (All Chemical Methods Excl. In-House Method 012 and SOP MC23)
Ms Z Skhosana (In-house Method 026)
Ms T de Beer (Rheological Methods)

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Nominated Representative:

Ms PM Modiba

Issue No.: 27
Date of Issue: 22 February 2018
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^{0}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)

Maize Grits	Moisture (Oven Method)	Analytical EBC Method 6.2.2, latest edition (4 hours, 130^{0}C)
Animal feed, Plant tissue and Sunflower (Milled)	Moisture (Oven Method)	AgriLASA 2.1, Latest Edition (5 hours, 105^{0}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 2016
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 Lab

FEEDS / VOERE

FOR THE PERIOD OF / VIR DIE TYDPERK VAN **01/07/2017** TO / TOT **31/01/2018**

PARTICIPATED IN THE QUALITY ASSURANCE SCHEME AND CONFORMED TO THE REQUIREMENTS

IN RESPECT OF THE FOLLOWING DETERMINATIONS

AAN DIE KWALITEITS MONITERINGS SKEMA EN AAN DIE VEREIESTES MET BETREKKING TOT DIE

VOLGENDE BEPALINGS VOLDOEN HET

Ash	**Crude Fibre**	**Fat**
Moisture	**Nx6.25-Protein**	**Starch**

EVALUASION CRITERIA

Z – VALUE BETWEEN -2 AND 2 PARTICIPATION ≥ 83%

EVALUASIE KRITERIA

Z-WAARDE TUSSEN -2 EN 2 DEELNAME ≥ 83%

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Report

Evaluation of sunflower cultivars: 2016/2017 season

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

This report, included in the South African Sunflower Crop Quality Report of the 2016/2017 season, is published in totality as received from ARC-Grain Crops.

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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 2016/2017 season with the voluntary collaboration of Agricol, Pannar, Pioneer and AGT. Seed companies entered 18 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). 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.

Four of the 18 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 6 trials, Pannar with 7, Pioneer with 4 and AGT with 1. Four trials were planted by the ARC-GCI. Trial sites were selected by collaborators and the co-workers involved are listed in Table 2.

Eight trials were not successful due to sclerotinia, bird damage, replanting not harvested or even not planted. Planting dates, amount of fertiliser applied, soil analyses and other agronomic details from some successful 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 and two trials at Boskop and one trial at Ventersdorp.

Yield data and seed samples were send by collaborators to ARC-GCI for analyses. Seed from selected trials sent to SAGL for oil and protein content analyses. Yield data from 14 field trials were subjected to analyses of variance. Results from 1 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 13 trials.

Yield probabilities were also calculated for 15 cultivars that were evaluated in 24 trials during 2015/2016 and 2016/2017.

RESULTS

Days from planting to flowering

The mean number of days from planting to 50% flowering of cultivars (Table 4) ranged from 67 (AGSUN 5264 and PHB 65A70) to 69 days (PAN 7080, PAN 7102 CLP, PAN 7156 CLP and SV 60064). Calculated across cultivars and planting dates, the period from planting to flowering was 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 moisture free oil content for cultivars at the various localities varied from 36 to 54% with an overall mean of 42%. Adjusted for a moisture content of 9% at which sunflower grain is traded, the overall mean would be about 38%.

The highest mean oil concentration among localities was at Senekal (planting date 15 December 2016) with 47.8%. The locality with the lowest mean oil content of 42% was Potchefstroom planting date was January 19, 2017. The highest oil concentration among cultivars and calculated across localities, was SV 60064 at 46.2% followed by AGSUN 5264 at 45.9%

The average protein content varied from 18.3 to 20.5% among cultivars at the different

localities. Among localities, Potchefstroom planted in January 19, 2017 had the highest and Senekal the lowest protein content of 22.5 and 14.9% respectively. Calculated across localities, AGSUN 5273 had the highest protein content (20.5%) followed by AGSUN 5264 (20.1) while PAN 7080 and PAN 7095 CL the lowest (18.3%).

Seed yield

The mean seed yield of cultivars at the respective localities is presented in Table 7. The highest locality mean yield of 3.27 t ha^{-1} was obtained at Bainsvlei planted on 20th December 2016 and the lowest of 1.38 t ha^{-1}, at Potchefstroom planted 19th of January 2017.

The six best performing cultivars, in terms of average yield calculated over localities, were PAN 7160 CLP, PAN 7102 CLP, PAN 7100, AGSUN 5272 and AGSUN 8251. The overall mean yield for 2016/2017 was 2.25 t ha^{-1}, 13 % higher than the mean yield of 2015/2016.

No high oleic cultivars were entered for evaluation in 2016/2017. Four Clearfield cultivars, PAN 7095 CL, PAN 7102 CLP, PAN 7156 and PAN 7160 CLP were entered. Two of these cultivars namely, PAN 7160 CLP and PAN 7102 CLP had yields higher than the overall mean yield of all cultivars.

Oil yield

Oil yield per unit area is the product of grain yield and seed oil content and presented in Table 8.

The oil yield for cultivars at the eight localities varied from 0.93 to 1.27 t ha^{-1} with an overall mean of 0.93 t ha^{-1}. The locality with the highest mean oil yield was Boskop and Potchefstroom planted in December 18, 2016 at 1.4 t ha^{-1}. Among cultivars, PAN 7100, PAN 7102 CLP and PAN 7160 CLP had equally high values of 1.3 t ha^{-1}.

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 2016/17 are shown in Figure 1 and for the 15 cultivars evaluated in 2015/16 and 2016/17 in Figure 2.

The yield stability of cultivars varied up to 21 fold among cultivars (Table 10). Cultivars which had exceptionally high stabilities (D-parameter ≤ 0.05) were, P 65LL02, AGSUN 5278, P 65LL02, and P 65LP54.

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 18 cultivars for 2016/17 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 15 cultivars evaluated in 23 trials in 2015/16 and 2016/17, 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 (AGT) 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 2016/2017**

Cultivar	Germinated (%)*			Company
	Normal	Abnormal	Dormant/dead	
AGSUN 5264	97	2	1	Agricol ♠
AGSUN 5270	90	-	10	
AGSUN 5272	97	2	1	
AGSUN 5273	98	1	1	
AGSUN 5278	97	1	2	
AGSUN 8251	95	1	4	
PAN 7080	99	-	1	Pannar ●
PAN 7095 CL	96	3	1	
PAN 7098	99	1	-	
PAN 7100	100	-	-	
PAN 7102 CLP	92	8	-	
PAN 7156 CLP	99	-	1	
PAN 7160 CLP	98	1	1	
P 65LL02	99	0	1	Pioneer ♗
P 65LL14	84	4	12	
P 65LP54	100	-	-	
PHB 65A70	96	3	1	
SV 60064	95	4	1	AGT ◘

