



**AgriFutures™**  
Pasture Seeds



## **Lucerne Variety Trial – Assess optimum plant stress levels for seed production**



# SEED PRODUCTION REPORT - YEAR 1

Lucerne Australia is pleased to release this report summary for the **Lucerne Variety Trial - Assess optimum plant stress levels for seed production.**

Funding was received from AgriFutures Australia through the Pasture Seeds Program funded by a \$15 per tonne levy on the sale of certified lucerne seed from Australian growers which is matched by Commonwealth Government funding.

The trial work is being conducted by Kalyx Australia on Simon Allen's Warrawee Park property south of Keith, SA.

Seed varieties have been supplied by:

Alforex Seeds, Heritage Seeds, Naracoorte Seeds, Pasture Genetics, PGG Wrightson Seeds, Seed Force, S&W Seed Co, Upper Murray Seeds.

This trial commenced with seeding on 22<sup>nd</sup> June 2018.

The seed harvest was carried out on 21<sup>st</sup> March 2019.

*NOTE: The LA executive Committee advises that this is a summary of the first-year seed production from a seedling crop – therefore, whilst we are confident with the statistical information, data should be read with that in mind. We look forward to having data from the mature crop over the next 2 years.*





## SUMMARY

The trial was conducted at Keith, South Australia on a sandy loam soil to evaluate and compare the seed yield of 29 current and pre-commercial Lucerne (*Medicago sativa*) varieties under modified irrigation management systems.

The trial was replicated over three flood irrigation bays to simulate a standard, moderate and high stress watering strategy. The standard watering strategy represented farmer practice with irrigation occurring approximately every 18 days. The moderate stress watering strategy delayed irrigation until 20 days. The high stress watering strategy aimed to stress the Lucerne stand further with irrigation occurring every 22 days.

Through the implementation of commercial soil probes and visual crop assessment, crop condition and soil moisture was monitored throughout the duration of this trial to assist and guide irrigation management regimes.

The varieties evaluated in this trial include SFR27-032, SFR27-033, SF 914QL, SFR27-030, L71, L92, GTL60, Magna 901, Magna 868, Silverland (D5), Silverosa GT (D7), Silverado (D9), Silversky (D11), Siriver MK II, Titan 9, AR245, AR323, SW18NPK90, SW18NPK91, SW18NPK92, Sardi 10 Series II, Heritage 10, Heritage ST, Sardi 7 Series II, SC01, SC02, SC03, SC04 and SC05. Siriver and Aurora were included in this trial as benchmark varieties.

Crop plant counts were assessed 11 weeks after sowing (WAS) to measure establishment. Crop yield was measured at commercial harvest and all harvest samples were cleaned and weighed.

The data from this trial is generated from a first year lucerne stand and seed yield data will continue to be collected over the following two years.



