Report

Evaluation of sunflower cultivars: 2019/2020 season

ARC-Grain Crops Institute in collaboration with the following seed companies: Agricol, Pannar, Pioneer, Syngenta, Sensako and Link Seed

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INTRODUCTION

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

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

MATERIALS AND METHODS

This project was conducted during the 2019/2020 season with the voluntary collaboration of Agricol, Pannar, Pioneer, Syngenta, Sensako and Link Seed. Seed companies entered 26 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. Germination tests, according to ISTA rules, were done on the supplied seed by a service provider (Senwes Grainlink). Seed germination from all cultivars exceeded the 80% requirement (Table 1). Seed from cultivars were packed according to trial plans and send to co-operators before the onset of the growing season.

Eleven of the 26 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®. Two hybrids (LG 5626 HO & SY 3975 CL HO) of the 26 was high oleic acid.

Each collaborating seed company had to conduct at least one trial for each cultivar entry. Agricol was supplied with seed for 13 trials, Pannar with 5, Pioneer with 5 and Syngenta with 3, Link Seed with 3 and Sensako with 2. Five trials were planted by the ARC-GC with different planting dates. Trial sites were selected by collaborators and the co-workers involved are listed in Table 2.

two trials of Pannar not planted or not harvested due to bad trial quality, two trials of Pioneer were not planted or planted and not harvested, three trial of Syngenta not planted or damaged due to the hail and drought, two trials of Link Seed not planted or not correctly done, three trials were not successful due to late planting and sclerotinia, bird damage, replanting not harvested or even not planted. Four trials 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 four trials at Potchefstroom and three trials at Boskop with different planting dates and one trial at Fochville, Leeudorngstad, Sannieshof, Makwassie, Wolmaransstad and Ventersdorp

Yield data and seed samples were send by collaborators to ARC-GC for analyses. Seed from selected trials sent to SAGL for oil and protein content analyses. Yield data from 21 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 21 trials.

Yield probabilities were also calculated for 22 cultivars that were evaluated in 35 trials during 2018/2019 and 2019/2020.

RESULTS

Days from planting to flowering

The mean number of days from planting to 50% flowering of cultivars (Table 4) ranged from 66 RN 28485 to 71 days (AGSUN 5102 CLP, AGSUN 5103 CLP, AGSUN 5106 CLP, SY 3975 CLHO & PAN 7080). Calculated across cultivars and planting dates, the period from planting to flowering was 69 days. The longest days to flowering recorded at Potchefstroom planted on the 5th of February 2020.

Oil and protein concentration

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

analyses were done according to the Dumas method.
The moisture free oil content for cultivars at the various localities varied from 37.62 to 50.61% with an overall mean of 42.12%.
The highest mean oil concentration among localities was at Potchefstroom (planting date 18 December 2019) with 45.90%. The locality with the lowest mean oil content of 36.82% was Potchefstroom planting date was February 05, 2019. The highest oil concentration among cultivars and calculated across localities, was SY 3970 CL at 50.61% followed by RN 28584 at 48.36%

The average protein content varied from 15.95 to 19.56% among cultivars at the different localities. Among localities, Ventersdorp planted in January 15, 2020 had the highest and Potchefstroom planted in November 04 2019 the lowest protein content of 20.82 and 12.81% respectively. Calculated across localities, RN 28485 had the highest protein content (19.56 %) followed by AGSUN 5102 CLP and AGSUN 5101 CLP (19.5) while PAN 64 LL 23 the lowest (15.95%).

Seed yield

The mean seed yield of cultivars at the respective localities is presented in Table 7. The highest locality mean yield of 3.52 t ha^{-1} was obtained at Kroonstad planted on 17 of January 2020 and the lowest of 0.89 t ha^{-1}, at Potchefstroom planted on 5^{h} February 2020.

The five best performing cultivars, in terms of average yield calculated over localities, were PAN 7156 CLP, P 64 L L23, PAN 7080, AGSUN 5270 & PAN 7160 CLP. The overall mean yield for 2019/20 was 2.50 t ha^{-1}, 12 % higher than the mean yield of 2018/19.

Two high oleic cultivar (LG 5625 HO & SY 3975 CLOH) was entered for evaluation in 2019/2020. Eleven Clearfield and Clearfield Plus cultivars, AGSUN 5101 CLP, AGSUN 5102 CLP, AGSUN 5103 CLP, AGSUN 5106 CLP, P 65 LP 54, PAN 7102 CLP, PAN 7156 CLP, PAN 7160 CLP, SY 3975 CLOH and SY 3970 CL were entered. eight of these cultivars namely PAN 7156 CLP, PAN 7160 CLP, AGSUN 5103 CLP, AGSUN 5106 CLP, AGSUN 5102 CLP, PAN 7102 CLP, P 65 LP 54 and AGSUN 5101 CLP have yields higher than the overall mean yield of all cultivars.

Oil yield

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

The oil yield for cultivars at the eleven localities varied from 0.91 to 1.18 t ha^{-1} with an overall mean of 1.03 t ha^{-1}. The locality with the highest mean oil yield was Potchefstroom planted in December 18, 2019 at 1.38 t ha^{-1}. P 64 LL 23 has the highest oil yield of 1.18 t ha^{-1} followed by SY 3970 CL with 1.17 t ha^{-1}

Parameters calculated from the analysis of variance

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

Regression line coordinates at different yield targets

Regression line coordinates at different yield targets, the overall mean yield, the intercept and slope from the regression line and yield stability (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 2019/20 are shown in Figure 1 and for the 22 cultivars evaluated in 2018/19 and 2019/20 in Figure 2.

The yield stability of cultivars varied up to 21 fold among cultivars (Table 10). Cultivars which had exceptionally high stabilities (R-parameter =1) were, PAN 7160 CLP, PAN 7080, PAN 7156 CLP, AGSUN 8251, AGSUN 5101 CLP, PAN 7100 and PAN 7170

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 26 cultivars for 2019/20 are shown in Table 11. It takes account of both the cultivar X environment interaction and the yield stability and is therefore a reliable measure for cultivar choice. Yield probabilities higher than or equal to 60% in Table 11 indicates which cultivars would be sensible choices at the various yield potentials

The yield probabilities of 22 cultivars evaluated in 35 trials in 2018/19 and 2019/20, and yield probabilities for the 17 cultivars evaluated in 47 trials are shown in Tables 12 and 13 respectively. Tables 11, 12 and 13 should be used jointly for cultivar selection.

Acknowledgements

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References

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

Table 1: **Cultivars evaluated, seed germinated rate and supplier's company 2019/20**

Cultivar's Name	Germinated (%)			
	Normal	Abnormal	Dormant/dead	Company
AGSUN 5101 CLP	94	1	5	Agricol
AGSUN 5102 CLP	97	0	3	
AGSUN 5103 CLP	98	2	0	
AGSUN 5106 CLP	97	2	1	
AGSUN 5270	97	1	2	
AGSUN 5273	98	0	2	
AGSUN 5278	100	0	0	
AGSUN 8251	99	0	1	
LG 5626 HO	86	9	5	Link Seed
LG 5678 CLP	99	1	0	
LG 5710	93	5	2	
P 64 LL 23	92	4	4	Pioneer
P 65 LL 02	84	6	10	
P 65 LL14	96	2	2	
P 65 LP 54	97	2	1	
PAN 7080	95	3	2	Pannar
PAN 7100	88	9	3	
PAN 7102 CLP	97	2	1	
PAN 7156 CLP	98	1	1	
PAN 7160 CLP	97	2	1	
PAN 7170	97	1	2	
RN 28485	94	1	5	Syngenta
RN 28584	97	1	2	
SY 3970 CL	95	2	3	
SY 3975 CLHO	95	2	3	
SY Arizona	97	3	0	

Table 2: Collaborating company, trial localities and responsible co-workers 2019/20

Company	Localities	Planting dates	Co-workers	E-mail address of co-worker
Agricol	Boskop 1	30/10/2019	Joubert Swanepoel	Jouberts@agricol.co.za
	Boskop 2	19/11/2019		
	Boskop 3	17/12/2019		
	Fochville	13/01/2020		
	Delpan	18/12/2019		
	Bothaville	19/12/2019		
	Makwassie	20/12/2019		
	Lichtenburg	06/01/2020		
	Wolmaranstad	14/01/2020		
	Leeudoringstad	15/01/2020		
	Ventersdorp	15/01/2020		
	Sannieshof	16/01/2020		
	Kroonstad	22/01/2020		
ARC-GCI	Potchefstroom	04/11/2019	William Makgoga & Jan Erasmus	Makgogamw@arc.agric.za Erasmusj@arc.agric.za
		21/11/2019		
		18/12/2019		
		23/01/2020		
		05/02/2020		
PANNAR	Potchefstroom	14/11/2019	Abre Pretorius & Louis Schoonraad	abre.pretorius@pannar.co.za louis.schoonraad@corteva.com
	Kroonstad Oos	19/12/2019		
	Kommandodrift	03/01/2020		
	Bethlehem	03/01/2020		
	Senekal	06/01/2020		
	Delmas	14/01/2020		
	Kroonstad Wes	15/01/2020		
Link seed	Henneman	17/01/2020	Werner Viljoen	Werner.viljoen@linkseed.co.za
	Kroonstad	17/01/2020		
	Sannieshof	24/01/2020		
Syngenta	Valsrivier	03/01/2020	Roean Wessels	roean.wessels@sensako.co.za Janco.Theunissen@syngenta.com
	Bothaville	02/01/2020		
	Settlers	13/02/2020		
	Kroonstad	Not planted		
	Excelsior	14/01/2020		
Pioneer	Putfontein	20/11/2019	Phillip Fourie	philip.fourie@pioneer.com
	Putfontein	21/11/2019		
	Gerdau	18/12/2019		
	Coligny	19/12/2019		