Table 2 Collaborating company, trial localities and responsible co-workers 2016/2017

Company	Localities	Planting dates	Co-workers	E-mail address of co-worker
Agricol ♠	Boskop Boskop Ottosdal Ventersdorp	14/11/2016 13/01/2017 11/01/2017 18/01/2017	J Swanepoel	Jouberts@agricol.co.za
ARC-GCI ▲	Potchefstroom	09/11/2016 23/11/2016 08/12/2016 19/01/2017	W Makgoga & J Erasmus	Makgogamw@arc.agric.za Erasmusj@arc.agric.za
PANNAR ●	Bainsvlei Delmas Senekal	20/12/2016 25/10/2016 15/12/2016	Pretorius, Abre	abre.pretorius@pannar.co.za
Pioneer	Gerdau	03/01/2017	Phillip Fourie	philip.fourie@pioneer.com]
AGT ◘	Bethlehem	-	Gideon Willemse	gideonp.willemse@vodamail.co.za

Table 3 Trial site information 2016/2017

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				
Bainsvlei ●	20/12/2016	42 000	Red Clay	-	-	-	-	-	300 kg 5.3.1	91	Plough & disc	7.28
Bethlehem ◘	?	-	-	-	-	-	-	-	25 N, 8 P, 4 K	-	Cruiser, Metolachlor, Boron	12.7
Boskop ♠	14/11/2016	45000	-	-	-	-	-	-	-	91	-	11.83
Boskop ♠	13/01/2017	45000	-	-	-	-	-	-	-	91	-	11.83
Delmas	25/10/2016	42000	-	-	-	-	-	-	-	91	-	6.82
Gerdau ♣	03/01/2017	45000	Hutton	5.4	-	-	-	-	32.8 N, P 8.2	91	S-metolachor	7.28
Ottosdal ♠	11/01/2017	45000	-	-	-	-	-	-	-	91	-	11.83
Potchefstroom ▲	09/11/2016	38 000	Westleigh	6.14	27	110	905	385	N 41; P 9; K 4	90	Grammoxone	14.4
Potchefstroom ▲	23/11/2016	38 000	Clovelly	6.54	24	143	1020	513	N 41; P 9; K 4	90	Grammoxone	14.4
Potchefstroom ▲	08/12/2016	38 000	Westleigh	6.14	27	110	905	385	N 41; P 9; K 4	90	Grammoxone	14.4
Potchefstroom ▲	19/01/2017	38 000	Clovelly	6.54	24	143	1020	513	N 41; P 9; K 4	90	Grammoxone	14.4
Senekal ●	15/12/2016	42 000	Sandy loam	-	-	-	-	-	-	91	Plough & disc	7.28
Ventersdorp ♠	18/01/2017	45000	-	-	-	-	-	-	-	91	-	11.83

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♣ Pioneer, ◘ AGT Foods

Table 1 Number of days from planting to 50 percent flowering of cultivars at selected localities and planting dates 2016/2017

Cultivar	Boskop ♠ 13/01/2017	Boskop ♠ 14/11/2016	Ottosdal ♠ 11/01/2017	Potchefstroom ◄ 09/11/2016	Potchefstroom ◄ 23/11/2016	Potchefstroom ◄ 08/12/2016	Potchefstroom ◄ 19/01/2017	Ventersdorp ♠ 18/01/2017	Mean
AGSUN 5264	68	65	66	68	66	64	70	67	67
AGSUN 5270	68	67	69	68	66	67	68	70	68
AGSUN 5272	69	68	70	70	63	65	69	70	68
AGSUN 5273	70	68	70	66	63	66	70	71	68
AGSUN 5278	70	66	69	64	68	68	71	70	68
AGSUN 8251	70	65	69	65	65	64	71	71	68
P 65LL02	68	66	69	68	66	65	72	70	68
P 65LL14	71	66	69	69	64	67	71	71	69
P 65LP54	70	67	70	64	64	67	71	71	68
PAN 7080	71	67	70	68	65	67	71	71	69
PAN 7095 CL	69	66	69	68	68	67	68	70	68
PAN 7098	70	66	69	70	64	65	71	70	68
PAN 7100	70	66	69	65	66	67	71	70	68
PAN 7102 CLP	70	65	68	65	64	67	71	70	68
PAN 7156 CLP	71	67	70	67	66	68	72	71	69
PAN 7160 CLP	71	67	70	68	67	67	73	70	69
PHB 65A70	69	65	69	65	68	65	68	70	67
SV 60064	70	66	69	70	68	64	70	71	69
Mean	70	66	69	67	66	66	70	70	68

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♣ Pioneer, ◘ AGT Foods

Table 2 The moisture free seed oil concentration (%) of cultivars at selected localities 2016/2017

Cultivar	Bethlehem ◘	Boskop ♠ 13/01/2017	Gerdau ♣ 3/01/2017	Ottosdal ♠ 11/01/2017	Potchefstroom ▲ 09-11-2016	Potchefstroom ▲ 08/12/2016	Potchefstroom ▲ 19/01/2017	Senekal ●	Mean
AGSUN 5264	45,7	43,2	45,1	44,5	48,1	52,0	38,7	49,6	45,9
AGSUN 5270	46,3	40,5	48,0	46,9	44,0	49,4	37,9	43,8	44,6
AGSUN 5272	44,5	47,8	45,8	41,1	40,8	44,6	36,8	49,6	43,9
AGSUN 5273	41,4	45,2	46,1	40,4	40,7	45,0	35,8	44,4	42,4
AGSUN 5278	48,0	45,0	47,1	41,8	43,8	44,4	44,0	50,1	45,5
AGSUN 8251	44,9	48,2	42,9	40,5	41,5	45,5	39,7	53,5	44,6
P 65LL02	41,6	44,1	40,5	46,4	45,2	49,8	47,6	49,3	45,6
P 65LL14	41,6	47,3	44,6	44,4	46,5	48,4	46,0	46,0	45,6
P 65LP54	43,3	46,7	48,5	42,7	43,6	43,7	41,3	46,8	44,6
PAN 7080	47,0	46,1	43,5	42,9	42,1	47,1	44,1	48,1	45,1
PAN 7095 CL	49,0	44,5	43,7	43,3	43,1	47,2	43,5	45,8	45,0
PAN 7098	44,8	43,0	44,3	43,8	42,7	45,1	41,5	45,3	43,8
PAN 7100	41,0	43,7	43,3	45,3	44,0	48,1	44,0	50,0	44,9
PAN 7102 CLP	41,7	48,7	43,7	45,3	44,4	44,6	41,8	47,2	44,7
PAN 7156 CLP	46,4	45,2	44,9	40,5	43,0	46,5	42,0	47,5	44,5
PAN 7160 CLP	44,6	43,9	43,7	44,2	45,5	50,1	43,1	47,0	45,3
PHB 65A70	42,7	44,0	46,5	44,4	44,9	46,3	39,0	50,0	44,7
SV 60064	43,0	46,1	47,5	44,5	45,3	49,6	48,3	45,6	46,2
Mean	44,3	45,2	45,0	43,5	43,8	47,1	42,0	47,8	

