



South African Sunflower Crop

Quality Report
2023/2024 season



**Compiled and issued by:
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OPDT OIL & PROTEIN SEEDS DEVELOPMENT TRUST
GAC OILSEEDS ADVISORY COMMITTEE



South African

Commercial sunflower quality for the 2023/24 Season

Acknowledgements

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- **Agbiz Grain and its members for their cooperation in providing the samples for this survey.**
- **The Crop Estimates Committee (CEC) of the Department of Agriculture (DOA) for providing production related figures.**
- **South African Grain Information Service (SAGIS) for providing sunflower related supply and demand figures.**
- **Precision Oil Laboratories for providing Fatty Acid Profile analyses.**

Introduction

The final calculated commercial sunflower crop figure of the 2023/24 season as overseen by the National Crop Estimates Liaison Committee (CELC) is 632 000 tons, which is 0.59% less than the final crop estimate figure of 635 750 tons. The crop decreased by 12% (88 000 tons) year on year. The major sunflower-producing provinces, namely the Free State and North West, contributed almost 88% of the total crop.

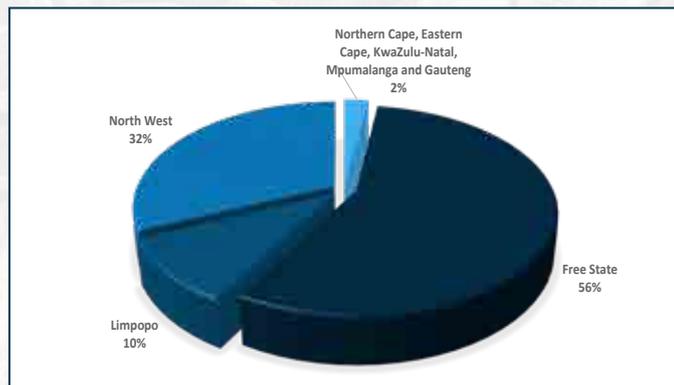
During the harvesting season, a representative sample of each delivery of sunflower seed was taken according to the prescribed grading regulations at the various grain intake points. The sampling procedure for the samples used in this survey is described on page 35. One hundred and forty (140) composite 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. Twenty samples, randomly selected to represent the different production regions, as well as 20 cultivar samples were submitted to Precision Oil Laboratories for fatty acid profile analyses.

This is the twelfth 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 various 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 seed produced in different production regions nationally.

Results of previous surveys to date are available on the SAGL website (www.sagl.co.za). Reports in an easy to page format, are available to read or download. Hard copy reports are distributed to Directly Affected Groups and interested parties.

Graph 1: Provincial contribution to the production of the 2023/24 sunflower crop



Figures provided by the CEC.

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 for the 2023/24 season, conducted by the ARC-Grain Crops Institute in collaboration with Agricol, (Pannar & Pioneer) Corteva, Syngenta and Limagrain South Africa, is included in totality and as received. The national grading regulations as published in Government Notice NO. 45 of 22 January 2016 are also provided.

Production

World sunflower seed production for the 2023/24 season stands at 59.0 million metric tons with Russia and the Ukraine contributing 57% to this total. An area of 29.8 million hectares were harvested resulting in a yield of 1.98 metric tons/hectare. The forecasted figure for the 2024/25 season is 53.9 million metric tons harvested on 29.9 million hectares and with a yield of 1.80 metric tons/hectare.

Please see Table 1 for the world sunflower seed supply and disappearance figures.

Table 1: World Sunflower Seed Supply and Disappearance (October through September)						
Season	2019/20	2020/21	2021/22	2022/23	2023/24 (Revised)	2024/25 (Forecast)
Area Harvested (1 000 Ha)	27 413	28 045	29 877	29 983	29 826	29 863
Yield (MT/Ha)	2.03	1.81	1.95	1.87	1.98	1.80
Production (1 000 MT)						
Argentina	3 020	3 200	3 360	4 130	3 760	4 100
European Union	9 469	8 969	10 389	9 520	9 892	8 666
China	2 680	2 750	2 880	2 930	3 000	3 100
Russia	15 379	13 420	15 660	17 100	18 600	16 900
Ukraine	16 500	13 900	16 900	12 680	14 900	12 500
United States	887	1 353	864	1 276	1 024	520
South Africa	810	678	846	720	636	810
Turkey	1 700	1 580	1 750	1 730	1 280	1 300
Other	5 202	4 995	5 652	5 947	5 931	5 954
TOTAL	55 647	50 845	58 301	56 033	59 023	53 850
Seed Import (1 000 MT)						
Turkey	1 058	844	673	981	294	270
European Union	1 057	817	1 807	1 466	833	515
Other	1 451	1 308	1 639	1 492	1 497	1 266
TOTAL	3 566	2 969	4 119	3 939	2 624	2 051
Seed Export (1 000 MT)						
Argentina	214	178	158	91	80	82
United States	64	72	69	63	46	35
Russia	1 278	528	280	285	324	320
Ukraine	76	186	1 793	1 685	302	77
Other	1 980	1 907	1 875	1 755	1 966	1 503
TOTAL	3 612	2 871	4 175	3 879	2 718	2 017
Oilseed crushed	50 300	45 568	48 315	52 180	55 527	50 420

National Sunflower Association website www.sunflowernsa.com.
Table updated January 10, 2025; Source: Oil World and USDA
Source: Oil World & USDA.

Sunflower seed production is very suitable for South African climatic conditions. Sunflower plants are drought tolerant and thus a crucial risk diversification crop going forward. The deep root system of a sunflower plant 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.

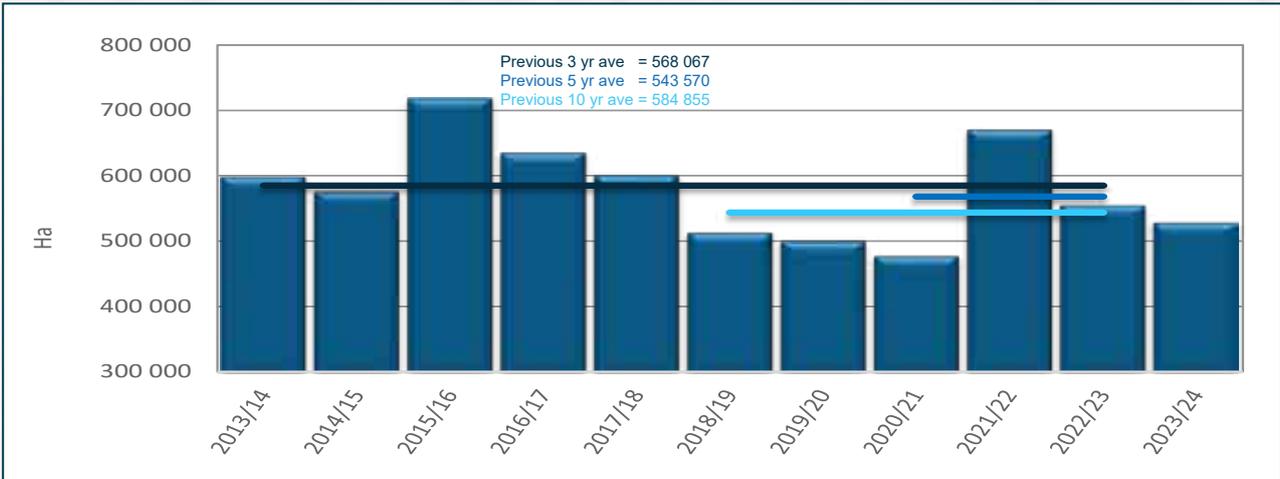
The area utilised for sunflower production decreased by 5% to 529 000 ha, compared to the 555 700 ha of the previous season. The national yield average decreased by 8% from 1.30 t/ha in the previous season to 1.19 t/ha this season.

Please see Table 2 for an overview of sunflower production under dry land conditions versus irrigation in the 2023/24 season, compared to the 2022/23 season. Graphs 2 to 4 provide national figures with regards to hectares planted, tonnage 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 and North West as well as Limpopo.

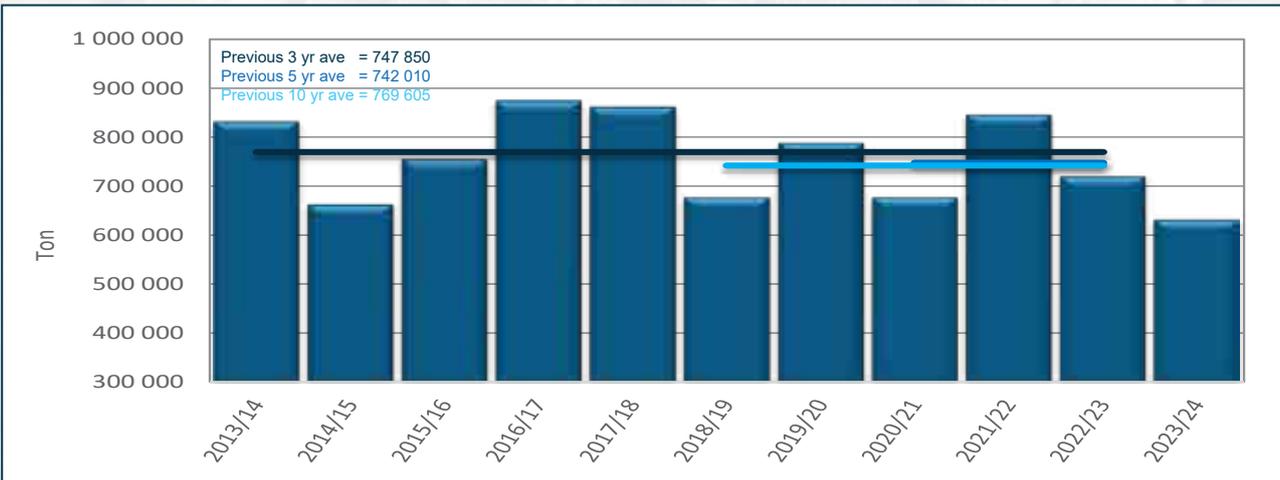
Table 2: Sunflower production overview over two seasons							
Province	Type of production	2023/24			2022/23		
		Hectares planted, ha	Production, tons	Yield, t/ha	Hectares planted, ha	Production, tons	Yield, t/ha
Western Cape	Dryland	-	-	-	-	-	-
	Irrigation	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Northern Cape	Dryland	-	-	-	-	-	-
	Irrigation	2 000	4 600	2.30	2 500	6 250	2.50
	Total	2 000	4 600	2.30	2 500	6 250	2.50
Free State	Dryland	250 000	341 250	1.37	283 000	385 000	1.36
	Irrigation	5 000	12 750	2.55	7 000	17 000	2.43
	Total	255 000	354 000	1.39	290 000	402 000	1.39
Eastern Cape	Dryland	700	1 400	2.00	700	1 400	2.00
	Irrigation	-	-	-	-	-	-
	Total	700	1 400	2.00	700	1 400	2.00
KwaZulu-Natal	Dryland	300	600	2.00	300	600	2.00
	Irrigation	-	-	-	-	-	-
	Total	300	600	2.00	300	600	2.00
Mpumalanga	Dryland	3 500	4 900	1.40	5 000	7 140	1.43
	Irrigation	-	-	-	-	-	-
	Total	3 500	4 900	1.40	5 000	7 140	1.43
Limpopo	Dryland	89 000	61 200	0.69	99 000	72 600	0.73
	Irrigation	1 000	1 800	1.80	1 000	2 400	2.40
	Total	90 000	63 000	0.70	100 000	75 000	0.75
Gauteng	Dryland	2 500	3 000	1.20	2 200	2 860	1.30
	Irrigation	-	-	-	-	-	-
	Total	2 500	3 000	1.20	2 200	2 860	1.30
North West	Dryland	172 000	193 500	1.13	152 900	221 250	1.45
	Irrigation	3 000	7 000	2.33	2 100	3 500	1.67
	Total	175 000	200 500	1.15	155 000	224 750	1.45
RSA	Dryland	518 000	605 850	1.17	543 100	690 850	1.27
	Irrigation	11 000	26 150	2.38	12 600	29 150	2.31
	Total	529 000	632 000	1.19	555 700	720 000	1.30

Figures provided by the CEC.

Graph 2: Total RSA area utilised for sunflower production from 2013/14 to 2023/24



Graph 3: Sunflower production in RSA from 2013/14 to 2023/24

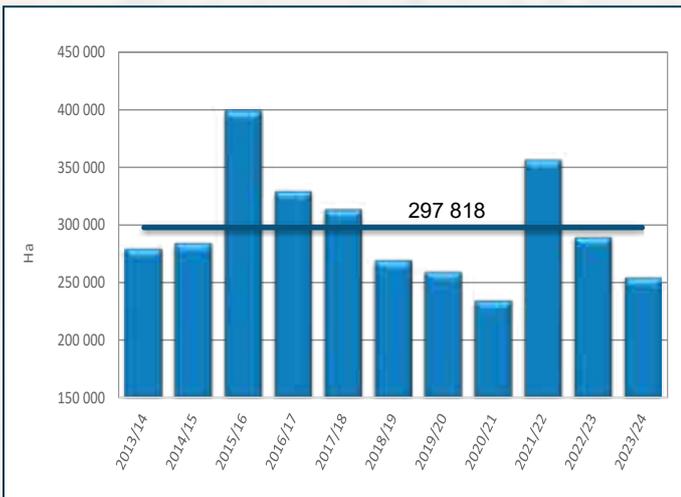


Graph 4: RSA Sunflower yield from 2013/14 to 2023/24

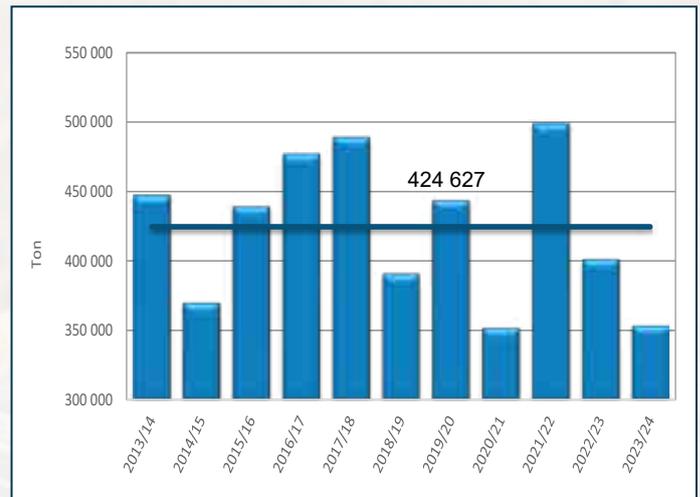


Figures provided by the CEC.

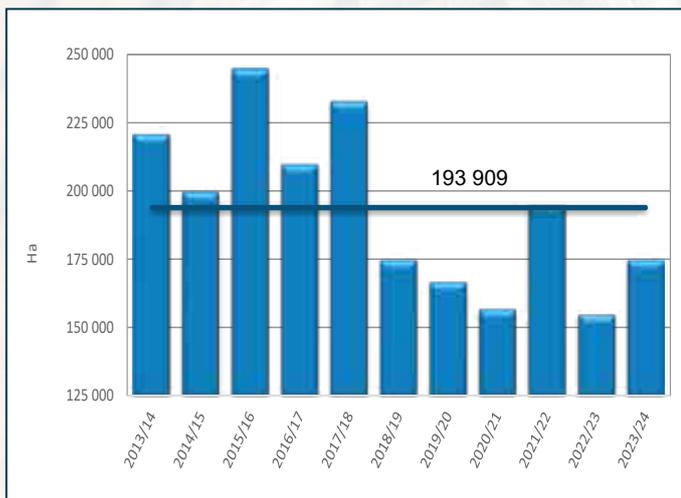
Graph 5: Area utilised for sunflower production in the Free State since 2013/14



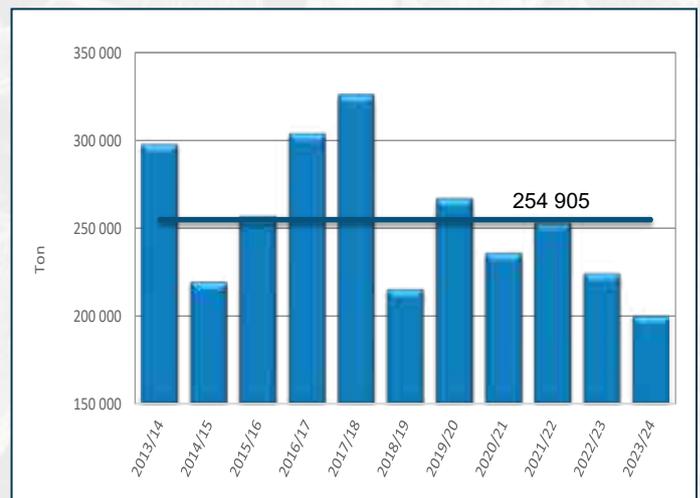
Graph 6: Sunflower production in the Free State since 2013/14



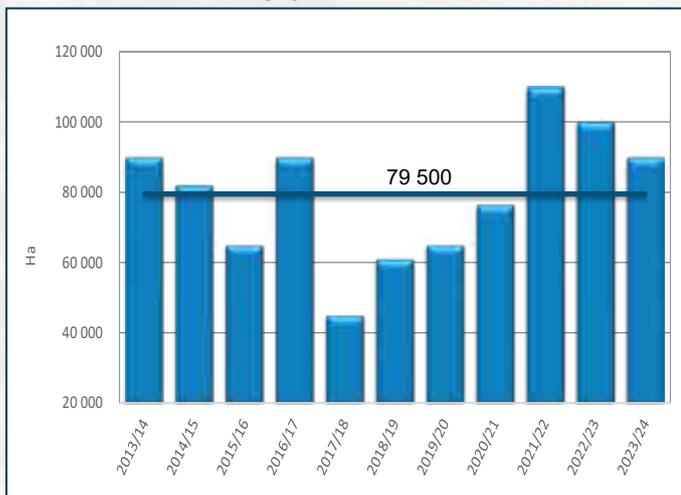
Graph 7: Area utilised for sunflower production in North West since 2013/14



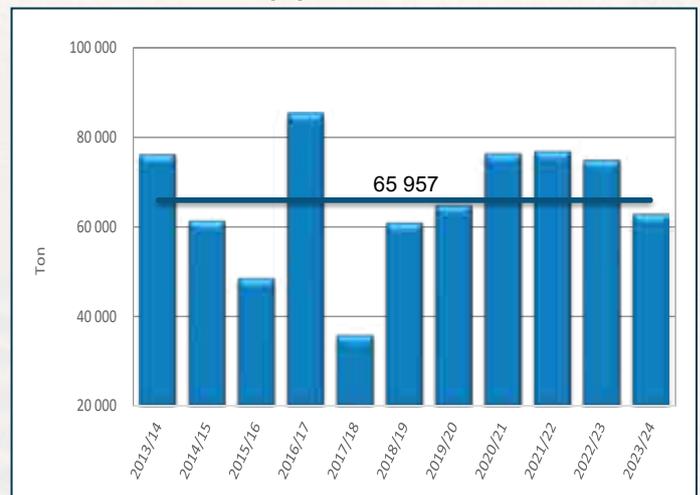
Graph 8: Sunflower production in North West since 2013/14



Graph 9: Area utilised for sunflower production in Limpopo since 2013/14



Graph 10: Sunflower production in Limpopo since 2013/14



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 2024/25 marketing season, opening stock improved by more than 70% compared to the previous marketing season. It is also 37% (34 584 tons) higher than the 10-year average.

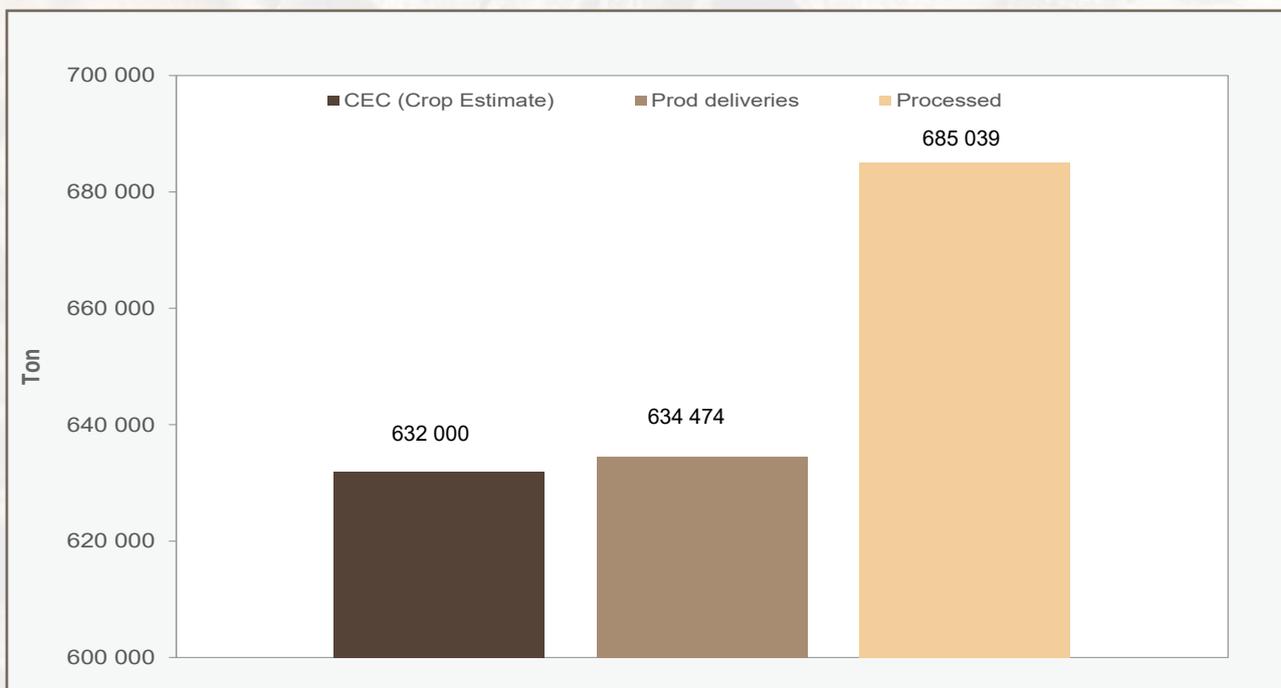
1 423 tons of sunflower and sunflower seed products were imported compared to the 12 793 and 6 805 tons of the previous two seasons respectively. The 10-year import average is 19 355 tons. Of the 685 039 tons of sunflower seeds processed this season, only 1 469 tons (0.2%) was used for human consumption and 6 011 tons (0.9%) for animal feed.

Sunflower and canola are crushed predominantly for the vegetable oil market to produce oil and oilcake. The amount of sunflower seeds crushed during the season (677 559 tons), is slightly (4 284 tons or 0.6%) more than during the previous season, but still almost 13% lower than the 10-year average of 775 807 tons.

Exports for the 2024/25 season amounted to 7 637 tons, compared to the 68 and 170 tons of the previous two seasons as well as the 10-year average of 347 tons. This year's export total was also the highest since the 79 400 tons in the 2008/09 season.

Globally, Russia, followed by the Ukraine, Argentina and the United States were the largest exporters of sunflower seeds during the 2023/24 season. Ukraine (6.3 million metric tons) and Russia (5.4 million metric tons) accounted for almost 73% of total sunflower oil exports worldwide in the corresponding period (*National Sunflower Association website www.sunflowernsa.com, Table updated January 10, 2025; Source: Oil World & USDA*).