Table 3:Trial site information 2019/20 season

Locality	Planting date	Plant population	Soil classification	Top soil analysis (mg kg^{-1})					Fertiliser applied (Kg ha^{-1})	Row width (cm)	Weed control and insecticides	Net plot size (m^2)
				pH (KCl)	P	K	Ca	Mg				
Boskop 1	30/10/2019	40 000		-	-	-	-	-	-	91	Alanex and Karate	11.83
Boskop 2	19/11/2019	40 000	-	-	-	-	-	-	-	91	Alanex and Karate	11.83
Boskop 3	17/12/2019	40 000	-	-	-	-	-	-	-	91	Alanex and Karate-	11.83
Bothaville	18/12/2019	40 000	-	-	-	-	-	-	-	91	Mechanical weeding -	11.83
Makwassie	19/12/2019	40 000	-	-	-	-	-	-	-	91	Mechanical weeding	11.83
Wolmaranstad	06/01/2020	40 000	-	-	-	-	-	-	-	91	Mechanical weeding	11.83
Leeudoringstad	14/01/2020	40 000	-	-	-	-	-	-	-	91	Mechanical weeding	11.83
Ventersdorp	15/01/2020	40 000	-	-	-	-	-	-	-	91	Mechanical weeding	11.83
Potchefstroom	04/11/2019	40 000	-	6,29	55	290	1033	475	N:98,P:8.3.K:4.1	90	Frontier Optima and Gramaxome	14.40
Potchefstroom	21/11/2019	40 000	-	6,67	74	303	1095	573	N:105,P:8.3.K:4.1	90	Metagen Gold and Gramaxone	12.60
Potchefstroom	18/12/2019	40 000	-	6,67	74	303	1095	573	N:105,P:8.3.K:4.1	90	Metagen Gold and Gramaxome	12.60
Potchefstroom	23/01/2020	40 000	-	6,26	23	185	1093	468	N:108,P:8.3.K:4.1	90	Frontier Optima and Gramaxome	12.60
Potchefstroom	05/02/2020	40 000	-	6.26	23	185	1093	468	N:108,P:8.3,K:4.1	90	Frontier Optima and Gramaxome	12.60
Valsrivier	03/01/2020	40 000	-	-	-	-	-	-	-	91	-	12.74
Kroonstad	17/01/2020	40 000	-	-	-	-	-	-	-	-	-	10.92
Sannieshof	16/01/2020	40 000	-	-	-	-	-	-	-	-	-	10.92
Kroonstad Oos	19/12/2019	40 000	-	-	-	-	-	-	-	-	-	13.65
Kommandodrift	03/01/2020	40 000	-	-	-	-	-	-	-	-	-	13.65
Senekal	06/01/2020	40 000	-	-	-	-	-	-	-	-	-	13.65
Fochvile	13/01/2020	40 000	-	-	-	-	-	-	-	-		13.65
Kroonstad Wes	15/01/2020	40 000	-	-	-	-	-	-	-	-	-	13.65
Gerdau	18/12/2019	40 000	-	-	-	-	-	-	-	-	-	13.65
Coligny	19/12/2019	40 000	-	-	-	-	-	-	-	-	-	13.65
Marquard		40 000	-	-	-	-	-	-	-	-	-	13.65

Table 4: Number of days from planting to 50 percent flowering of cultivars at selected localities and planting dates 2019/2020

Cultivar	Boskop 2019/10/30	Boskop 2019/11/19	Boskop 02019/12/17	Leeudoringstad 2020/01/14	Fochville 2020/01/13	Makwassie 2019/12/19	Sannieshof 2020/01/16	Wolmaransstad 2020/01/06	Ventersdorp 2020/01/15	Potchefstroom 04/11/2019	Potchefstroom 21/11/2019	Potchefstroom 18/12/2019	Potchefstroom 05/02/2020	Mean
AGSUN 5101 CLP	75	70	67	69	75	64	69	69	68	71	63	64	81	70
AGSUN 5102 CLP	73	70	67	69	78	65	69	69	68	74	64	67	85	71
AGSUN 5103 CLP	75	71	68	70	75	62	70	70	69	74	67	67	81	71
AGSUN 5106 CLP	76	72	69	69	77	60	70	70	68	73	64	69	84	71
AGSUN 5270	69	70	65	67	70	62	67	67	66	70	63	67	73	67
AGSUN 5273	68	69	68	67	78	60	70	70	66	73	67	70	79	70
AGSUN 5278	73	71	67	68	76	61	69	69	67	73	63	64	80	69
AGSUN 8251	72	70	67	68	73	64	70	70	67	73	63	65	80	69
LG 5626 HO	75	72	66	65	68	64	68	68	64	69	59	61	74	67
LG 5678 CLP	72	72	66	68	75	60	69	69	67	73	66	67	85	70
LG 5710	75	70	68	67	73	63	69	69	66	71	62	61	80	69
P 64 LL 23	73	67	60	67	70	64	66	66	66	70	61	63	80	67
P 65 LL 02	75	69	64	68	75	65	68	68	67	73	64	70	77	69
P 65 LL 14	75	68	67	68	76	65	70	70	67	72	63	66	81	70
P 65 LP 54	71	69	62	69	75	65	69	69	68	72	63	65	75	69
PAN 7080	72	70	67	71	74	65	71	71	70	74	66	69	83	71
PAN 7100	73	69	69	67	72	65	69	69	66	73	63	68	78	69
PAN 7102 CLP	73	68	67	68	71	65	69	69	67	68	60	64	80	68
PAN 7156 CLP	71	68	68	69	77	63	70	70	68	69	67	69	81	70
PAN 7160 CLP	70	68	69	68	76	65	71	71	67	70	67	69	80	70
PAN 7170	70	69	68	68	74	63	71	71	67	71	64	67	78	69
RN 28485	70	66	60	65	71	61	67	67	64	68	61	62	72	66
RN 28584	72	67	62	68	73	65	68	68	67	71	60	61	75	67
SY 3970 CL	72	72	68	68	74	60	67	67	67	72	65	69	79	69
SY 3975 CLHO	76	72	66	70	77	61	71	71	69	73	67	69	79	71
SY Arizona	69	67	60	68	72	62	68	68	67	74	60	64	78	67
Mean	73	69	66	68	74	63	69	69	67	72	64	66	79	69

Table 5: The moisture free seed oil concentration (%) of cultivars at selected localities 2019/2020

Cultivar	Boskop 2019/10/30	Boskop 02019/12/17	Leeudoringstad 2020/01/14	Kroonstad 22/01/20	Fochville 2020/01/13	Sannieshof 2020/01/16	Wolmaransstad 2020/01/06	Ventersdorp 2020/01/15	Potchefstroom 04/11/2019	Potchefstroom 18/12/2019	Potchefstroom 05/02/2020	Mean
AGSUN 5101 CLP	37,57	40,49	39,99	34,84	39,05	38,65	35,23	35,96	41,14	39,00	32,16	37,64
AGSUN 5102 CLP	37,83	40,13	39,19	34,42	39,12	37,55	36,82	36,92	41,21	41,88	32,35	37,95
AGSUN 5103 CLP	38,21	40,59	39,33	33,68	38,80	37,46	37,10	35,94	40,95	42,25	32,60	37,90
AGSUN 5106 CLP	38,08	40,04	40,32	34,16	39,60	36,97	35,79	33,83	41,48	42,99	30,54	37,62
AGSUN 5270	38,15	43,31	44,11	36,23	45,96	44,24	42,41	38,91	43,69	45,46	41,34	42,17
AGSUN 5273	38,64	39,84	41,19	32,51	40,98	39,38	39,76	36,68	41,14	44,75	34,94	39,07
AGSUN 5278	38,70	42,44	41,38	32,11	41,38	40,95	38,20	36,04	41,36	42,25	30,37	38,65
AGSUN 8251	35,63	41,01	40,32	31,63	41,51	41,18	38,04	36,64	40,35	42,13	31,61	38,19
LG 5626 HO	42,23	45,85	44,64	46,02	46,68	45,39	45,46	42,27	47,92	47,63	41,01	45,01
LG 5678 CLP	46,13	48,60	46,21	42,74	49,47	45,23	48,10	43,46	48,89	50,21	38,65	46,15
LG 5710	45,38	48,87	46,55	41,00	50,57	49,61	47,10	45,79	50,07	49,60	40,84	46,85
P 64 LL 23	43,75	43,94	44,80	37,49	46,57	47,94	44,01	42,87	46,75	47,37	38,70	44,02
P 65 LL 02	40,68	42,43	43,81	36,58	44,47	43,35	42,15	40,74	45,71	48,75	41,32	42,73
P 65 LL 14	38,97	40,96	40,56	32,72	42,90	42,91	40,32	32,96	45,77	46,81	35,57	40,04
P 65 LP 54	35,96	38,07	37,57	34,81	40,27	38,92	38,28	35,03	39,76	42,81	35,93	37,95
PAN 7080	35,40	38,88	40,50	33,22	42,92	43,06	38,37	32,23	44,57	42,34	32,65	38,56
PAN 7100	40,27	43,58	42,80	36,67	45,27	43,89	41,30	40,22	44,81	46,70	38,35	42,17
PAN 7102 CLP	38,22	39,23	39,80	34,10	42,53	40,28	38,67	35,86	42,67	42,38	35,92	39,06
PAN 7156 CLP	35,65	39,81	39,96	35,56	41,63	39,79	38,41	36,74	40,60	44,62	34,25	38,82
PAN 7160 CLP	38,27	43,70	40,93	37,20	44,67	43,16	39,34	38,54	43,95	46,07	37,44	41,21
PAN 7170	38,84	41,48	42,81	37,16	46,96	43,34	39,24	39,40	45,94	46,69	38,90	41,89
RN 28485	46,71	47,15	49,60	40,82	50,76	50,26	48,26	47,70	50,66	44,68	46,90	47,59
RN 28584	47,28	48,85	48,98	43,92	54,00	52,11	49,53	46,30	50,55	51,08	39,37	48,36
SY 3970 CL	54,90	51,48	51,62	44,18	55,96	52,84	48,28	48,72	52,82	54,37	41,54	50,61
SY 3975 CLHO	49,24	46,76	48,27	41,62	50,55	50,54	45,88	43,15	54,74	51,45	37,14	47,21
SY Arizona	42,99	44,94	45,70	37,68	48,67	48,62	47,89	43,49	48,76	49,09	36,82	44,97
Mean	40,91	43,17	43,11	38,23	45,05	43,76	41,69	39,48	45,24	45,90	36,82	42,12

Table 6: The moisture free seed protein concentration (%) of cultivars at selected localities 2019/2020