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♣ Pioneer, ◘ AGT Foods

Table 3 The moisture free seed protein concentration (%) of cultivars at selected localities 2016/2017

Cultivar	Bethlehem ◘	Boskop ♠ 13/01/2017	Gerdau ♣ 3/01/2017	Ottosdal ♠ 11/01/2017	Potchefstroom ▲ 09-11-2016	Potchefstroom ▲ 08/12/2016	Potchefstroom ▲ 19/01/2017	Senekal ●	Mean
AGSUN 5264	16,2	23,8	21,4	22,3	19,3	17,6	27,4	13,2	20,1
AGSUN 5270	17,1	21,7	21,9	21,5	18,6	16,8	24,8	15,6	19,7
AGSUN 5272	20,1	21,9	19,1	22,5	18,2	17,7	23,4	13,1	19,5
AGSUN 5273	22,0	22,7	20,0	23,7	16,2	18,0	26,0	15,4	20,5
AGSUN 5278	20,7	21,9	20,6	19,4	15,1	18,3	19,1	14,3	18,7
AGSUN 8251	23,0	22,0	17,5	21,4	19,7	17,8	23,4	15,9	20,1
P 65LL02	18,3	21,4	18,0	20,3	17,2	16,4	21,0	14,4	18,4
P 65LL14	16,1	22,1	21,4	20,7	16,2	17,8	22,0	13,8	18,8
P 65LP54	16,2	23,0	22,4	20,7	17,8	18,6	22,5	15,7	19,6
PAN 7080	14,5	20,7	20,2	20,0	17,3	17,6	20,7	15,1	18,3
PAN 7095 CL	15,7	20,6	18,8	21,3	16,6	16,8	21,8	14,7	18,3
PAN 7098	18,5	20,8	19,8	20,0	15,7	16,8	21,4	18,8	19,0
PAN 7100	21,0	21,2	19,6	18,4	18,5	16,9	20,5	15,5	19,0
PAN 7102 CLP	19,4	22,5	20,3	18,0	17,9	17,7	20,9	13,9	18,8
PAN 7156 CLP	16,8	21,6	19,8	19,8	18,0	16,0	22,7	14,7	18,7
PAN 7160 CLP	17,6	21,8	19,9	19,0	16,2	16,5	22,8	14,4	18,5
PHB 65A70	18,6	21,5	18,2	20,9	17,7	16,7	22,8	14,4	18,9
SV 60064	16,7	22,5	18,9	23,9	19,7	18,1	20,5	16,1	19,5
Mean	18,3	21,9	20,0	20,6	17,4	17,3	22,5	14,9	

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♣ Pioneer, ◘ AGT Foods

Table 4 Mean seed yield (t ha-[1]) of cultivars at each locality 2016/2017

Cultivar	Bainsvlei ● 20/12/2016	Bethlehem ◘	Boskop ♠ 14/11/2016	Boskop ♠ 13/01/2017	Delmas ● 25/10/2016	Gerdau ♗ 3/01/2017	Ottosdal ♠ 11/01/2017	Potchefstroom ▲ 09/11/2016	Potchefstroom ▲ 23/11/2016	Potchefstroom ▲ 08/12/2016	Potchefstroom ▲ 19/01/2017	Senekal ● 15/12/2016	Ventersdorp ♠ 18/01/2017	Mean
AGSUN 5264	3,11	2,39	3,47	2,44	1,93	2,11	2,34	2,84	2,21	2,94	1,07	1,94	1,93	2,36
AGSUN 5270	3,33	2,19	3,79	3,14	2,48	2,68	2,61	2,90	2,03	2,82	1,31	2,48	2,46	2,63
AGSUN 5272	3,86	3,21	3,91	3,44	1,52	2,23	2,48	2,54	2,27	2,80	1,44	2,47	2,44	2,66
AGSUN 5273	3,76	3,16	3,47	3,32	1,61	2,31	2,67	2,61	1,97	2,81	1,24	2,90	2,22	2,62
AGSUN 5278	2,67	2,48	3,10	2,95	2,30	1,96	2,35	2,80	2,29	3,02	1,51	2,03	2,35	2,45
AGSUN 8251	3,41	2,40	3,49	3,22	2,71	2,05	2,62	2,56	2,35	3,38	1,60	2,17	2,37	2,64
P 65LL02	3,36	2,88	3,16	3,32	1,92	2,27	2,27	2,75	1,95	3,21	1,43	2,18	2,19	2,53
P 65LL14	3,18	2,59	3,05	3,29	2,26	2,42	2,32	2,52	1,89	2,92	0,93	3,30	2,39	2,54
P 65LP54	2,85	2,09	2,94	3,01	2,21	2,07	2,23	2,78	2,12	3,11	1,73	2,87	2,48	2,50
PAN 7080	3,59	2,89	3,91	3,28	1,47	1,94	2,45	2,48	2,06	3,00	1,42	3,19	2,18	2,60
PAN 7095 CL	3,12	1,76	2,16	2,84	3,10	1,91	2,38	2,67	2,09	2,73	1,40	1,97	2,43	2,35
PAN 7098	2,85	2,77	3,52	3,41	2,18	1,45	2,49	3,47	2,21	3,27	1,48	3,07	2,19	2,64
PAN 7100	3,59	2,56	3,19	3,47	1,93	2,12	2,32	3,26	2,07	3,38	1,73	3,46	2,16	2,71
PAN 7102 CLP	3,51	3,03	3,71	3,12	1,61	2,44	2,73	3,04	2,17	3,41	1,46	3,14	2,07	2,73
PAN 7156 CLP	3,40	2,33	2,58	3,36	2,11	2,63	2,56	2,99	2,33	3,16	1,28	3,07	2,35	2,63
PAN 7160 CLP	3,34	2,66	3,29	3,41	2,31	2,59	2,59	2,98	2,20	3,19	1,48	3,40	2,28	2,79
PHB 65A70	3,36	2,17	2,60	2,18	2,22	1,60	2,00	3,04	1,92	2,89	0,94	1,66	2,10	2,21
SV 60064	2,49	2,69	3,09	3,03	1,44	1,66	2,12	2,58	2,04	2,30	1,39	2,27	2,10	2,25
Mean	3,27	2,60	3,25	3,12	2,07	2,14	2,42	2,82	2,12	3,02	1,38	2,64	2,26	2.25
CV	18,4	18,5	15,5	9,9	18,7	16,7	13,0	7,7	10,8	10,3	16,4	18,5	12,7	