Graph 11: Sunflower supply and demand overview for the 2024/25 marketing season (Mar 2024 - Feb 2025)



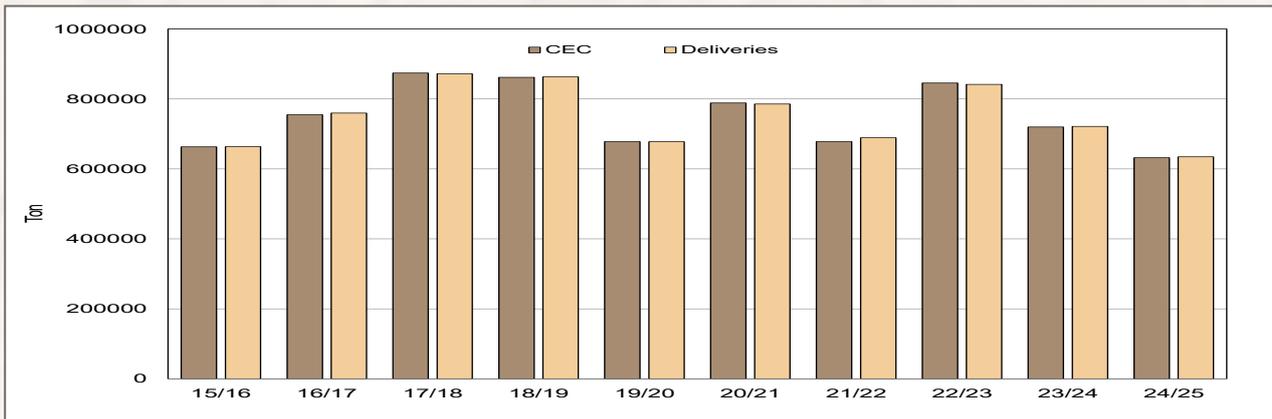
Information provided by SAGIS.

SUNFLOWERSEED: SUPPLY AND DEMAND TABLE BASED ON SAGIS' INFO (TON)

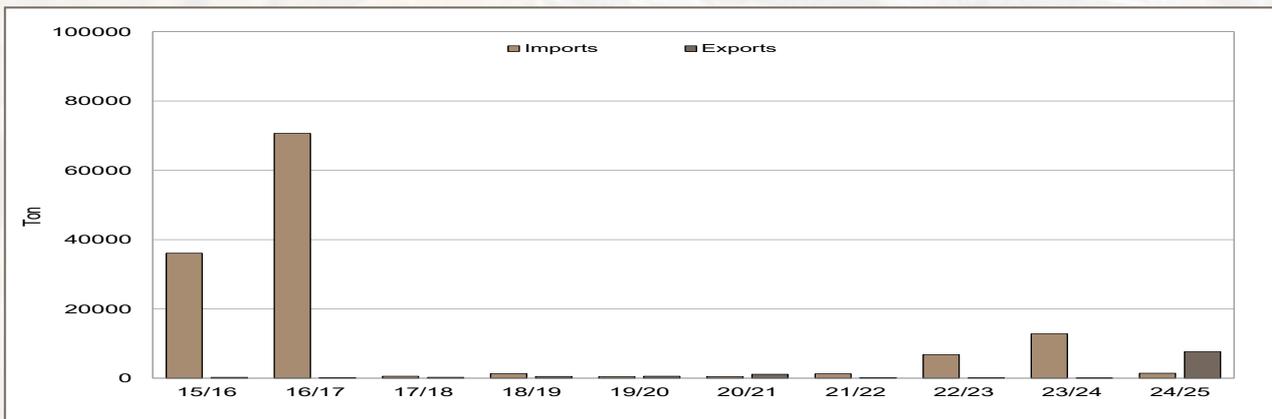
	Season (Mar - Feb)														Publication date: 2025-03-26			
															Current Season	10 Year average		
	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	2014/15-2023/24
CEC (Crop Estimate)	872 000	801 000	490 000	860 000	522 000	557 000	832 000	663 000	755 000	874 000	862 000	678 000	788 500	678 000	845 550	720 000	632 000	769 605
SUPPLY																		
Opening stock (1 Mar)	64 700	164 300	157 200	18 800	109 000	81 302	47 116	92 927	45 867	163 086	154 841	120 165	135 325	60 964	31 790	73 517	127 144	92 560
Prod deliveries	846 600	806 900	477 300	866 300	534 251	542 165	833 165	663 669	759 614	872 171	863 184	677 674	785 567	689 083	841 784	721 752	634 474	770 766
Imports	25 600	45 300	62 400	10 800	11 737	94 475	63 180	36 064	70 843	554	1 324	457	471	1 256	6 805	12 793	1 423	19 355
Surplus	4 100	700	2 000	3 800	5 485	4 689	5 948	9 897	4 268	12 173	6 863	6 520	7 200	9 306	11 241	3 642	7 965	7 706
Total Supply	941 000	1 017 200	698 900	899 700	660 473	722 631	949 409	802 557	880 392	1 047 984	1 026 212	804 816	928 563	760 609	891 620	811 704	771 006	890 387
DEMAND																		
Processed	665 300	847 200	671 500	782 200	572 519	666 551	847 682	747 808	707 327	885 039	900 045	664 027	861 295	724 949	815 258	680 788	685 039	783 422
-human	2 400	1 900	1 600	1 300	904	1 162	467	1 003	1 192	1 487	1 609	1 478	1 652	1 556	1 656	2 081	1 469	1 418
-animal feed	3 400	3 300	3 100	2 900	3 022	2 777	2 893	8 995	10 665	5 737	5 114	5 511	5 432	6 129	6 058	5 432	6 011	6 197
-crush (oil and oilcake)	679 500	842 000	666 800	778 000	568 593	662 612	844 322	737 810	695 470	877 815	893 322	657 038	854 211	717 264	807 544	673 275	677 559	775 807
Withdrawn by producers	4 900	5 700	1 700	3 500	2 521	2 524	1 068	1 157	605	442	519	783	464	359	392	110	8	590
Released to end-consumers	2 800	4 800	4 100	3 700	3 154	2 923	2 799	2 936	2 867	2 592	1 764	1 023	1 144	666	106	162	39	1 606
Seed for planting purposes	3 300	2 700	1 700	2 500	2 700	2 903	3 804	2 824	3 474	3 026	3 582	2 447	2 493	2 495	1 775	3 286	3 023	2 921
Net receipts(-)/disp(+)	1 000	- 400	1 000	- 1 200	- 1 716	606	1 081	1 709	2 828	1 770	- 378	635	1 063	133	402	146	306	939
Deficit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exports	79 400	0	100	0	27	8	48	256	205	274	515	576	1 140	217	170	68	7 637	347
Total Demand	776 700	860 000	680 100	790 700	579 205	675 515	856 482	756 690	717 306	893 143	906 047	669 491	867 599	728 819	818 103	684 560	696 052	789 824
Ending Stock (28 Feb)	164 300	157 200	18 800	109 000	81 268	47 116	92 927	45 867	163 086	154 841	120 165	135 325	60 964	31 790	73 517	127 144	74 954	100 563
- processed p/month	57 100	70 600	65 000	65 200	47 700	55 546	70 640	62 317	58 944	73 753	75 004	55 336	71 775	60 412	67 938	56 732	57 087	65 285
- months' stock	2.9	2.2	0.3	1.7	1.7	0.8	1.3	0.7	2.8	2.1	1.6	2.4	0.8	0.5	1.1	2.2	1.3	2

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

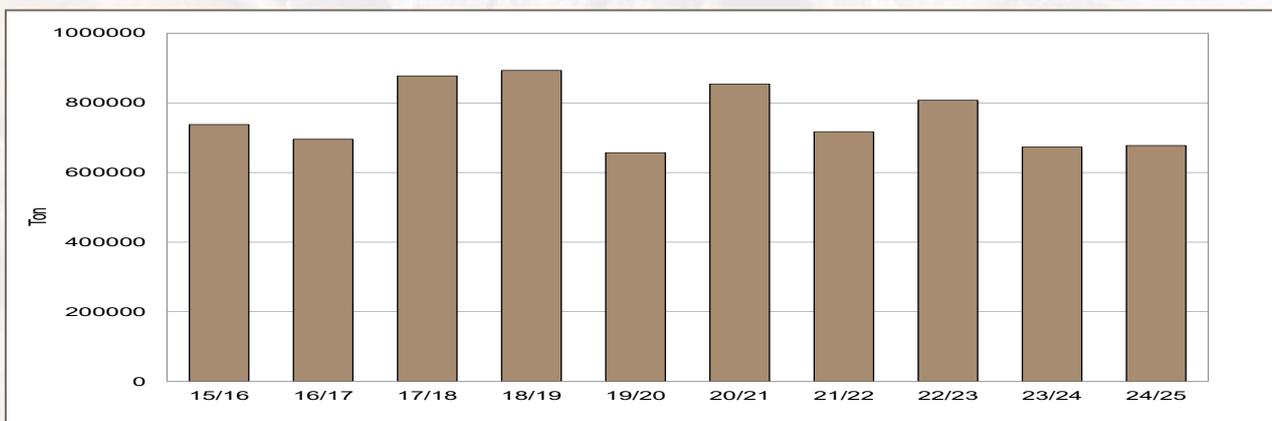
Graph 12: Sunflower: C&C Estimate vs SAGIS deliveries over 10 marketing seasons



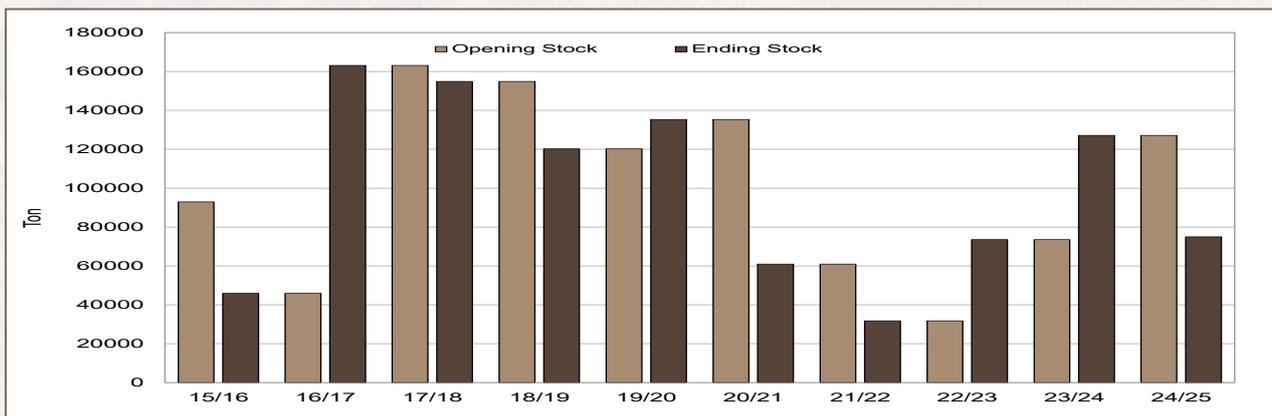
Graph 13: Sunflower: Imports and Exports over 10 marketing seasons



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 (TONS)													
	Argentina	Botswana	Brazil	Bulgaria	China	Egypt	Malawi	Mozambique	Romania	Ukraine	United Kingdom	Zambia	Zimbabwe	Total
2015/16	80	4 518	0	0	0	0	663	0	30 531	0	0	272	0	36 064
2016/17	42	1 424	0	38 434	0	0	686	0	30 015	19	23	0	0	70 643
2017/18	21	0	0	0	18	44	429	19	0	0	23	0	0	554
2018/19	65	381	0	0	0	23	855	0	0	0	0	0	0	1 324
2019/20	44	0	0	0	0	23	390	0	0	0	0	0	0	457
2020/21	87	0	20	0	0	90	274	0	0	0	0	0	0	471
2021/22	43	1 003	0	3	0	184	23	0	0	0	0	0	0	1 256
2022/23	66	6 564	0	0	0	0	175	0	0	0	0	0	0	6 805
2023/24	22	12 711	0	0	0	44	10	0	0	0	0	0	6	12 793
2024/25	221	1 056	0	0	0	116	30	0	0	0	0	0	0	1 423

Season	SUNFLOWER: IMPORTS PER HARBOUR (TONS)					
	Harbours					Total
	East London	Durban	Cape	Port Elizabeth	Richards Bay	
2015/16	0	30 611	0	0	0	30 611
2016/17	0	68 533	0	0	0	68 533
2017/18	0	44	62	0	0	106
2018/19	0	88	0	0	0	88
2019/20	0	67	0	0	0	67
2020/21	0	132	65	0	0	197
2021/22	0	135	95	0	0	230
2022/23	0	66	0	0	0	66
2023/24	0	66	0	0	0	66
2024/25*	0	316	21	0	0	337

*Progressive March 2024 - January 2025
Note: Includes Imports for RSA and Other Countries

Season	WHOLE SUNFLOWER: RSA EXPORTS PER COUNTRY (TONS)							
	Australia	Botswana	Mauritius	Namibia	Eswatini	Uganda	Zimbabwe	Total
2015/16	0	10	0	158	88	0	0	256
2016/17	0	40	0	48	107	0	10	205
2017/18	0	23	0	136	115	0	0	274
2018/19	0	10	0	360	145	0	0	515
2019/20	0	95	0	341	140	0	0	576
2020/21	0	24	0	304	192	54	566	1 140
2021/22	0	35	0	65	117	0	0	217
2022/23	0	35	4	50	81	0	0	170
2023/24	0	0	0	1	67	0	0	68
2024/25	0	0	0	0	63	0	133	196

Season	SUNFLOWER: EXPORTS PER HARBOUR (TONS)					
	Harbours					Total
	East London	Durban	Cape	Port Elizabeth	Richards Bay	
2015/16	0	0	0	0	0	0
2016/17	0	0	0	0	0	0
2017/18	0	0	0	0	0	0
2018/19	0	0	0	0	0	0
2019/20	0	0	0	0	0	0
2020/21	0	0	0	0	0	0
2021/22	0	0	0	0	0	0
2022/23	0	4	0	0	0	4
2023/24	0	0	0	0	0	0
2024/25*	0	0	0	0	0	0

*Progressive March 2024 - January 2025

OIL SEEDS PRODUCTS MANUFACTURED (PER MONTH)

	Marketing year Mar 2022 - Feb 2023 Progressive: 12 Months	Marketing year Mar 2023 - Feb 2024 Progressive: 12 Months	Mar 2024 Tons	Apr 2024 Tons	May 2024 Tons	Jun 2024 Tons	Jul 2024 Tons	Aug 2024 Tons	Sep 2024 Tons	Oct 2024 Tons	Nov 2024 Tons	Dec 2024 Tons	Jan 2025 Tons	Feb 2025 Tons	Date published: 2024/04/04 Marketing year Mar 2024 - Feb 2025 Progressive: 12 Months (Mar - Feb)
Palm Oil and Derivatives	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soybean Oil	287 762	311 007	20 302	31 713	29 767	27 721	30 164	29 815	30 790	29 840	28 433	22 384	25 297	25 514	331 740
Sunflower Oil	295 476	253 507	17 552	22 184	26 186	22 829	25 612	24 453	29 901	27 589	27 026	17 468	13 694	10 384	264 878
Coconut Oil/ Groundnut Oil / Canola Oil / Corn (Maize) Oil / Blends or mixes of Oils which includes one of the above Oils / Biodiesel / Cottonseed Oil	67 862	80 812	7 586	5 364	8 117	6 846	7 633	7 435	8 394	7 890	8 405	8 060	6 489	10 111	92 330
Sunflower Oilcake	319 018	269 302	18 760	25 810	28 615	23 007	27 100	27 103	33 044	29 892	29 434	18 691	14 864	11 945	288 265
Coconut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soybean Oilcake / Canola Oil- cake / Cottonseed Oilcake	1 379 161	1 476 779	98 300	141 071	139 810	130 507	143 637	140 557	141 741	136 442	131 723	103 285	113 814	116 049	1 536 936
Soybean Flours and Meals / Textured Vegetable Protein	41 726	50 478	3 365	4 668	4 984	4 203	3 880	4 276	3 806	5 662	4 558	2 933	2 758	2 179	47 272
Soybean Fullfat	173 986	153 025	10 024	9 374	9 463	8 729	10 233	8 583	8 848	9 034	9 881	9 648	8 634	7 514	108 965
Peanut Butter and Paste	30 519	30 744	2 498	2 993	2 561	2 539	2 925	2 510	2 482	2 525	2 637	2 604	1 652	1 837	28 763
Total	2 595 510	2 625 654	178 387	243 177	249 503	226 381	251 184	244 732	259 006	248 874	242 097	185 073	187 202	185 533	2 701 149

OIL SEEDS PRODUCTS IMPORTED (PER MONTH)

	Marketing year Mar 2022 - Feb 2023 Progressive: 12 Months	Mar 2024 Tons	Apr 2024 Tons	May 2024 Tons	Jun 2024 Tons	Jul 2024 Tons	Aug 2024 Tons	Sep 2024 Tons	Oct 2024 Tons	Nov 2024 Tons	Dec 2024 Tons	Jan 2025 Tons	Feb 2025 Tons	Marketing year Mar 2024 - Feb 2025 Progressive: 12 Months (Mar - Feb)
Palm Oil and Derivatives	495 285	76 990	46 092	43 712	49 639	38 312	60 689	51 473	77 919	43 459	55 810	38 648	33 458	616 201
Soybean Oil	52 125	1 546	796	1 291	5 109	6 387	1 080	11 509	2 462	2 148	682	2 133	2 407	37 550
Sunflower Oil	125 929	10 429	1 579	16 185	15 501	8 852	1 639	25 361	12 194	22 570	15 061	1 585	1 240	132 196
Coconut Oil/ Groundnut Oil / Canola Oil / Corn (Maize) Oil / Blends or mixes of Oils which includes one of the above Oils / Biodiesel / Cottonseed Oil	5 537	594	525	583	517	163	268	256	435	318	269	440	140	4 508
Sunflower Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coconut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soybean Oilcake / Canola Oil- cake / Cottonseed Oilcake	181 566	543	0	23 152	23 832	3 439	17 028	17 327	40 166	31 264	13 643	31 817	37 437	239 648
Soybean Flours and Meals / Textured Vegetable Protein	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
Peanut Butter and Paste	1 969	37	77	42	121	215	91	121	320	266	42	452	54	1 838
Total	862 411	90 139	49 089	84 965	94 719	57 388	80 795	106 047	133 496	100 025	85 507	75 075	74 736	1 031 941

	OIL SEEDS PRODUCTS EXPORTED (PER MONTH)												Date published: 20/04/04	
	Marketing year Mar 2022 - Feb 2023 Progressive: 12 Months	Mar 2024 Tons	Apr 2024 Tons	May 2024 Tons	June 2024 Tons	July 2024 Tons	Aug 2024 Tons	Sep 2024 Tons	Oct 2024 Tons	Nov 2024 Tons	Dec 2024 Tons	Jan 2025 Tons	Feb 2025 Tons	Marketing year Mar 2024 - Feb 2025 Progressive: 12 Months (Mar - Feb)
Palm Oil and Derivatives	11 505	1 048	669	693	714	710	900	562	1 005	1 021	708	792	1 188	10 010
Soybean Oil	46 201	7 477	8 949	9 662	8 605	7 043	8 208	3 413	3 381	3 433	5 528	4 660	9 179	79 538
Sunflower Oil	9 330	583	287	642	281	100	1 813	424	198	178	231	279	143	5 159
Coconut Oil/ Groundnut Oil / Canola Oil / Corn (Maize) Oil / Blends or mixes of Oils which includes one of the above Oils / Biodiesel / Cottonseed Oil	13 624	908	1 290	765	331	857	495	368	622	57	227	688	575	7 183
Sunflower Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coconut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmut Oilcake	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Soybean Oilcake / Canola Oil- cake / Cottonseed Oilcake	10 404	3 090	3 086	3 585	3 911	5 538	8 265	6 630	8 564	7 468	6 719	8 044	10 182	75 082
Soybean Flours and Meals / Textured Vegetable Protein	23 619	1 043	1 862	1 872	2 198	3 597	3 920	2 640	2 904	3 975	3 685	3 468	3 545	34 709
Soybean Fullfat	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peanut Butter and Paste	212	14	5	17	15	14	22	13	13	15	11	13	13	165
Total	114 895	14 163	16 148	17 236	16 055	17 859	23 823	14 050	16 687	16 147	17 109	17 944	24 825	211 846

Figure 1: RSA Provinces



Regional map with gratitude to SiQ.

The 9 provinces are divided into 36 grain production regions.

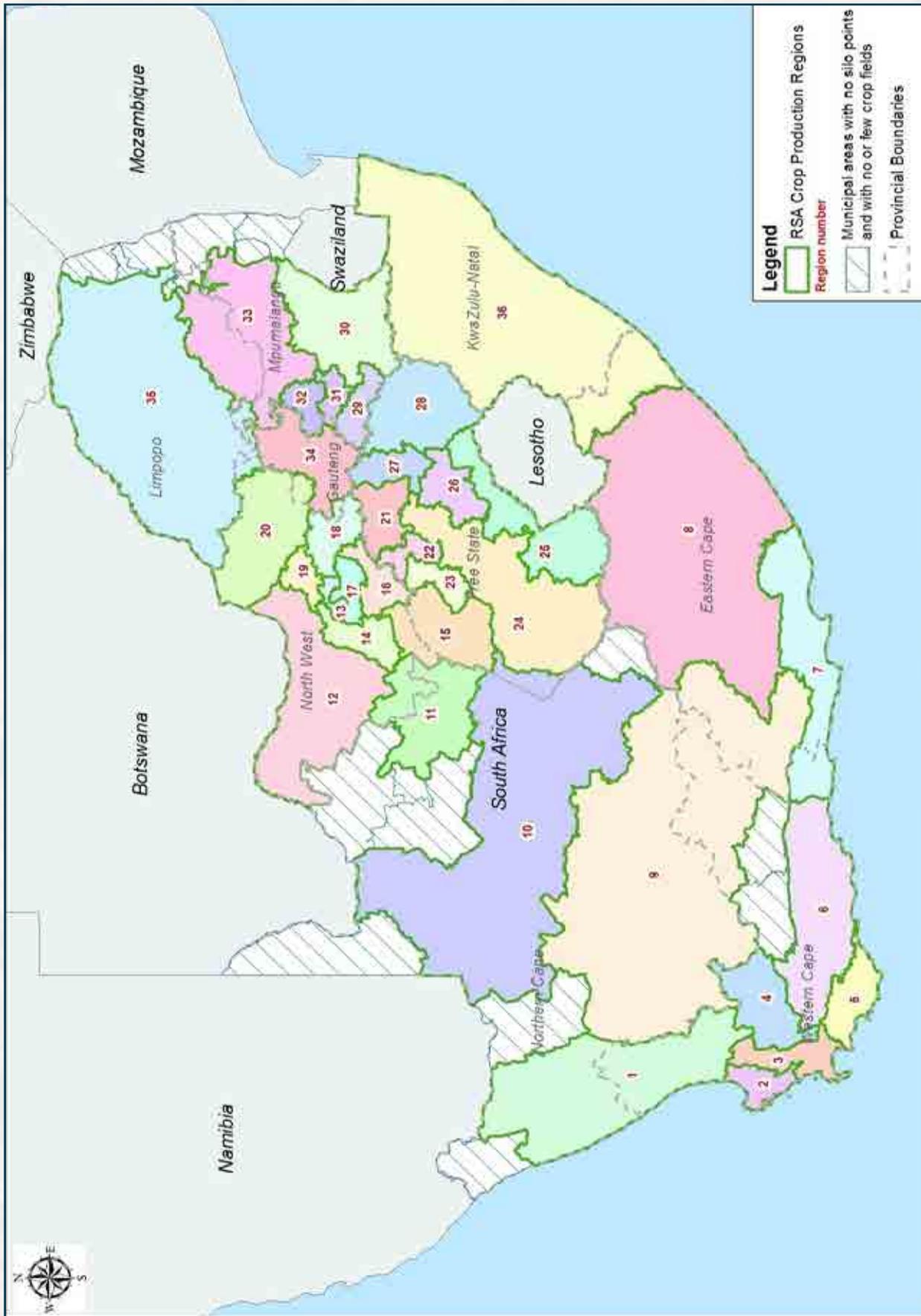
The regions are distributed as follows:

- Region 1: Namakwaland
- Regions 2 to 4: Swartland
- Regions 5 and 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 2023/24 production season, are named and described on pages 15 to 17. All the silo/intake stands as well as the type of storage structure, situated in a particular region, are provided.