Cultivar	Boskop 2019/10/30	Boskop 02019/12/17	Leeudoringstad 2020/01/14	Kroonstad 22/01/20	Fochville 2020/01/13	Sannieshof 2020/01/16	Wolmaransstad 2020/01/06	Ventersdorp 2020/01/15	Potchefstroom 04/11/2019	Potchefstroom 18/12/2019	Potchefstroom 05/02/2020	Mean
AGSUN 5101 CLP	21,16	17,72	19,68	19,26	17,95	18,06	21,97	22,25	13,03	16,27	18,38	18,70
AGSUN 5102 CLP	19,69	18,85	19,11	20,55	17,67	18,10	22,59	22,85	12,83	18,33	19,76	19,12
AGSUN 5103 CLP	17,91	16,71	19,59	18,28	16,92	17,84	20,69	22,13	12,94	15,93	17,63	17,87
AGSUN 5106 CLP	18,45	18,97	18,06	18,80	16,24	19,10	20,99	22,34	12,39	16,13	17,57	18,09
AGSUN 5270	21,46	17,37	16,47	15,86	15,28	16,45	18,91	20,73	14,31	15,42	15,77	17,09
AGSUN 5273	18,88	18,16	16,82	17,95	15,63	16,23	17,43	21,04	12,86	15,55	16,72	17,02
AGSUN 5278	20,11	17,18	17,77	18,30	15,82	15,08	19,13	20,75	13,09	15,76	17,88	17,35
AGSUN 8251	18,51	16,29	17,70	17,73	15,46	15,43	17,89	21,05	12,56	16,62	16,92	16,92
LG 5626 HO	19,47	17,16	18,56	17,79	16,02	16,26	17,99	20,08	13,95	17,60	19,52	17,67
LG 5678 CLP	20,06	16,38	18,63	17,45	16,00	16,65	16,66	20,88	14,57	17,22	18,38	17,53
LG 5710	20,91	17,33	20,38	17,84	16,15	15,71	19,58	21,19	13,93	17,76	20,01	18,25
P 64 LL 23	16,31	17,25	17,00	16,37	15,09	14,26	16,70	20,48	11,43	14,66	15,89	15,95
P 65 LL 02	17,82	18,27	16,10	17,19	14,94	13,92	15,86	19,98	12,22	13,32	16,16	15,98
P 65 LL 14	19,27	18,25	17,30	19,06	15,44	12,30	15,85	20,21	11,69	14,02	16,69	16,37
P 65 LP 54	20,13	18,70	17,46	18,21	14,17	14,43	16,31	22,60	12,84	14,40	16,74	16,91
PAN 7080	18,37	18,21	17,54	21,96	13,16	11,52	15,81	20,86	11,04	12,95	16,90	16,21
PAN 7100	18,34	17,42	16,21	19,78	13,96	12,33	15,85	18,71	11,59	15,54	15,86	15,96
PAN 7102 CLP	18,12	17,64	16,68	16,93	13,68	14,42	16,53	20,12	12,33	13,91	15,87	16,02
PAN 7156 CLP	20,96	18,45	17,05	17,89	14,14	13,46	15,37	18,91	12,81	13,45	17,10	16,32
PAN 7160 CLP	20,12	17,00	16,57	17,40	13,89	13,03	16,26	20,64	12,02	14,63	15,42	16,09
PAN 7170	17,99	18,78	17,81	16,49	14,16	15,50	17,31	19,67	12,21	15,24	15,25	16,40
RN 28485	22,90	21,65	20,05	19,13	17,53	16,29	20,53	22,00	15,97	19,35	19,81	19,56
RN 28584	19,98	19,23	18,76	18,24	13,54	13,51	17,87	19,63	14,15	18,14	17,99	17,37
SY 3970 CL	17,39	17,59	17,57	23,05	13,85	14,49	18,38	20,94	11,74	15,46	19,90	17,30
SY 3975 CLHO	19,23	20,73	19,82	20,67	16,24	14,45	18,67	21,38	12,22	18,04	19,66	18,28
SY Arizona	18,85	17,15	19,14	18,12	15,36	14,41	15,46	19,77	12,35	15,74	17,79	16,74
Mean	19,32	18,02	17,99	18,47	15,32	15,12	17,95	20,82	12,81	15,82	17,52	17,20

Table 7: Mean seed yield (t ha^{-1}) of cultivars at each locality 2019/2020

Cultivar /Locality	Boskop1 30/10/2019	Boskop2 19/11/2019	Boskop3 17/12/2019	Fochville 13/01/2020	Kroonstad 17/1/20	Kroonstad 22/01/2020	Kroonstad Oos	Kroonstad Wes	Leeudoringstad 14/01/2020	Makwassie 19/12/2019	Marquard	Potchefstroom 18/12/2019	Potchefstroom 23/01/2020	Potchefstroom 04/11/2019	Potchefstroom 05/02/2020	Potchefstroom 29/11/2019	Sannieshof 16/01/2020	Senekal	Valsrivier 3/01/2020	Ventersdorp 15/01/2020	Wolmaranstad 06/01/2020	Mean
AGSUN 5101 CLP	3,63	3,18	2,96	2,08	3,71	1,65	3,27	2,05	2,57	3,02	1,71	2,76	1,92	2,21	0,71	2,68	1,80	1,91	2,84	3,03	2,98	2,51
AGSUN 5102 CLP	3,43	3,58	3,21	2,24	3,48	1,56	3,14	2,07	3,34	2,92	1,78	2,61	1,48	2,30	0,72	2,74	1,96	2,25	2,67	3,44	3,21	2,58
AGSUN 5103 CLP	3,85	3,34	2,96	2,25	3,76	1,55	3,58	2,33	3,24	2,70	1,44	2,88	1,71	2,24	0,76	2,70	2,23	2,61	2,24	3,45	3,39	2,63
AGSUN 5106 CLP	3,45	3,32	2,73	2,06	3,84	1,45	3,33	2,25	3,77	3,03	1,65	2,83	1,90	2,26	0,52	2,54	2,20	2,46	2,39	3,37	3,64	2,62
AGSUN 5270	3,05	3,87	2,92	2,55	3,06	2,16	3,46	1,61	3,41	3,35	1,80	2,99	2,24	2,06	1,64	2,77	1,96	2,20	2,49	2,79	3,48	2,66
AGSU N5273	3,34	2,46	2,39	1,80	3,44	1,44	2,79	2,24	3,12	3,67	1,24	2,69	2,27	2,19	1,20	2,60	1,34	2,18	2,17	2,68	2,99	2,39
AGSU N5278	3,30	3,78	3,06	2,52	3,70	1,52	3,05	2,30	3,11	2,60	1,76	2,77	1,93	2,17	0,88	2,90	1,91	2,54	2,36	3,53	3,11	2,61
AGSUN 8251	3,21	3,26	2,94	2,68	4,15	1,62	3,24	1,93	3,42	3,17	1,32	2,74	1,98	2,18	0,83	2,83	1,99	2,17	2,31	3,24	3,45	2,60
LG 5626 HO	3,32	2,71	2,46	2,03	2,89	1,37	2,80	1,59	2,56	2,02	1,24	2,95	2,01	2,27	0,97	2,83	1,28	1,57	1,73	2,40	1,95	2,14
LG 5678 CLP	2,71	2,73	2,82	2,26	3,07	1,33	3,21	1,84	2,58	2,24	1,77	2,87	1,44	2,30	0,41	2,59	1,20	1,75	2,22	2,37	2,92	2,22
LG 5710	3,21	3,33	3,18	1,85	3,03	1,19	2,87	1,78	2,48	2,34	1,38	2,92	1,98	2,55	0,71	3,12	1,87	2,74	2,28	2,57	2,29	2,37
P 64 L L23	3,66	4,02	2,76	2,40	4,16	1,76	2,81	2,12	3,36	3,02	1,61	3,40	2,54	2,63	1,15	3,18	1,98	1,44	2,42	3,00	3,06	2,69
P 65 LL 02	2,89	3,05	2,84	2,08	4,22	1,38	2,59	1,10	3,11	3,72	1,27	3,45	2,33	2,67	1,37	2,92	1,74	1,69	2,60	3,26	3,02	2,54
P 65 LL 14	2,88	2,76	2,27	2,34	3,86	1,20	3,13	2,13	3,44	3,06	1,61	3,24	2,38	2,45	0,80	3,03	1,79	2,50	2,47	3,19	3,47	2,57
P65 LP 54	2,72	2,65	2,83	2,55	3,77	1,56	2,76	2,14	2,87	2,73	1,79	3,25	2,36	2,77	0,61	3,03	1,95	2,11	2,85	2,67	3,59	2,55
PAN 7080	3,35	3,36	2,97	2,13	4,08	1,37	3,01	2,40	3,05	3,38	1,41	3,39	2,18	2,59	0,65	2,90	1,94	2,54	2,81	3,33	3,46	2,68
PAN 7100	3,09	3,37	2,98	2,10	4,17	1,43	2,81	2,21	3,00	3,29	1,59	3,15	2,49	2,51	1,15	2,81	1,74	2,73	2,57	2,99	3,41	2,65
PAN 7102 CLP	2,81	3,48	2,97	2,32	3,60	1,62	2,82	2,12	2,56	3,26	1,30	3,20	2,44	2,43	1,15	2,97	2,09	2,29	2,38	2,97	3,08	2,56
PAN 7156 CLP	2,95	3,46	3,13	2,75	3,91	1,54	3,73	2,24	3,52	3,55	1,65	3,40	2,14	2,55	0,84	2,84	2,18	2,66	2,73	3,42	3,25	2,78
PAN 7160 CLP	3,37	3,13	3,06	2,31	3,89	1,39	3,32	2,05	3,39	3,25	1,66	3,04	1,92	2,52	0,80	3,03	1,84	2,69	2,87	2,90	3,40	2,66
PAN 7170	3,10	3,49	2,94	2,04	4,08	1,20	2,77	2,26	3,38	3,09	1,72	3,13	2,36	2,55	1,23	3,12	1,82	2,61	2,63	2,76	3,05	2,63
RN 28485	3,31	2,64	2,66	1,57	2,78	1,35	2,83	1,52	2,48	2,48	1,30	2,86	2,13	2,30	1,52	2,81	1,70	2,20	2,13	2,26	2,60	2,26
RN 28584	3,43	3,42	2,71	1,87	2,55	1,11	2,34	1,83	2,45	1,84	1,50	2,96	1,90	2,59	0,44	2,62	1,75	2,87	2,19	2,97	2,84	2,29
SY 3970 CL	3,10	2,16	2,59	2,28	3,15	1,30	3,44	2,03	2,68	2,89	1,83	3,03	1,53	2,29	0,59	2,78	1,80	2,06	2,32	2,48	2,78	2,34
SY 3975 CLHO	3,28	2,28	2,29	1,79	3,11	1,00	3,21	1,84	2,29	2,64	1,81	2,63	1,60	2,15	0,58	2,70	1,84	2,39	2,39	1,92	2,17	2,19
SYArizona	3,32	2,58	2,51	1,75	2,04	1,46	3,40	1,51	2,25	2,39	1,56	2,99	2,22	2,20	0,98	2,49	1,80	1,85	2,22	3,28	2,37	2,25
Mean	3,22	3,13	2,81	2,18	3,52	1,44	3,07	1,98	2,98	2,91	1,57	3,00	2,05	2,38	0,89	2,83	1,83	2,27	2,43	2,93	3,04	2,50
Cv%	15,60	12,70	11,70	14,70	10,40	18,30	11,30	12,30	14,70	14,00	17,30	7,30	7,90	10,10	16,60	7,60	13,20	15,80	12,70	12,50	12,80	