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♗ Pioneer, ◘ AGT Foods

Table 8 Oil yield (t ha^{-1}) of cultivars at selected localities 2016/2017

Cultivar	Bethlehem ◘	Boskop ♠ 13/01/2017	Gerdau ♣ 3/01/2017	Ottosdal ♠ 11/01/2017	Potchefstroom ▲ 09-11-2016	Potchefstroom ▲ 08/12/2016	Potchefstroom ▲ 19/01/2017	Senekal ●	Mean
AGSUN 5264	1,1	1,1	1,0	1,0	1,4	1,5	0,4	1,0	1,1
AGSUN 5270	1,0	1,3	1,3	1,2	1,3	1,4	0,5	1,1	1,1
AGSUN 5272	1,4	1,6	1,0	1,0	1,0	1,2	0,5	1,2	1,1
AGSUN 5273	1,3	1,5	1,1	1,1	1,1	1,3	0,4	1,3	1,1
AGSUN 5278	1,2	1,3	0,9	1,0	1,2	1,3	0,7	1,0	1,1
AGSUN 8251	1,1	1,6	0,9	1,1	1,1	1,5	0,6	1,2	1,1
P 65LL02	1,2	1,5	0,9	1,1	1,2	1,6	0,7	1,1	1,2
P 65LL14	1,1	1,6	1,1	1,0	1,2	1,4	0,4	1,5	1,2
P 65LP54	0,9	1,4	1,0	1,0	1,2	1,4	0,7	1,3	1,1
PAN 7080	1,4	1,5	0,8	1,1	1,0	1,4	0,6	1,5	1,2
PAN 7095 CL	0,9	1,3	0,8	1,0	1,2	1,3	0,6	0,9	1,0
PAN 7098	1,2	1,5	0,6	1,1	1,5	1,5	0,6	1,4	1,2
PAN 7100	1,1	1,5	0,9	1,1	1,4	1,6	0,8	1,7	1,3
PAN 7102 CLP	1,3	1,5	1,1	1,2	1,3	1,5	0,6	1,5	1,3
PAN 7156 CLP	1,1	1,5	1,2	1,0	1,3	1,5	0,5	1,5	1,2
PAN 7160 CLP	1,2	1,5	1,1	1,1	1,4	1,6	0,6	1,6	1,3
PHB 65A70	0,9	1,0	0,7	0,9	1,4	1,3	0,4	0,8	0,9
SV 60064	1,2	1,4	0,8	0,9	1,2	1,1	0,7	1,0	1,0
Mean	1,1	1,4	1,0	1,1	1,2	1,4	0,6	1,3	

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♣ Pioneer, ◘ AGT Foods

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
Bainsvlei ● 20/12/2016	3.27	0.35	18.4	3.75	0.04	0.15	0.11
Bethlehem ◘	2.60	0,28	18,50	11,70	0,29	0,16	0,55
Boskop ♠ 14/11/2016	3,25	0,29	15,50	11,60	0,36	0.15	0,63
Boskop ♠ 13/01/2017	3,12	0,18	9,9	9,57	0,48	0,14	0,74
Delmas ● 25/10/2016	2,07	0,22	18.70	18,6	0,50	0,14	0,75
Gerdau ♗ 03/01/2017	2,14	0,21	16,70	13,30	0,39	0,15	0,66
Ottosdal ♠ 11/01/2017	2,42	0,17	13,00	3,00	0,05	0,15	0,14
Potchefstroom ▲ 09/11/2016	2,82	0,13	7,70	8,60	0,55	0,13	0,79
Potchefstroom ▲ 23/11/2016	2,12	0,13	10,80	2,40	0,05	0,15	0,14
Potchefstroom ▲ 08/12/2016	3,02	0,18	10,30	7,10	0,32	0,16	0,59
Potchefstroom ▲19/01/2017	1,38	0,13	16,40	13,40	0,40	0,15	0,67
Senekal ● 15/12/2016	2,64	0,27	18,50	19,15	0,51	0,14	0,76
Ventersdorp ♠ 18/01/2017	2,26	0,17	12,70	Error	-0,04	0,13	-0,13

♠ Agricol; ▲ ARC-GCI; ● Pannar; ♗ Pioneer, ◘ AGT Foods

Table 10 Regression line coordinates at different yield potentials 2016/2017

Cultivar	Yield potential (t ha^{-1})						Average	Intercept	Slope	D-parameter
	1	1.5	2	2.5	3	3.5				
AGSUN 5264	0,80	1,31	1,81	2,32	2,82	3,33	2,36	-0,21	1,01	0,08
AGSUN 5270	1,11	1,61	2,10	2,60	3,09	3,59	2,63	0,12	0,99	0,09
AGSUN 5272	0,72	1,35	1,97	2,60	3,22	3,85	2,66	-0,53	1,25	0,13
AGSUN 5273	0,71	1,33	1,95	2,57	3,19	3,81	2,62	-0,53	1,24	0,08
AGSUN 5278	1,31	1,68	2,04	2,41	2,77	3,14	2,45	0,58	0,73	0,05
AGSUN 8251	1,23	1,69	2,15	2,61	3,07	3,53	2,64	0,31	0,92	0,09
P 65LL02	0,89	1,42	1,95	2,48	3,01	3,54	2,53	-0,17	1,06	0,04
P 65LL14	0,90	1,43	1,96	2,49	3,02	3,55	2,54	-0,16	1,06	0,09
P 65LP54	1,39	1,75	2,11	2,47	2,83	3,19	2,50	0,67	0,72	0,05
PAN 7080	0,59	1,24	1,89	2,54	3,19	3,84	2,60	-0,71	1,30	0,10
PAN 7095 CL	1,54	1,80	2,06	2,32	2,58	2,84	2,35	1,02	0,52	0,21
PAN 7098	0,89	1,46	2,02	2,59	3,15	3,72	2,64	-0,24	1,13	0,12
PAN 7100	0,96	1,53	2,09	2,66	3,22	3,79	2,71	-0,17	1,13	0,09
PAN 7102 CLP	0,84	1,45	2,06	2,67	3,28	3,89	2,73	-0,38	1,22	0,07
PAN 7156 CLP	1,22	1,68	2,13	2,59	3,04	3,50	2,63	0,31	0,91	0,09
PAN 7160 CLP	1,24	1,74	2,24	2,74	3,24	3,74	2,79	0,24	1,00	0,06
PHB 65A70	0,75	1,23	1,70	2,18	2,65	3,13	2,21	-0,20	0,95	0,16
SV 60064	0,94	1,37	1,79	2,22	2,64	3,07	2,25	0,09	0,85	0,08

