

26 CULTIVARS EVALUATED

in 2019/2020 trials

SAFIAH MA'ALI and NICOLENE COCHRANE, ARC-Grain Crops, Potchefstroom and Biometry (ARC)

Maintaining a high level of efficiency is the basis for the financial success of sunflower production. The selection of well-adapted cultivars is a simple and easy way to foster efficiency for which information on the performance of cultivars is needed.

The aim of the sunflower cultivar trials is to generate information from which a sensible selection of cultivars can be made.

The cultivar recommendations in this document stem from such an evaluation, made possible by collaboration between the ARC-Grain Crops and several seed companies, with financial support from the Oil and Protein Seed Development Trust.

26 cultivars, of which four were new introductions, were evaluated in 21 field trials during 2019/2020. **Table 1** shows the growing season lengths of these cultivars as well as their mean seed yields for 2018/2019 and 2019/2020.

The graphs show sunflower seed yields for one year (**Graph 1**), two years (**Graph 2**) and three years (**Graph 3**) on page 19.

1 DAYS TO FLOWERING AND SEED YIELD OF CULTIVARS EVALUATED IN 2018/2019 AND 2019/2020.

CULTIVAR	DAYS TO 50% FLOWERING MEAN	SEED YIELD (T/HA)		
		2018/2019	2019/2020	MEAN
AGSUN 5101 CLP	71	2,18	2,51	2,34
AGSUN 5102 CLP	71	2,16	2,58	2,37
AGSUN 5103 CLP	71	2,22	2,63	2,42
AGSUN 5106 CLP	71	2,26	2,62	2,44
AGSUN 5270	67	2,39	2,66	2,53
AGSUN 5273	69	2,07	2,39	2,23
AGSUN 5278	70	2,06	2,61	2,33
AGSUN 8251	70	2,37	2,60	2,49
LG 5626 HO	67	-	2,14	2,14
LG 5678 CLP	71	2,06	2,22	2,14
LG 5710	69	2,18	2,37	2,27
P 64 LL 23	67	2,31	2,69	2,50
P 65 LC 17	68	2,30	-	2,30
P 65 LL 02	69	2,35	2,54	2,44
P 65 LL 14	69	2,36	2,57	2,47
P 65 LP 54	69	2,21	2,55	2,38
PAN 7080	71	2,44	2,68	2,56
PAN 7100	69	2,20	2,65	2,42
PAN 7102 CLP	69	2,43	2,56	2,50
PAN 7156 CLP	69	2,44	2,78	2,61
PAN 7158 HO	69	2,14	-	2,14
PAN 7160 CLP	71	2,33	2,66	2,49
PAN 7170	69	-	2,63	2,63
RN 28485	66	-	2,26	2,26
RN 28584	67	-	2,29	2,29
SY 3970 CL	69	1,98	2,34	2,16
SY 3975 CLOH	71	1,88	2,19	2,03
SY Arizona	67	2,20	2,25	2,22

Yield probability

A cultivar's yield probability is the chance to realise an above average yield at a particular yield potential. For instance, if the yield probability of a cultivar at a particular yield potential equals 60%, the chance to realise a yield above the mean of all cultivars is 60%, with a 40% chance of obtaining a yield below the mean.

Table 2 shows yield probability values for the cultivars tested in 2019/2020. Since new cultivars are introduced and some removed annually, a multi-season reliability analysis is only possible for a limited number of cultivars. **Table 3** shows yield probability values for 22 cultivars that were evaluated in 35 trials during 2018/2019 and 2019/2020. **Table 4** (on page 19) shows yield probability values for 17 cultivars that were evaluated in 47 trials during the 2017/2018 to 2019/2020 growing season.

Table 3 and Table 4 can be used to select a core of cultivars. This selection can be expanded with cultivars selected from Table 1 and Table 2. It is advisable to grow more than one cultivar and to include new cultivars on a limited scale only.

Cultivar selection from the yield probability table

Determine the yield potential for a particular land and set a yield target. The long-term mean yield of a particular field is usually a good indicator of the yield potential and can therefore serve as yield target. Consult the yield probability tables next.

Cultivars with the highest yield probability values, in the column below a particular yield potential, are those with the best chance to perform well under the particular conditions.

Tips to optimise sunflower yields

1. Choosing the correct hybrid is one of the key decisions every grower has to take before the beginning of a season. Growers should consider not just the yield, but also yield stability, yield potential and yield probability according to a realistic yield potential for each field. The stability of a cultivar is determined by the closer the R² value is to 1 and the smaller the F probability is (preferably < 0,1).
2. Planting date: Plantings during November up to mid-December will benefit yield significantly as opposed to late-season plantings in January or even February.
3. Planting depth: A general recommendation for planting depth is an extreme challenge. In most cases sandy soils that tend to dry out quicker will necessitate deeper planting depth. Avoid poorly drained soils as well as highly acidic soils.
4. It is essential to run a millipede rotary harrow (*duisendpoof*) over your newly planted crop three to four days after planting, because a hard crust also causes a poor stand.
5. Plant population should be based on soil type, rainfall and yield potential. Keep to the optimal plant population of 35 000 to 42 000 plants per hectare and maintain a row width of 0,91cm.
6. Crop rotation: Do not plant the same crop in the same field year after year. A two- or three-year rotation cycle is necessary to control diseases.
7. Appropriate fertilisation is important and plays a vital role in yields achieved. Your fertiliser programme must always be based on scientific soil analysis. If it is possible, do not apply the full nitrogen requirement in one application. Rather apply half during planting and the other half at 30 to 40 days after emergence.
8. Another vital key to achieving a good sunflower yield is good weed control, especially in the first 45 days in the life of a young seedling. Clearfield hybrids allow growers to address the issue shortly after emergence with the application of post-emergence herbicide. Growers should not neglect to apply a pre-emergence grass herbicide during planting. ➔