Table 8: Oil yield (t ha^{-1}) of cultivars at selected localities 2019/2020

Cultivar	Boskop 2019/10/30	Boskop 02019/12/17	Leeudoringstad 2020/01/14	Kroonstad 22/01/20	Fochville 2020/01/13	Sannieshof 2020/01/16	Wolmaransstad 2020/01/06	Ventersdorp 2020/01/15	Potchefstroom 04/11/2019	Potchefstroom 18/12/2019	Potchefstroom 05/02/2020	Mean
AGSUN 5101 CLP	1,36	1,20	1,03	0,57	0,81	0,70	1,05	1,09	0,91	1,08	0,23	0,91
AGSUN 5102 CLP	1,30	1,29	1,31	0,54	0,88	0,74	1,18	1,27	0,95	1,09	0,23	0,98
AGSUN 5103 CLP	1,47	1,20	1,27	0,52	0,87	0,84	1,26	1,24	0,92	1,22	0,25	1,01
AGSUN 5106 CLP	1,31	1,09	1,52	0,50	0,82	0,81	1,30	1,14	0,94	1,22	0,16	0,98
AGSUN 5270	1,16	1,26	1,50	0,78	1,17	0,87	1,48	1,09	0,90	1,36	0,68	1,11
AGSUN 5273	1,29	0,95	1,29	0,47	0,74	0,53	1,19	0,98	0,90	1,20	0,42	0,91
AGSUN 5278	1,28	1,30	1,29	0,49	1,04	0,78	1,19	1,27	0,90	1,17	0,27	1,00
AGSUN 8251	1,14	1,21	1,38	0,51	1,11	0,82	1,31	1,19	0,88	1,15	0,26	1,00
LG 5626 HO	1,40	1,13	1,14	0,63	0,95	0,58	0,89	1,01	1,09	1,40	0,40	0,97
LG 5678 CLP	1,25	1,37	1,19	0,57	1,12	0,54	1,40	1,03	1,12	1,44	0,16	1,02
LG 5710	1,46	1,55	1,15	0,49	0,94	0,93	1,08	1,18	1,28	1,45	0,29	1,07
P 64 LL 23	1,60	1,21	1,51	0,66	1,12	0,95	1,35	1,29	1,23	1,61	0,45	1,18
P 65 LL 02	1,18	1,20	1,36	0,50	0,92	0,75	1,27	1,33	1,22	1,68	0,57	1,09
P 65 LL 14	1,12	0,93	1,40	0,39	1,00	0,77	1,40	1,05	1,12	1,52	0,28	1,00
P 65 LP 54	0,98	1,08	1,08	0,54	1,03	0,76	1,37	0,94	1,10	1,39	0,22	0,95
PAN 7080	1,19	1,15	1,24	0,46	0,91	0,84	1,33	1,07	1,15	1,44	0,21	1,00
PAN 7100	1,24	1,30	1,28	0,52	0,95	0,76	1,41	1,20	1,12	1,47	0,44	1,06
PAN 7102 CLP	1,07	1,17	1,02	0,55	0,99	0,84	1,19	1,06	1,04	1,36	0,41	0,97
PAN 7156 CLP	1,05	1,25	1,41	0,55	1,14	0,87	1,25	1,26	1,04	1,52	0,29	1,06
PAN 7160 CLP	1,29	1,34	1,39	0,52	1,03	0,79	1,34	1,12	1,11	1,40	0,30	1,06
PAN 7170	1,20	1,22	1,45	0,45	0,96	0,79	1,20	1,09	1,17	1,46	0,48	1,04
RN 28485	1,55	1,25	1,23	0,55	0,80	0,85	1,25	1,08	1,17	1,28	0,71	1,07
RN 28584	1,62	1,32	1,20	0,49	1,01	0,91	1,41	1,38	1,31	1,51	0,17	1,12
SY 3970 CL	1,70	1,33	1,38	0,57	1,28	0,95	1,34	1,21	1,21	1,65	0,25	1,17
SY 3975 CLHO	1,62	1,07	1,11	0,42	0,90	0,93	1,00	0,83	1,18	1,35	0,22	0,96
SY Arizona	1,43	1,13	1,03	0,55	0,85	0,88	1,14	1,43	1,07	1,47	0,36	1,03
Mean	1,36	1,20	1,03	0,57	0,81	0,70	1,05	1,09	0,91	1,08	0,23	0,91

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

Locality	Mean (t/ha)	SE	CV (%)	GCV	t	SE(t)	tn
Boskop1 30-10-2019	3,22	0,29	15,60	.	-0,01	0,11	-0,03
Boskop2 19-11-2019	3,13	0,23	12,70	13,90	0,55	0,11	0,79
Boskop3 17-12-2019	2,81	0,19	11,70	6,40	0,23	0,13	0,47
Bothaville 02-01-2020	2,10	0,25	20,60	6,30	0,08	0,12	0,21
Coligny	1,86	0,30	27,60	13,30	0,19	0,13	0,41
Fochville 13-01-2020	2,18	0,19	14,70	10,80	0,35	0,13	0,62
Gerdau	1,46	0,30	35,70	23,00	0,29	0,13	0,55
Kommandodrif	1,90	0,33	30,30	22,10	0,35	0,13	0,62
Kroonstad 17-01-2020	3,52	0,21	10,40	15,00	0,67	0,09	0,86
Kroonsatd 22-01-2020	1,44	0,15	18,30	11,90	0,30	0,13	0,56
KroonstadOos	3,07	0,20	11,30	8,60	0,37	0,13	0,64
KroonstadWes	1,98	0,14	12,30	14,20	0,57	0,11	0,80
Leeudoringstad 14-01-2020	2,98	0,25	14,70	12,00	0,40	0,13	0,67
Makwassie 19-12-2019	2,91	0,24	14,00	14,80	0,53	0,11	0,77
Marquard	1,57	0,16	17,30	8,00	0,18	0,13	0,40
Potchefstroom 18-12-2019	3,00	0,13	7,30	7,10	0,49	0,12	0,74
Potchefstroom 23-01-2020	2,05	0,09	7,90	14,80	0,78	0,07	0,91
Potchefstoom 04-11-2019	2,38	0,14	10,10	5,60	0,24	0,13	0,49
Potchefstroom 05-12-2020	0,89	0,09	16,60	35,10	0,82	0,06	0,93
Potchefstroom 21-11-2019	2,83	0,12	7,60	5,00	0,30	0,13	0,56
Sannieshof 16-01-2020	1,83	0,14	13,20	11,40	0,42	0,12	0,68
Senekal	2,27	0,21	15,80	14,50	0,46	0,12	0,72
Valsrivier 03-01-2020	2,43	0,18	12,70	8,30	0,30	0,13	0,56
Ventersdorp 15-01-2020	2,93	0,21	12,50	12,50	0,50	0,12	0,75
Wolmaranstad 06-01-2020	3,04	0,23	12,80	12,90	0,50	0,12	0,75

Table 10: Regression line coordinates at different yield potentials 2019/20

	Yield potential (t ha^{-1})						Mean (t ha^{-1})	Intercept	Slope	Fprob	R^2
Cultivar	1	1,5	2	2,5	3	3,5					
AGSUN 5101 CLP	0,93	1,46	1,98	2,51	3,03	3,56	2,51	-0,12	1,05	<0.001	0,91
AGSUN 5102 CLP	0,94	1,49	2,04	2,59	3,14	3,69	2,58	-0,16	1,10	<0.001	0,90
AGSUN 5103 CLP	0,91	1,49	2,06	2,64	3,21	3,79	2,63	-0,24	1,15	<0.001	0,90
AGSUN 5106 CLP	0,84	1,43	2,02	2,61	3,20	3,79	2,62	-0,34	1,18	<0.001	0,90
AGSUN 5270	1,41	1,83	2,24	2,66	3,07	3,49	2,66	0,58	0,83	<0.001	0,73
AGSU N5273	0,99	1,46	1,92	2,39	2,85	3,32	2,39	0,06	0,93	<0.001	0,79
AGSU N5278	1,06	1,58	2,09	2,61	3,12	3,64	2,61	0,03	1,03	<0.001	0,90
AGSUN 8251	0,88	1,46	2,03	2,61	3,18	3,76	2,60	-0,27	1,15	<0.001	0,91
LG 5626 HO	0,87	1,30	1,72	2,15	2,57	3,00	2,14	0,02	0,85	<0.001	0,78
LG 5678 CLP	0,77	1,25	1,73	2,21	2,69	3,17	2,22	-0,19	0,96	<0.001	0,86
LG 5710	0,95	1,42	1,89	2,36	2,83	3,30	2,37	0,01	0,94	<0.001	0,80
P 64 L L23	1,05	1,60	2,14	2,69	3,23	3,78	2,69	-0,04	1,09	<0.001	0,83
P 65 LL 02	0,87	1,43	1,98	2,54	3,09	3,65	2,54	-0,24	1,11	<0.001	0,78
P 65 LL 14	0,98	1,52	2,05	2,59	3,12	3,66	2,57	-0,09	1,07	<0.001	0,89
P65 LP 54	1,16	1,63	2,09	2,56	3,02	3,49	2,55	0,23	0,93	<0.001	0,81
PAN 7080	0,89	1,49	2,09	2,69	3,29	3,89	2,68	-0,31	1,20	<0.001	0,96
PAN 7100	1,10	1,62	2,13	2,65	3,16	3,68	2,65	0,07	1,03	<0.001	0,91
PAN 7102 CLP	1,20	1,66	2,12	2,58	3,04	3,50	2,56	0,28	0,92	<0.001	0,88
PAN 7156 CLP	1,10	1,66	2,22	2,78	3,34	3,90	2,78	-0,02	1,12	<0.001	0,92
PAN 7160 CLP	0,96	1,53	2,10	2,67	3,24	3,81	2,66	-0,18	1,14	<0.001	0,96
PAN 7170	1,11	1,62	2,13	2,64	3,15	3,66	2,63	0,09	1,02	<0.001	0,91
RN 28485	1,14	1,52	1,89	2,27	2,64	3,02	2,26	0,39	0,75	<0.001	0,79
RN 28584	0,91	1,38	1,84	2,31	2,77	3,24	2,29	-0,02	0,93	<0.001	0,72
SY 3970 CL	0,97	1,43	1,89	2,35	2,81	3,27	2,34	0,05	0,92	<0.001	0,84
SY 3975 CLHO	0,93	1,36	1,78	2,21	2,63	3,06	2,19	0,08	0,85	<0.001	0,75
SYArizona	1,11	1,49	1,86	2,24	2,61	2,99	2,25	0,36	0,75	<0.001	0,63

Table 11: Yield probability (%) of cultivars for 2019/20 at different yield potentials

Cultivar	Yield potential (t ha^{-1})						Regression line	
	1	1,5	2	2,5	3	3,5	Fprob	R2
AGSUN 5101 CLP	45	47	48	51	52	55	<0.001	0,91
AGSUN 5102 CLP	46	49	53	57	61	64	<0.001	0,89
AGSUN 5103 CLP	44	49	55	61	65	71	<0.001	0,89
AGSUN 5106 CLP	39	45	52	58	65	70	<0.001	0,90
AGSUN 5270	74	71	66	61	55	49	<0.001	0,73
AGSUN 5273	49	47	45	43	40	38	<0.001	0,80
AGSUN 5278	54	56	57	59	59	61	<0.001	0,90
AGSUN 8251	41	47	52	59	64	70	<0.001	0,92
LG 5626 HO	41	37	31	27	23	20	<0.001	0,78
LG 5678 CLP	34	32	31	29	28	27	<0.001	0,85
LG 5710	47	45	42	40	38	37	<0.001	0,81
P 64 LL 23	53	56	59	62	65	68	<0.001	0,83
P 65 LL 02	43	46	49	52	55	59	<0.001	0,74
P 65 LL 14	49	51	54	57	59	62	<0.001	0,88
P 65 LP 54	61	59	56	54	51	49	<0.001	0,81
PAN 7080	40	49	58	67	75	81	<0.001	0,96
PAN 7100	58	60	61	62	63	64	<0.001	0,91
PAN 7102 CLP	65	63	60	57	53	50	<0.001	0,88
PAN 7156 CLP	58	63	67	72	76	79	<0.001	0,89
PAN 7160 CLP	46	53	60	66	72	77	<0.001	0,96
PAN 7170	58	59	60	61	62	62	<0.001	0,90
RN 28485	60	51	42	33	25	19	<0.001	0,80
RN 28584	45	43	40	38	36	35	<0.001	0,73
SY 3970 CL	48	45	42	39	36	34	<0.001	0,83
SY 3975 CLHO	46	41	36	31	27	23	<0.001	0,76
SYArizona	57	49	41	34	27	22	<0.001	0,64