Figure 2: RSA Crop Production Regions



Regional map with gratitude to Agbiz Grain and SIQ.

Grain Production Regions

Silo/Intake stands per region indicating type of storage structure

Region 12: North West Western Region

NWK	Blaauwbank (Bins)	NWK	Mareetsane (Bins)
NWK	Bührmannsdrif (Bins)	Senwes	Kameel (Bins)
NWK	Kameel (Bins)	Senwes	Vryburg (Bins)

Region 13: North West Central Region (Sannieshof)

NWK	Biesiesvlei (Bins)	NWK	Oppaslaagte (Bins)
NWK	Bossies (Bins)	NWK	Sannieshof (Bins)
NWK	Gerdau (Bins)		

Region 14: North West Southern Region

NWK	Barberspan (Bins)	NWK	Taaibospan (Bins)
NWK	Delareyville (Bins)	Senwes	Amalia (Bins)
NWK	Excelsior (Bins)	Senwes	Hallatshope (Bins)
NWK	Geysdorp (Bins)	Senwes	Migdol (Bins)
NWK	Migdol (Bins)	Senwes	Schweizer-Reneke (Bins)
NWK	Nooitgedacht (Bins)		

Region 15: North West South-Eastern Region

Senwes	Bloemhof (Bins)	Senwes	Hoopstad (Bins)
GWK	Christiana (Bins)	Senwes	Kingswood (Bins)
Senwes	Christiana (Bins)	Senwes	Kruising (Bins)
Senwes	Helpman (Bags)	Senwes	Poppieland (Bunkers)
Senwes	Hertzogville (Bins)		

Region 16: North West Central Eastern Region

Senwes	Bamboesspruit (Bins)	Senwes	Regina (Bins)
Senwes	Klerksdorp (Bins)	Senwes	Strydpoort (Bins)
Senwes	Leeudoringstad (Bins)	Senwes	Wolmaranstad (Bins)
Senwes	Makwassie (Bins)		

Region 17: North West Central-Northern Region (Ottosdal)

NWK	Boschpoort (Bags/Bins/Bulk)	NWK	Vermaas (Bins)
NWK	Kleinwarts (Bins)	Senwes	Hartbeesfontein (Bins)
NWK	Ottosdal (Bins)	Senwes	Melliodora (Bins)
NWK	Rostrataville (Bins)	Senwes	Werda (Bins)

Region 18: North West Central Region (Ventersdorp)

NWK	Bodenstein (Bins)	Senwes	Makokskraal (Bins)
NWK	Coligny (Bins)	Senwes	Potchefstroom (Bins)
Senwes	Buckingham (Bins)	Senwes	Ventersdorp (Bins)
Senwes	Enselspruit (Bins)		

Region 19: North West Central Region (Lichtenburg)

Afgri	Lichtenburg (Bunkers)	NWK	Lottie Halte (Bins)
NWK	Grootpan (Bins)	NWK	Lusthof (Bins)
NWK	Halfpad (Bins)	NWK	Lichtenburg Silo 3 (Bins)
NWK	Hibernia (Bins)	NWK	Lichtenburg Silo 5 (Bins)

Grain Production Regions

Silo/Intake stands per region indicating type of storage structure

Region 20: North West Eastern Region

Afgri	Battery (Bins)	NWK	Koster (Bins)
Afgri	Brits (Bins)	NWK	Swartruggens (Bins)
NWK	Boons (Bins)	NWK	Syferbult (Bins)
NWK	Derby (Bins)		

Region 21: Free State North-Western Region (Viljoenskroon)

Senwes	Attie (Bins)	Senwes	Vierfontein (Bins)
Senwes	Groenebloem (Bins)	Senwes	Viljoenskroon (Bins)
Senwes	Heuningspruit (Bins)	Senwes	Vredefort (Bins)
Senwes	Koppies (Bins)	Senwes	Weiveld (Bins)
Senwes	Rooiwal (Bins)		

Region 22: Free State North-Western Region (Bothaville)

Senwes	Allanrigde (Bins)	Senwes	Schoonspruit (Bins)
Senwes	Bothaville (Bins)	Senwes	Schuttendraai (Bins)
Senwes	Mirage (Bins)	Suidwes	Misgunst (Bunkers)
Senwes	Odendaalsrus (Bins)		

Region 23: Free State North-Western Region (Bultfontein)

Senwes	Bultfontein (Bins)	Senwes	Tierfontein (Bins)
Senwes	Losdoorns (Bins)	Senwes	Wesselsbron (Bins)
Senwes	Protespan (Bins)	Senwes	Willemsrus (Bins)

Region 24: Free State Central Region

Senwes	Bloemfontein (Bins)	Senwes	Petrusburg (Bins)
Senwes	Bradfort (Bins)	Senwes	Theunissen (Bins)
Senwes	De Brug (Bins)	Senwes	Van Tonder (Bins)
Senwes	Geneva (Bins)	Senwes	Welgeleë (Bins)
Senwes	Hennenman (Bins)	Senwes	Winburg (Bins)
Senwes	Kroonstad (Bins)		

Region 25: Free State South-Western Region

Afgri	Bethlehem (Bins)	OVK	Marseilles (Bins)
Afgri	Slabberts (Bins)	OVK	Modderpoort (Bins)
OVK	Clocolan (Bins)	OVK	Tweespruit (Bins)
OVK	Ficksburg (Bins)	OVK	Westminster (Bins)
OVK	Fouriesburg (Bins)	Senwes	Dewetsdorp (Bins)

Region 26: Free State South-Eastern Region

Afgri	Kaallaagte (Bins)	Afgri	Monte Video (Bins)
Afgri	Libertas (Bins)	Afgri	Senekal (Bins)
Afgri	Marquard (Bins)	Senwes	Arlington (Bins)
Afgri	Meets (Bins)	Senwes	Steynsrus (Bins)

Grain Production Regions

Silo/Intake stands per region indicating type of storage structure

Region 27: Free State Northern Region

Senwes	Gottenburg (Bins)	Senwes	Mooigeleë (Bins)
Senwes	Heilbron (Bins)	Senwes	Wolwehoek (Bins)
Senwes	Hoogte Grainlink (Bins)	VKB	Petrus Steyn (Bins)

Region 29: Mpumalanga Southern Region

Afgri	Balfour (Bins)	Afgri	Leeuspruit (Bins)
Afgri	Greylingstad (Bins)	Afgri	Platrand (Bins)
Afgri	Grootvlei (Bins)	Afgri	Standerton (Bins)
Afgri	Harvard (Bins)	Afgri	Vaaldrift (Bunkers)
Afgri	Holmdene (Bins)	Afgri	Val (Bins)

Region 31: Mpumalanga Central Region

Afgri	Bakenlaagte (Bunkers)	Afgri	Kortlaagte (Bins)
Afgri	Bethal (Bins)	Afgri	Leslie (Bins)
Afgri	Brakfontein (Bunkers)	Afgri	Palmietfontein (Bunkers)
Afgri	Devon (Bin)	Afgri	Trichardt (Bins)
Afgri	Kinross (Bins/Bunkers)	Afgri	Vaalkrantz (Bunkers)

Region 35: Limpopo Region

Afgri	Northam (Bins)	VKB	Nylstroom (Modimolle) (Bins)
VKB	Alma (Bins)	VKB	Potgietersrus (Mokopane) (Bins)
VKB	Lehau (Bins)	VKB	Roedtan (Bins)
VKB	Naboomspruit (Mookgophong) (Bins)	VKB	Settlers (Bins)
VKB	Nutfield (Bins)	VKB	Warmbad (Bela-Bela) (Bins)

Sunflower Crop Quality 2023/24 - Summary of Results

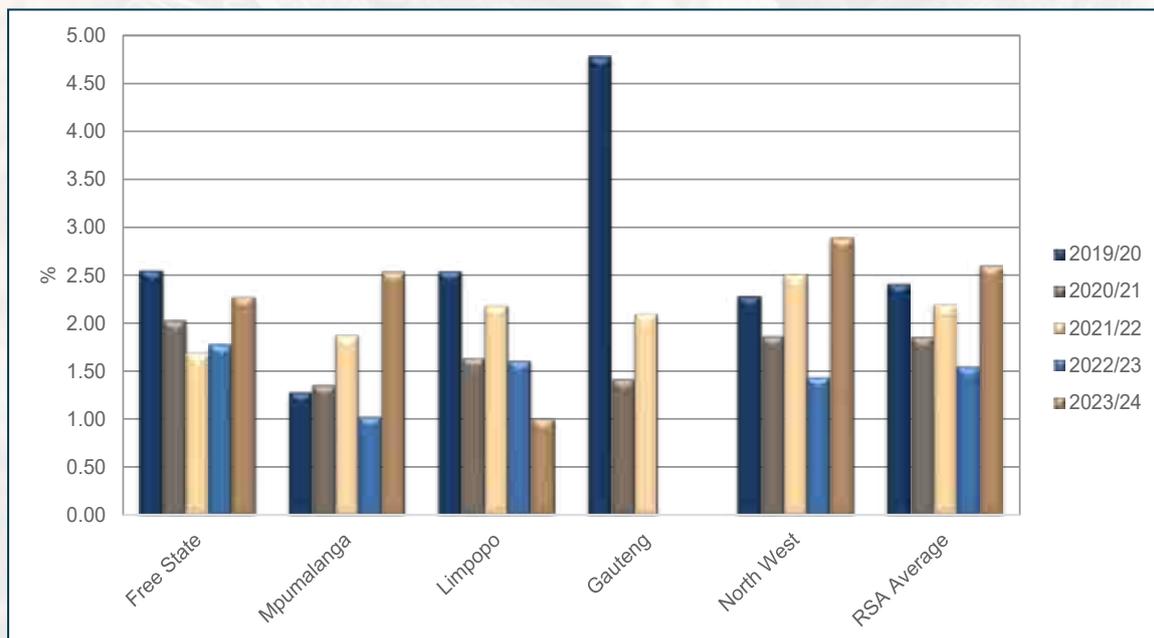
Seventy-six percent (106) of the 140 samples analysed for the purpose of this survey were graded as Grade FH1, with 34 (24%) of the samples downgraded to COSF (Class Other Sunflower Seed). The percentage of samples graded FH1 decreased compared to the previous season's 83%. The ten-year weighted average of the percentage samples graded as FH1 is 79%.

The grading results of the 34 samples downgraded to COSF can be summarised as follows:

- Percentage screenings exceeding the maximum permissible deviation of 4% was present in 21 samples.
- Percentage foreign matter exceeding the maximum permissible deviation of 4% was present in 11 samples.
- Percentage collective deviations exceeding the maximum permissible deviation of 6% was present in 25 samples.
- Poisonous seeds (*Datura sp.*) exceeding the maximum permissible number of 1 per 1000 g were present in five samples.
- Twenty-two of the 34 samples downgraded to COSF were as a result of a combination of two or more of the above mentioned deviations exceeding the maximum permissible .

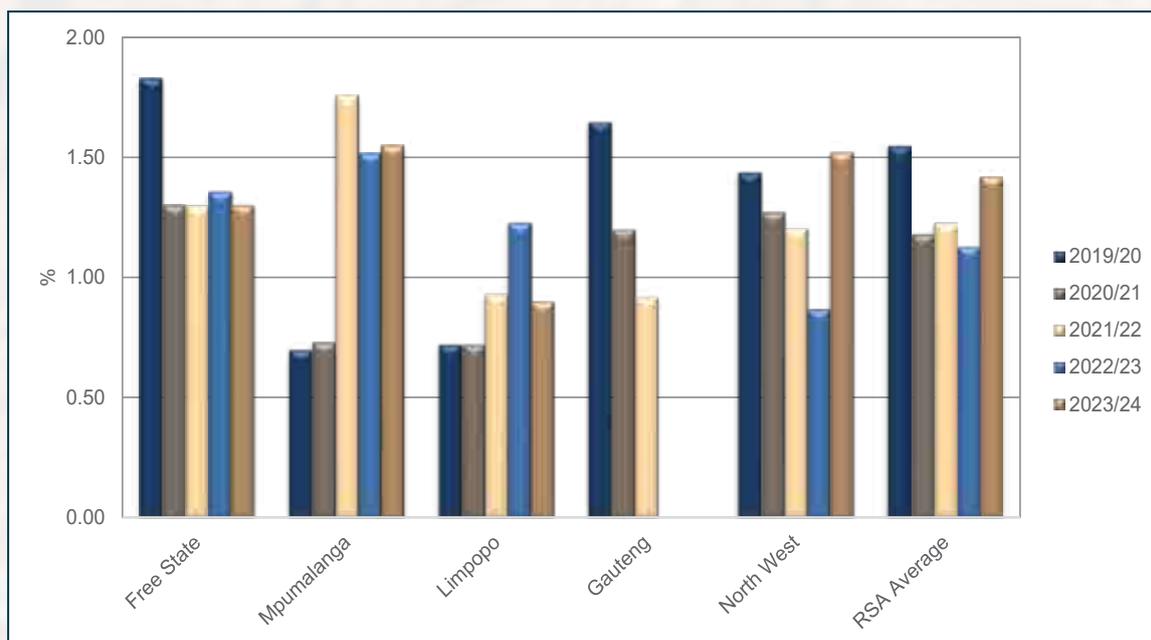
The samples from North West province (N = 83) reported the highest average percentage screenings namely 2.89%, followed by Mpumalanga (N = 2) and the Free State (N = 50) with 2.54% and 2.28% respectively. Limpopo (N = 5) reported the lowest percentage screenings of 1.01%. The weighted national average was 2.60% compared to the 1.55% of the previous season.

Graph 16: Average percentage screenings per province over five seasons



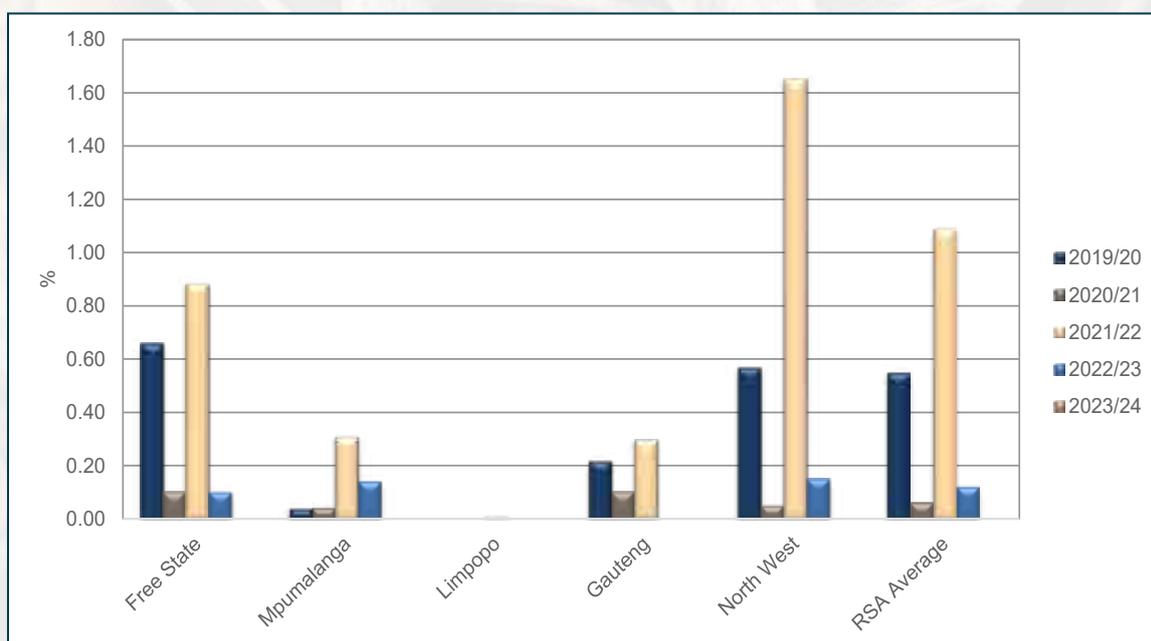
The highest weighted average percentage foreign matter (1.55%) was reported for the samples from the Mpumalanga regions. North West and the Free State followed with 1.52% and 1.30% respectively. The lowest percentage was found in Limpopo (0.90%). The national average was 1.42% compared to the 1.13% and 1.23% of the previous two seasons. Please see Graph 17.

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



Only two samples received for this survey contained sclerotia (0.20% and 0.10% respectively) from the fungus *Sclerotinia sclerotiorum*. Both of these samples originated in the Free State. The previous season 22% of samples contained sclerotia and in the 2021/22 season this figure was 70%.

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 seed is provided in Table 3 for information purposes. The standard working procedure of the Kern 222 instrument, as described in ISO 7971-3:2019, was followed. The g/1 L filling mass of the sunflower seed samples was determined and divided by two. The test weight was then extrapolated by means of the following formulas obtained from the Test Weight Conversion Chart for 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 also see Graph 19 for a comparison of the test weight per province over the last five seasons.

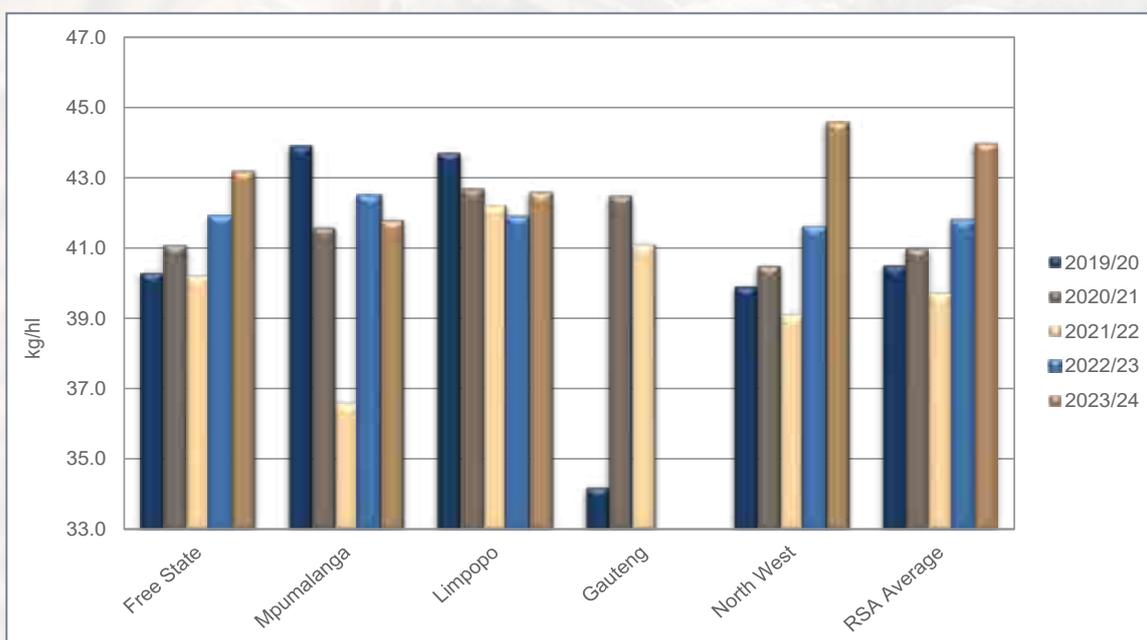
Table 3: Approximation of test weight per province over three seasons

Province	Test weight, kg/hl								
	2023/24 Season			2022/23 Season			2021/22 Season		
	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples	Weighted average	Range	No. of samples
Free State (Regions 21 - 28)	43.2	39.9 - 47.6	50	41.9	34.8 - 47.0	64	40.2	33.1 - 43.9	*45
Mpumalanga (Regions 29 - 33)	41.8	40.4 - 43.1	2	42.5	40.9 - 45.2	11	36.6	35.2 - 44.5	13
Limpopo (Region 35)	42.6	40.2 - 42.1	5	41.9	36.4 - 47.2	17	42.2	39.9 - 47.3	27
Gauteng (Region 34)	-	-	-	-	-	-	41.1	-	1
North West (Region 12 - 20)	44.6	38.8 - 49.2	**81	41.6	32.2 - 45.4	82	39.1	32.0 - 42.4	**86
RSA	44.0	38.8 - 49.2	138	41.8	32.2 - 47.2	174	39.7	32.0 - 47.3	172

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

**Three samples with outlier values were not taken into account for calculation purposes.

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/100 g) on an 'as received' or 'as is' basis.

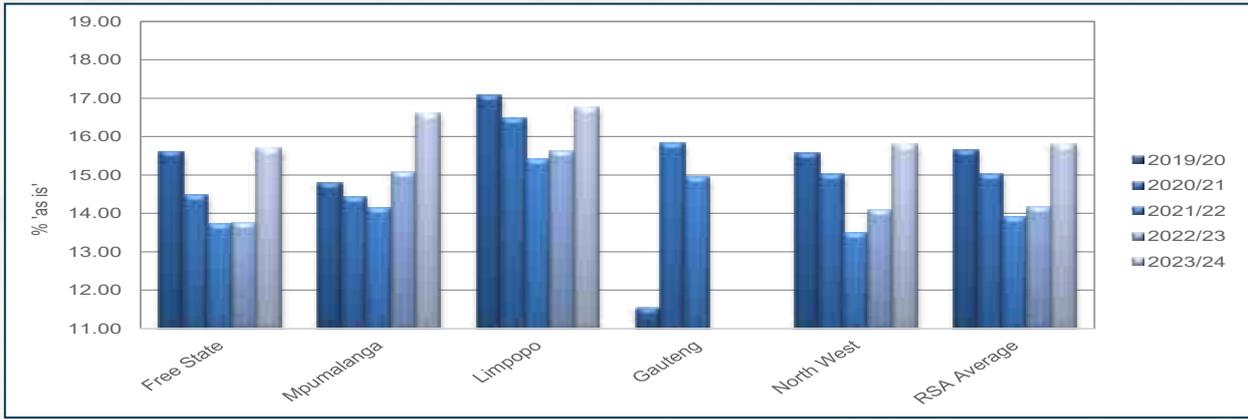
The weighted average crude protein content this season was 15.81%. The last five seasons reported the lowest average values of the twelve seasons for which crop survey results are available. The average results of the previous four seasons (between 2019/20 to 2022/23) ranged from 13.90% to 15.66%. Limpopo had the highest weighted average crude protein content of 16.76%, followed by Mpumalanga with 16.62%, North West with 15.81% and the Free State with the lowest average of 15.69%.

The weighted average crude fat percentage of 40.4%, is the highest since the start of the survey in the 2012/13 season, followed by last season's 39.9%. The lowest average fat percentage of 37.0% was reported in the 2017/18 season. The samples from North West had the highest crude fat content of 41.3%, followed by Mpumalanga with 40.7%. Limpopo and the Free State averaged 39.5% and 39.0% respectively.