# Lucerne seed yield t/ha

Assessment Date	22-Mar-2019		
Assessment Type	YIELD		
Assessment Unit	t/ha		
Description	Standard Water	Moderate Stress Water	High Stress Water
Crop Stage Majority	99		
Crop Stage Minimum/Maximum	99 99		
Plant-Eval Interval	273 DP-1		
ARM Action Code		AS	
Trt Treatment			
No. Name			
1SFR27-032	0.594b	0.628c-g	0.655a-e
2SFR27-033	0.539b-g	0.661cde	0.628c-g
3SF 914QL	0.521d-i	0.619d-g	0.561g-k
4SFR27-030	0.475g-j	0.588e-h	0.545ijk
5L71	0.509e-j	0.624c-g	0.557g-k
6L92	0.558b-e	0.643c-f	0.569f-k
7GTL60	0.592bc	0.673cd	0.627c-h
8Magna 901	0.447j	0.560ghi	0.542jk
9Magna 868	0.458hij	0.527hi	0.507k
10Silverland (D 5)	0.571b-e	0.700bc	0.691abc
11Silverosa GT (D 7)	0.504e-j	0.645c-f	0.598d-j
12Silverado (D9)	0.525c-h	0.642c-f	0.639b-f
13Silversky (D11)	0.551b-f	0.649c-f	0.625c-h
14Siriver MK II	0.519d-i	0.633c-g	0.605d-j
15Titan 9	0.552b-f	0.657c-f	0.589e-j
16AR245	0.601b	0.641c-f	0.696abc
17AR323	0.487f-j	0.620c-g	0.598d-j