2 THE YIELD PROBABILITY (%) OF CULTIVARS EVALUATED IN 2019/2020 AT DIFFERENT YIELD POTENTIALS.

CULTIVAR	YIELD POTENTIAL (T/HA)						REGRESSION LINE	
	1	1,5	2	2,5	3	3,5	Fprob	R ²
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
SY Arizona	57	49	41	34	27	22	<0,001	0,64

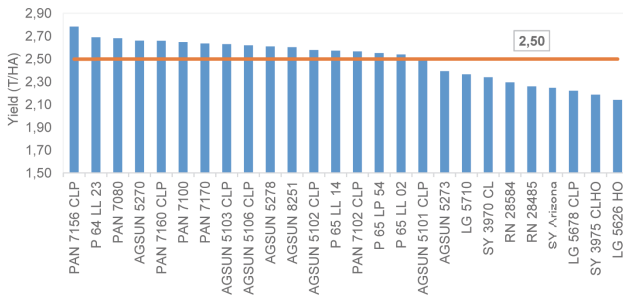
3 THE YIELD PROBABILITY (%) OF CULTIVARS EVALUATED IN 2018/2019 AND 2019/2020 AT DIFFERENT YIELD POTENTIALS.

CULTIVAR	YIELD POTENTIAL (T/HA)						REGRESSION LINE	
	1	1,5	2	2,5	3	3,5	Fprob	R ²
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
LG 5678 CLP	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

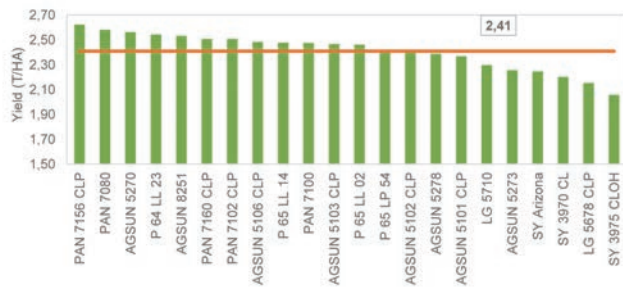
R² is a statistic that explains the variation around the mean of the appropriate model. An R² of >0,5 is recommended. The closer the R² value is to 1, the better the regression fit is. The better the cultivar meets the requirements and stays above the regression line, the stabler the cultivar is.

Fprob = F probability (the probability that the slope and section on the y-axis contribute significantly to the model).
An Fprob value of <0,1 is recommended.

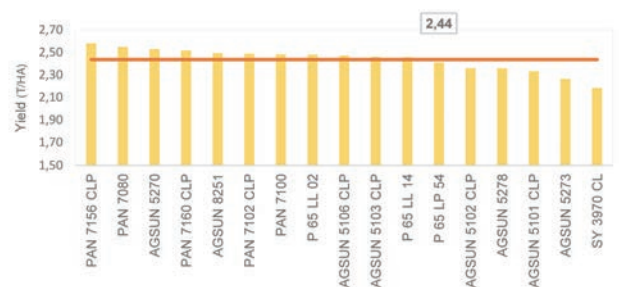
26 CULTIVARS EVALUATED...



Graph 1: Sunflower seed yield average for one year.



Graph 2: Sunflower seed yield average for two years.



Graph 3: Sunflower seed yield average for three years.

4 THE YIELD PROBABILITY (%) OF CULTIVARS EVALUATED IN 2017/2018 TO 2019/2020 AT DIFFERENT YIELD POTENTIALS.

CULTIVAR	YIELD POTENTIAL (T/HA)						REGRESSION LINE	
	1	1,5	2	2,5	3	3,5	Fprob	R ²
AGSUN 5101 CLP	41	41	41	41	41	41	<0,001	0,90
AGSUN 5102 CLP	44	44	43	43	42	42	<0,001	0,90
AGSUN 5103 CLP	40	44	48	53	57	61	<0,001	0,91
AGSUN 5106 CLP	41	46	50	55	59	64	<0,001	0,93
AGSUN 5270	67	64	60	56	52	48	<0,001	0,81
AGSUN 5273	47	44	40	37	33	31	<0,001	0,83
AGSUN 5278	51	49	47	45	43	42	<0,001	0,86
AGSUN 8251	55	55	54	54	54	54	<0,001	0,84
P 65 LL 02	50	51	52	54	54	56	<0,001	0,88
P 65 LL 14	52	52	52	53	53	54	<0,001	0,80
P 65 LP 54	53	52	50	48	47	45	<0,001	0,81
PAN 7160 CLP	46	50	54	57	61	65	<0,001	0,82
PAN 7080	44	50	55	61	66	71	<0,001	0,89
PAN 7100	56	56	55	55	54	54	<0,001	0,86
PAN 7102 CLP	66	62	58	54	50	46	<0,001	0,93
PAN 7156 CLP	59	60	61	63	64	65	<0,001	0,91
SY 3970 CL	39	37	34	32	29	27	<0,001	0,88

R² is a statistic that explains the variation around the mean of the appropriate model. An R² of >0,5 is recommended. The closer the R² value is to 1, the better the regression fit is. The better the cultivar meets the requirements and stays above the regression line, the stabler the cultivar is.

Fprob = F probability (the probability that the slope and section on the y-axis contribute significantly to the model). An Fprob value of <0,1 is recommended.

This research was made possible through the financial support of the ARC and the Oil and Protein Seed Development Trust.