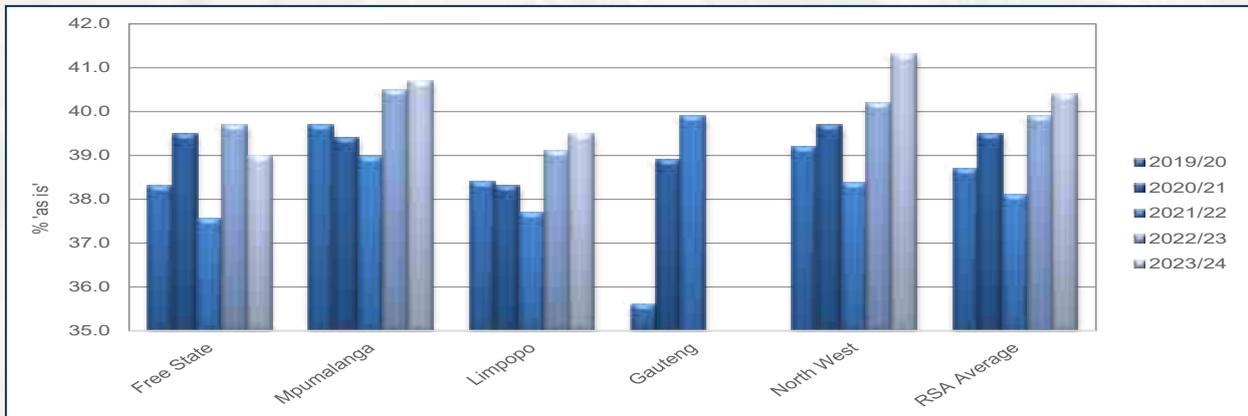
The weighted average percentage crude fibre was 20.0%, the combined lowest value together with the 2014/15 and 2012/13 seasons. Average values varied from a low of 19.8% in North West to a high of 21.0% in Mpumalanga. The weighted average ash content was 2.46%, also the lowest value of the twelve seasons. The provincial averages ranged from 2.37% in Limpopo to 2.64% in the Free State.

Graphs 20 to 23 on page 21 provide comparisons between provinces and over seasons for the nutritional components discussed above.

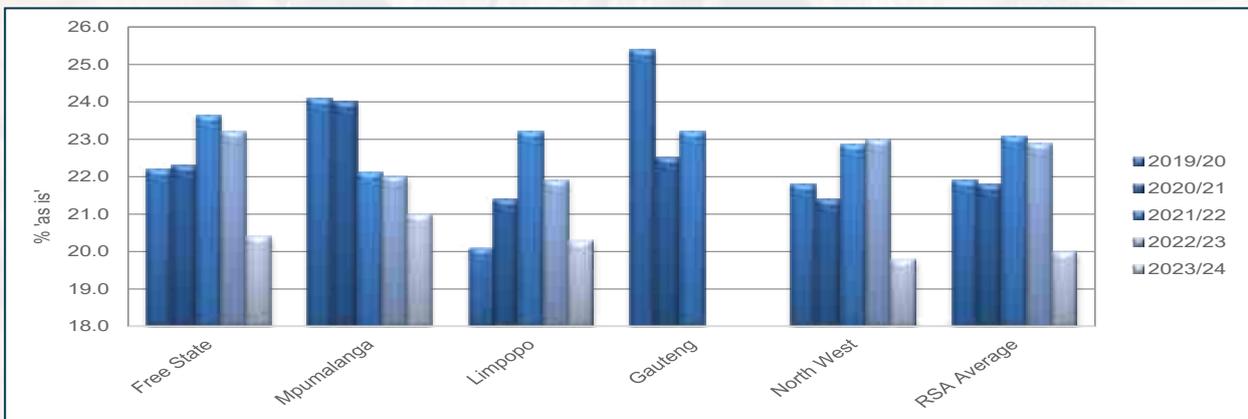
Graph 20: Average crude protein content per province over five seasons



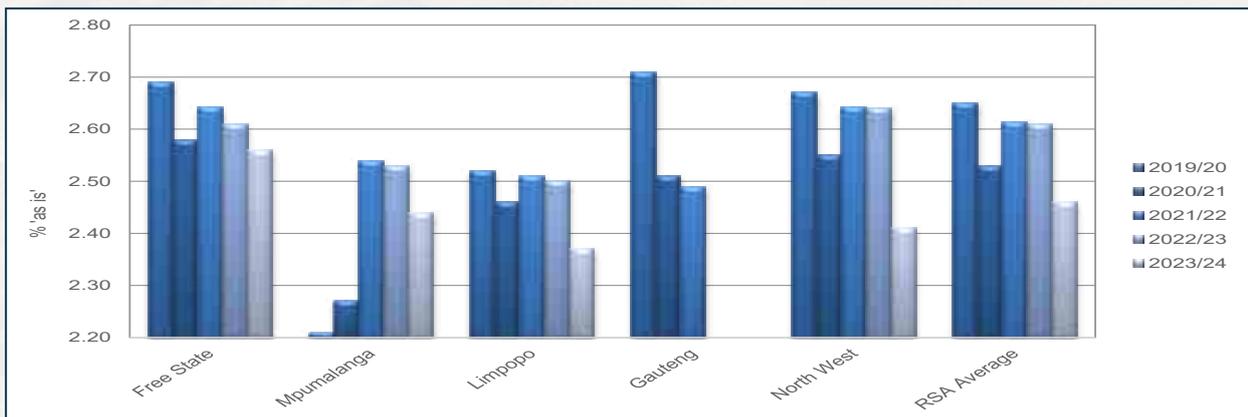
Graph 21: Average crude fat content per province over five seasons



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



Graph 23: Average ash content per province over five seasons



Please see a comparison of the moisture, crude protein and crude fat results between the crop survey and ARC Grain Crops sunflower cultivar trials' samples in Table 4.

Table 4: Comparison between the moisture, crude protein and crude fat results of the sunflower crop quality and ARC cultivar trial samples of the 2023/24 season			
Analysis	Moisture, % (5hr, 105°C)	Crude Protein, % (as is)	Crude Fat, % (as is)
Sunflower Crop Quality Survey results			
Average	4.6	15.81	40.4
Minimum	2.7	12.66	33.2
Maximum	7.7	19.29	45.9
Standard deviation	0.90	1.06	2.63
No. of samples	140	140	140
ARC Grains Crops Cultivar trial sample results			
Average	5.2	16.57	44.4
Minimum	3.5	11.36	35.3
Maximum	6.8	22.93	54.8
Standard deviation	0.73	2.75	3.97
No. of samples	170	170	170
% Difference between crop and cultivar samples	-0.6	-0.76	-4.0

See Table 5 on page 23 for a summary of the RSA Sunflower Crop Quality averages of the 2023/24 season compared to those of the 2022/23 season.

Please also see pages 24 to 30 for the average sunflower quality per region.

Graphs 20 to 23 on page 21 provide comparisons between provinces and over seasons for the nutritional components discussed above.

Table 5: South African Sunflower Crop Quality Averages 2023/24 vs 2022/23

Class and Grade Sunflower	2023/24			2022/23		
	FH1	COSF	Average	FH1	COSF	Average
<u>Grading:</u>						
1. Damaged sunflower seed, %	0.00	0.01	0.01	0.06	1.01	0.22
2. Screenings, %	1.83	4.97	2.60	1.30	2.81	1.55
3. Sclerotia, %	0.00	0.00	0.00	0.05	0.46	0.12
4. Foreign Matter, %	1.03	2.63	1.42	0.92	2.18	1.13
5. Deviations in 2,3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	2.87	7.61	4.02	2.27	5.45	2.80
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 (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	2	0	0	7	1
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0	0	0
Number of samples	106	34	140	145	29	174
<u>Nutritional analysis:</u>						
Moisture, % (5 hr, 105 °C)	4.7	4.4	4.6	4.8	4.8	4.8
Crude Protein, % (as is)	15.82	15.80	15.81	14.13	14.38	14.17
Crude Fat, % (as is)	40.3	40.7	40.4	40.0	39.7	39.9
Crude Fibre, % (as is)	20.0	20.2	20.0	23.0	22.3	22.9
Ash, % (as is)	2.47	2.44	2.46	2.59	2.69	2.61
Number of samples	106	34	140	145	29	174

South Africa

Regional Sunflower Quality

PRODUCTION REGION	(12) North-West Western Region				(13) North-West Central Region (Sannieshof)				(14) North-West Southern Region			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
<u>Grading:</u>												
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.02	0.00	0.24	0.06	0.00	0.00	0.00	0.00
2. Screenings, %	0.97	0.20	2.06	0.81	3.59	1.04	12.04	2.77	3.37	1.20	7.00	2.21
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Foreign Matter, %	2.12	0.40	8.80	3.29	1.63	0.20	5.64	1.70	1.53	0.26	4.40	1.29
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	3.08	0.60	10.86	3.93	5.21	1.48	16.84	3.79	4.90	1.46	11.40	2.63
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00	1	0	10	2.58	1	0	20	5.16
Number of samples	6				15				15			
<u>Nutritional analysis:</u>												
Moisture, % (5 hr, 105 °C)	4.2	3.1	5.5	0.86	4.6	3.3	6.1	0.89	4.3	2.8	7.7	1.24
Crude Protein, % (as is)	15.47	14.48	16.55	0.82	16.16	14.06	17.37	0.86	15.50	14.33	16.62	0.71
Crude Fat, % (as is)	41.2	38.0	43.6	2.00	41.4	35.5	43.6	2.24	42.7	38.1	45.9	1.94
Crude Fibre, % (as is)	19.6	18.3	21.0	1.23	19.3	16.6	23.6	2.09	19.1	15.9	22.4	1.45
Ash, % (as is)	2.27	2.05	2.49	0.17	2.49	2.27	2.84	0.17	2.28	1.94	2.66	0.19
Number of samples	6				15				15			

South Africa

Regional Sunflower Quality

PRODUCTION REGION	(15) North-West South-Eastern Region				(16) North-West Central-Eastern Region				(17) North-West Central-Northern Region (Ottosdal)			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
<u>Grading:</u>												
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Screenings, %	1.05	1.00	1.10	0.07	2.40	2.20	2.60	0.28	2.04	0.60	4.66	1.32
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Foreign Matter, %	0.61	0.42	0.80	0.27	1.15	0.70	1.60	0.64	0.68	0.10	2.00	0.63
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	1.66	1.52	1.80	0.20	3.55	2.90	4.20	0.92	2.73	0.70	5.72	1.72
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00	10	0	20	14.14	0	0	0	0.00
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	2				2				9			
<u>Nutritional analysis:</u>												
Moisture, % (5 hr, 105 °C)	4.2	4.0	4.4	0.28	4.0	3.4	4.6	0.85	4.6	3.2	6.0	0.89
Crude Protein, % (as is)	14.84	13.63	16.04	1.70	16.27	16.11	16.43	0.23	16.37	14.80	19.29	1.30
Crude Fat, % (as is)	40.7	40.6	40.8	0.14	40.8	37.9	43.6	4.03	39.7	33.6	42.6	3.01
Crude Fibre, % (as is)	21.2	20.8	21.5	0.49	21.3	19.9	22.7	1.98	19.4	17.9	21.5	1.15
Ash, % (as is)	2.43	2.42	2.43	0.01	2.29	2.19	2.38	0.13	2.52	2.26	3.25	0.30
Number of samples	2				2				9			

South Africa

Regional Sunflower Quality

PRODUCTION REGION	(18) North-West Central Region (Ventersdorp)				(19) North-West Central Region (Lichtenburg)				(20) North-West Eastern Region			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
<u>Grading:</u>												
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.50	0.22
2. Screenings, %	2.93	1.00	6.50	1.65	2.69	0.86	5.62	1.11	4.72	1.00	12.00	4.42
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.10	0.04
4. Foreign Matter, %	1.67	0.44	6.20	1.61	1.88	0.10	6.24	2.02	0.79	0.20	1.80	0.68
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	4.60	1.50	12.70	3.00	4.57	0.96	11.86	2.77	5.53	1.62	12.60	4.40
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00	1	0	10	2.36	0	0	0	0.00
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	11				18				5			
<u>Nutritional analysis:</u>												
Moisture, % (5 hr, 105 °C)	4.7	3.9	5.6	0.58	4.0	2.7	6.1	0.82	4.8	4.5	5.2	0.31
Crude Protein, % (as is)	15.89	14.63	17.04	0.87	15.71	14.27	17.34	0.87	15.49	14.49	17.03	0.94
Crude Fat, % (as is)	40.1	34.5	45.3	2.72	41.7	37.8	44.6	2.14	41.6	40.6	43.4	1.13
Crude Fibre, % (as is)	20.8	18.9	23.9	1.82	20.1	16.9	24.2	1.80	19.6	18.6	21.0	0.94
Ash, % (as is)	2.45	2.05	2.68	0.20	2.40	2.19	2.75	0.16	2.55	2.21	2.92	0.28
Number of samples	11				18				5			

South Africa

Regional Sunflower Quality

PRODUCTION REGION	(21) Free State North-Western Region (Viljoenskroon)				(22) Free State North-Western Region (Bothaville)				(23) Free State North-Western Region			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
<u>Grading:</u>												
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.20	0.08
2. Screenings, %	2.99	1.20	5.30	1.69	2.27	1.80	3.20	0.81	1.90	0.60	2.60	0.88
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Foreign Matter, %	1.18	0.70	1.60	0.35	1.28	0.84	1.60	0.39	0.90	0.60	2.00	0.54
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	4.17	2.46	6.50	1.72	3.55	2.64	4.80	1.12	2.80	1.40	4.60	1.18
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00	3	0	10	5.77	0	0	0	0.00
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	5				3				6			
<u>Nutritional analysis:</u>												
Moisture, % (5 hr, 105 °C)	4.9	4.3	5.3	0.51	4.9	4.7	5.2	0.25	4.7	3.6	5.5	0.63
Crude Protein, % (as is)	16.63	15.36	18.29	1.11	15.61	14.75	16.59	0.93	14.60	12.88	15.84	1.20
Crude Fat, % (as is)	38.3	33.3	40.0	2.85	37.6	35.7	38.7	1.63	40.4	38.6	43.3	1.87
Crude Fibre, % (as is)	20.5	18.8	21.3	0.98	21.0	20.5	21.4	0.46	21.4	18.8	23.7	2.23
Ash, % (as is)	2.59	2.48	2.73	0.10	2.66	2.63	2.70	0.04	2.39	2.23	2.54	0.14
Number of samples	5				3				6			

South Africa

Regional Sunflower Quality

PRODUCTION REGION	(24) Free State Central Region				(25) Free State South-Western Region				(26) Free State South-Eastern Region			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
<u>Grading:</u>												
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2. Screenings, %	2.55	0.46	7.40	1.75	1.37	0.60	2.10	0.75	2.51	0.66	8.00	2.33
3. Sclerotia, %	0.01	0.00	0.20	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4. Foreign Matter, %	1.64	0.24	5.00	1.30	1.13	0.40	1.80	0.70	1.31	0.22	4.40	1.25
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	4.20	1.06	9.28	2.28	2.50	1.00	3.90	1.45	3.82	1.42	9.50	2.96
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00	0	0	0	0.00	0	0	0	0.00
Number of samples	21				3				9			
<u>Nutritional analysis:</u>												
Moisture, % (5 hr, 105 °C)	4.8	3.8	6.3	0.71	5.4	4.3	5.9	0.92	5.3	4.3	6.0	0.63
Crude Protein, % (as is)	15.70	12.66	18.08	1.31	15.37	14.31	16.48	1.09	15.94	14.05	16.87	1.10
Crude Fat, % (as is)	39.1	33.2	44.8	2.91	39.0	37.5	40.2	1.37	39.6	38.5	41.4	1.03
Crude Fibre, % (as is)	20.8	16.3	22.9	1.58	22.4	20.5	23.6	1.66	19.1	17.2	21.5	1.19
Ash, % (as is)	2.59	2.12	3.26	0.26	2.50	2.30	2.67	0.19	2.54	2.46	2.76	0.09
Number of samples	21				3				9			



South Africa

Regional Sunflower Quality

PRODUCTION REGION	(27) Free State Northern Region				(29) Mpumalanga Southern Region				(31) Mpumalanga Central Region			
	ave	min	max	stdev	ave	min	max	stdev	ave	min	max	stdev
<u>Grading:</u>												
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00	0.00	-	-	-	0.00	-	-	-
2. Screenings, %	0.12	0.10	0.16	0.03	2.46	-	-	-	2.62	-	-	-
3. Sclerotia, %	0.00	0.00	0.00	0.00	0.00	-	-	-	0.00	-	-	-
4. Foreign Matter, %	0.15	0.04	0.30	0.14	0.64	-	-	-	2.46	-	-	-
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	0.27	0.20	0.40	0.12	3.10	-	-	-	5.08	-	-	-
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00	0.00	-	-	-	0.00	-	-	-
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00	0.00	-	-	-	0.00	-	-	-
Number of samples	3				1				1			
<u>Nutritional analysis:</u>												
Moisture, % (5 hr, 105 °C)	6.7	6.0	7.1	0.61	3.8	-	-	-	4.5	-	-	-
Crude Protein, % (as is)	15.93	14.90	16.50	0.90	16.24	-	-	-	16.99	-	-	-
Crude Fat, % (as is)	36.9	35.3	38.3	1.50	42.3	-	-	-	39.0	-	-	-
Crude Fibre, % (as is)	20.3	19.6	20.6	0.58	20.3	-	-	-	21.60	-	-	-
Ash, % (as is)	2.65	2.46	2.80	0.17	20.3	-	-	-	2.40	-	-	-
Number of samples	3				1				1			





South Africa

Regional Sunflower Quality

PRODUCTION REGION	(35) Limpopo Region			
<u>Grading:</u>	ave	min	max	stdev
1. Damaged sunflower seed, %	0.00	0.00	0.00	0.00
2. Screenings, %	1.01	0.30	1.84	0.61
3. Sclerotia, %	0.00	0.00	0.00	0.00
4. Foreign Matter, %	0.90	0.30	1.64	0.48
5. Deviations in 2, 3 and 4 collectively, %: Provided that such deviations are individually within the limits of said items	1.91	1.24	2.44	0.51
Poisonous seeds (<i>Crotalaria sp.</i> , <i>Datura sp.</i> , <i>Ricinis communis</i>)	0	0	0	0.00
Poisonous seeds (<i>Argemone mexicana L.</i> , <i>Convolvulus sp.</i> , <i>Ipomoea purpurea Roth.</i> , <i>Lolium temulentum</i> , <i>Xanthium sp.</i>)	0	0	0	0.00
Number of samples	5			
<u>Nutritional analysis:</u>	ave	min	max	stdev
Moisture, % (5 hr, 105 °C)	4.4	3.6	5.3	0.73
Crude Protein, % (as is)	16.76	15.70	17.68	0.96
Crude Fat, % (as is)	39.5	35.8	45.2	3.51
Crude Fibre, % (as is)	20.3	15.4	22.7	2.88
Ash, % (as is)	2.37	2.07	2.68	0.28
Number of samples	5			



Fatty acid Profile

Fatty acid profiles are the most important tool for identification of authenticity of vegetable fats and oils. All types of oil have their own specific fatty acid profile which is unique to that product. Fatty acids are typically esterified to a glycerol backbone to form triglycerides (also called fats or oils). Fatty acids are either described as saturated or unsaturated, with saturated fatty acids being solid at room temperature and unsaturated fatty acids being liquid at room temperature. Unsaturated fatty acids are further subdivided into mono-unsaturated (one double bond in the carbon chain) or poly-unsaturated (more than one double bond in the carbon chain). The unique fatty acid profile of each product/crop is a combination of saturated, mono-unsaturated and poly-unsaturated oils and is specific to that type of oil.

Fatty acid profiles of every crop, however, are subject to variation. The variation or typical pattern of fatty acids in a specific oil not only influences the stability and physical properties of the oil but also aids in distinguishing one type of oil from another. Variation of fatty acids within the same product depend on climate, latitude, soil type, cultivar, rainfall as well as seasonal variation. These variations should be included when ranges for identification of authenticity are determined.

It is imperative to include ranges wherein fatty acids vary, in order to successfully validate the authenticity of a specific vegetable oil. Building of a database requires gathering of information over different seasons, areas and cultivars in order to give a true reflection of the ranges wherein fatty acids can differ. Currently, no national updated database for fatty acid composition of sunflower oil is available.

It is important that South Africa, as a sunflower seed producing country, develop and maintain a national fatty acid profile database to the benefit of the Oil Seed Industry. Annual analysis of crop and cultivar samples will ensure that the natural variation caused by different cultivars as well as the influence of climate and locality are included in the database values. Seasonal variations will also be addressed. Recording all variation applicable to the crops in the database will enable the annual review of the specified ranges.

Precision Oil Laboratories was subcontracted for the fourth consecutive year to perform fatty acid profile analyses on 20 composite crop samples representing different production regions as well as 20 cultivar samples from different localities. Please refer to Tables 6, 7 and 8 on pages 32 to 34 for the results.

C14:0	Myristic acid	C18:3n3	n3 Linolenic acid
C16:0	Palmitic acid	C20:0	Arachidic acid
C16:1	Palmitoleic acid	C20:1	Eicosenoic acid
C17:0	Margaric acid	C20:2	Eicosadienoic acid
C18:0	Stearic acid	C22:0	Behenic acid
C18:1 cis	cis Oleic acid	C24:0	Lignoceric acid
C18:1n7	Vaccenic acid	Unknown 1	
C18:2 cis	cis Linoleic acid	Unknown 2	
C18:3n6	n6 Linolenic acid		

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The Fatty acid Profile information was supplied by Dr. Mathilda Mostert from Precision Oil Laboratories.

Table 6: Fatty acid profile results of a selection of crop quality samples from the 2023/24 season

Province	Re-gion	g Fatty acids/100 g Fatty Acids																
		C14:0	C16:0	C16:1	C17:0	C18:0	C18:1 cis	C18:1 n7*	C18:2 cis	C18:3 n6	C18:3 n3	C20:0	C20:1	C20:2	C22:0	C24:0	Unknown 1	
North West	12	LOQ	6.24	LOQ	ND	4.60	28.74	0.66	57.5	ND	LOQ	0.361	LOQ	ND	0.910	0.248	0.42	
	13	LOQ	6.70	LOQ	ND	4.99	25.87	0.70	59.1	ND	ND	0.387	LOQ	ND	0.855	0.249	0.78	
	13	LOQ	5.88	ND	ND	5.06	24.82	0.58	61.5	ND	LOQ	0.361	LOQ	ND	0.874	0.228	0.34	
	14	LOQ	6.12	LOQ	ND	4.66	25.61	0.63	61.0	ND	ND	0.342	LOQ	ND	0.824	0.221	0.25	
	14	LOQ	5.82	LOQ	ND	4.67	33.67	0.76	52.8	ND	ND	0.334	LOQ	ND	0.809	0.228	0.47	
	17	LOQ	6.06	ND	ND	5.56	21.23	0.62	64.1	ND	LOQ	0.374	LOQ	ND	0.883	0.214	0.62	
	18	LOQ	6.03	ND	ND	4.47	24.32	0.59	62.2	ND	LOQ	0.332	LOQ	ND	0.906	0.241	0.53	
	18	LOQ	5.71	ND	ND	5.09	20.00	0.57	66.5	ND	LOQ	0.336	LOQ	ND	0.822	0.204	0.39	
	19	LOQ	5.90	ND	LOQ	5.29	23.84	0.58	62.1	ND	LOQ	0.365	LOQ	ND	0.882	0.213	0.45	
	19	ND	6.01	ND	ND	5.22	21.60	0.58	64.3	ND	LOQ	0.362	LOQ	ND	0.907	0.224	0.40	
19	LOQ	6.06	ND	ND	4.85	24.70	0.61	61.6	ND	LOQ	0.350	LOQ	ND	0.865	0.211	0.41		
	Min	-	5.71	-	-	4.47	20.00	0.57	52.8	-	-	0.332	-	-	0.809	0.204	0.25	
	Max	-	6.70	-	-	5.56	33.67	0.76	66.5	-	-	0.387	-	-	0.910	0.249	0.78	
	N	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
Free State	21	LOQ	5.99	ND	ND	5.30	22.81	0.57	63.0	ND	LOQ	0.375	LOQ	ND	0.898	0.213	0.50	
	23	ND	6.10	ND	ND	5.30	18.72	0.58	67.1	ND	LOQ	0.355	LOQ	ND	0.847	0.207	0.45	
	24	LOQ	6.56	LOQ	LOQ	5.42	22.65	0.70	62.3	ND	ND	0.363	LOQ	ND	0.798	0.215	0.59	
	24	ND	6.01	ND	ND	6.09	18.11	0.56	67.1	ND	LOQ	0.379	LOQ	ND	0.822	0.192	0.36	
	24	LOQ	5.83	ND	LOQ	5.96	19.43	0.58	66.1	ND	LOQ	0.370	LOQ	ND	0.789	0.195	0.43	
	26	LOQ	6.46	LOQ	ND	5.63	23.12	0.59	61.9	ND	LOQ	0.428	LOQ	ND	0.936	0.238	0.31	
	26	LOQ	6.87	LOQ	LOQ	4.91	20.69	0.67	64.5	ND	LOQ	0.377	LOQ	ND	0.812	0.226	0.49	
		Min	-	5.83	-	-	4.91	18.11	0.56	61.9	-	-	0.355	-	-	0.789	0.192	0.31
		Max	-	6.87	-	-	6.09	23.12	0.70	67.1	-	-	0.428	-	-	0.936	0.238	0.59
		N	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Mpumalanga	31	LOQ	5.94	ND	ND	6.49	24.01	0.57	60.7	ND	ND	0.409	LOQ	ND	0.850	0.217	0.45	
Limpopo	35	LOQ	6.42	LOQ	ND	5.46	21.27	0.63	63.5	ND	LOQ	0.389	LOQ	ND	0.901	0.223	0.86	
	Min	-	5.71	-	-	4.47	18.11	0.56	52.8	-	-	0.332	-	-	0.789	0.192	0.25	
	Max	-	6.87	-	-	6.49	33.67	0.76	67.1	-	-	0.428	-	-	0.936	0.249	0.86	
	N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	

Note:
 All fatty acids marked with an asterisk (*) are not SANAS accredited.
 Limit of detection (LOD) = 0.06 g/100 g.
 Values below the limit of detection are reported as ND (not detected).
 Limit of quantitation (LOQ) = 0.14 g/100 g.
 Values below the limit of quantitation cannot be accurately quantified.