18SW18NPK90	0.572b-e	0.644c-f	0.644b-f
19SW18NPK91	0.694a	0.789a	0.708ab
20SW18NPK92	0.673a	0.606d-h	0.652a-e
21Sardi 10 Series II	0.557b-e	0.669cd	0.623c-h
22Heritage 10	0.726a	0.783ab	0.721a
23Heritage ST	0.565b-e	0.624c-g	0.601d-j
24Sardi 7 Series II	0.582bcd	0.611d-g	0.668a-d
25SC01	0.559b-e	0.633c-g	0.627c-h
26SC02	0.549b-f	0.604d-h	0.620c-i
27SC03	0.521d-i	0.528hi	0.569f-k
28SC04	0.468hij	0.504i	0.553g-k
29SC05	0.513e-j	0.581f-i	0.606d-j
30Siriver	0.455ij	0.606d-g	0.551h-k
31Aurora	0.601b	0.619d-g	0.629c-g
LSD P=.05	0.0686	NA	0.0766
Standard Deviation	0.0488	0.0266t	0.0545
CV	8.88	2.51t	8.89
Bartlett's X2	32.484	20.329	26.98
P(Bartlett's X2)	0.345	0.908	0.624
Skewness	0.4325	0.1334	0.1933
Kurtosis	0.3407	0.8454	-0.217
Replicate F	2.987	1.923	2.138
Replicate Prob(F)	0.0353	0.1315	0.1011
Treatment F	7.335	4.449	3.684
Treatment Prob(F)	0.0001	0.0001	0.0001

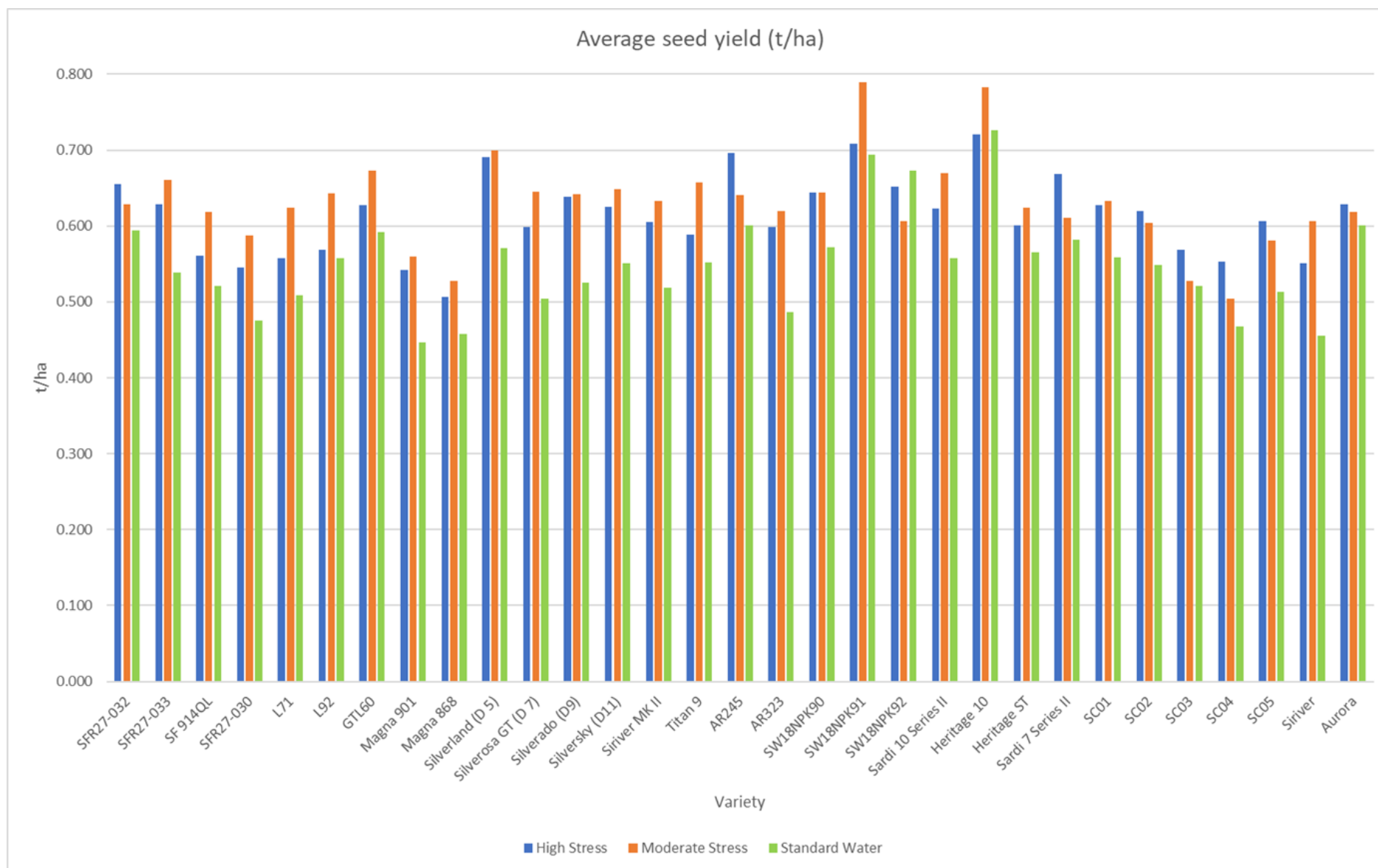
\*moderate water stress had a square root (n+.5) data transformation to correct