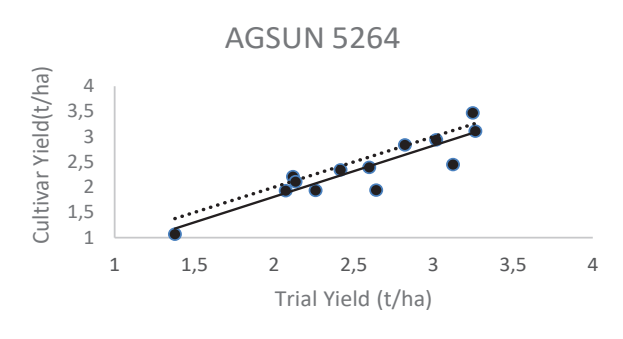
Table 11 Yield probability (%) of cultivars 2016/2017 at different yield potentials

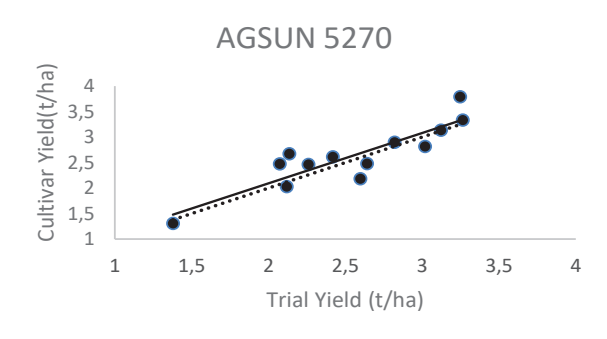
Cultivar	Yield potential (t ha^{-1})					
	1	1.5	2	2.5	3	3.5
AGSUN 5264	30	28	27	27	28	30
AGSUN 5270	61	62	62	63	61	60
AGSUN 5272	27	36	47	61	72	80
AGSUN 5273	22	30	43	59	74	83
AGSUN 5278	85	75	57	35	17	8
AGSUN 8251	72	71	68	64	59	53
P 65LL02	34	37	41	46	52	57
P 65LL14	40	42	45	49	53	56
P 65LP54	92	84	68	45	23	10
PAN 7080	16	24	37	55	71	82
PAN 7095 CL	81	71	55	35	20	11
PAN 7098	41	46	52	60	66	71
PAN 7100	46	53	61	70	76	80
PAN 7102 CLP	32	44	58	73	84	90
PAN 7156 CLP	71	69	65	61	55	50
PAN 7160 CLP	78	81	83	84	83	81
PHB 65A70	32	28	24	22	21	21
SV 60064	43	34	24	17	11	9

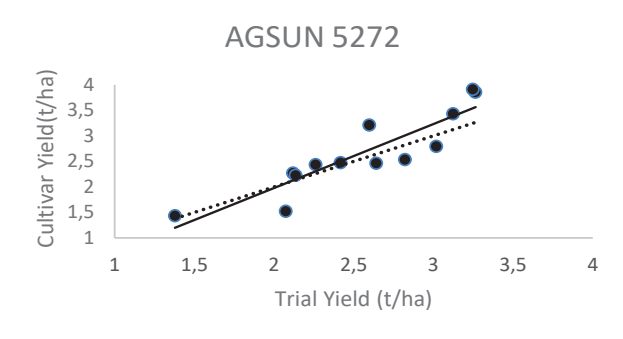
Table 12 Yield probability (%) of cultivars 2015/2016 and 2016/2017 at different yield potentials

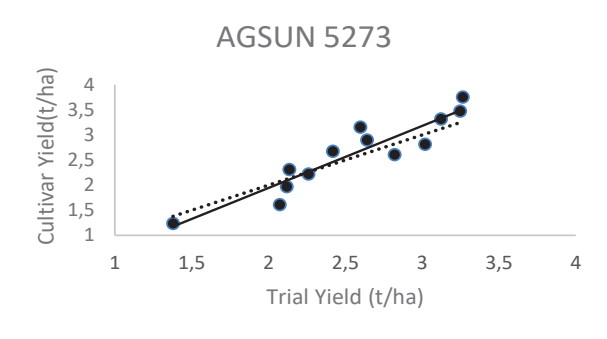
Cultivar	Yield potential (t ha^{-1})					
	1	1.5	2	2.5	3	3.5
AGSUN 5264	36	29	23	18	14	11
AGSUN 5270	50	53	55	58	60	63
AGSUN 5272	35	42	50	59	66	73
AGSUN 5273	25	34	43	55	65	74
AGSUN 5278	62	52	43	33	25	19
AGSUN 8251	56	56	55	55	53	53
P 65LL02	58	58	56	56	54	54
P 65LL14	56	57	55	55	54	54
PAN 7080	42	50	58	66	73	78
PAN 7095 CL	68	59	49	39	30	22
PAN 7098	56	58	58	59	59	60
PAN 7100	50	53	56	59	61	64
PAN 7102 CLP	45	53	62	70	77	82
PAN 7160 CLP	65	70	75	79	82	85
PHB 65A70	44	38	32	27	22	19

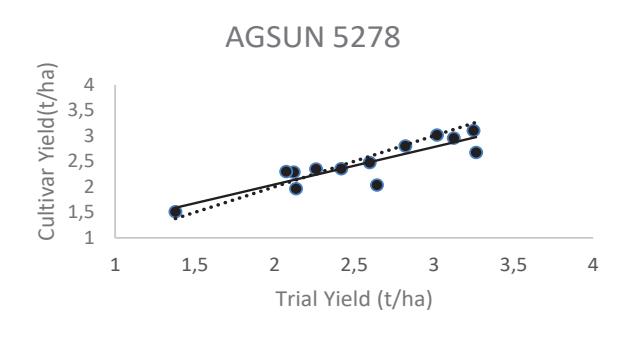
Figure 1 Regression lines for cultivars 2016/2017

