

# Northern Cape cultivar trial under irrigation at Douglas in 2023

By André Prins, GWK, and Enrike Verster, Potatoes SA

**E**ighteen producers are currently producing potatoes for the country's fresh produce markets on 2 214 ha in the Northern Cape potato production region. Approximately 60.74% of this region's potato production comprises seed potatoes. The main cultivars earmarked for commercial production in this region include Lanorma, Sifra and Mondial.

Douglas is located in South Africa's dry continental area (*Figure 1*) with an annual average rainfall of approximately 200 mm for the last six years. Winters are cold with regular frost, while summers can be extremely hot.

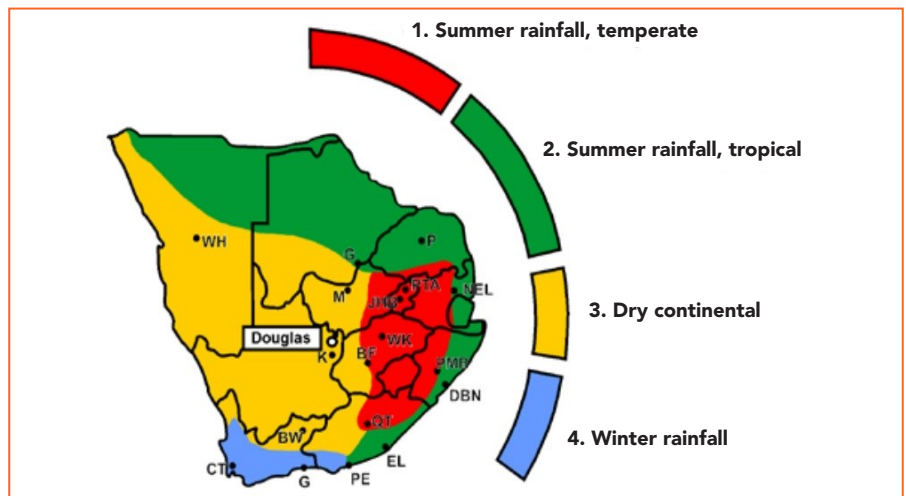
The cultivar trial was carried out in sandy loam soil and laid out in a randomised block design with three replications per cultivar. *Table 1* contains additional technical information relating to the trial.

The cultivar trial included cultivars with short and long growing periods. Hence, growing periods can influence the eventual crop yield of certain cultivars. Growing periods are defined as the number of days from emergence to leaf senescence, depending on the season. A potato plant's lifetime can be divided into five growth phases which include sprout development, vegetative growth, tuber initiation, tuber filling and maturity.

*Table 2* illustrates how the growth period differs from one cultivar to another. Environmental factors and management practices influence the different growth phases and their time of commencement.

Population density and haulm count influence tuber size and yield.

**Figure 1: Location of Douglas in the Northern Cape production region.**



The trial was carried out in sandy loam soil and laid out in a randomised block design with three replications per cultivar.

















The number of eyes per tuber is dependent on the cultivar and can determine the number of sprouts produced per tuber. In this instance, the plant readiness of seed potatoes is very important seeing as better plant readiness leads to better sprouting in seed potatoes. Plant readiness of seed potatoes during the planting of this trial as well as population density and haulm count are indicated in *Table 2*.

The evaluation of new cultivars such as those in this trial provides, among others, results regarding yield and marketing index. The marketing index of the specific cultivars is calculated by classing and sorting each cultivar according to quality and size group distribution (for example, Class 1 Large or Class 2 Large medium). Prices are then compared to market prices as obtained during harvesting time. The performance of new cultivars cannot be based on

**Table 1: Summary of technical information regarding the trial site and layout.**

<b>Farm</b>	<b>Bossiespan</b>		
<b>Producer</b>	Jaco Mulke		
<b>Planting date</b>	26 January 2023		
<b>Harvest date</b>	31 August 2023		
<b>Irrigation/dryland</b>	Irrigation		
<b>Double or single rows</b>	Double rows		
<b>Leaf senescence</b>	Natural		
<b>Intra-row spacing</b>	0.9 m		
<b>Trial site</b>	18 m <sup>2</sup>		
<b>Population density</b>	44 444 plants/ha		
<b>Tuber size</b>	250 count (average 100 g)		
<b>Fertiliser programme</b>			
<b>Nutritional value</b>			
	<b>N (kg/ha)</b>	<b>P (kg/ha)</b>	<b>K (kg/ha)</b>
<b>Total</b>	<b>220</b>	<b>185</b>	<b>216</b>