### Lucerne seed yield percentage relative to the standard watering

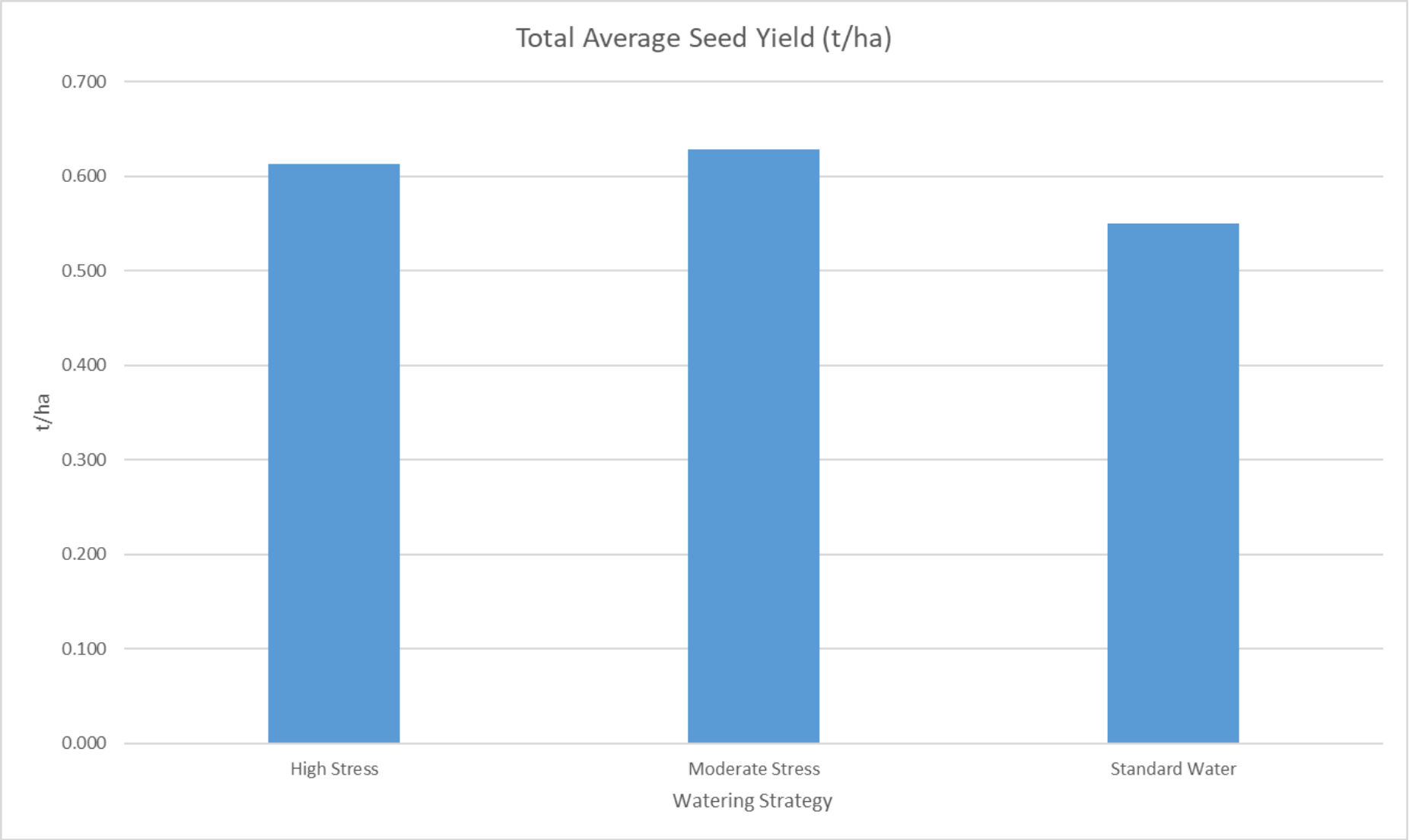
Assessment Date	22-Mar-2019		
Assessment Type	YIELD		
Assessment Unit	% Relative to Standard Water		
Description	Standard Water	Moderate Water Stress	High Stress Water
Crop Stage Majority	99		
Crop Stage Minimum/Maximum	99 99		
Plant-Eval Interval	273 DP-1		
Trt Treatment No. Name			
1SFR27-032	100	106	110
2SFR27-033	100	123	117
3SF 914QL	100	119	108
4SFR27-030	100	124	115
5L71	100	123	109
6L92	100	115	102
7GTL60	100	114	106
8Magna 901	100	125	121
9Magna 868	100	115	111
10Silverland (D 5)	100	123	121
11Silverosa GT (D 7)	100	128	119
12Silverado (D9)	100	122	122
13Silversky (D11)	100	118	113
14Siriver MK II	100	122	117
15Titan 9	100	119	107
16AR245	100	107	116
17AR323	100	127	123
18SW18NPK90	100	113	113
19SW18NPK91	100	114	102
20SW18NPK92	100	90	97
21Sardi 10 Series II	100	120	112
22Heritage 10	100	108	99
23Heritage ST	100	110	106
24Sardi 7 Series II	100	105	115
25SC01	100	113	112
26SC02	100	110	113
27SC03	100	101	109
28SC04	100	108	118
29SC05	100	113	118
30Siriver	100	133	121
31Aurora	100	103	105

\*This table displays the yield percentage of each Lucerne variety relative the standard watering strategy but does not compare varieties. i.e. Siriver yielded 33% more in the moderate water stress bay when compared to the standard watering strategy. The table indicates that different varieties respond differently to water stress; however, it is important to note that the top performing varieties in the trial performed well regardless of watering strategy.

**Graph 1 -Average seed yield (t/ha) per variety for each watering strategy**



**Graph 2- The total average seed yield (t/ha) for each watering strategy**



## DISCUSSION

Each flood irrigation bay was sown at 2.7 kg/ha, however; a significant reduction in plant establishment was observed across the moderate stress watering strategy. It is difficult to determine the reason behind this reduction in establishment, however; plant counts will be conducted each year.