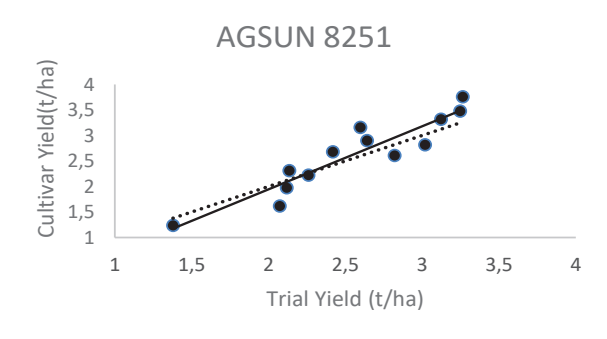


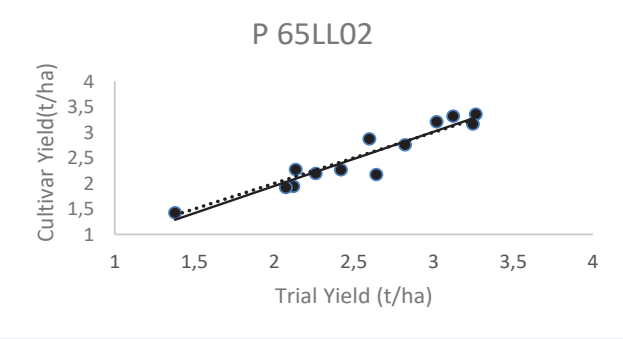


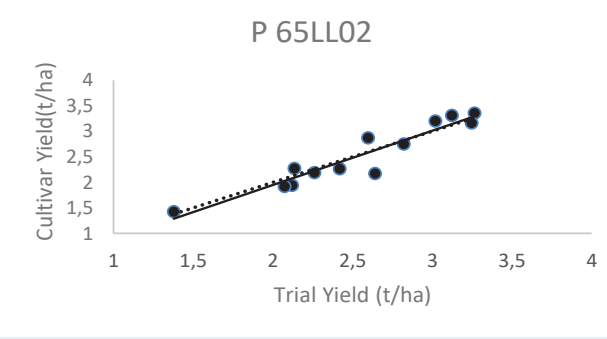


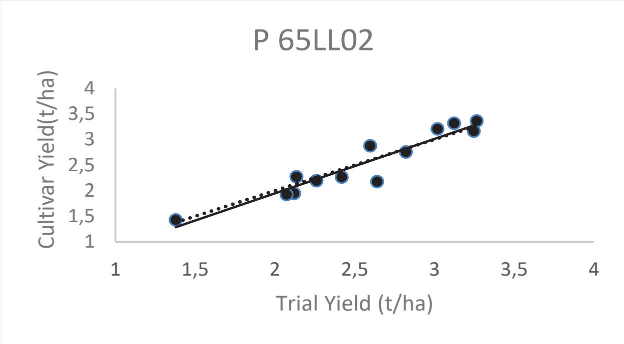


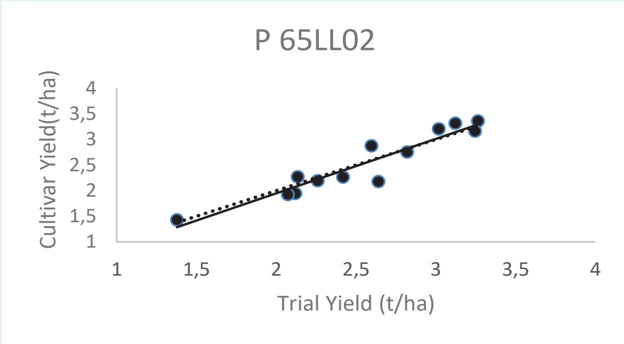


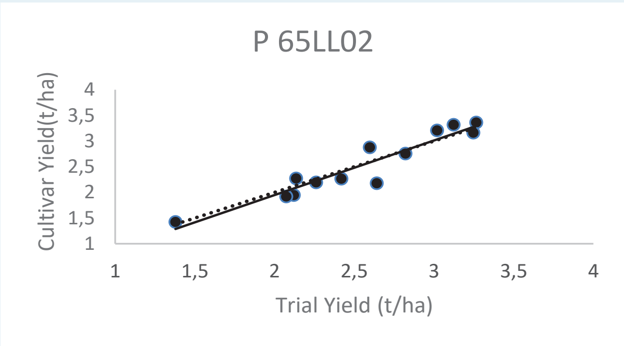







P 65LL02
Cultivar Yield(t/ha)
4 3,5 3 2,5 2 1,5 1
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)


P 65LL02
Cultivar Yield(t/ha)
4 3,5 3 2,5 2 1,5 1
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)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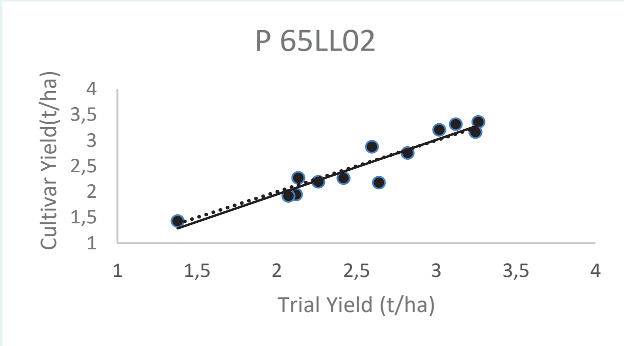
Cultivar Yield(t/ha)
4 3,5 3 2,5 2 1,5 1
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)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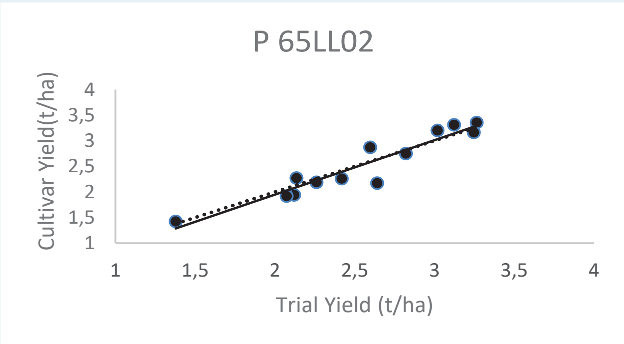
Cultivar Yield(t/ha)
4 3,5 3 2,5 2 1,5 1
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)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Cultivar Yield(t/ha)
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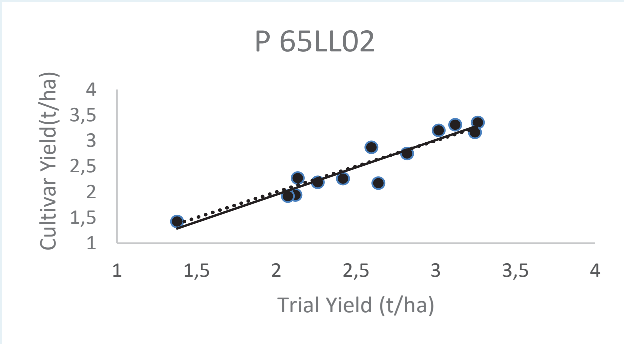
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)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Cultivar Yield(t/ha)
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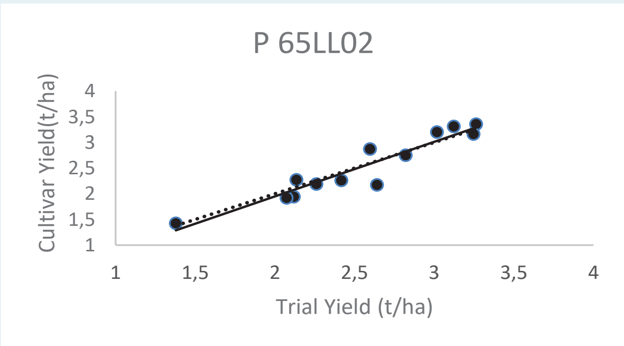
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)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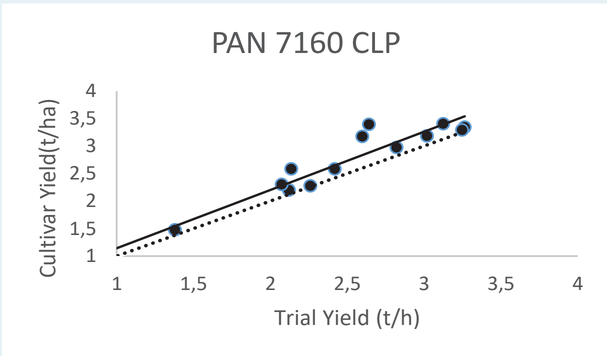
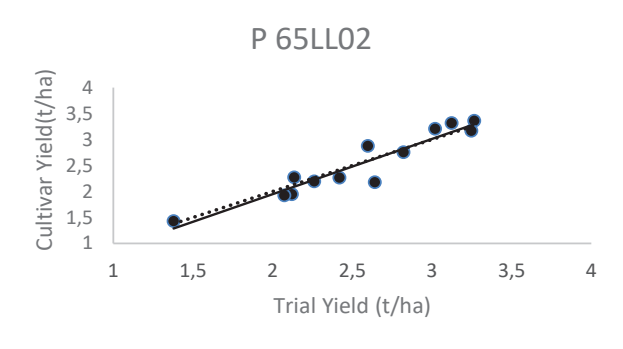
Cultivar Yield(t/ha)
4 3,5 3 2,5 2 1,5 1
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/ha)