Table 7: Fatty acid profile results of a selection of cultivar samples from the 2023/24 season

Province	Locality	Region	Cultivar	g Fatty acids/100 g Fatty Acids																	
				C14:0	C16:0	C16:1	C17:0	C18:0	C18:1 cis	C18:1 n7	C18:2 cis	C18:3 n6	C18:3 n3	C20:0	C20:1	C20:2	C22:0	C24:0	Unknown 1	Unknown 2	
North West	Potchefstroom 2	18	AGSUN 5106 CLP	LOQ	6.22	LOQ	LOQ	5.35	29.79	0.55	56.0	ND	ND	0.377	LOQ	ND	0.872	0.244	LOQ	LOQ	
		18	AGSUN 5270	LOQ	6.04	LOQ	ND	4.82	35.71	0.56	50.8	ND	ND	0.369	LOQ	ND	0.884	0.275	LOQ	LOQ	
		18	P 65 LP 65	LOQ	6.41	LOQ	ND	5.01	33.74	0.56	52.0	ND	ND	0.424	LOQ	ND	1.00	0.281	LOQ	LOQ	
		18	PAN 7160 CLP	LOQ	6.42	LOQ	ND	5.01	33.68	0.57	52.0	ND	ND	0.428	LOQ	ND	1.03	0.280	LOQ	LOQ	
		18	SY 3970 CL	ND	5.67	LOQ	ND	5.77	34.19	0.52	51.5	ND	ND	0.447	LOQ	ND	1.08	0.270	LOQ	LOQ	
			<i>Min</i>		5.67			4.82	29.79	0.52	50.8				0.369			0.872	0.244		
			<i>Max</i>		6.42			5.77	35.71	0.57	56.0				0.447			1.08	0.281		
			<i>N</i>		5		5	5	5	5	5				5		5	5	5	5	5
		19	AGSUN 5106 CLP	LOQ	5.44	ND	LOQ	LOQ	5.30	25.80	0.49	61.1	ND	ND	0.345	LOQ	ND	0.838	0.213	LOQ	LOQ
		19	AGSUN 5270	ND	5.15	ND	ND	4.26	30.14	0.49	59.2	ND	ND	0.287	LOQ	ND	0.770	0.230	LOQ	LOQ	
19	P 65 LP 65	ND	5.70	ND	ND	4.22	27.02	0.52	60.7	ND	ND	0.322	LOQ	ND	0.831	0.216	LOQ	LOQ			
19	PAN 7160 CLP	LOQ	5.79	ND	ND	4.12	26.30	0.52	59.3	ND	LOQ	LOQ	0.321	LOQ	ND	0.875	0.230	LOQ	LOQ		
19	SY 3970 CL	ND	5.34	ND	ND	4.97	25.12	0.48	62.0	ND	LOQ	LOQ	0.359	LOQ	ND	0.84	0.233	LOQ	LOQ		
	<i>Min</i>		5.15			4.12	25.12	0.48	58.2				0.287			0.770	0.213				
	<i>Max</i>		5.79			5.30	30.14	0.52	62.0				0.359			0.84	0.233				
	<i>N</i>		5		5	5	5	5	5				5		5	5	5	5	5		
	<i>Min</i>						4.12	25.12	0.48	50.8				0.287			0.770	0.213			
	<i>Max</i>		6.42			5.77	35.71	0.57	62.0				0.447			1.08	0.281				
Free State	Kroonstad	24	AGSUN 5106 CLP	LOQ	5.80	ND	LOQ	5.97	21.66	0.48	64.1	ND	ND	0.381	LOQ	ND	0.845	0.201	LOQ	LOQ	
		24	AGSUN 5270	ND	6.01	LOQ	ND	4.76	26.18	0.60	60.2	ND	LOQ	0.369	LOQ	ND	1.01	0.258	LOQ	LOQ	
		24	P 65 LP 65	LOQ	6.21	ND	LOQ	6.50	19.20	0.50	65.5	ND	LOQ	0.435	LOQ	ND	0.887	0.195	LOQ	LOQ	
		24	PAN 7160 CLP	ND	5.91	ND	ND	6.39	21.18	0.45	63.9	ND	LOQ	0.426	LOQ	ND	0.938	0.199	LOQ	LOQ	
		24	SY 3970 CL	ND	5.16	ND	ND	7.47	19.85	0.41	65.0	ND	LOQ	0.452	LOQ	ND	0.97	0.188	LOQ	LOQ	
			<i>Min</i>		5.16			4.76	19.20	0.41	60.2				0.389			0.845	0.188		
			<i>Max</i>		6.21			7.47	26.18	0.60	65.5				0.452			1.01	0.258		
			<i>N</i>		5		5	5	5	5	5				5		5	5	5	5	5
		25	AGSUN 5106 CLP	LOQ	6.12	ND	LOQ	6.34	17.83	0.55	67.2	ND	LOQ	LOQ	0.403	LOQ	ND	0.824	0.200	LOQ	LOQ
		25	AGSUN 5270	ND	5.61	ND	ND	6.07	21.98	0.46	64.0	ND	LOQ	LOQ	0.411	LOQ	ND	0.850	0.239	LOQ	ND
25	P 65 LP 65	LOQ	6.11	ND	ND	5.45	18.21	0.53	67.8	ND	LOQ	LOQ	0.388	LOQ	ND	0.864	0.206	LOQ	LOQ		
25	PAN 7160 CLP	LOQ	6.19	LOQ	ND	5.83	20.08	0.53	65.3	ND	LOQ	LOQ	0.442	LOQ	ND	0.866	0.222	LOQ	LOQ		
25	SY 3970 CL	ND	5.65	ND	ND	6.67	19.51	0.45	65.5	ND	LOQ	LOQ	0.469	LOQ	ND	1.02	0.235	LOQ	LOQ		
	<i>Min</i>		5.61			5.45	17.83	0.45	64.0				0.388			0.824	0.200				
	<i>Max</i>		6.19			6.67	21.98	0.55	67.8				0.469			1.02	0.239				
	<i>N</i>		5		5	5	5	5	5				5		5	5	5	5	5		
	<i>Min</i>						17.83	0.41	60.2				0.369			0.824	0.188				
	<i>Max</i>		6.21			7.47	26.18	0.60	67.8				0.469			1.02	0.258				
RSA	Bethlehem	10	AGSUN 5106 CLP	LOQ	5.15	ND	LOQ	5.10	10	10	10	10	10	10	10	10	10	10	10	10	
		10	AGSUN 5270	ND	5.15	ND	LOQ	5.10	10	10	10	10	10	10	10	10	10	10	10	10	
		10	P 65 LP 65	LOQ	5.15	ND	LOQ	5.10	10	10	10	10	10	10	10	10	10	10	10	10	
		10	PAN 7160 CLP	LOQ	5.15	ND	LOQ	5.10	10	10	10	10	10	10	10	10	10	10	10	10	
		10	SY 3970 CL	ND	5.15	ND	LOQ	5.10	10	10	10	10	10	10	10	10	10	10	10	10	
			<i>Min</i>		5.15			5.10	10	10	10	10	10	10	10	10	10	10	10	10	10
	<i>Max</i>		6.42			7.47	26.18	0.60	67.8				0.469			1.08	0.281				

Note:
 All fatty acids marked with an asterisk (*) are not SANAS accredited.
 Limit of detection (LOD) = 0.06 g/100 g.
 Values below the limit of detection are reported as ND (not detected).
 Limit of quantitation (LOQ) = 0.14 g/100 g.
 Values below the limit of quantitation cannot be accurately quantified.

Table 8: Fatty acid profile results per cultivar for the 2023/24 season

Province	Region	Cultivar	g Fatty acids/100 g Fatty Acids																
			C14:0	C16:0	C16:1	C17:0	C18:0	C18:1 cis	C18:1 n7	C18:2 cis	C18:3 n6	C18:3 n3	C20:0	C20:1	C20:2	C22:0	C24:0	Unknown 1	Unknown 2
North West	18	AGSUN 5106 CLP	LOQ	6.22	LOQ	LOQ	5.35	29.79	0.55	56.0	ND	ND	0.377	LOQ	ND	0.872	0.244	LOQ	LOQ
	19		LOQ	5.44	ND	LOQ	5.30	25.80	0.49	61.1	ND	ND	0.345	LOQ	ND	0.838	0.213	LOQ	LOQ
24	LOQ		5.80	ND	LOQ	5.97	21.66	0.48	64.1	ND	ND	0.381	LOQ	ND	0.845	0.201	LOQ	LOQ	
25	LOQ		6.12	ND	LOQ	6.34	17.83	0.55	67.2	ND	LOQ	0.403	LOQ	ND	0.824	0.200	LOQ	LOQ	
	Min		5.44	-	-	5.30	17.83	0.48	56.0	-	-	0.345	-	-	0.824	0.200	-	-	
	Max		6.22	-	-	6.34	29.79	0.55	67.2	-	-	0.403	-	-	0.872	0.244	-	-	
North West	18	AGSUN 5270	LOQ	6.04	LOQ	LOQ	4.82	35.71	0.56	50.8	ND	ND	0.389	LOQ	ND	0.884	0.275	LOQ	LOQ
	19		ND	5.15	ND	ND	4.26	30.14	0.49	58.2	ND	ND	0.287	LOQ	ND	0.770	0.230	LOQ	LOQ
24	ND		6.01	LOQ	LOQ	4.76	26.18	0.60	60.2	ND	LOQ	0.389	LOQ	ND	1.01	0.258	LOQ	LOQ	
25	ND		5.61	ND	LOQ	6.07	21.98	0.46	64.0	ND	LOQ	0.411	LOQ	ND	0.850	0.239	LOQ	LOQ	
	Min		5.15	-	-	4.26	21.98	0.46	50.8	-	-	0.287	-	-	0.770	0.230	-	-	
	Max		6.04	-	-	6.07	35.71	0.60	64.0	-	-	0.411	-	-	1.010	0.275	-	-	
North West	18	P 65 LP 65	LOQ	6.47	ND	LOQ	4.52	20.36	0.55	66.0	ND	ND	LOQ	LOQ	LOQ	ND	0.841	0.217	LOQ
	19		ND	5.56	ND	LOQ	5.87	16.16	0.44	69.9	ND	ND	LOQ	LOQ	LOQ	ND	0.866	0.201	LOQ
24	ND		5.48	ND	LOQ	5.79	15.91	0.44	70.4	ND	ND	LOQ	LOQ	LOQ	ND	0.864	0.192	LOQ	
25	LOQ		6.81	LOQ	LOQ	4.25	15.95	0.61	70.5	ND	ND	LOQ	LOQ	LOQ	LOQ	0.774	0.214	LOQ	
	Min		5.48	-	-	4.25	15.91	0.44	66.0	-	-	-	0.312	-	-	0.774	0.192	LOQ	
	Max		6.81	-	-	5.87	20.36	0.61	70.5	-	-	-	0.382	-	-	0.866	0.217	LOQ	
North West	18	PAN 7160 CLP	LOQ	6.42	LOQ	LOQ	5.01	33.68	0.57	52.0	ND	ND	0.428	LOQ	ND	1.03	0.280	LOQ	LOQ
	19		LOQ	5.79	ND	LOQ	4.12	28.30	0.52	59.3	ND	LOQ	0.321	LOQ	ND	0.875	0.230	LOQ	LOQ
24	ND		5.91	ND	LOQ	6.39	21.18	0.45	63.9	ND	LOQ	0.426	LOQ	ND	0.938	0.199	LOQ	LOQ	
25	LOQ		6.19	LOQ	LOQ	5.83	20.08	0.53	65.3	ND	LOQ	0.442	LOQ	ND	0.886	0.222	LOQ	LOQ	
	Min		5.79	-	-	4.12	20.08	0.45	52.0	-	-	0.321	-	-	0.875	0.199	-	-	
	Max		6.42	-	-	6.39	33.68	0.57	65.3	-	-	0.442	-	-	1.03	0.280	-	-	
North West	18	SY 3970 CL	ND	5.67	LOQ	LOQ	5.77	34.19	0.52	51.5	ND	ND	0.447	LOQ	ND	1.08	0.270	LOQ	LOQ
	19		ND	5.34	ND	LOQ	4.97	25.12	0.48	62.0	ND	LOQ	0.359	LOQ	ND	0.94	0.233	LOQ	LOQ
24	ND		5.16	ND	LOQ	7.47	19.85	0.41	65.0	ND	LOQ	0.452	LOQ	ND	0.97	0.188	LOQ	LOQ	
25	ND		5.65	ND	LOQ	6.67	19.51	0.45	65.5	ND	LOQ	0.469	LOQ	ND	1.02	0.235	LOQ	LOQ	
	Min		5.16	-	-	4.97	19.51	0.41	51.5	-	-	0.359	-	-	0.94	0.188	-	-	
	Max		5.67	-	-	7.47	34.19	0.52	65.5	-	-	0.469	-	-	1.08	0.270	-	-	
RSA	Min		5.15	-	-	4.12	17.83	0.41	50.8	-	-	0.287	-	-	0.770	0.188	-	-	
	Max		6.42	-	-	7.47	35.71	0.60	67.8	-	-	0.469	-	-	1.08	0.281	-	-	
	N		20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	

Note:
 All fatty acids marked with an asterisk (*) are not SANAS accredited.
 Limit of detection (LOD) = 0.06 g/100 g.
 Values below the limit of detection are reported as ND (not detected).
 Limit of quantitation (LOQ) = 0.14 g/100 g.
 Values below the limit of quantitation cannot be accurately quantified.

Methods

SAMPLING PROCEDURE:

A working group determined the procedure to be followed to ensure that the crop quality samples submitted to the SAGL by the various grain storage companies, 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/bag/bunker at each silo.

When the container was full or at the end of each week, 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/bag/bunker, 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, 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, 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 (Government Notice NO. 45 of 22 January 2016).

See pages 71 to 78 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 seed in South Africa. An approximation of the test weight of South African sunflower seed is provided in this report for information purposes. The standard working procedure of the Kern 222 instrument, as described in ISO 7971-3:2019, was followed. The g/1 L filling mass of the sunflower seed samples was determined and divided by two. The test weight was then extrapolated by means of the following formulas obtained from the Test Weight Conversion Chart for 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 nutritional analyses, the sunflower seed 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.

Crude Fibre

Crude fibre is the loss on ignition of the dried residue remaining after digestion of a sample with 1.25% Sulphuric acid (H_2SO_4) and 1.25% Sodium hydroxide (NaOH) solutions under specific conditions.

In-House method 031 was used for the determination of the crude fibre in the samples. This method is based on AACCI method 32-10.01 using the Velp FIWE Advance fibre AutoExtractor.

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.

PRECISION OIL LABORATORIES' FATTY ACID PROFILE METHODS:

Fat Extraction

In-House method POL 019 was used for the extraction of the crude fat from the samples. After sample preparation the fat is extracted by petroleum ether under reflux, followed by the removal of the solvent by evaporation. The residue obtained from the fat extraction is used for preparation of methyl esters for determination of the fatty acid profile.

Fatty Acid Profile

In-House method POL 015 was used for determination of the fatty acid composition. Extracted fat is converted to methyl esters using an alkali catalyzed method. Methyl esters are injected into a Gas Chromatograph and an external fatty acid methyl ester standard is used to identify peaks based on retention times. The fatty acid composition is expressed as a total fatty acid content of 100% with different fatty acids representing a percentage of the total fatty acids.



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

Southern African Grain Laboratories NPC

Facility Accreditation Number: T0116

is a South African National Accreditation System accredited facility provided that all 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 17025:2017

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

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

Mrs FS Radebe
Acting Chief Executive Officer

Effective Date: 01 November 2024
Certificate Expires: 31 October 2029



Facility Number: T0116

ANNEXURE A
SCHEDULE OF ACCREDITATION

Facility Number: **T0116**

Permanent Address of Laboratory:

South African Grain Laboratories
Agri-Hub Office Park - Grain Building
477 Witherite Road
The Willows
Pretoria
0040

Technical Signatories:

Ms J Nortje (All Methods excl. In-house method 029)
Ms A de Jager (Nutrients & Contaminants Methods)
Ms W Louw (In-house Methods 001, 002, 003, 010 & 026)
Ms D Moleke (Rheological Methods)
Mrs H Meyer (All Chemical, Nutrients and Contaminants & Grading Methods)
Ms M Motlanthe (In-house Methods 001, 003 & 026)
Ms T de Beer (Rheological Methods)
Ms S Makhoba (In-House Method 026)
Ms T Mabobo (In-House Methods 001 & 010)
Mr J Kobola (All Grading Methods)
Ms J Ntimane (All Chemical Methods)

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Tel: (012) 807-4019

Issue No.: 36

Fax: N/A

Date of Issue: 14 March 2025

E-mail: mamsy.motlanthe@sagl.co.za

Expiry Date: 31 October 2029

Material or Products Tested	Type of Tests / Properties Measured, Range of Measurement	Standard Specifications, Techniques / Equipment Used
CHEMICAL		
Ground Barley	Moisture (Oven Method)	Analytical EBC Method 3.2, latest Edition (2 hour; 130°C)
Cereal and cereal products specifically-wheat, rice, (hulled paddy), barley, millet, rye, and oats as grain, semolina and flour	Moisture (Oven Method)	ICC Std No.110/1, Latest Edition (90 min; 130°C) (2 hour; 130°C)
Flour, semolina, bread, all kind of grains and cereal products and food products (except those that are sugar coated)	Moisture (Oven Method)	AACCI 44-15.02, Latest Edition (1 hour; 130°C) (72 hour; 103°C)
Animal feed, Plant tissue and Sunflower (Milled)	Moisture (Oven Method)	AgriLASA 2.1 Latest Edition (% hours, 105°C)

Facility Number: T0116

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
Yeast and Bread	Vitamin D ₂ (HPLC)	In-House method 029
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

Facility Number: T0116

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

Report

Evaluation of sunflower cultivars: 2023/2024 season

ARC-Grain Crops Institute in collaboration with the following seed companies: Agricol, (Pannar & Pioneer) Corteva, Syngenta, and Limagrain South Africa.

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INTRODUCTION

Optimisation of crop production requires, among several 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 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 2023/2024 season with the voluntary collaboration of Agricol, Cortiva (Pannar, Pioneer), Syngenta and Limagrain South Africa. Seed companies entered 17 cultivars for evaluation (Table 1) and supplied seed to the ARC-GC which planned the field trials with randomised complete-block design layouts with three replicates. Seed from cultivars were packed according to trial plans and sent to co-operators before the onset of the growing season.

Eleven of the 17 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 21 trials, Corteva (Pannar & Pioneer) with 9 trials, Syngenta with three and Limagrain SA with one. Five trials were planted by the ARC-GC with different planting dates at Potchefstroom and one trial planted at Bethlehem. Trial sites were selected by collaborators and the co-workers involved are listed in Table 2.

Two trials of Syngenta not harvested due to drought and bad trial quality. Two trials of

Agricol, five trials of Corteva were not statistically successful and were not included in the results. 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 23 trials at different localities with different planting dates at northwest and Free State table 3.

Yield data and seed samples were sent by collaborators to ARC-GC for analyses. Seed from selected trials sent to SAGL for oil and protein content analyses. Yield data from 30 field trials were subjected to analyses of variance. 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 30 trials.

Yield probabilities were also calculated for 15 cultivars that were evaluated in 57 trials during 2022/2023 and 2023/2024.

RESULTS

Days from planting to flowering

The mean number of days from planting to 50% flowering of cultivars (Table 3) ranged from 64 days for LG 50745, to 70 days AGSUN 5111 CLP Calculated across cultivars and planting dates, the average period from planting to flowering was 67 days. The longest days to flowering 72 days recorded at Potchefstroom planted on 03 November 2023 and Reitz planted 09 November 2023.

Oil and protein concentration

Oil and protein concentrations of seed from ten trial localities, as analysed by the Southern African Grain Laboratory NPC, are shown in Tables 4 and 5 respectively. The oil analyses were done with a Soxhlet apparatus while the protein analyses were done according to the Dumas method.

The oil content on “as is” basis for cultivars at the various localities varied from 38.04% to 50.34% with an overall mean of 42.05%. The highest mean oil concentration among localities was at Lichtenburg (planting date on 28 December 2023) with 44.52%. The

locality with the lowest mean oil content of 39.08% was Potchefstroom planting date was 22 November 2023. The highest oil concentration among cultivars calculated across localities, was SY 3970 CL at 50.34% followed by SNK 270CL at 48.59%. 70% of the tested hybrids have more than 40% oil content.

The average protein content varied from 14.93 to 16.53% among cultivars at the different localities. Among localities, Koster planting date was 14 December 2023, had the highest and Boskop 1 planted on 27 November 2023 the lowest protein content of 19.46 and 12.77 % respectively. Calculated across localities, AGSUN 5270 had the highest protein content (16.53 %) followed by AGSUN 5103 CLP (16.45) while PAN 7102 CLP the lowest (14.93%).

Seed yield

The mean seed yield of cultivars at the respective localities is presented in Table 6. The highest locality mean yield of 3.57 t ha⁻¹ was obtained at Bethlehem, planted on 21 of November 2023 and the lowest of 1.27 t ha⁻¹, at Makwassie planted on 15th of December 2023.

The five best performing cultivars, in terms of average yield calculated over localities, were P 65 LL 25, AGSUN 5111 CLP, AGSUN 5106 CLP, PAN 7102 CLP and PAN 7160 CLP. The overall mean yield for 2023/24 was 2.22 t ha⁻¹, 0.45 % lower than the mean yield of the last year.