Delaying irrigation timings statistically increased Lucerne +seed yield. Under the conditions of this trial, a 14% seed yield increase was observed across the moderate watering strategy (Graph 2).

The high and moderate stress watering strategies respectively had 11.5% and 14.4% higher yields when compared to the standard watering strategy. This trend was significant for both strategies when compared to the standard watering (Graph 2).

### Standard Watering

The highest yielding varieties were SW18NPK91, SW18NPK92 and Heritage 10 with clean seed weights between 0.673t/ha and 0.726t/ha.

The benchmark variety Aurora yielded 0.601t/ha, significantly higher than Siriver by 32.1%.

Varieties that performed similarly to Aurora include; SFR27-032, SFR27-033, L92, GTL60, Silverland (D 5), Silversky (D11), Titan 9, AR245, SW18NPK90, Sardi 10 Series II, Heritage ST, Sardi 7 Series II, SC01 and SC02.

SF 914QL, SFR27-030, L71, Magna 868, Silverosa GT (D 7), Siriver MK II, AR323, SC03, SC04 and SC05 had significantly similar cleaned weight yields as Siriver at 0.455t/ha.

### Moderate Stress Watering

The highest yielding varieties were SW18NPK91 and Heritage 10 with clean seed weights of 0.789t/ha and 0.783t/ha respectively.

SW18NPK91 and Heritage 10 provided up to 30.2% greater yield when compared to benchmark varieties Siriver and Aurora which had significantly similar yields of 0.606t/ha and 0.619t/ha. Silverland (D5) also had significantly greater yield when compared to both benchmark varieties by up to 15.5%.

SFR27-032, SFR27-033, SF 914QL, SFR27-030, L71, L92, GTL60, Magna 901, Silverosa GT (D 7), Silverado (D9), Silversky (D11), Siriver MK II, Titan 9, AR245, AR323, SW18NPK90, SW18NPK92, Sardi 10 Series II, Heritage ST, Sardi 7 Series II and SC02 had significantly similar yields when compared to both Siriver and Aurora.



## High Stress Watering

The highest performing variety was Heritage 10 yielding 0.721t/ha. This variety provided a 30.9% yield increase when compared to Siriver and a 14.6% increase when compared to Aurora with a yield of 0.629t/ha.

SFR27-032, Silverland (D 5), AR245, SW18NPK91, SW18NPK92, Sardi 7 Series II had significantly similar yields to Heritage 10 and provided greater yields by up to 28.5% when compared to Siriver of 0.551t/ha and 12.5% when compared to Aurora of 0.629t/ha.

SF 914QL, L71, L92, GTL60, Silverosa GT (D 7), Silversky (D11), Siriver MK II, Titan 9, AR323, Sardi 10 Series II, Heritage ST, SC01, SC02, SC03, SC04 and SC05 yielded equally to both benchmark varieties Siriver and Aurora.

Silverado (D9), SW18NPK90 and SFR27-033 also yielded equally to Aurora of 0.629t/ha, however these varieties yielded significantly more than Siriver by 14-17%.

## CONCLUSIONS

The results of this trial show a statistically significant increase in seed yield when irrigation is delayed, and plant stress is increased.

The highest yielding varieties across the standard watering strategy were SW18NPK91, SW18NPK92 and Heritage 10 with clean seed weights between 0.673t/ha and 0.726t/ha.

SW18NPK91 and Heritage 10 were the highest yielding varieties across the moderate stress watering strategy with clean seed weights of 0.789t/ha and 0.783t/ha respectively.

The highest yielding varieties for the high stress watering strategy were Heritage 10, SFR27-032, Silverland (D5), AR245, SW18NPK91 and SW18NPK92 yielding between 0.655t/ha and 0.721t/ha.

Heritage 10 and SW18NPK91 are consistently the highest yielding varieties across all three watering strategies.