**Table 2: Characteristics regarding growing period, plant readiness, population density (%) and haulm count for each cultivar.**

Agent	Cultivar	Growing period (days) <sup>1</sup>		Plant readiness <sup>2</sup>	Plant density (%)	Haulms per plant	Haulms per ha
	11Z49A1	Medium to long	(100-120)	3	100	6.4	284 442
	11Z55A5	Medium to long	(100-120)	3	97	5.0	215 553
	Amany	Medium to long	(110)	3	92	5.1	208 531
	Connect	Medium to long	(120)	3	80	5.0	177 776
	Foxy	Short to medium	(90-100)	2	97	3.6	155 198
	Kelly	Long	(120)	3	92	5.4	220 798
	King Russet	Short	(80-90)	3	100	7.4	328 886
	Lanorma	Short	(80-90)	3	100	5.3	235 553
	Lilly	Medium	(100)	3	92	8.0	327 108
	Mondial	Medium to long	(110-115)	2	100	5.6	248 886
	Noha	Medium	(100)	3	100	3.9	173 332
	Noya	Medium to long	(120)	3	95	2.5	105 555
	Panamera	Long	(120-125)	3	89	5.5	217 553
	Sababa	Medium to long	(110-115)	3	100	6.7	297 775
	Sifra	Short to medium	(90-100)	3	98	5.8	252 620
	Tyson	Short to medium	(90-100)	3	91	4.3	173 909

<sup>1</sup>General guidelines and categories (days from emergence to leaf senescence, depending on the season): Short = 70 to 90 days; short to medium = 80 to 100 days; medium = 90 to 110 days; medium to long = 90 to 120 days; long = 90 to 140 days.

<sup>2</sup>Plant readiness of seed potatoes: 1 = Fresh; 2 = slightly fresh; 3 = ready for planting; 4 = slightly old; 5 = old.

Figure 2: Rainfall during the 2023 season and the long-term average rainfall.

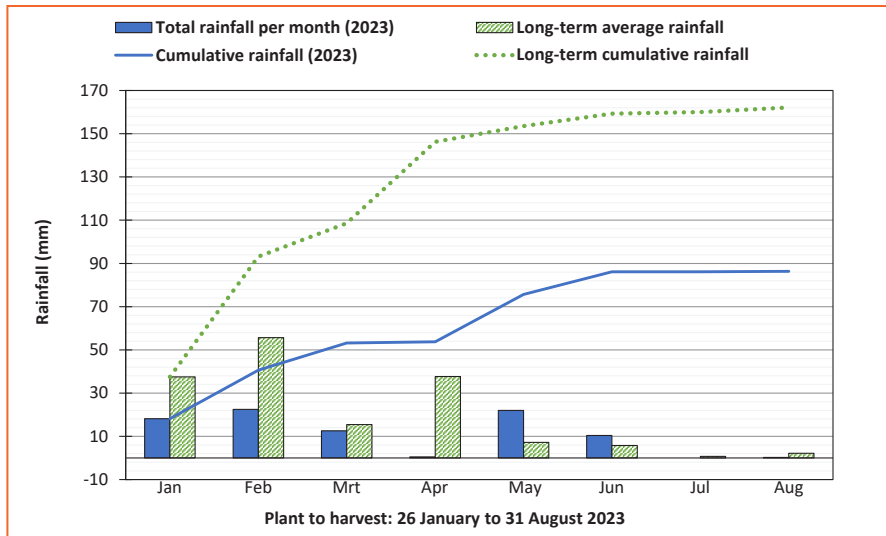


Figure 3: Minimum and maximum temperatures during the 2023 season as well as long-term temperatures.