PAN 7160 CLP
Cultivar Yield(t/ha)
4 3,5 3 2,5 2 1,5 1
1 1,5 2 2,5 3 3,5 4
Trial Yield (t/h)

18



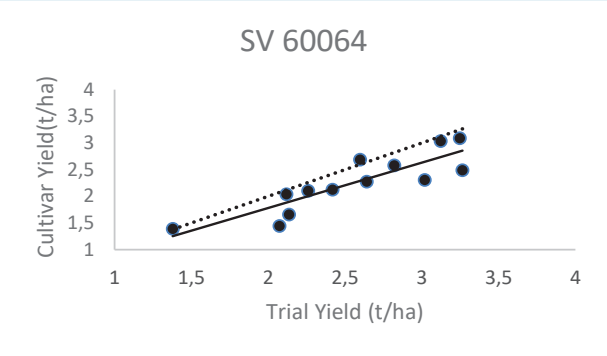
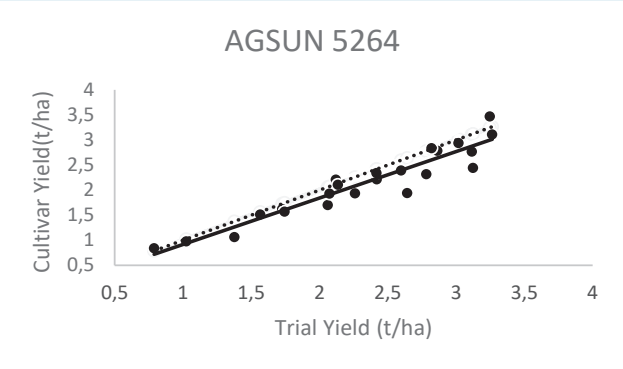
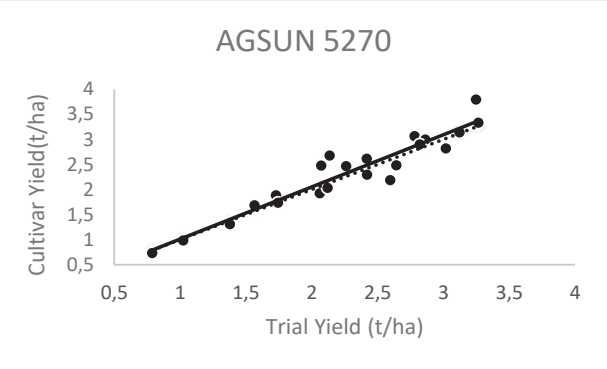
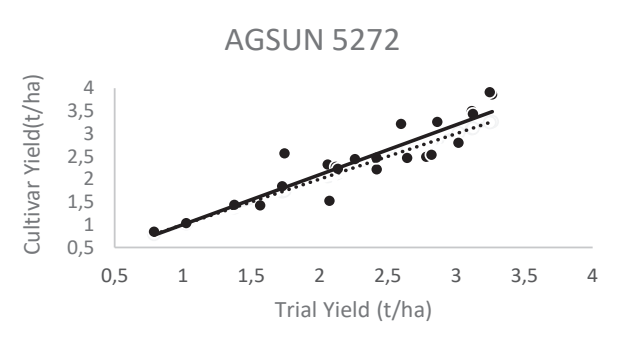
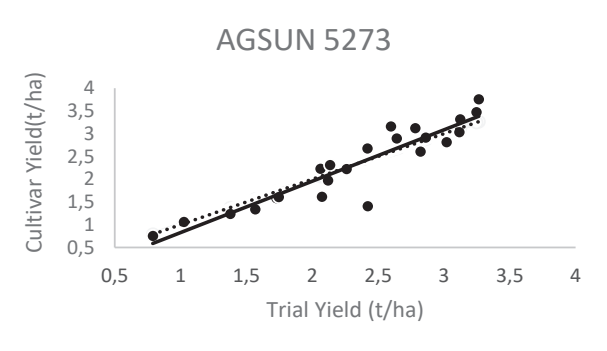


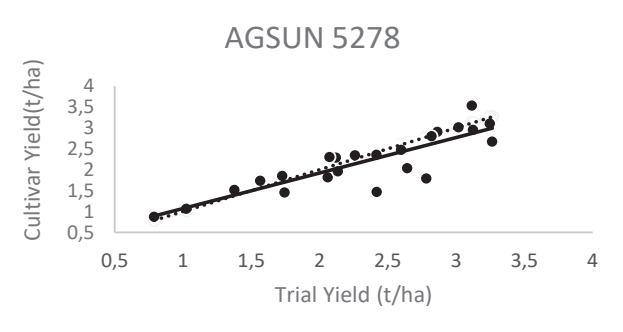
Figure 2 Regression lines for cultivars 2015/2016 and 2016/2017