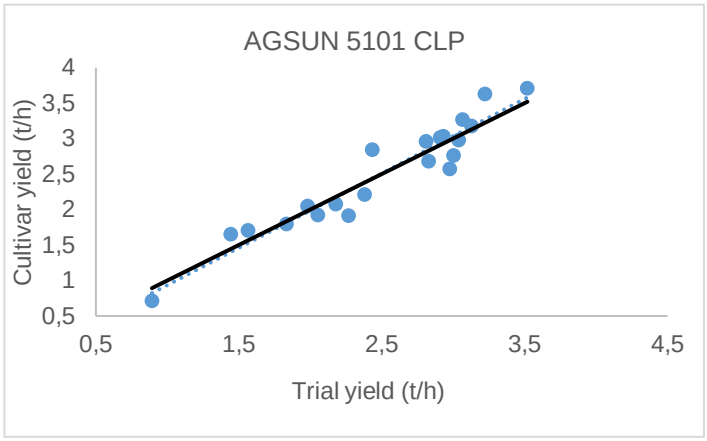
Table 12: Yield probability (%) of cultivars 2018/2019 and 2019/2020 at different yield potentials

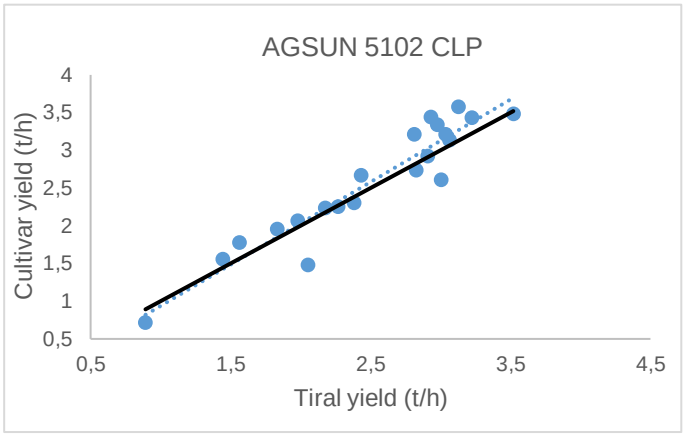
	Yield potential (t/ha)						Regression line	
	1	1,5	2	2,5	3	3,5	Fprob	R2
AGSUN 5101 CLP	45	46	46	47	47	48	<0.001	0,90
AGSUN 5102 CLP	46	48	48	50	51	52	<0.001	0,90
AGSUN 5103 CLP	42	47	51	56	60	64	<0.001	0,91
AGSUN 5106 CLP	34	42	49	58	65	72	<0.001	0,94
AGSUN 5270	69	66	63	59	56	52	<0.001	0,81
AGSUN 5273	45	44	41	40	38	37	<0.001	0,83
AGSUN 5278	47	48	48	49	49	49	<0.001	0,86
AGSUN 8251	56	57	58	59	60	61	<0.001	0,84
LG567 8CLP	39	36	33	30	28	25	<0.001	0,88
LG 5710	49	46	43	40	37	35	<0.001	0,80
P 64 LL 23	59	59	59	59	59	59	<0.001	0,81
P 65 LL 02	46	49	52	55	58	61	<0.001	0,82
P 65 LL 14	51	52	54	56	57	58	<0.001	0,89
P 65 LP 54	57	55	53	52	49	48	<0.001	0,86
PAN 7080	49	55	61	67	72	76	<0.001	0,93
PAN 7100	57	57	56	55	54	53	<0.001	0,91
PAN 7102 CLP	68	65	61	57	53	49	<0.001	0,88
PAN 7156 CLP	58	62	66	70	73	76	<0.001	0,93
PAN 7160 CLP	43	48	54	59	64	69	<0.001	0,95
SY 3970 CL	36	36	35	35	35	35	<0.001	0,86
SY 3975 CLOH	42	36	31	26	21	18	<0.001	0,79
SY Arizona	58	52	46	39	34	28	<0.001	0,66

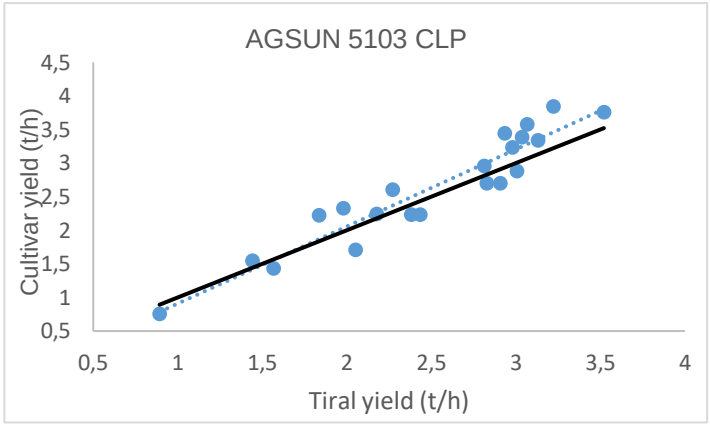
Table 13: Yield probability (%) of cultivars for three years' data 2017/18 to 2019/2020 at different yield potentials

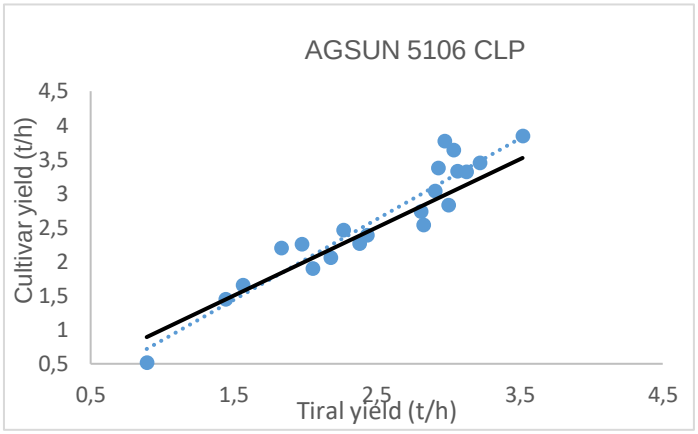
	Yield potential (t/ha)						Regression line	
	1	1,5	2	2,5	3	3,5	Fprob	R2
AGSUN5101CLP	41	41	41	41	41	41	<0.001	0,90
AGSUN5102CLP	44	44	43	43	42	42	<0.001	0,90
AGSUN5103CLP	40	44	48	53	57	61	<0.001	0,91
AGSUN5106CLP	41	46	50	55	59	64	<0.001	0,93
AGSUN5270	67	64	60	56	52	48	<0.001	0,81
AGSUN5273	47	44	40	37	33	31	<0.001	0,83
AGSUN5278	51	49	47	45	43	42	<0.001	0,86
AGSUN8251	55	55	54	54	54	54	<0.001	0,84
P65LL02	50	51	52	54	54	56	<0.001	0,88
P65LL14	52	52	52	53	53	54	<0.001	0,80
P65LP54	53	52	50	48	47	45	<0.001	0,81
PAN7160CLP	46	50	54	57	61	65	<0.001	0,82
PAN7080	44	50	55	61	66	71	<0.001	0,89
PAN7100	56	56	55	55	54	54	<0.001	0,86
PAN7102CLP	66	62	58	54	50	46	<0.001	0,93
PAN7156CLP	59	60	61	63	64	65	<0.001	0,91
SY3970CL	39	37	34	32	29	27	<0.001	0,88

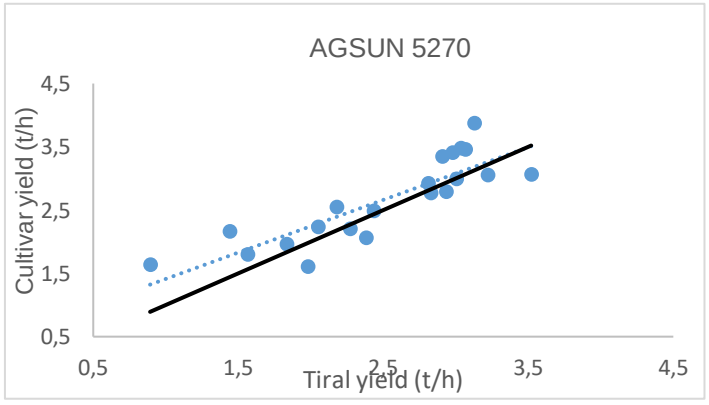
Figure 1: Regression lines for cultivars 2019/2020