Elven Clearfield and Clearfield Plus cultivars AGSUN 5103 CLP, AGSUN 5106 CLP, AGSUN 5110, CLP AGSUN 5111 CLP, P 65 LP 54, P 65 LP 65, PAN 7102 CLP, PAN 7160 CLP, PAN 7180 CLP, SNK 270 CL and SY 3970 CL were entered. Seven of these cultivars namely AGSUN 5111 CLP, AGSUN 5106 CLP, PAN 7102 CLP, PAN 7160 CLP, PAN 7180 CLP, P 65 LP 65, and P 65 LP 54 and have yields even or 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 is resented in

Table 8. The oil yield for cultivars at the ten localities varied from 0.86 to 1.13 t ha⁻¹ with an overall mean of 0.98 t ha⁻¹. The locality with the highest mean oil yield was Boskop 1 planted in 27 November 2023 at 1.37 t ha⁻¹. SNK 270 CL has the highest oil yield of 1.13 t ha⁻¹ followed by SY 3970 CL with 1.11 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 8. 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 (R^2 - 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 2023/2024 are shown in Figure 1 and for the 15 cultivars evaluated in 2021/2022 and 2023/2024 in Figure 2.

The yield stability of cultivars varied up to 21-fold among cultivars (Table 9). Cultivars which had exceptionally high stabilities (R -parameter =1) were, AGSUN 58251, P 65 LP 65 and PAN 7160 CLP

Yield probability

The yield probability of a cultivar is the probability of exceeding the mean yield of all cultivars, at a particular yield potential. The yield probabilities of all 17 cultivars for 2023/2024 are shown in Table 10. 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 10 indicates which cultivars would be sensible choices at the various yield potentials

The yield probabilities of 15 cultivars evaluated in 57 trials in 2022/2023 and 2023/2024, and yield probabilities for the 11 cultivars evaluated in 73 trials are shown in Tables 11 and

12 respectively. Tables 10, 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, Syngenta and Limagrain SA, gratefully acknowledged.

References

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

SOUTH AFRICAN SCLEROTINIA RESEARCH NETWORK: CULTIVAR EVALUATIONS 2023/2024

Project charter

Project title	<i>Evaluations of South African soybean and sunflower cultivars to escape sclerotinia stem and head rot.</i>
Principal investigator	Lisa Ann Rothmann
Industry Partner	Dr. Derick van Staden (industry partner, MP) Mr. Koos Strydom (producer, FS) Agricultural Research Council – Grain Crops Seed companies
Collaborating institution(s)	University of the Free State
Students and postdoctoral fellows	None
Technicians	None
High-level strategic issue	<i>Crop Protection</i>
Beneficiaries	Oilseed producers

SUNFLOWER CULTIVAR EVALUATIONS AGAINST SCLEROTINIA SCLEROTIORUM

In Clocolan (FS) under natural disease pressure 14.3% and 3.4% mean sclerotinia prevalence were observed at planting date one and planting date two, respectively. In Delmas (MP) under artificial disease pressure, 12.5% and 18.6% mean sclerotinia prevalence were observed at planting date one and planting date two, respectively. Head and stem rot were not observed in the third planting at Clocolan or Delmas. Although, no significant differences were reported, categorisations of cultivars according to a head rot prevalence was performed using thresholds, greater than 40% were considered least tolerant, 39-11% moderately tolerate and <10% greatest tolerance of *Sclerotinia sclerotiorum*.

PAN 7100 greatest mean prevalence in Clocolan at the first planting date (~40.8%), however, it had a moderate response to head rot, 5.6% mean head rot prevalence, in the second planting date where the disease pressure was lower. In the second planting date, AGSUN 5106 CLP had the highest mean prevalence, 13.7%, and in the first planting date a moderate response of 8.1% mean head rot was observed. Three cultivars which had no head rot observed in the second planting had lower mean head rot prevalence in planting one, these have been indicated in bold (Table 11).

Under inoculated field conditions similar ranges of mean head rot were observed in Delmas, across both planting dates, 24.5 to 2.1% and 27.8 to 5.2%, respectively. Distinguishing cultivars is more complex under inoculated trials, however, PAN7160 CLP responded with consistently lower mean head rot prevalence than other cultivars in Delmas, indicated by bold text (Table 12).

Table 8 ANOVA for screening 26 sunflower cultivars in Delmas (MP) under field conditions, planted on 13 December 2023, under natural conditions to tolerance of *Sclerotinia sclerotiorum*.

Sunflower Delmas Planting 1 ($\alpha = 0.01$)					
Factor	df	ss	ms	F-value	Pr (>F)
Block	2	785.9	393.0	5.71	0.0678
Cultivar	19	2131.3	112.2	1.63	0.09828
Residual	38	2614.3	68.8		

Table 9 ANOVA for screening 26 sunflower cultivars in Delmas (MP) under field conditions, planted on 21 December 2022, under natural conditions to tolerance of *Sclerotinia sclerotiorum*.

Sunflower Delmas Planting 2 ($\alpha = 0.05$)					
Factor	df	ss	Ms	F-value	Pr (>F)
Block	2	431	215.3	1.683	0.199
Cultivar	19	2369	124.7	0.975	0.508
Residual	38	4862	127.9		

Table 10 ANOVA for screening 20 sunflower cultivars in Clocolan (FS) under field conditions, planted on 8 December 2022, under natural conditions to tolerance of *Sclerotinia sclerotiorum*.

Sunflower Clocolan Planting 1 ($\alpha = 0.01$)					
Factor	df	ss	ms	F-value	Pr (>F)
Block	2	9	4.26	0.027	0.9731
Cultivar	19	5208	274.09	1.756	0.0689
Residual	38	5932	156.1		

Table 10 ANOVA for screening 20 sunflower cultivars in Cloclan (FS) under field conditions, planted on 22 December 2022, under natural conditions to tolerance of *Sclerotinia sclerotiorum*.

Sunflower Clocolan Planting 2 ($\alpha = 0.01$)					
Factor	df	Ss	ms	F-value	Pr (>F)
Block	2	136.1	68.03	2.25	0.119
Cultivar	19	783.8	41.25	1.364	0.203
Residual	38	1148.9	30.24		

Table 11. Mean head rot response on cultivars planted in Clocolan (FS) under natural field conditions.

Cultivar	Planting 1		Planting 2	
	Cultivar	Mean Head Rot Prevalence (%)	Cultivar	Mean Head Rot Prevalence (%)
PAN 7100	PAN 7100	40.8	AGSUN 5106 CLP	13.7
PAN 7090	PAN 7090	28.7	PAN 7090	9.5
P 65 LL 46	P 65 LL 46	26.0	AGSUN 5108 CLP	8.8
AGSUN 5108 CLP	AGSUN 5108 CLP	22.3	PAN 7100	5.6
AGSUN 5103 CLP	AGSUN 5103 CLP	19.7	AGSUN 5270	5.3
P 65 LP 54	P 65 LP 54	18.0	AGUARA 6	4.5
AGSUN 5270	AGSUN 5270	16.8	AGSUN 5103 CLP	3.9
P 65 LL 02	P 65 LL 02	14.6	PAN 7180 CLP	3.5
PAN 7080	PAN 7080	13.8	LG 5710	2.2
PAN 7160 CLP	PAN 7160 CLP	12.7	P 65 LP 65	2.2
AGSUN 5110 CLP	AGSUN 5110 CLP	11.9	AGSUN 5111 CLP	2.1
LG 50745	LG 50745	11.1	LG 50745	2.1
LG 5710	LG 5710	8.3	P 65 LP 54	2.0
AGSUN 5106 CLP	AGSUN 5106 CLP	8.1	PAN 7080	1.9
AGUARA 6	AGUARA 6	7.8	AGSUN 5110 CLP	0.0
SY 3970 CL	SY 3970 CL	6.8	P 65 LL 02	0.0
PAN 7180 CLP	PAN 7180 CLP	6.5	P 65 LL 46	0.0
AGSUN 5111 CLP	AGSUN 5111 CLP	5.7	PAN 7102 CLP	0.0
PAN 7102 CLP	PAN 7102 CLP	4.8	PAN 7160 CLP	0.0
P 65 LP 65	P 65 LP 65	1.7	SY 3970 CL	0.0

Table 12. Mean head rot response on cultivars planted in Delmas (MP) under inoculated field conditions.

Planting 1		Planting 2	
Cultivar	Mean Head Rot Prevalence (%)	Cultivar	Mean Head Rot Prevalence (%)
P 65 LL 46	24.5	P 65 LP 54	27.8
AGUARA 6	20.1	AGSUN 5270	25.9
AGSUN 5270	19.6	AGSUN 5110 CLP	24.5
P 65 LL 02	17.3	PAN 7160 CLP	23.7
PAN 7100	17.2	SY 3970 CL	23.1
SY 3970 CL	15.5	P 65 LL 02	21.7
P 65 LP 54	15.3	AGSUN 5108 CLP	20.6
AGSUN 5110 CLP	14.9	PAN 7080	19.8
PAN 7180 CLP	14.4	AGSUN 5103 CLP	17.5
LG 5710	13.7	AGUARA 6	16.9
AGSUN 5106 CLP	11.2	PAN 7180 CLP	15.2
PAN 7090	10.9	P 65 LP 65	15.1
LG 50745	10.7	LG 5710	14.2
P 65 LP 65	10.5	P 65 LL 46	12.7
PAN 7080	8.0	AGSUN 5111 CLP	12.4
AGSUN 5103 CLP	6.5	LG 50745	12.1
PAN 7102 CLP	6.5	PAN 7090	11.8
AGSUN 5111 CLP	3.3	PAN 7102 CLP	9.8
AGSUN 5108 CLP	3.0	AGSUN 5106 CLP	6.3
PAN 7160 CLP	2.1	PAN 7100	5.2

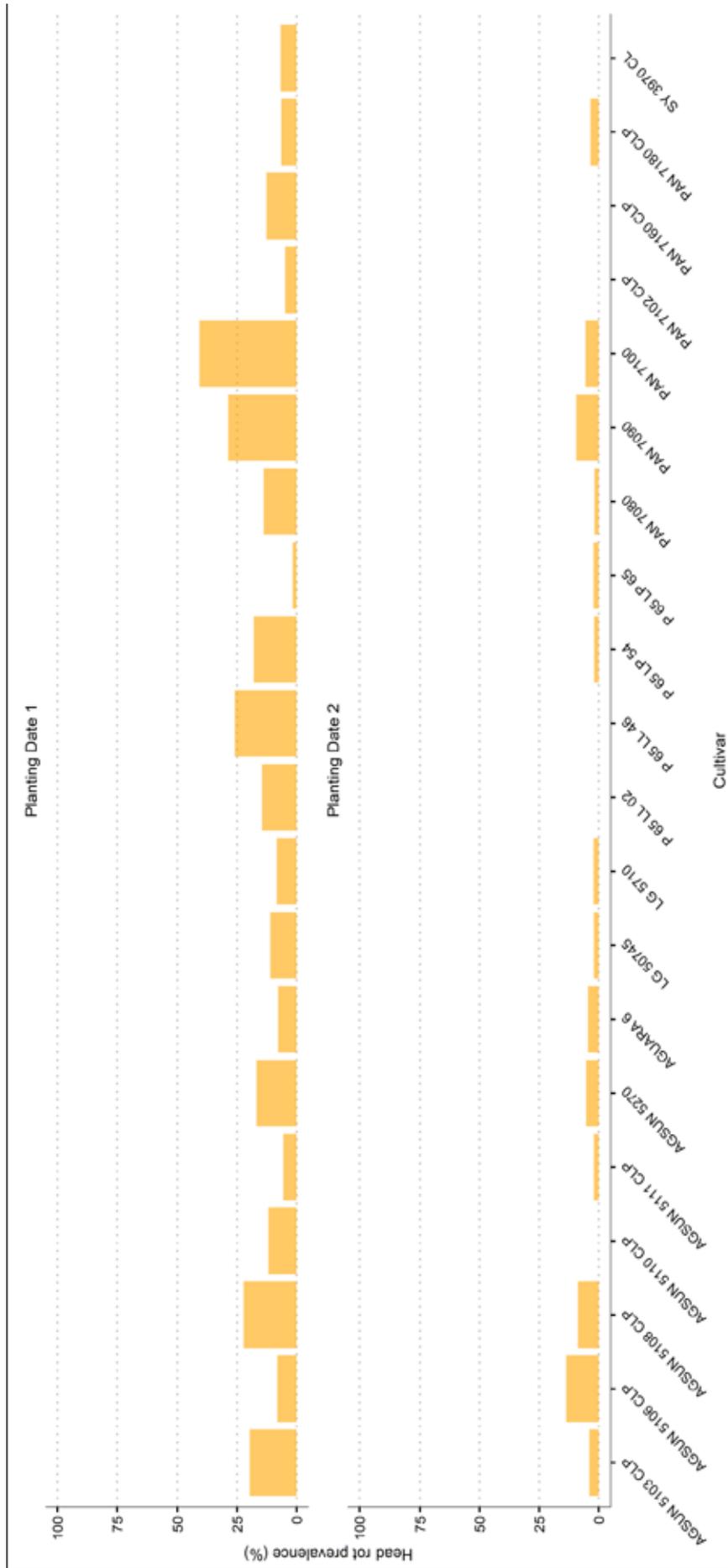


Figure 5. Mean head rot prevalence of sunflower cultivars screened against *Sclerotinia sclerotiorum* under inoculated field conditions in Delmas (MP) for the first and second planting on 13 and 21 December 2022.

Table 1: Collaborating company, trial localities and responsible co-workers 2023/2024

Company	Localities	Planting dates	Co-workers	E-mail address of co-worker
Agricol	Boskop 1	2023/11/27		
	Boskop 2	2023/12/20		
	Boskop 3	2024/01/29		
	Bethlehem	2023/11/21		
	Dealesvilled	2023/12/21		
	Heilbron	2023/12/22		
	Fochville	2024/01/15		
	Schweizer- Reneke	2024/01/16		
	Mareestane	2024/01/17		
	Rysmierbult	2023/12/08		
	Colligny2	2024/01/17		
	Lichtenburg	2023/12/28		
	Sannieshoff	2024/01/03		
	Ventersdorp 2	2023/12/29		
	Losberg	2024/01/04		
	Kroonstad 1	2023/12/14		
	Colligny 1	2024/01/04		JSwanepoel@agricol.co.za
	Ventersdorp 1	2023/12/20		
	Reitz	2023/11/09		
	Kroonstad 2	2024/01/05		
Makwassie	2023/12/15			
ARC-GCI	Potchefstroom	2023/11/03		
	Potchefstroom	2023/11/22		
	Potchefstroom	2023/12/18		
	Potchefstroom	2024/01/03	William Makgoga & Jan Erasmus	Makgogamw@arc.agric.za Erasmusj@arc.agric.za
	Bethlehem	2024/01/20 2023/12/20		
Corteva	Lichtenburg	2023/12/13		
	Koster	2023/12/14		
	Biesiesvlei	2023/12/14	Abre Pretorius, Phillip Fourie & Louis Schoonraad	abre.pretorius@pannar.co.za phillip.fourie@pioneer.com louis.schoonraad@corteva.com
	Senekal	2023/12/14		
	Gerdau	2023/12/15		
	Vredefort	2023/12/19		
	Puffontein	2023/12/21		
Corteva	Exelsior	2023/12/22		
	Colligny			
Lima Grain	Settlers	2024/01/15	Anita Janeke	anita.ianeke@limagrain.com
Syngenta	Bethlehem	2023/12/13	PieterTajjaard	Pieter.Tajjaard@syngenta.com
	De brug	2024/01/15		
	Schweizer Reneke	2024/01/03		

Table 2: Trial successful site information 2023/2024 season

Locality	Planting date	Plant Population	Soil Classification	pH (KCL)	Topsoil analysis (mg kg ⁻¹)					Fertiliser applied (Kg ha ⁻¹)	Row width (cm)	Weed control and insecticides	Net plot size (m ²)
					P	K	Ca	Mg					
Boskop 1	2023/11/27	40 000	-	-	-	-	-	-	-	0.91		11.83	
Boskop 2	2023/12/20	40 000	-	-	-	-	-	-	-	0.91		11.83	
Boskop 3	2024/01/29	40 000	-	-	-	-	-	-	-	1.13		14.69	
Bethlehem	2023/11/21	40 000	-	-	-	-	-	-	-	0.91		11.83	
Wolmaranstad	22/12/2022	40 000	-	-	-	-	-	-	-	0.91		11.83	
Schweizer- Reneke	2024/01/16	40 000	-	-	-	-	-	-	-	0.91		11.83	
Mareestane	2024/01/17	40 000	-	-	-	-	-	-	-	0.91		11.83	
Rysmierbult	2023/12/08	40 000	-	-	-	-	-	-	-	0.91		11.83	
Colligny2	2024/01/17	40 000	-	-	-	-	-	-	-	0.91		11.83	
Lichtenburg	2023/12/28	40 000	-	-	-	-	-	-	-	0.91		11.83	
Sannieshoff	2024/01/03	40 000	-	-	-	-	-	-	-	0.91			
Ventersdorp 2	2023/12/29	40 000	-	-	-	-	-	-	-	0.91			
Losberg	2024/01/04	40 000	-	-	-	-	-	-	-	0.91			
Kroonstad 1	2023/12/14	40 000	-	-	-	-	-	-	-	0.91			
Ventersdorp 1	2023/12/20	40 000	-	-	-	-	-	-	-	0.91			
Reitz	2023/11/09	40 000	-	-	-	-	-	-	-	0.91			
Kroonstad 2	2024/01/05	40 000	-	-	-	-	-	-	-	0.91			
Potchefstroom	2023/11/03	38 000	Westleigh	6.91	49	345	1150	560	N:73,P:8.3, K:4.1	0.90	Metagen Gold and Mechanical weeding	12.60	
Potchefstroom	2023/11/22	38 000	Westleigh	6.91	49	345	1150	560	N:73,P:8.3, K:4.1	0.90	Metagen Gold and Mechanical weeding	12.60	
Potchefstroom	2023/12/18	38 000	Westleigh	6.91	49	345	1150	560	N:73,P:8.3, K:4.1	0.90	Metagen Gold and Mechanical weeding	12.60	
Potchefstroom	2024/01/03	38 000	Westleigh	6.91	49	345	1150	560	N:73,P:8.3, K:4.1	0.90	Metagen Gold and Mechanical weeding	12.60	
Potchefstroom	2024/01/20	38 000	Westleigh	6.91	49	345	1150	560	N:73,P:8.3, K:4.1	0.90	Metagen Gold and Mechanical weeding	12.60	
Potchefstroom	2023/12/20	38 000	Westleigh	6.91	49	345	1150	560	N:73,P:8.3, K:4.1	0.90	Metagen Gold and Mechanical weeding	12.60	
Bethlehem	2023/11/03	38 000											
Lichtenburg	2023/12/13	48 000											
Koster	2023/12/14												
Vredefort	2023/12/19												
Colligny	01/12/2022												
Settlers	2024/01/15												
Bethlehem	2023/12/13												
Koster	2023/12/14												
Vredefort	2023/12/19											18.20	

Table 3: Number of days from planting to 50 percent flowering of cultivars at selected localities and planting dates 2023/2024

Cultivar Name	Bethlehem 2023-11-21	Boskop1 2023-11-27	Boskop 2023-12-20	Boskop3 2024-01-29	Coligny 22024-01-017	Coligny1 2024-01-04	Dealesvilled 2023-12-21	Fochville 2024-01-15	Kroonstad1 2023-12-14	Lichtenburg 2023-12-28	Losberg 2024-01-04	Makwassie 2023-12-15	Maretsane 2024-01-17	Sannieshof 2024-01-03	Rysmierbut 2023-12-08	Schweizer-Reneke 2024-01-16	Ventersdorp 22023-12-29	Retz 2023-11-09	Potchefstroom 2023-11-03	Potchefstroom 2023-11-22	Potchefstroom 2023-12-18	Potchefstroom 2024-01-03	Potchefstroom 2024-01-22	mean
AGSUN 5103 CLP	72	66	64	67	67	64	64	72	68	64	65	67	66	68	70	68	65	71	75	73	66	65	71	68
AGSUN 5106 CLP	72	67	64	68	68	66	64	73	69	65	65	67	67	67	70	68	65	72	75	74	66	65	72	68
AGSUN 5110 CLP	71	66	63	66	68	62	62	70	64	63	62	65	65	67	69	67	64	70	76	68	63	66	71	66
AGSUN 5111 CLP	74	67	66	71	69	67	69	74	71	66	66	69	68	68	71	69	66	74	75	74	70	69	68	70
AGSUN 5270	70	65	63	65	62	63	68	65	68	62	63	67	63	62	67	62	63	69	70	70	66	64	64	65
LG 50745	68	63	60	64	65	61	63	65	63	61	62	61	63	61	66	64	63	69	69	66	61	62	62	64
P 65 LL 25	72	66	64	66	68	65	66	71	68	65	65	67	66	67	67	68	65	72	74	75	67	69	75	68
P 65 LP 54	72	64	64	66	66	63	67	71	67	64	64	67	63	65	68	67	66	70	68	68	66	66	67	66
P 65 LP 65	73	66	65	68	70	66	69	73	70	66	65	68	67	67	70	68	66	71	73	75	70	68	68	69
PAN 7080	74	67	64	66	68	67	68	71	69	64	63	68	64	65	68	66	64	74	72	73	68	67	73	68
PAN 7090	73	65	63	67	66	66	65	72	70	64	65	66	65	64	70	66	64	73	72	70	68	68	68	67
PAN 7100	68	66	63	64	67	65	68	72	69	62	65	66	64	66	70	64	63	72	71	70	68	66	66	67
PAN 7102 CLP	69	64	61	64	67	64	64	66	65	62	62	65	63	63	67	62	62	72	69	67	65	64	67	65
PAN 7160 CLP	71	64	63	66	67	67	68	68	69	64	64	65	66	67	70	66	64	74	71	70	67	65	68	67
PAN 7180 CLP	74	66	65	71	68	68	66	66	69	65	67	67	64	68	70	66	63	73	72	73	68	68	71	68
SNK 270 CL	71	65	63	66	68	65	66	72	65	63	63	65	66	67	67	67	64	70	72	69	65	66	71	67
SY 3970 CL	71	66	64	66	67	64	69	67	65	65	62	67	66	67	68	66	63	71	72	72	66	66	71	67
Mean	71	65	63	67	67	65	66	70	68	64	64	66	65	66	69	66	64	72	72	71	66	66	69	67

Table 4: The “as is” seed oil concentration (%) of cultivars at selected localities 2023/2024