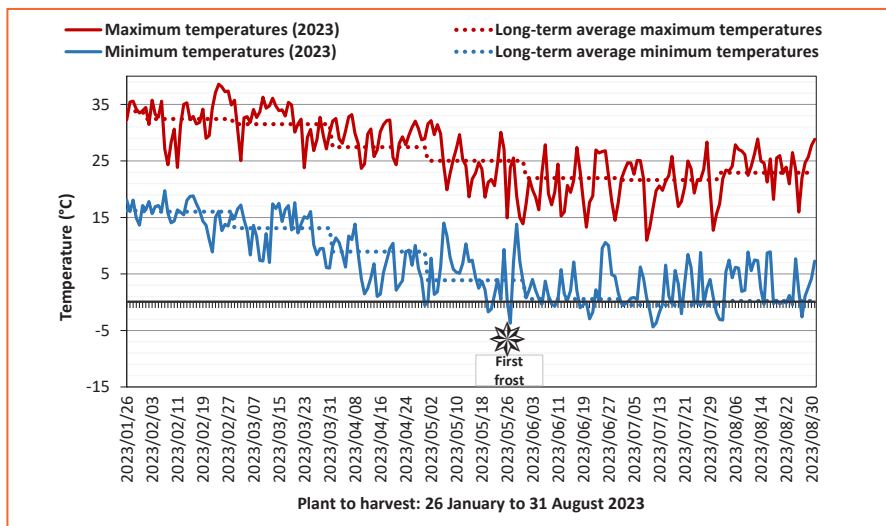
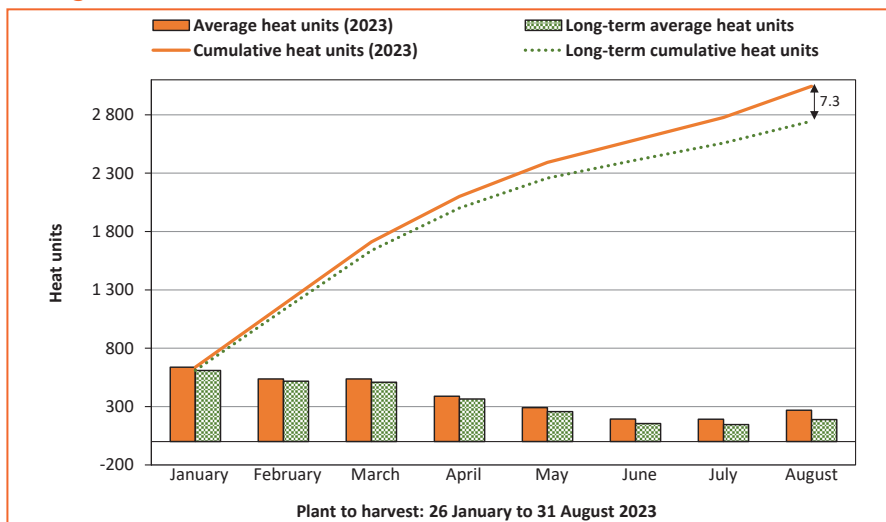


Figure 4: Heat units during the 2023 season, as well as the long-term average.



\*Total heat units determined specifically for potatoes as a crop (threshold temperature = 5°C). Calculated from hourly data.



one specific season only, as climate can vary from one year to the next. Therefore, cultivars are preferably tested across several seasons.

As with any crop, aspects such as temperatures, the availability of water (whether through good irrigation scheduling or rainfall) as well as heat units, are all important factors that have a fundamental influence during the potato plant's growing period. These factors are thus taken into consideration when the performance of cultivars is evaluated.

### Rainfall and irrigation

The season's rainfall was substantially lower than the long-term average rainfall trend for the growing season (Figure 2). In this dry continental region, there is heavy reliance on good irrigation scheduling for potatoes.

### Temperatures and heat units

Figure 3 indicates minimum and maximum temperatures. Temperatures below freezing point were recorded regularly since the end of May. These continuous below-freezing temperatures led to natural foliage die-off.



Cultivars with short and long growing periods were included in the cultivar trial. Growing periods can affect the crop yield of cultivars.