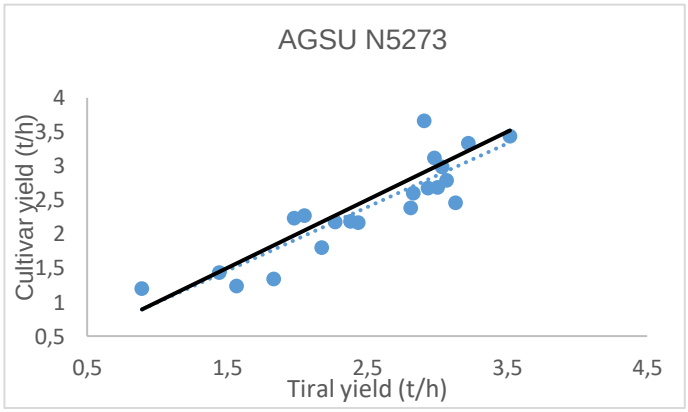


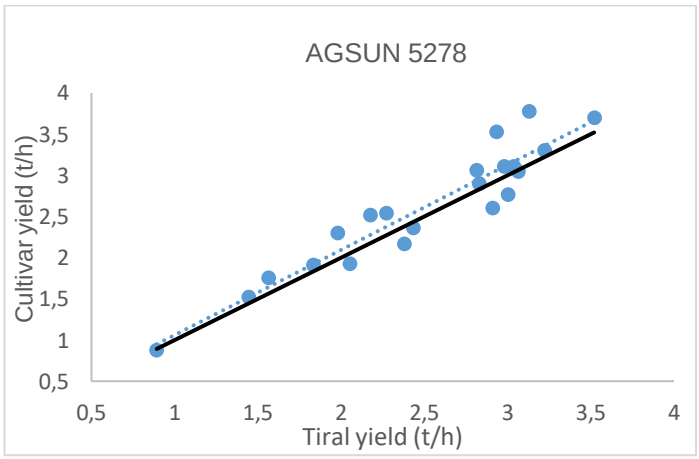


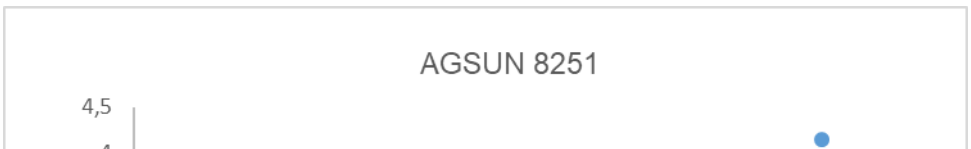


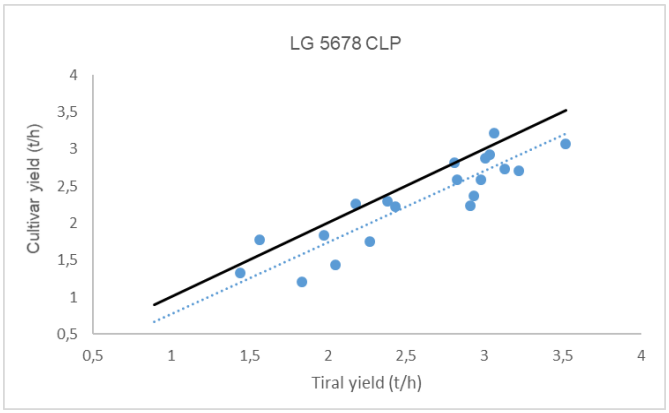


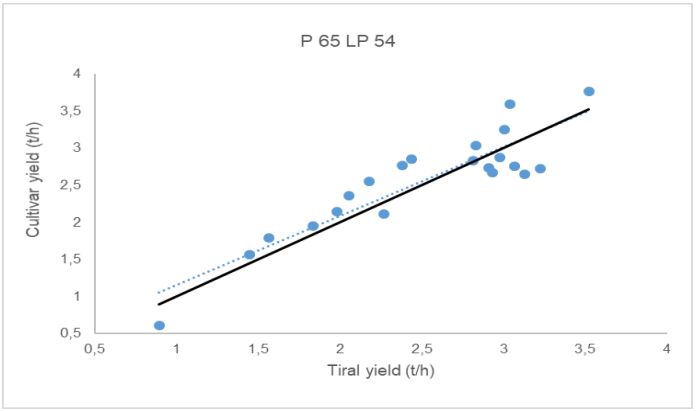


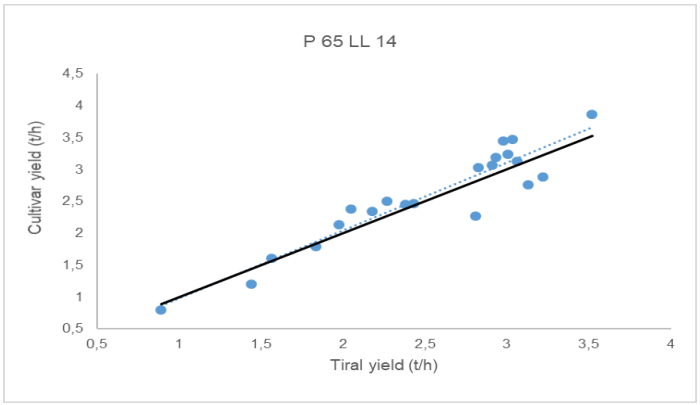












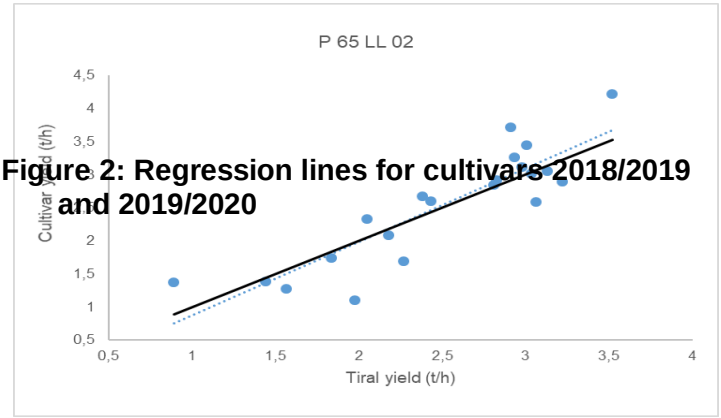
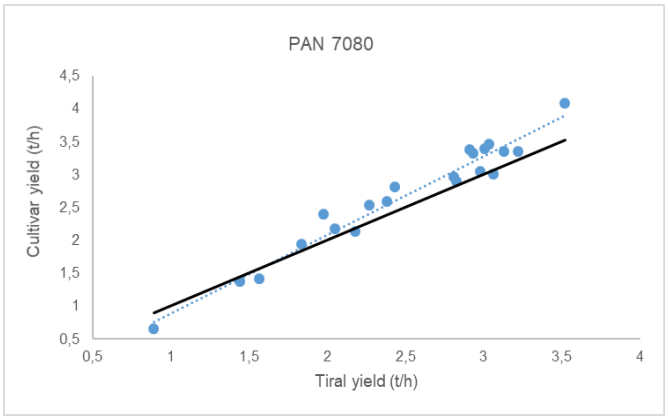
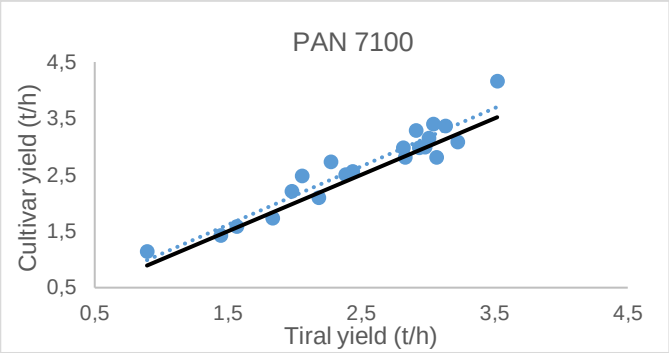
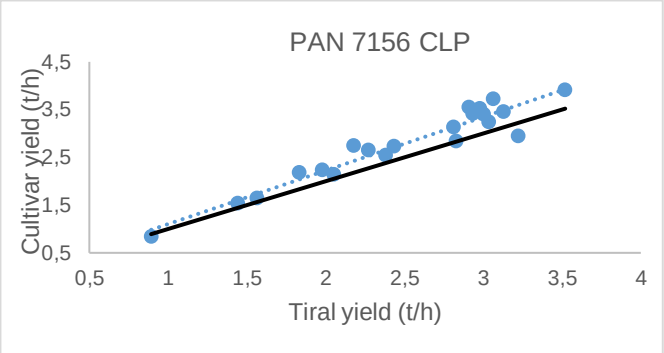
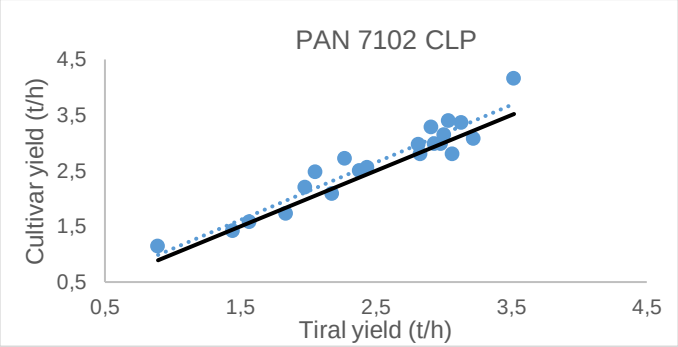


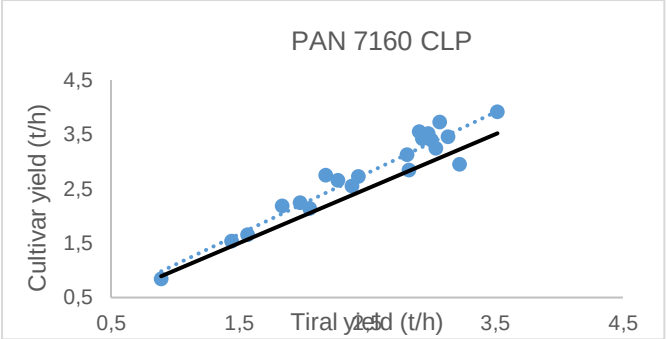
Figure 2: Regression lines for cultivars 2018/2019 and 2019/2020

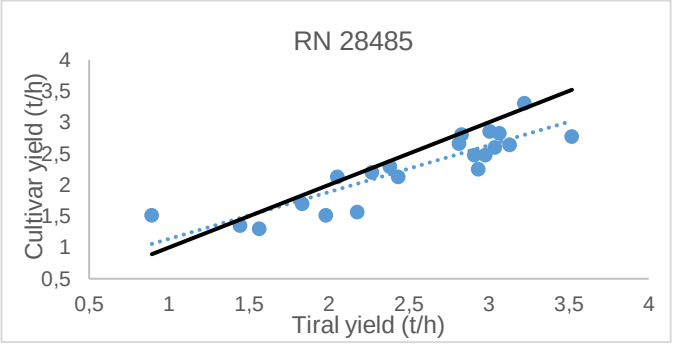


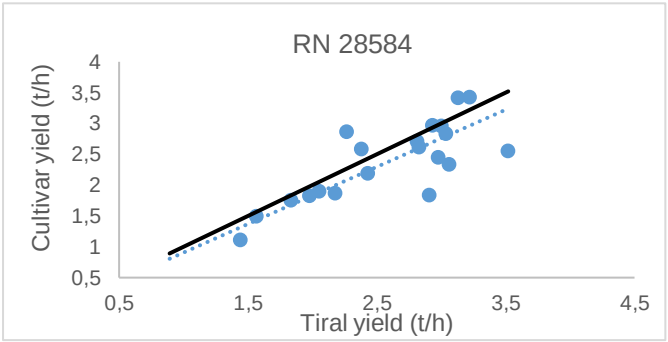

PAN 7100
Cultivar yield (t/h)
Tiral yield (t/h)
4,5
3,5
2,5
1,5
0,5
0,5
1,5
2,5
3,5
4,5