Cultivar Name	Boskop ¹ - 2023-11-27	Boskop ² - 2023-12-20	Boskop ³ - 2024-01-29	Potchefstroom 2023-11-03	Potchefstroom 2023-11-22	Potchefstroom 2023-12-18	Potchefstroom 2024-01-20	Koster 2023-12-14	Bethlehem 2023-12-20	Lichtenburg 2023-12-28	Mean
AGSUN5103CLP	40.64	40.64	39.18	40.25	35.87	40.16	37.53	38.02	35.89	40.16	38.83
AGSUN5106CLP	39.75	41.57	40.21	38.60	35.91	40.64	36.92	38.04	38.98	40.12	39.07
AGSUN5110CLP	39.52	40.17	40.59	39.26	36.77	39.55	36.86	37.87	35.55	39.28	38.54
AGSUN5111CLP	39.24	41.20	39.36	37.15	35.46	42.42	37.07	43.88	36.44	42.62	39.48
AGSUN5270	42.75	41.11	46.80	45.21	40.90	44.69	41.81	41.14	38.70	47.76	43.09
LG50745	43.89	43.04	43.37	43.10	41.42	42.46	43.56	40.65	41.96	47.07	43.05
P65LL25	48.15	44.79	47.33	46.51	43.08	46.94	42.03	44.09	42.23	50.88	45.60
P65LP54	40.12	39.49	42.41	39.45	35.23	39.55	37.22	41.77	36.26	42.40	39.39
P65LP65	44.79	42.85	41.15	42.89	39.08	41.21	40.97	40.27	42.95	44.21	42.04
PAN7080	43.42	39.74	37.92	43.60	38.42	43.94	36.71	38.69	37.95	41.33	40.17
PAN7090	46.51	41.72	41.77	43.93	39.68	43.42	39.80	41.83	39.40	45.22	42.33
PAN7100	45.27	42.90	41.76	45.07	38.60	43.65	40.83	40.27	42.01	44.40	42.48
PAN7102CLP	43.28	39.23	43.31	41.30	33.36	42.03	36.60	40.12	36.85	42.05	39.81
PAN7160CLP	42.99	42.80	42.18	42.12	38.16	42.60	39.00	42.05	40.33	43.83	41.61
PAN7180CLP	41.67	38.53	39.19	41.95	38.27	42.52	38.69	39.19	42.53	41.24	40.38
SNK270CL	52.35	51.82	47.70	47.32	46.37	48.27	45.84	49.74	44.70	51.84	48.59
SY3970CL	51.70	52.77	51.80	52.01	47.80	51.05	47.18	49.69	46.98	52.40	50.34
Mean	43.88	42.61	42.71	42.92	39.08	43.24	39.92	41.61	39.98	44.52	42.05

Table 5: The “as is” seed protein concentration (%) of cultivars at selected localities 2023/2024

Cultivar Name	Boskop1- 2023-11-27	Boskop2 2023-12-20	Boskop3 2024-01-29	Potchefstroom 2023-11-03	Potchefstroom 2023-11-22	Potchefstroom 2023-12-18	Potchefstroom 2024-01-20	Koster 2023-12-14	Bethlehem 2023-12-20	Lichtenburg 2023-12-28	Mean
AGSUN5103CLP	14.30	17.53	17.71	13.20	17.07	13.74	14.00	17.97	20.15	18.80	16.45
AGSUN5106CLP	15.39	17.17	17.55	13.89	16.00	13.40	14.48	19.14	19.05	15.71	16.18
AGSUN5110CLP	15.65	16.83	17.20	13.75	16.38	13.64	14.90	19.08	19.66	14.74	16.18
AGSUN5111CLP	12.38	16.98	16.33	14.18	16.24	11.24	13.43	17.30	19.43	13.77	15.13
AGSUN5270	13.75	18.90	17.77	13.33	14.94	15.46	15.00	20.77	19.36	16.08	16.53
LG50745	15.69	21.12	19.92	13.27	15.67	14.74	14.33	19.50	15.46	14.35	16.40
P65LL25	13.81	17.85	17.88	13.12	16.11	11.52	15.14	19.58	18.86	15.03	15.89
P65LP54	13.19	17.42	17.02	13.08	16.33	14.34	15.82	19.44	18.70	14.29	15.96
P65LP65	11.13	16.59	18.33	12.77	16.01	14.13	14.13	19.50	16.93	14.64	15.42
PAN7080	10.77	17.26	17.67	11.91	15.24	11.65	14.24	20.78	18.05	14.01	15.16
PAN7090	11.65	17.34	17.65	12.37	15.14	12.05	14.15	19.03	18.84	12.48	15.07
PAN7100	11.80	16.80	16.87	12.81	16.61	11.48	14.02	19.71	17.72	12.81	15.06
PAN7102CLP	11.31	16.00	16.38	13.03	16.08	11.48	13.28	19.93	18.57	13.23	14.93
PAN7160CLP	11.28	17.18	16.34	13.05	15.30	13.96	14.84	18.72	17.56	12.63	15.09
PAN7180CLP	11.61	15.88	18.20	12.07	17.85	12.47	14.20	19.41	16.05	15.24	15.30
SNK270CL	11.61	16.49	18.90	13.18	16.53	15.20	16.44	19.17	18.83	14.76	16.11
SY3970CL	11.78	17.38	18.05	12.84	15.86	12.75	15.45	21.82	19.67	14.92	16.05
Mean	12.77	17.34	17.63	13.05	16.08	13.13	14.58	19.46	18.41	14.56	15.70

Table 6: Mean seed yield (t ha⁻¹) of cultivars at each locality 2023/2024

Cultivar Name	Bethlehem2023-11-09syn	Bethlehem 2023-11-21	Bethlehem2023-12-20	Boskop1-2023-11-27	Boskop2023-12-20	Boskop32024-01-29	Coligny	Coligny12024-01-04	Coligny22024-01-17	Dealesvilled2023-12-21	Fochvillie2024-01-15	Koster2023-12-14	Kroonstad12023-12-14	Lichtenburg	Lichtenburg2023-12-28	Losberg2024-01-04	Makwassie2023-12-15	Maretsane2024-01-17	Potchefstrom2023-11-03	Potchefstrom2023-11-22	Potchefstrom2023-12-18	Potchefstrom2024-01-03	Potchefstrom2024-01-20	Reitz2023-11-09	Rysmierbult2023-12-08	SCHWEIZER-RENEKE2024-01-16	Sanneshof2024-01-03	Setters2024-01-15	Ventersdorp2023-12-29	Vrededorp2023-12-19	mean
AGSUN 5103 CLP	1.89	3.40	1.78	3.35	2.29	2.35	2.12	1.97	2.80	1.98	1.62	1.44	1.59	1.53	3.08	2.88	1.20	2.46	2.46	1.93	2.17	1.67	1.89	2.70	3.21	1.56	2.53	2.00	1.60	2.45	2.20
AGSUN 5106 CLP	1.86	3.47	1.48	3.34	2.32	2.57	2.31	1.93	3.39	2.27	1.45	1.61	1.89	2.20	3.17	2.59	1.37	2.72	2.64	2.08	1.96	2.34	1.96	2.77	3.00	1.61	2.60	1.68	1.47	2.71	2.29
AGSUN 5110 CLP	1.81	2.95	1.56	2.99	2.19	2.17	2.88	1.95	2.80	1.73	1.56	1.79	1.45	1.17	2.78	2.42	1.19	2.51	2.55	1.98	2.07	2.02	1.82	2.57	2.94	1.42	2.42	1.92	1.30	1.58	2.08
AGSUN 5111 CLP	1.54	3.49	1.53	3.18	2.35	2.41	2.70	1.85	3.30	2.00	1.88	1.61	1.80	1.75	3.40	2.88	1.29	2.66	2.55	2.09	2.30	2.79	1.84	2.76	3.04	1.51	2.89	2.04	1.52	2.00	2.30
AGSUN 5270	1.61	3.61	1.66	3.22	2.35	2.42	1.86	2.10	2.94	1.90	1.82	1.92	1.75	1.82	3.09	2.64	1.67	2.72	2.25	2.15	1.87	2.39	1.90	2.85	2.76	1.85	2.56	1.93	1.63	2.49	2.26
LG 50745	1.77	3.51	1.45	2.79	2.20	2.47	2.18	1.46	2.41	1.84	1.18	1.90	1.41	1.35	2.73	2.39	1.21	2.25	2.51	2.19	2.28	2.21	1.89	2.80	2.47	1.43	2.09	2.11	1.19	3.03	2.09
P 65 LL 25	1.77	3.79	1.31	3.24	2.23	2.50	2.34	2.06	2.86	1.84	1.48	2.07	1.77	2.02	3.30	3.19	1.25	2.67	2.82	2.01	2.33	2.22	1.76	2.73	3.34	1.67	2.86	1.63	1.81	2.62	2.32
P 65 LP 54	1.47	3.45	1.45	3.37	2.19	2.38	2.14	1.81	3.02	1.76	1.80	1.83	1.83	1.55	2.95	2.62	1.14	2.41	2.80	2.48	2.30	2.55	1.84	2.59	2.96	1.56	2.68	2.22	1.61	2.39	2.24
P 65 LP 65	1.49	3.28	1.36	3.20	2.33	2.39	2.94	1.80	3.10	1.98	1.52	1.50	1.57	1.92	2.70	2.73	1.41	3.07	2.91	2.13	2.44	2.50	2.24	2.33	2.83	1.49	2.49	2.13	1.46	2.43	2.26
PAN 7080	2.25	3.14	1.51	3.16	2.31	2.55	2.90	1.85	2.72	1.88	1.68	1.28	1.61	1.60	2.74	2.71	1.16	2.97	2.98	2.19	2.23	2.24	1.97	2.57	3.05	1.50	2.78	1.70	1.56	3.12	2.26
PAN 7090	1.88	3.48	1.54	2.83	1.89	2.44	2.98	1.89	3.14	2.17	1.66	1.64	1.36	1.64	3.00	2.85	1.02	2.37	2.84	2.19	2.23	2.37	1.95	2.93	3.27	1.61	2.24	2.20	1.37	2.14	2.24
PAN 7100	1.20	3.56	1.39	3.06	2.17	2.43	2.17	2.02	2.46	1.79	1.45	1.47	1.86	1.87	3.14	3.13	1.40	2.14	2.68	2.24	2.19	2.32	2.13	2.87	2.57	1.47	2.25	2.33	1.36	2.17	2.18
PAN 7102 CLP	1.13	3.42	1.69	3.18	2.49	2.76	2.32	1.93	3.15	1.93	1.92	2.03	1.49	1.94	3.02	3.06	1.45	2.77	2.62	2.27	2.41	2.32	2.07	2.77	3.07	1.59	2.12	2.08	1.51	2.15	2.29
PAN 7160 CLP	1.29	3.33	1.56	3.12	2.37	2.34	2.42	1.90	2.85	1.89	1.79	1.94	1.48	2.15	3.20	2.62	1.32	2.15	2.85	2.19	2.50	2.41	2.34	2.62	3.10	1.52	2.59	2.30	1.52	2.66	2.28
PAN 7180 CLP	1.60	3.24	1.47	3.41	2.22	2.61	2.73	1.98	2.63	2.01	1.58	1.51	1.78	1.82	2.97	2.90	1.24	2.46	2.85	2.33	2.27	2.36	2.07	2.79	2.98	1.54	2.27	1.87	1.60	3.00	2.27
SNK 270 CL	1.69	3.28	1.23	2.97	2.12	2.28	2.58	1.63	2.78	1.81	1.35	1.69	1.50	1.59	2.65	2.28	1.17	2.46	3.36	2.47	2.08	2.38	2.30	2.84	2.68	1.36	2.27	2.48	1.32	2.99	2.19
SY 3970 CL	1.87	3.35	1.35	2.94	2.01	2.10	2.63	1.68	2.84	1.62	1.19	1.76	1.38	1.51	2.69	1.97	1.12	2.26	3.15	2.03	2.22	2.48	1.62	2.69	2.52	1.23	2.21	2.24	1.27	2.56	2.08
Mean	1.65	3.40	1.49	3.14	2.24	2.42	2.48	1.87	2.89	1.91	1.58	1.71	1.62	1.73	2.98	2.70	1.27	2.53	2.75	2.17	2.23	2.33	1.98	2.72	2.93	1.52	2.46	2.05	1.48	2.50	2.22
CV	13.5	12.5	12.4	14.8	17.8	16.9	17.8	17.3	11.6	14.0	18.4	15.4	15.9	18.3	13.0	17	18.3	19.0	8.5	9.2	8.6	9.8	10.0	19.9	16.0	18.8	12.8	13.9	15.7	18.1	14.8

Table 7: Oil yield (t ha⁻¹) of cultivars at selected localities 2023/2024

Cultivar Name	Boskop1- 2023-11-27	Boskop2 2023-12-20	Boskop3 2024-01-29	Potchefstroom 2023-11-03	Potchefstroom 2023-11-22	Potchefstroom 2023-12-18	Potchefstroom 2024-01-20	Koster 2023-12-14	Bethlehem 2023-12-20	Lichtenburg 2023-12-28	Mean
AGSUN5103CLP	1.36	0.93	0.92	0.99	0.69	0.87	0.71	0.55	0.64	1.24	0.89
AGSUN5106CLP	1.33	0.96	1.03	1.02	0.75	0.80	0.72	0.61	0.58	1.27	0.91
AGSUN5110CLP	1.18	0.88	0.88	1.00	0.73	0.82	0.67	0.68	0.55	1.09	0.85
AGSUN5111CLP	1.25	0.97	0.95	0.95	0.74	0.98	0.68	0.71	0.56	1.45	0.92
AGSUN5270	1.38	0.97	1.13	1.02	0.88	0.84	0.79	0.79	0.64	1.48	0.99
LG50745	1.22	0.95	1.07	1.08	0.91	0.97	0.82	0.77	0.61	1.29	0.97
P65LL25	1.56	1.00	1.18	1.31	0.87	1.09	0.74	0.91	0.55	1.68	1.09
P65LP54	1.35	0.86	1.01	1.10	0.87	0.91	0.68	0.76	0.53	1.25	0.93
P65LP65	1.43	1.00	0.98	1.25	0.83	1.01	0.92	0.60	0.58	1.19	0.98
PAN7080	1.37	0.92	0.97	1.30	0.84	0.98	0.72	0.50	0.57	1.13	0.93
PAN7090	1.32	0.79	1.02	1.25	0.87	0.97	0.78	0.69	0.61	1.36	0.96
PAN7100	1.39	0.93	1.01	1.21	0.86	0.96	0.87	0.59	0.58	1.39	0.98
PAN7102CLP	1.38	0.98	1.20	1.08	0.76	1.01	0.76	0.81	0.62	1.27	0.99
PAN7160CLP	1.34	1.01	0.99	1.20	0.84	1.06	0.91	0.82	0.63	1.40	1.02
PAN7180CLP	1.42	0.86	1.02	1.20	0.89	0.97	0.80	0.59	0.63	1.22	0.96
SNK270CL	1.55	1.10	1.09	1.59	1.15	1.00	1.05	0.84	0.55	1.37	1.13
SY3970CL	1.52	1.06	1.09	1.64	0.97	1.13	0.76	0.87	0.63	1.41	1.11
Mean	1.37	0.95	1.03	1.19	0.85	0.96	0.79	0.71	0.59	1.32	0.98

Table 8: Parameters calculated from the analysis of variance for yield data at each locality

Locality	Mean (t/ha)	SE	CV (%)	GCV	t	SE(t)	tn
Bethlehem 2023-11-09syn	1.7	0.13	13.5	15.3	0.56	0.135	0.79
Bethlehem 2023-11-21	3.4	0.25	12.5	.	-0.15	0.116	-0.64
Bethlehem 2023-12-20	1.5	0.11	12.4	6.3	0.2	0.162	0.43
Biesievlei 2023-12-14	1.1	0.17	27.4	20.5	0.36	0.159	0.63
Boskop1- 2023-11-27	3.1	0.27	14.8	.	-0.21	0.101	-1.09
Boskop 2023-12-20	2.2	0.23	17.8	.	-0.26	0.087	-1.63
Boskop3 2024-01-29	2.4	0.24	16.9	.	-0.23	0.096	-1.28
Coligny	2.5	0.26	17.8	8.9	0.2	0.162	0.43
Coligny1 2024-01-04	1.9	0.19	17.3	.	-0.09	0.129	-0.33
Coligny 22024-01-017	2.9	0.19	11.6	6.4	0.23	0.162	0.47
Dealesvilled 2023-12-21	1.9	0.15	14	1.7	0.01	0.146	0.03
Fochville 2024-01-15	1.6	0.17	18.4	9	0.19	0.161	0.41
Gerdau 2023-12-15	1.1	0.21	33.7	.	-0.03	0.14	-0.1
Heilbron 2023-12-22	0.8	0.18	39.9	.	-0.27	0.084	-1.76
Koster 2023-12-14	1.7	0.15	15.4	9.9	0.29	0.162	0.55
Kroonstad1 2023-12-14	1.6	0.15	15.9	6.5	0.14	0.159	0.33
Kroonstad2 2024-01-05	0.9	0.16	31.6	.	-0.13	0.121	-0.53
Lichtenburg	1.7	0.18	18.3	11.9	0.3	0.162	0.56
Lichtenburg 2023-12-28	3.0	0.22	13	1.9	0.02	0.147	0.06
Losberg 2024-01-04	2.7	0.26	17	6.3	0.12	0.158	0.29
Makwassie 2023-12-15	1.3	0.13	18.3	5.9	0.09	0.155	0.23
Mareetsane 2024-01-17	2.5	0.28	19	.	-0.02	0.141	-0.06
Potchefstroom 2023-11-03	2.8	0.14	8.5	8.4	0.49	0.146	0.74
Potchefstroom 2023-11-22	2.2	0.12	9.2	4.7	0.21	0.162	0.44
Potchefstroom 2023-12-18	2.2	0.11	8.6	5.4	0.28	0.162	0.54
Potchefstroom 2024-01-03	2.3	0.13	9.8	8.4	0.42	0.154	0.68
Potchefstroom 2024-01-20	2.0	0.11	10	7.9	0.39	0.157	0.66
Putfontein 2023-12-21	1.1	0.2	31.2	.	-0.07	0.133	-0.24
Reitz 2023-11-09	2.7	0.31	19.9	.	-0.35	0.058	-3.5
Rysmierbult 2023-12-08	2.9	0.27	16	.	-0.03	0.14	-0.1
Schweizer-Reneke 2024-01-16	1.5	0.17	18.8	.	-0.13	0.121	-0.53
Sannieshof 2024-01-03	2.5	0.18	12.8	7.1	0.23	0.162	0.47
Senekal 2023-12-14	0.8	0.15	33.8	10.5	0.09	0.155	0.23
Settlers 2024-01-15	2.1	0.16	13.9	8.5	0.27	0.162	0.53
Venterts dorp 22023-12-29	1.5	0.13	15.7	5.7	0.11	0.157	0.27
Vredefort 2023-12-19	2.5	0.26	18.1	12.8	0.33	0.161	0.6

Table 9: Regression line coordinates at different yield potentials 2023/2024

Cultivar	Yield potential (t ha ⁻¹)					Mean (t ha ⁻¹)	Intercept	Slope	Fprob	R ²
	1	1,5	2	2,5	3					
AGSUN 5103 CLP	1.0	1.5	2.0	2.5	3.0	3.5	-0.02	1.00	<0.001	0.88
AGSUN 5106 CLP	1.0	1.6	2.1	2.6	3.1	3.6	0.00	1.03	<0.001	0.90
AGSUN 5110 CLP	1.0	1.4	1.9	2.3	2.8	3.3	0.06	0.91	<0.001	0.84
AGSUN 5111 CLP	1.0	1.5	2.1	2.6	3.1	3.7	-0.09	1.07	<0.001	0.90
AGSUN 5270	1.2	1.6	2.1	2.5	2.9	3.4	0.33	0.87	<0.001	0.84
LG 50745	0.9	1.4	1.9	2.4	2.8	3.3	-0.04	0.96	<0.001	0.85
P 65 LL 25	1.0	1.5	2.1	2.6	3.2	3.7	-0.14	1.10	<0.001	0.89
P 65 LP 54	1.0	1.5	2.0	2.5	3.0	3.6	-0.02	1.02	<0.001	0.93
P 65 LP 65	1.0	1.5	2.0	2.5	3.0	3.6	0.01	1.01	<0.001	0.89
PAN 7080	1.0	1.5	2.0	2.6	3.1	3.6	0.02	1.01	<0.001	0.84
PAN 7090	0.9	1.5	2.0	2.5	3.1	3.6	-0.12	1.06	<0.001	0.90
PAN 7100	1.0	1.5	2.0	2.5	2.9	3.4	0.00	0.98	<0.001	0.87
PAN 7102 CLP	1.1	1.6	2.1	2.6	3.1	3.6	0.10	0.99	<0.001	0.87
PAN 7160 CLP	1.1	1.6	2.1	2.5	3.0	3.5	0.14	0.96	<0.001	0.90
PAN 7180 CLP	1.0	1.5	2.1	2.6	3.1	3.6	0.01	1.02	<0.001	0.93
SNK 270 CL	0.9	1.4	2.0	2.5	3.0	3.5	-0.09	1.02	<0.001	0.85
SY 3970 CL	0.8	1.4	1.9	2.4	2.9	3.4	-0.17	1.01	<0.001	0.86

Table 10: Yield probability (%) of cultivars for 2023/2024 at different yield potentials

Cultivar	Yield potential (t ha ⁻¹)						Regression line	
	1	1,5	2	2,5	3	3,5	F prob	R ²
AGSUN 5103 CLP	46	46	46	46	46	46	<0.001	0.88
AGSUN 5106 CLP	55	60	62	65	67	69	<0.001	0.90
AGSUN 5110 CLP	45	38	30	25	19	16	<0.001	0.84
AGSUN 5111 CLP	46	54	60	67	71	76	<0.001	0.90
AGSUN 5270	80	74	63	52	39	30	<0.001	0.84
LG 50745	38	34	31	28	26	24	<0.001	0.85
P 65 LL 25	43	52	61	69	76	81	<0.001	0.89
P 65 LP 54	50	52	55	57	59	61	<0.001	0.93
P 65 LP 65	54	56	56	58	58	59	<0.001	0.89
PAN 7080	54	56	56	58	58	59	<0.001	0.84
PAN 7090	40	45	50	56	61	65	<0.001	0.90
PAN 7100	47	45	43	42	40	39	<0.001	0.87
PAN 7102 CLP	65	66	64	64	62	62	<0.001	0.87
PAN 7160 CLP	69	66	63	58	54	50	<0.001	0.90
PAN 7180 CLP	57	59	62	64	66	67	<0.001	0.93
SNK 270 CL	40	41	42	44	45	47	<0.001	0.85
SY 3970 CL	26	27	26	28	28	31	<0.001	0.86