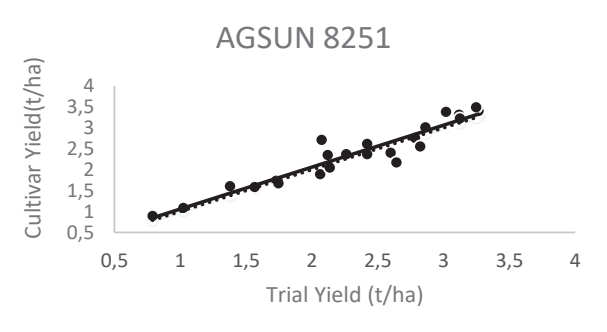


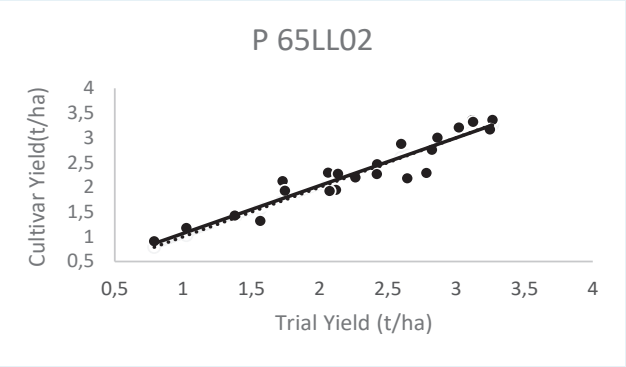








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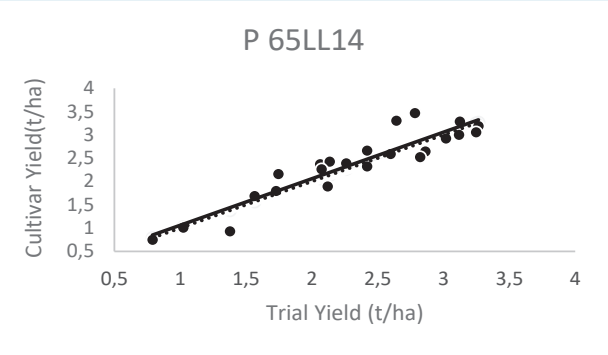
Cultivar Yield(t/ha)
Trial Yield (t/ha)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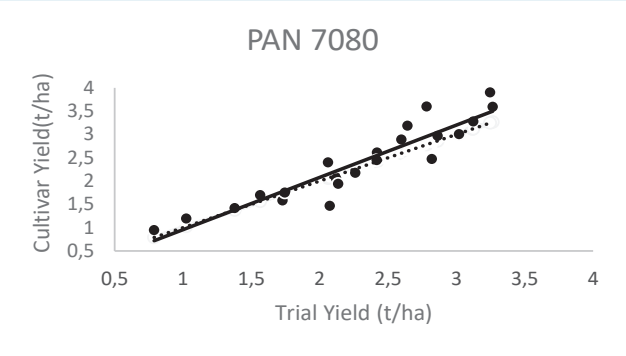
Cultivar Yield(t/ha)
Trial Yield (t/ha)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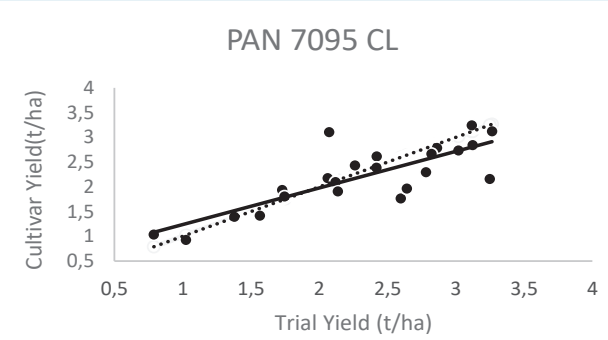
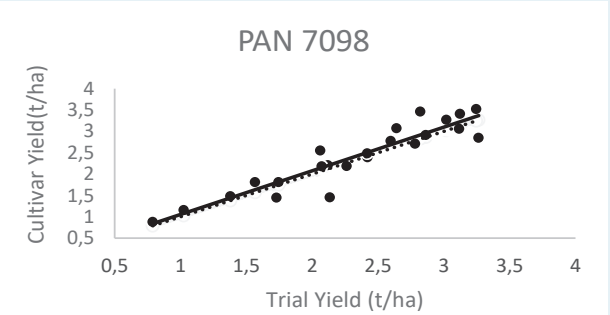
Cultivar Yield(t/ha)
Trial Yield (t/ha)


PAN 7095 CL
Cultivar Yield(t/ha)
Trial Yield (t/ha)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Cultivar Yield(t/ha)
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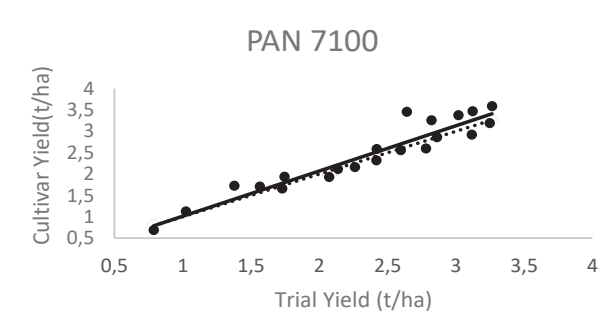
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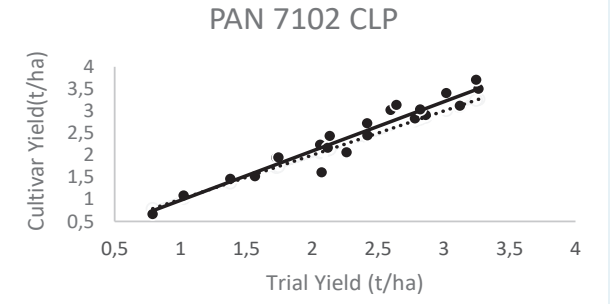
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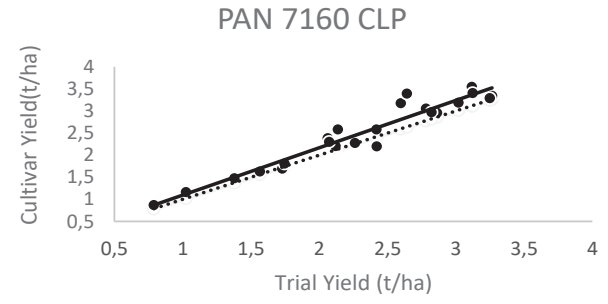
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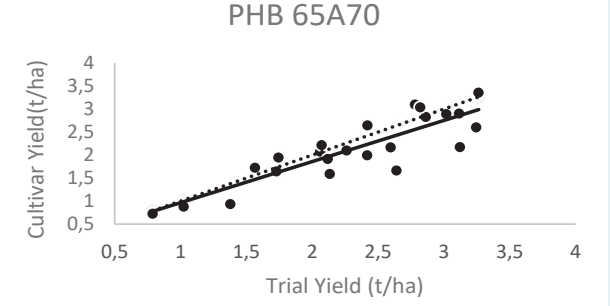
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Trial Yield (t/ha)

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%