The collection of heat units during a growing period is an important factor in a potato plant's development. The trend of heat units available for the season's cultivar trial seemed to be somewhat higher than the trend of average long-term heat units. (Figure 4)

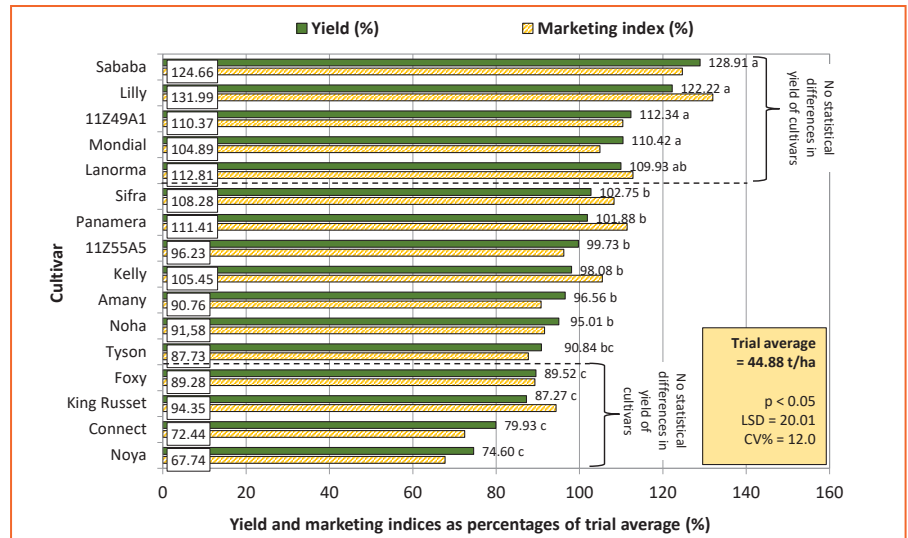
### The yield index

Yield data collected during harvest was subjected to statistical processing using the GenStat® program. The Tukey test of least significant differences (LSDs) was used to separate the mean. The cultivar effect during this specific trial (Figure 5) was statistically significant ( $p < 0.05$ ) and the coefficient of variation was acceptably low (12%).

These factors indicate that the trial was well executed and the results reliable. The yield of each of the cultivars is divided by the trial average (the trial average of all the cultivars is taken as 100%). A yield index is created and each cultivar's performance is then read as a percentage of the trial average.

The average yield for the 2023 season trial was 44.88 t/ha.

Figure 5: Total yield and marketing indices per cultivar as a percentage of the trial average.



\*Values followed by the same letter do not significantly differ from one another.

Figure 6: Grading of each cultivar.

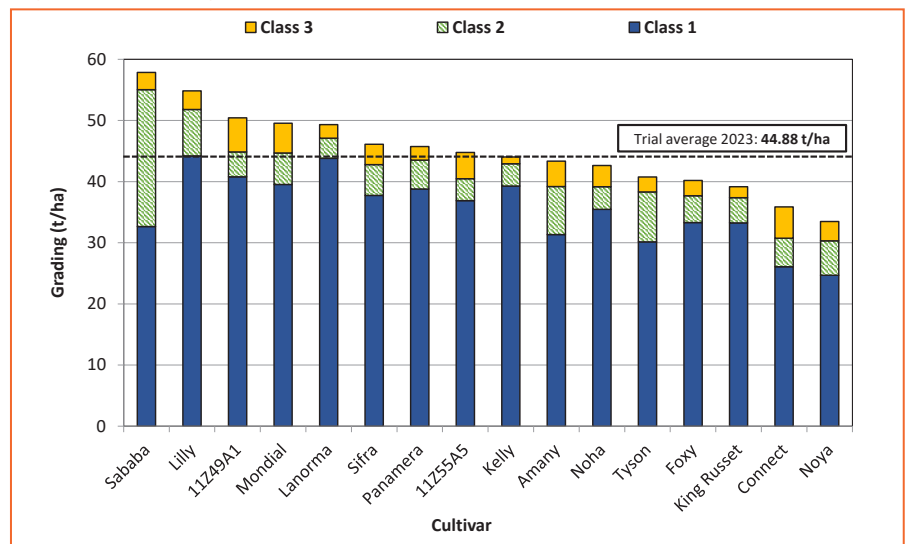


Figure 7: Size-group distribution of each cultivar during final harvest.