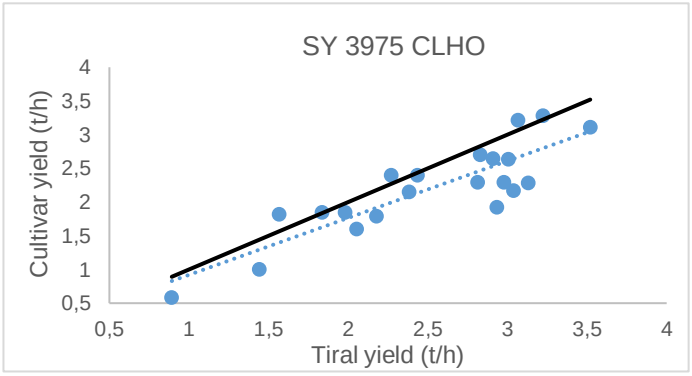

PAN 7156 CLP
Cultivar yield (t/h)
Tiral yield (t/h)
4,5
3,5
2,5
1,5
0,5
0,5
1
1,5
2
2,5
3
3,5
4

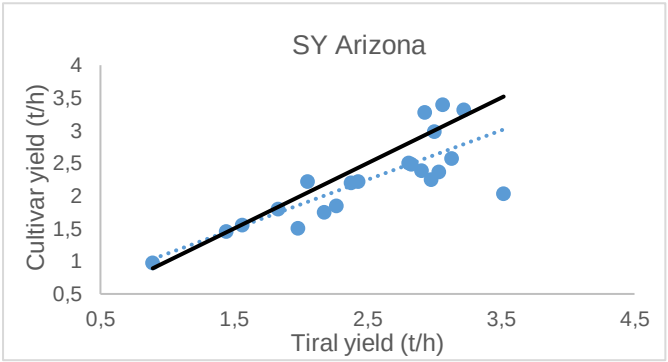

PAN 7102 CLP
Cultivar yield (t/h)
Tiral yield (t/h)
4,5
3,5
2,5
1,5
0,5
0,5
1,5
2,5
3,5
4,5


PAN 7160 CLP
Cultivar yield (t/h)
Tiral yield (t/h)
4,5
3,5
2,5
1,5
0,5
0,5
1,5
2,5
3,5
4,5


RN 28485
Cultivar yield (t/h)
Tiral yield (t/h)
4
3,5
3
2,5
2
1,5
1
0,5
0,5
1
1,5
2
2,5
3
3,5
4


RN 28584
Cultivar yield (t/h)
Tiral yield (t/h)
4
3,5
3
2,5
2
1,5
1
0,5
0,5
1,5
2,5
3,5
4,5


SY 3975 CLHO
Cultivar yield (t/h)
Tiral yield (t/h)
4
3,5
3
2,5
2
1,5
1
0,5
0,5
1
1,5
2
2,5
3
3,5
4


SY Arizona
Cultivar yield (t/h)
Tiral yield (t/h)
4
3,5
3
2,5
2
1,5
1
0,5
0,5
1,5
2,5
3,5
4,5

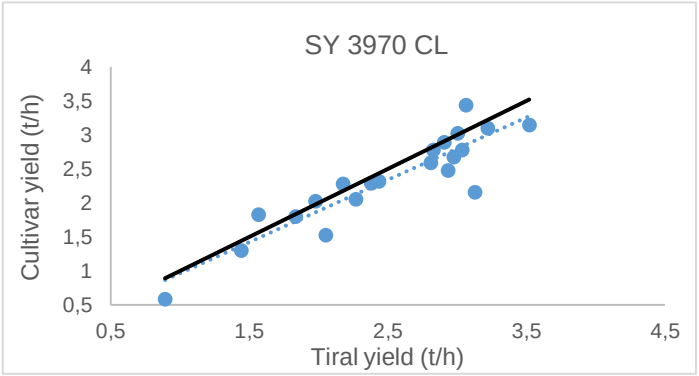
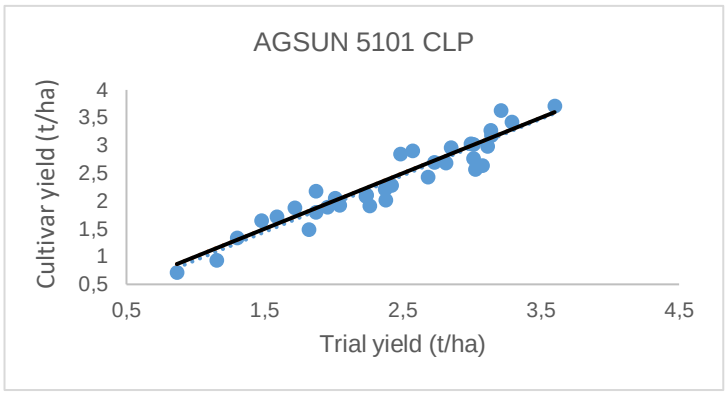
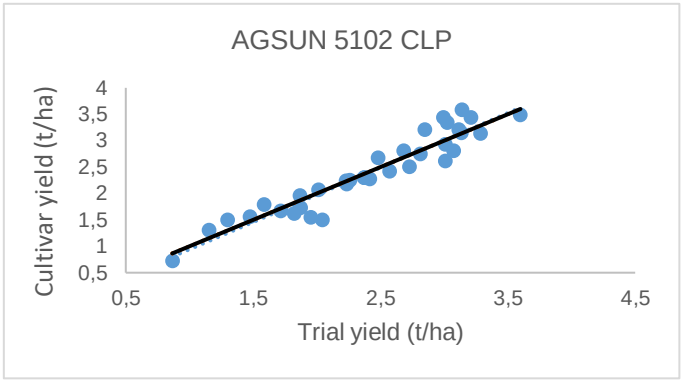
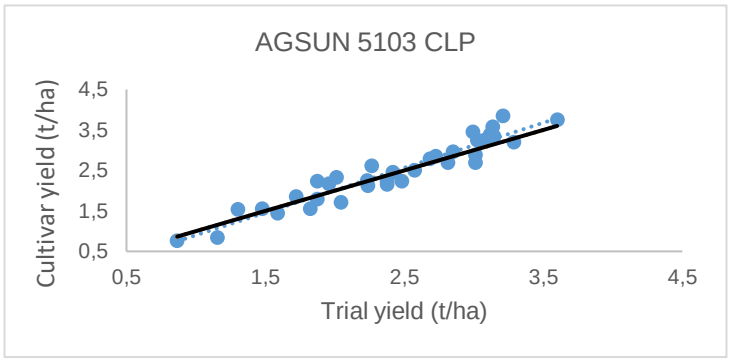
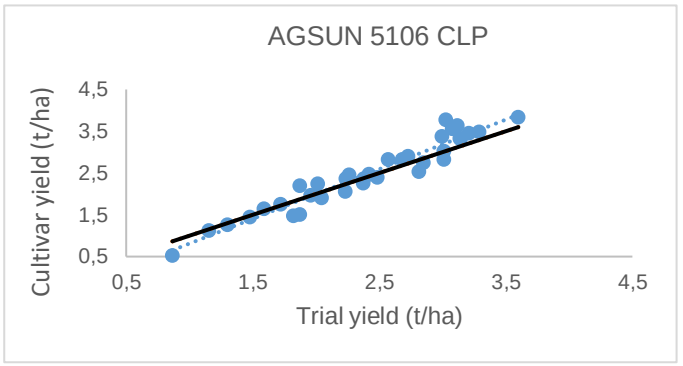

SY 3970 CL
Cultivar yield (t/h)
Tiral yield (t/h)
4
3,5
3
2,5
2
1,5
1
0,5
0,5
1,5
2,5
3,5
4,5

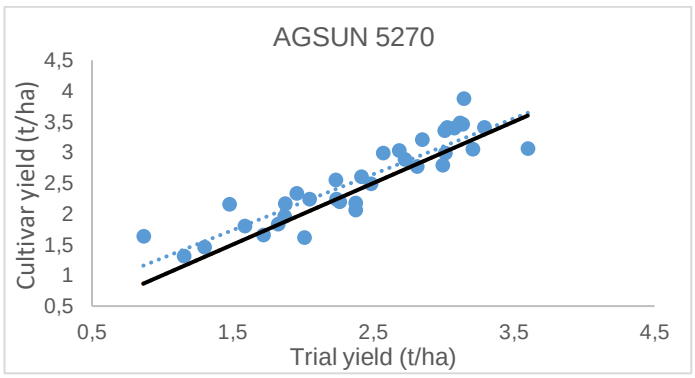
Figure 2: Regression lines for cultivars 2018/2019-2019/2020