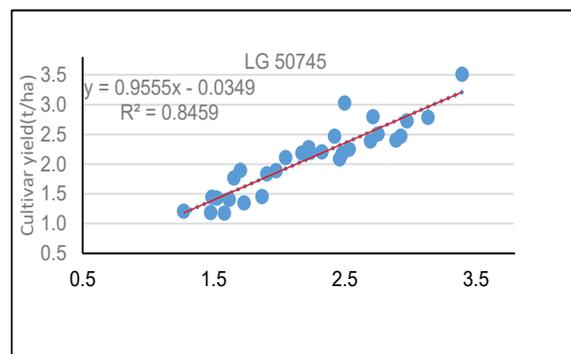
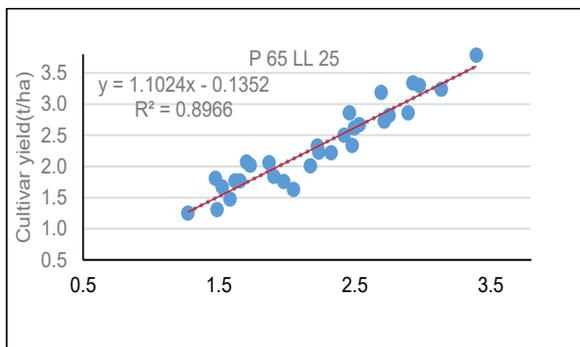
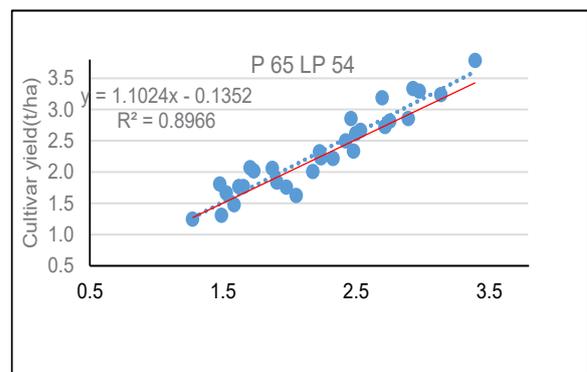
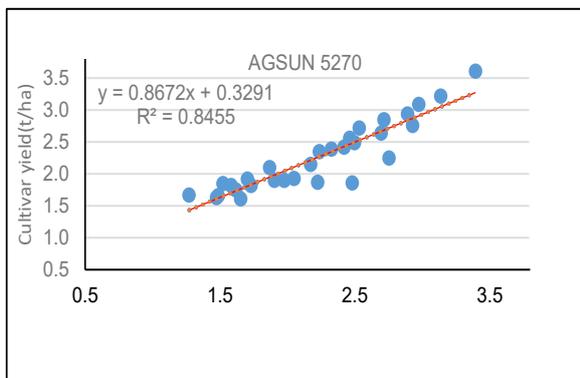
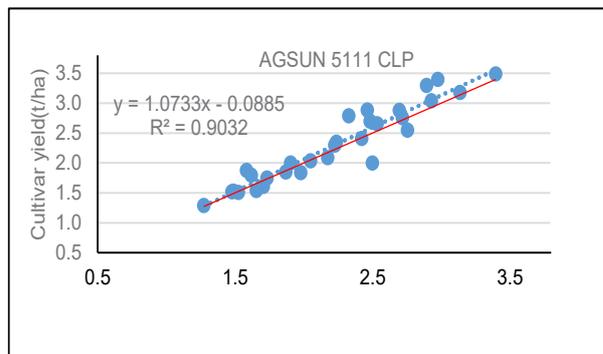
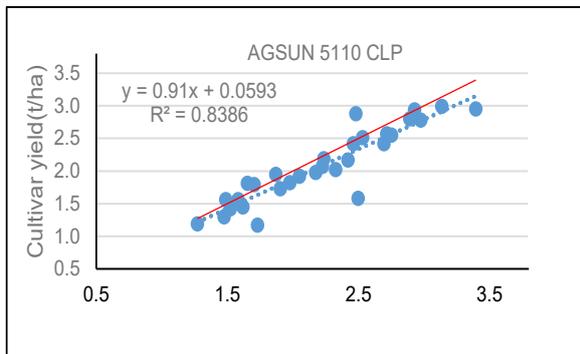
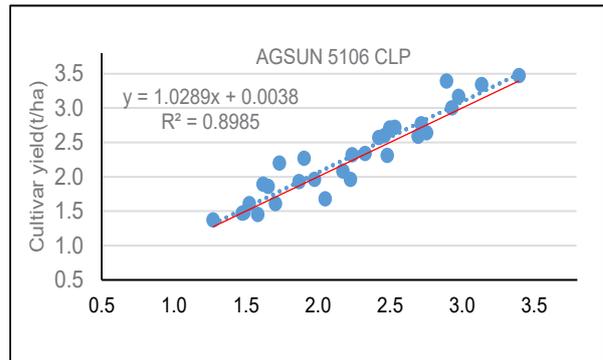
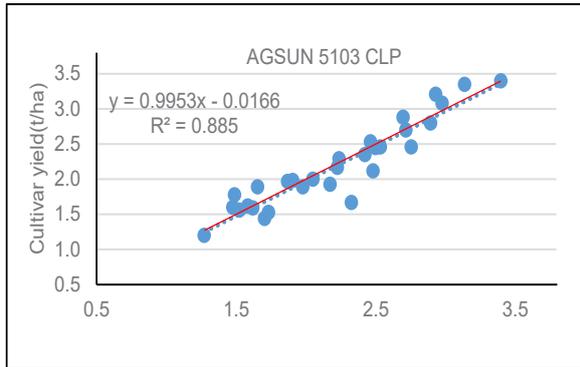
Table 11: Yield probability (%) of cultivars 2022/2023 and 2023/2024 at different yield potentials

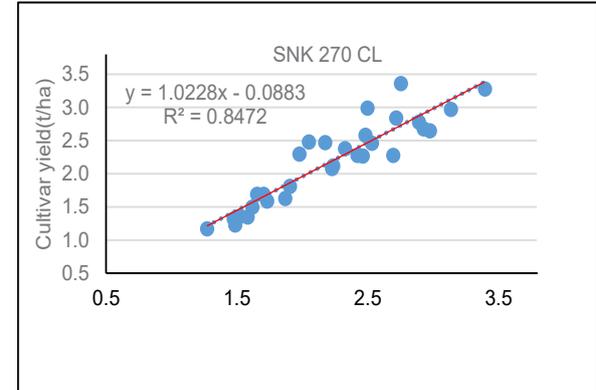
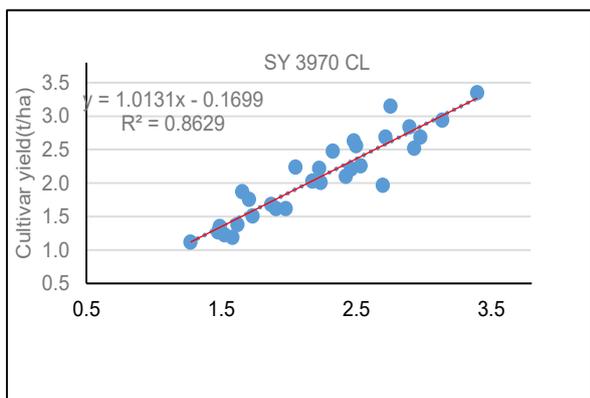
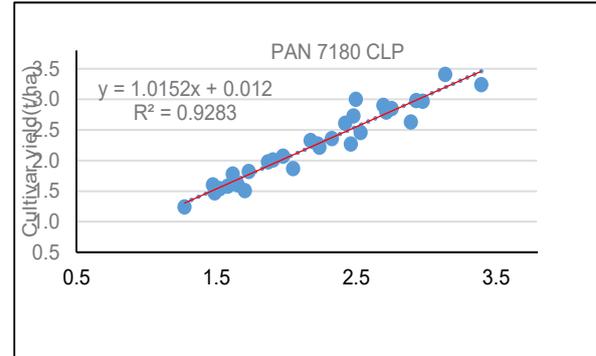
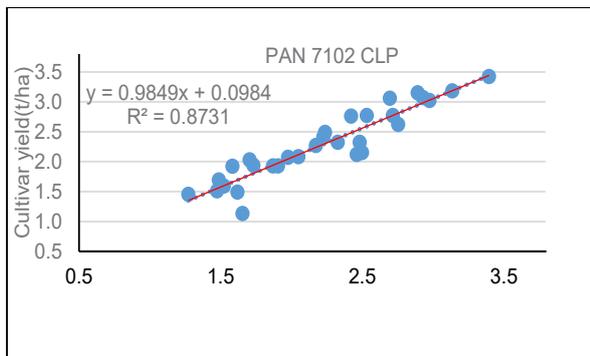
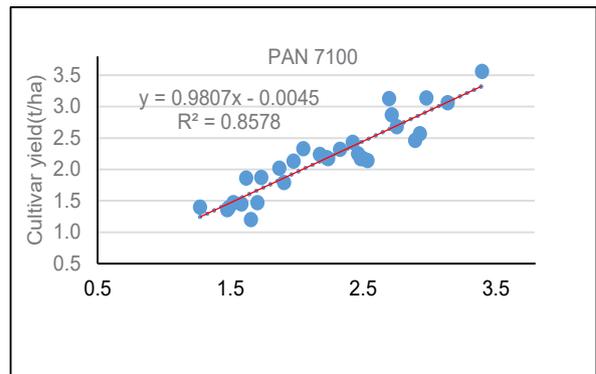
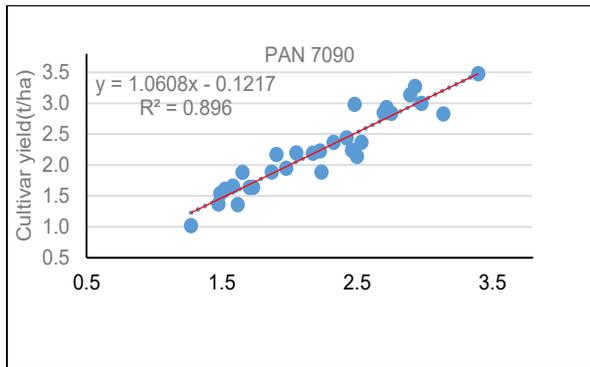
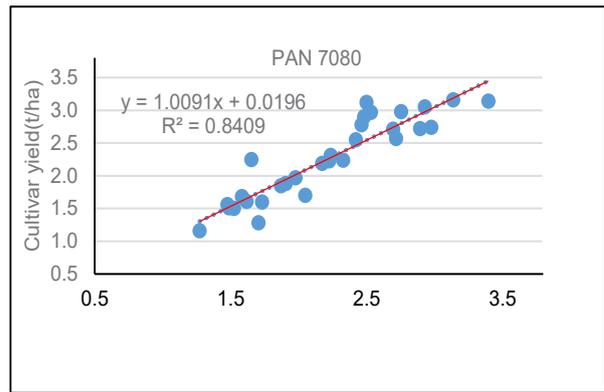
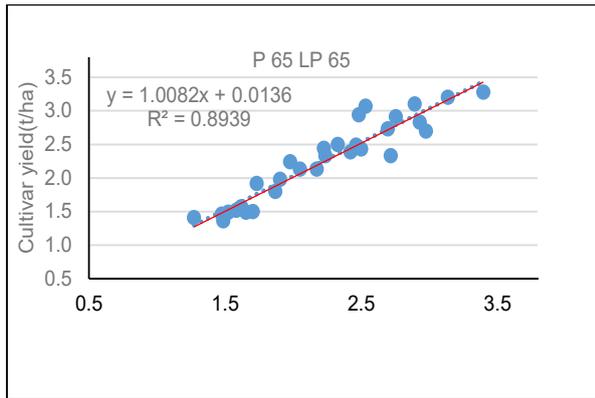
Cultivar	Yield potential (t ha ⁻¹)						Regression line	
	1	1,5	2	2,5	3	3,5	F prob	R ²
AGSUN 5103 CLP	34	37	40	43	47	50	<0.001	0.87
AGSUN 5106 CLP	52	54	56	57	59	61	<0.001	0.89
AGSUN 5110 CLP	40	33	27	21	17	14	<0.001	0.86
AGSUN 5111 CLP	49	53	56	60	63	66	<0.001	0.84
AGSUN 5270	72	68	63	57	52	46	<0.001	0.88
LG 50745	43	40	36	33	30	28	<0.001	0.81
P 65 LP 54	54	56	56	58	58	59	<0.001	0.90
P 65 LP 65	62	61	59	57	56	54	<0.001	0.89
PAN 7080	64	64	63	63	61	61	<0.001	0.85
PAN 7090	50	52	54	56	57	59	<0.001	0.89
PAN 7100	52	50	46	44	41	39	<0.001	0.88
PAN 7102 CLP	46	51	56	62	66	71	<0.001	0.85
PAN 7160 CLP	56	58	60	61	63	65	<0.001	0.89
PAN 7180 CLP	48	55	60	67	71	76	<0.001	0.88
SY 3970 CL	39	36	32	30	27	25	<0.001	0.80

Table 12: Yield probability (%) of cultivars for three years' data 2021/2022 to 2023/2024 at different yield potentials

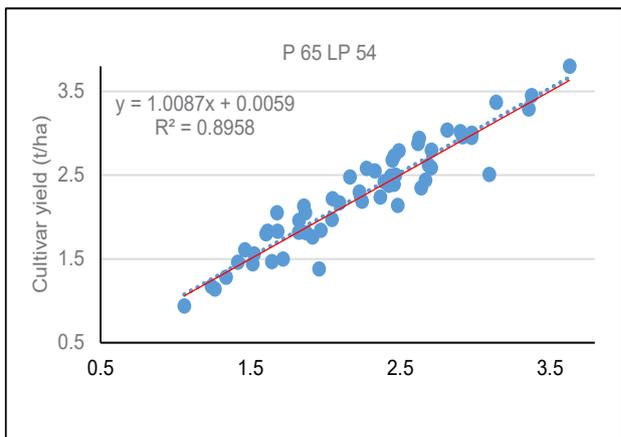
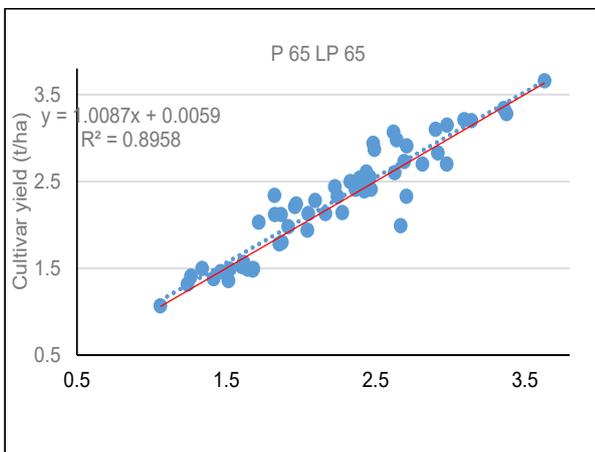
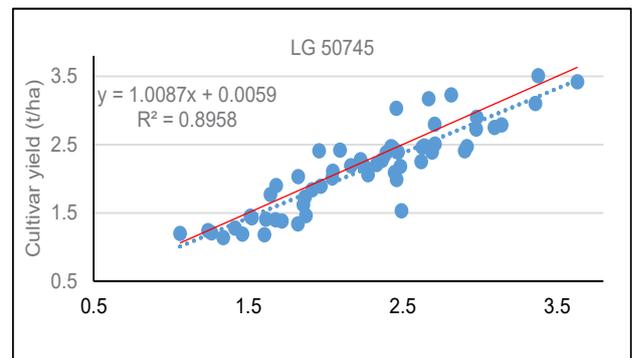
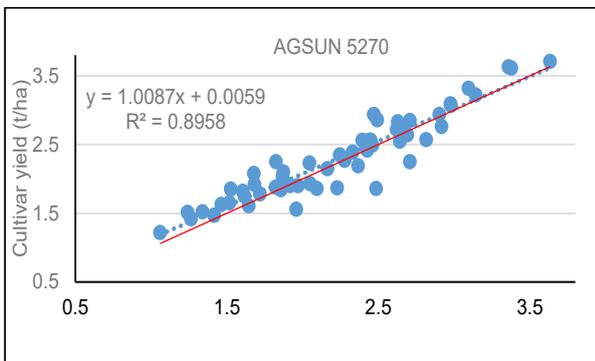
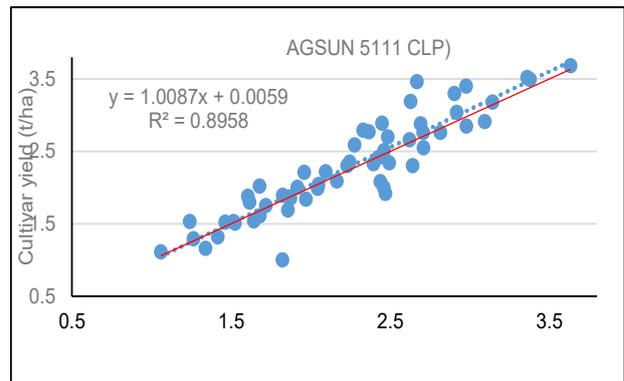
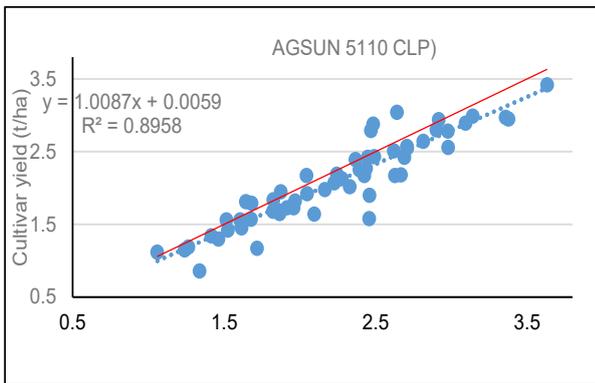
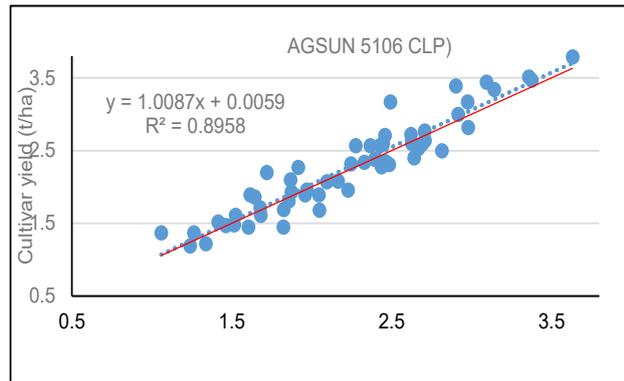
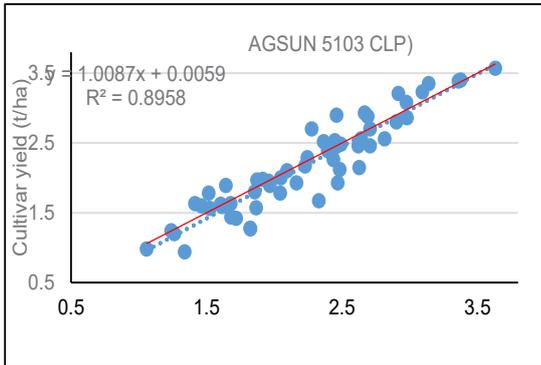
	Yield potential (t/ha)							Regression line	
	1	1,5	2	2,5	3	3,5	Fprob	R ²	
AGSUN 5103 CLP	42	42	42	42	42	42	<0.001	0.86	
AGSUN 5106 CLP	52	53	55	57	59	60	<0.001	0.88	
AGSUN 5270	65	63	60	58	54	52	<0.001	0.89	
P 65 LP 54	56	54	50	48	44	42	<0.001	0.91	
P 65 LP 65	54	56	56	58	58	60	<0.001	0.91	
PAN 7080	56	58	60	61	63	64	<0.001	0.86	
PAN 7100	50	48	46	44	42	40	<0.001	0.91	
PAN 7102 CLP	41	47	53	60	66	71	<0.001	0.88	
PAN 7160 CLP	59	63	65	69	71	74	<0.001	0.93	
PAN 7180 CLP	52	56	57	61	63	66	<0.001	0.89	
SY 3970 CL	38	33	28	24	19	17	<0.001	0.75	

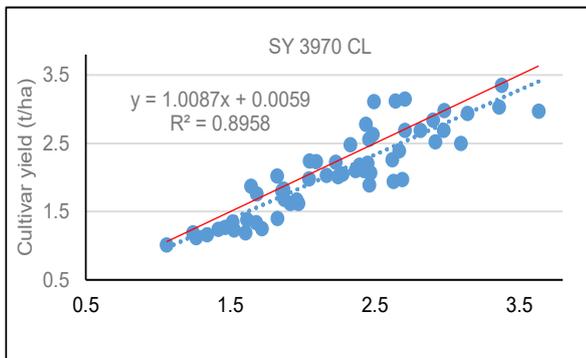
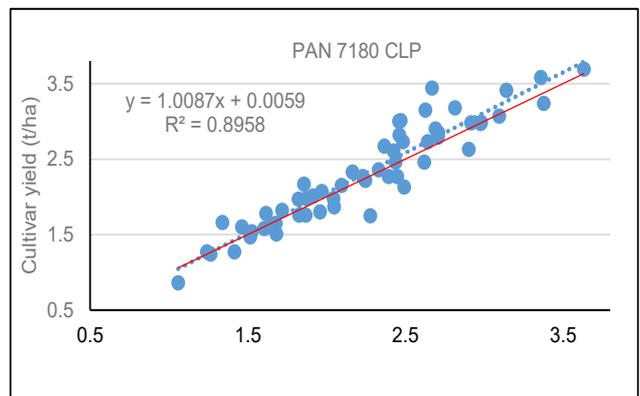
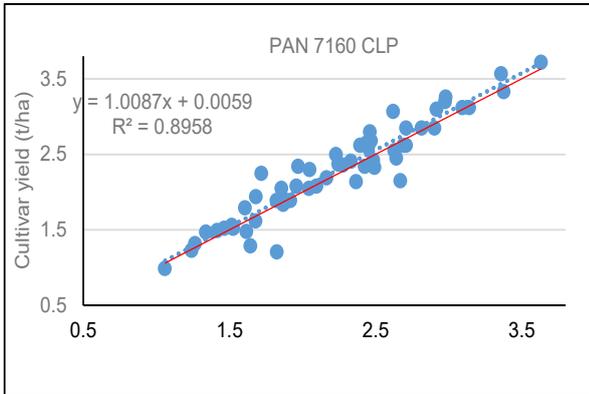
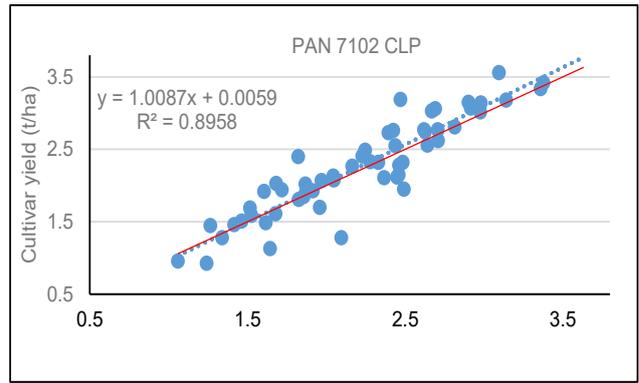
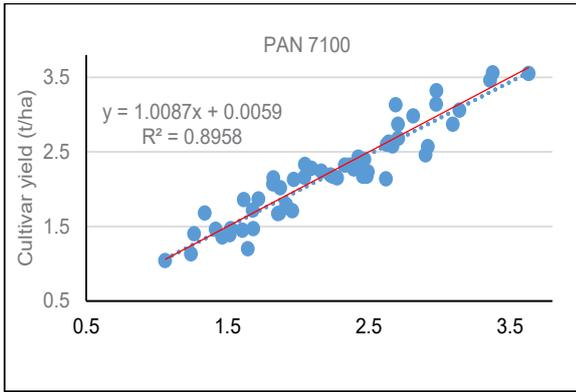
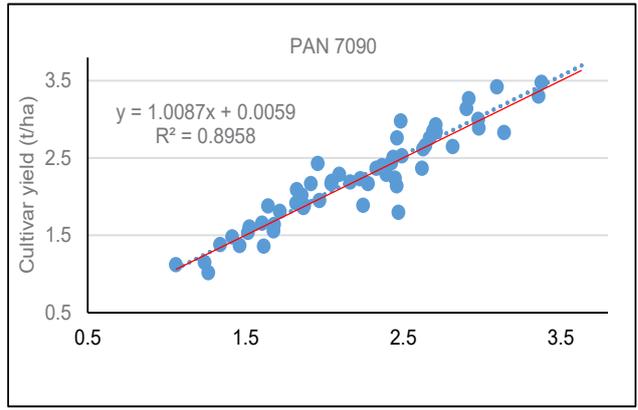
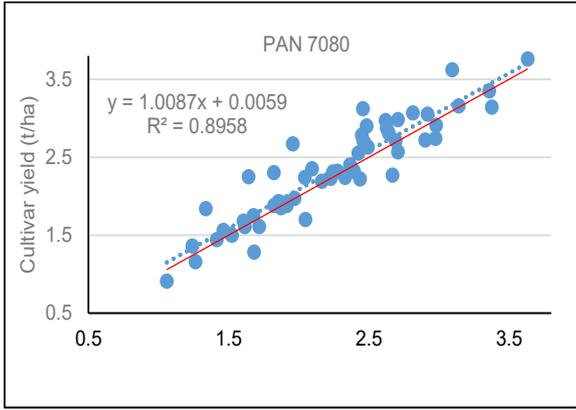
Figure 1: Regression lines for cultivars 2023/2024





**Figure 2: Regression lines for cultivars
2022/2023 & 2023/2024**





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 complies 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%	