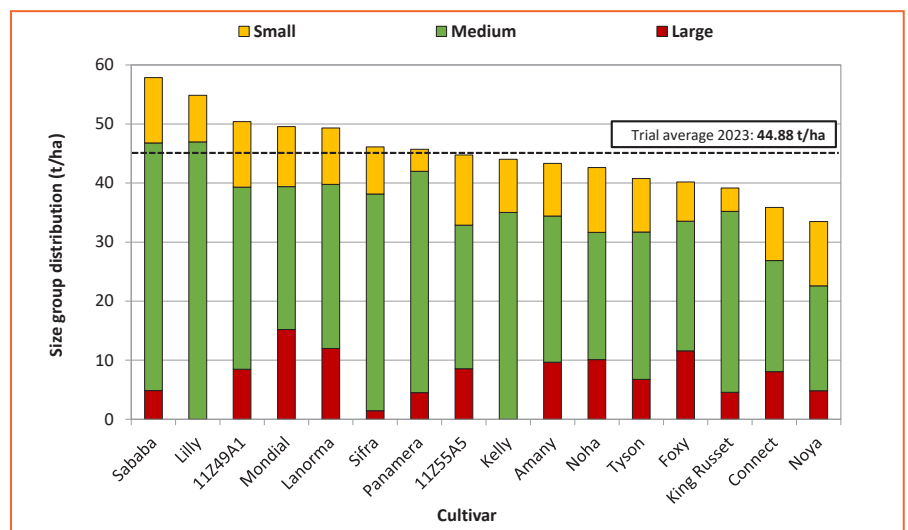


Table 3: Main reasons for downgrading during the Douglas harvest in 2023.

Cultivar	Malformation	Rhizoctonia	Growth cracks	Other cracks	Common scab	Silver scab	Moth	Insects	Greening
11Z49A1					x		x		x
11Z55A5	x			x		x	x		
Amany		x			x		x		x
Connect			x		x		x		x
Foxy						x	x	x	x
Kelly			x	x			x		
King Russet	x			x			x		
Lanorma					x		x	x	x
Lilly					x	x		x	x
Mondial			x	x			x	x	x
Noha		x			x		x	x	
Noya		x			x		x	x	x
Panamera			x					x	x
Sababa		x				x	x		x
Sifra					x		x	x	
Tyson	x		x				x	x	

Table 4: Processing characteristics and internal quality of cultivars in the 2023 trial. (Conducted by the Agricultural Research Council – Roodeplaat)

Cultivar	Chip colour <sup>1</sup>	SG <sup>2</sup>	Dry Matter <sup>3</sup>
11Z49A1	60.89	1.065	17.1
11Z55A5	49.77	1.059	15.8
Amany	60.45	1.073	18,7
Connect	59.69	1.068	17.6
Foxy	58.11	1.061	16,1
Kelly	53.99	1.057	1.4
King Russet	52.72	1.075	19.2
Lanorma	62.54	1.064	16.8
Lilly	45.34	1.075	19.2
Mondial	56	1.064	16.9
Noha	51.15	1.065	1.1
Noya	64.70	1.071	18.3
Panamera	55.87	1.070	18.2
Sababa	60.45	1.060	15.9
Sifra	62.19	1.062	16.3
Tyson	50.52	1.068	17.7

<sup>1</sup>Chip colour with a value of >50 and without defects is acceptable for the chip industry.

<sup>2</sup>Specific gravity of ≥1.075 is acceptable for the processing industry.

<sup>3</sup>The percentage of dry matter is a calculated value:  $DM\% = 24.182 + 211.04 * (SG - 1.0988)$ . The actual percentage value will differ slightly between varieties based on this calculating value.

The cultivars Sababa, Lilly, 11Z49A1, Mondial and Lanorma statistically produced the highest yields. Lilly produced the highest marketing index which can be ascribed to a good yield of Medium tubers as well as minimal Class 3 tubers.

Market prices for Class 1 Medium-sized potatoes were R5 more than Class 1 Large potatoes during the week of harvesting; this will influence the marketing index as indicated on the graph where Lilly produced the highest marketing index. The main reasons for the downgrading of each cultivar (Table 3) were investigated to determine which challenges the specific cultivars were faced with in terms of quality index. Moth damage, malformation and common scab were the main reasons for downgrading.

Lastly, to adhere to processing requirements, cultivars must meet the chip colour standard of >50 and specific gravity (SG) of ≥1.075. Only King Russet met the SG and chip colour requirements. (Table 4). 📍

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