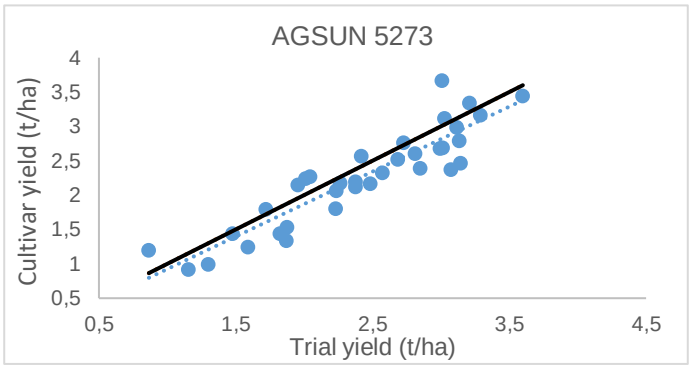


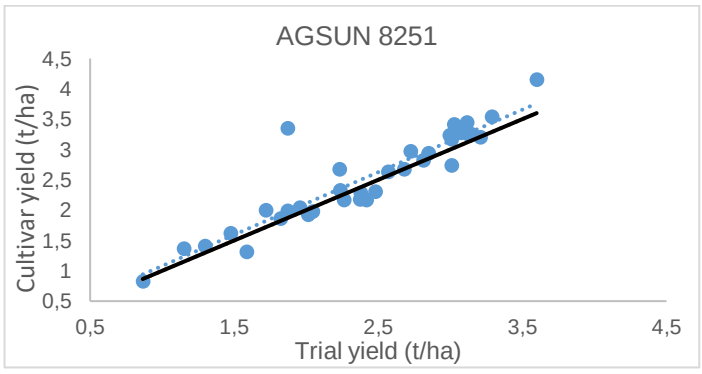


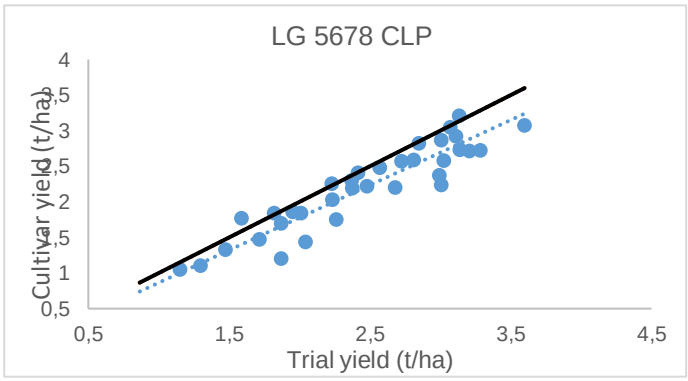


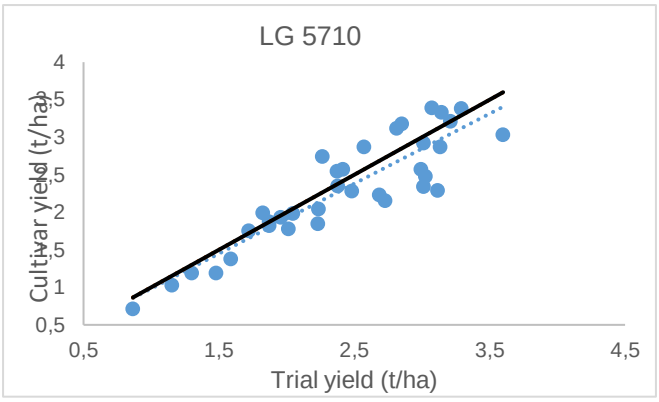


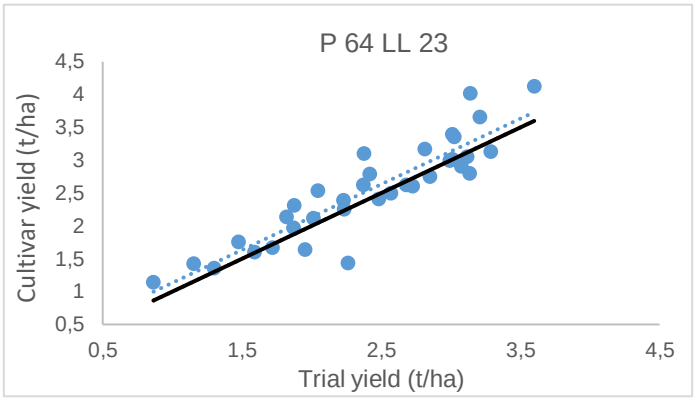


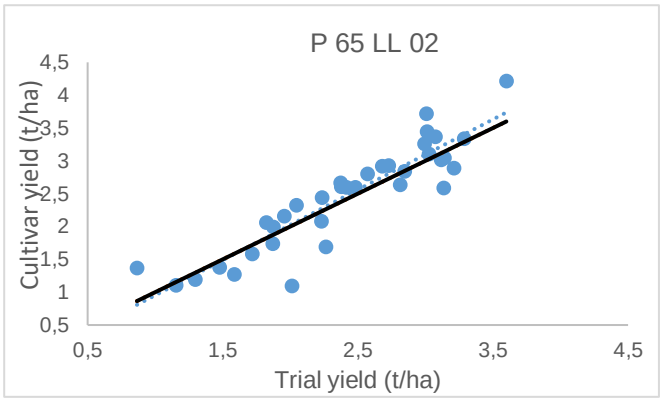


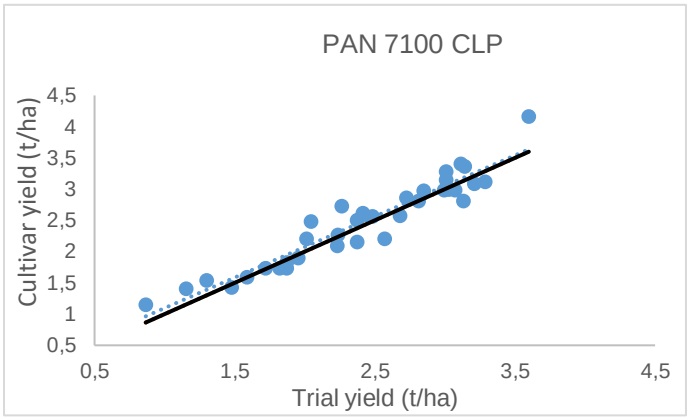


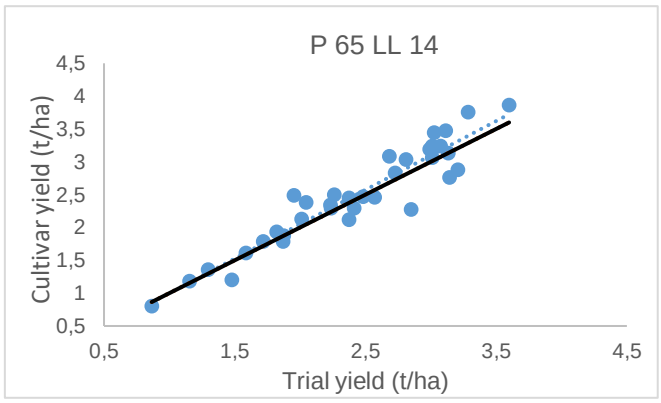


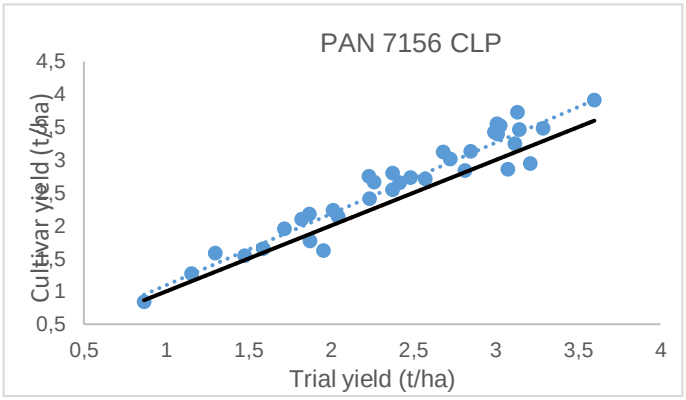

LG 5710
Cultivar yield (t/ha)
Trial yield (t/ha)

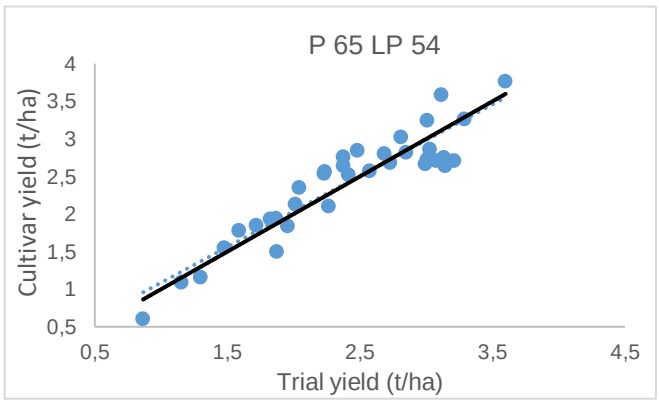

P 64 LL 23
Cultivar yield (t/ha)
Trial yield (t/ha)

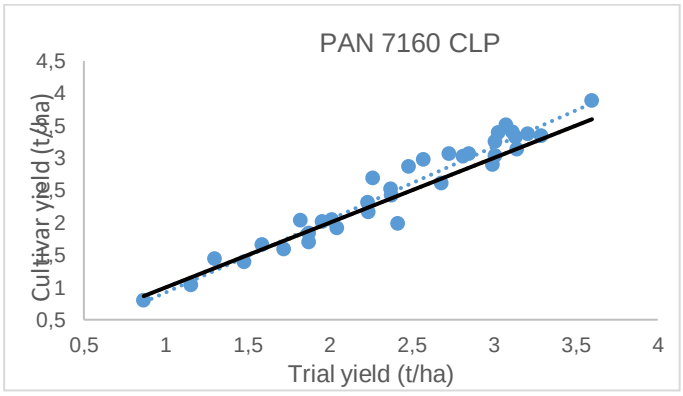

P 65 LL 02
Cultivar yield (t/ha)
Trial yield (t/ha)

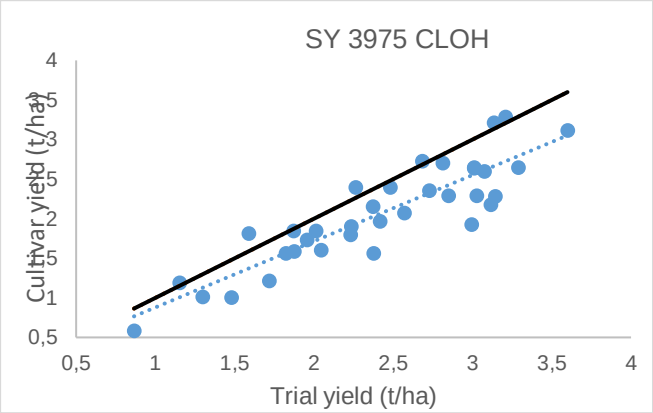

PAN 7100 CLP
Cultivar yield (t/ha)
Trial yield (t/ha)

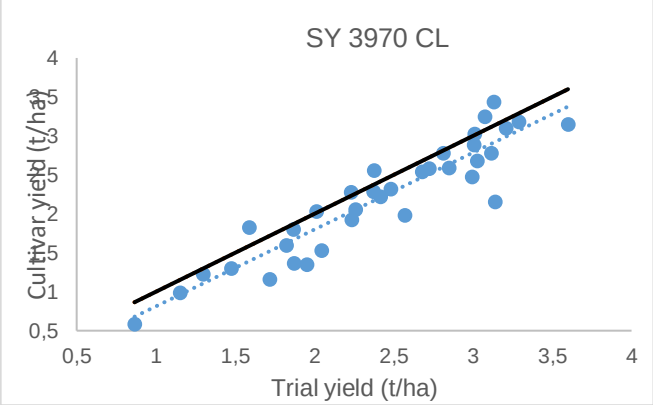

P 65 LL 14
Cultivar yield (t/ha)
Trial yield (t/ha)

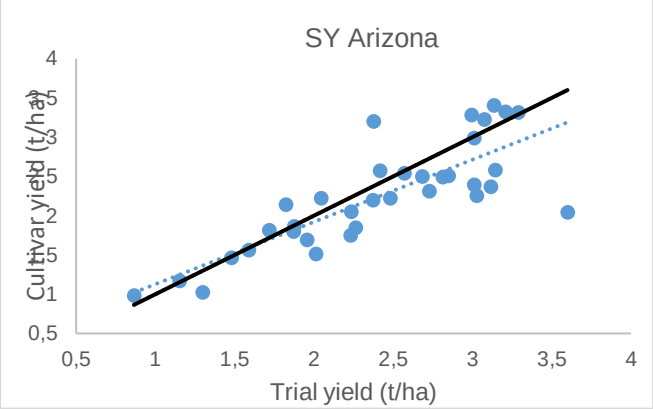

PAN 7156 CLP
Cultivar yield (t/ha)
Trial yield (t/ha)


P 65 LP 54
Cultivar yield (t/ha)
Trial yield (t/ha)


PAN 7160 CLP
Cultivar yield (t/ha)
Trial yield (t/ha)


SY 3975 CLOH
Cultivar yield (t/ha)
Trial yield (t/ha)
0,5
1
1,5
2
2,5
3
3,5
4


SY 3970 CL
Cultivar yield (t/ha)
Trial yield (t/ha)
0,5
1
1,5
2
2,5
3
3,5
4


SY Arizona
Cultivar yield (t/ha)
Trial yield (t/ha)
0,5
1
1,5
2
2,5
3
3,5
4