**THE NATIONAL WHEAT CULTIVAR EVALUATION PROGRAMME UNDER DRYLAND CONDITIONS IN THE SUMMER RAINFALL REGION REPORT**

**2016**

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1. **INTRODUCTION AND BACKGROUND**

The summer rainfall area (predominantly the Free State Province) is a major dryland wheat production region of South Africa. There is considerable variation of precipitation, soil types and average temperature from east to west, hence the Free State is commonly divided into four distinct dryland wheat production regions, namely; the South Western Free State, North Western Free State, Central Free State and Eastern Free State. To minimize the uncertainties associated with dryland wheat farming such as cultivar choice amongst others, it is important to conduct cultivar evaluations annually across the major geographic regions of the summer rainfall area.

**Mandate of the ARC-SGI**

The ARC-Small Grain Institute has the mandate to conduct the National Cultivar Adaptation programme in all the major production areas in the Republic of South Africa. This is done so as to supply reliable guidelines for the choice of adapted cultivars to small grain producers and policy makers. Cultivar selection should be based on long term scientific data and should be revised annually to make provision for new improved cultivars. ARC-Small Grain Institute has the specific task and function within its mandate to conduct field trials on a scientific basis on all cultivars of breeding institutions participating in the programme. To achieve this goal the Small Grain Institute requests and enlists the co-operation and co-ordination of other institutions and role players within the industry to join and assist them with the task of gathering, combining and presenting the results to the small grain industry. Data collected over the current season may also be compared with historical data and in so doing a more reliable comparison of the data is achieved.

**Objectives**

The specific objective of the study was to carry out wheat cultivar evaluation trials in all the major dryland wheat production regions of the summer rainfall area, South Africa, namely: South Western, North Western, Central and Eastern Free State. The end objective of the cultivar evaluation program is to supply reliable guidelines for the choice of adapted cultivars to its clients and main benefactors, mainly wheat producers.

1. **SITE SELECTION AND CHARACTERISATION**

Trials were planted on farms of collaborators under commercial production conditions, where soil, climate and general production practices are representative of a specific area. At each trial site, two experiments were planted side by side, an earlier planting and a later planting. All trials were carried out on the fields of wheat producers. Therefore, the trials were prepared by the producers, who were simultaneously preparing the field for their own crops. The list of localities, GPS coordinates, farm names and previous crops on the sites are listed in the Tables below:

**Central Free State**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Locality** | **GPS Coordinates** | **Farm Name** | **Farmer Details** | | **Previous crop on trial site** |
| **Name** | **Contact number** |
| Alington (FB) | S28º00.961’/E027º40.333’ | Castlebar | F Bertou | 0829201953 | Wheat |
| Alington (JT) | S27º56.633’/E027º53.354’ | Groen & Goud | JJ van Tonder | 0824962557 | Wheat |
| Clocolan (LO) | S28º42.159’/E027º50.582’ | Zoutfontein | L Oberholzer | 0825623718 | Maize |
| Clocolan (TW) | S28º43.021’/E027º43.964’ | Huurgrond | TI Wille | 0846035070 | Soybean |
| Petrus Steyn | S27º41.751’/E028º14.874’ | Novo | P Meiring | 0828046447 | Maize |

**North Western Free State**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Locality** | **GPS Coordinates** | **Farm Name** | **Farmer Details** | | **Previous crop on trial site** |
| **Name** | **Contact number** |
| Bultfontein | S28º10,061’/E026º05.796 | Klein Hoek | M Bredenkamp | 0823246600 | Soybean |
| Wesselsbron (LO) | S27º46.687’/E026º17.683 | Boland Plaas | L Odendaal | 0837009307 | Maize |
| Bothaville | S27º42.295’/E026º32.274 | Uitenhaag | P van Zyl | 0832981038 | Maizeow |
| Wesselsbron (NM) | S27º39.856’/E026º29.585 | Rusplaas | N Maree | 0827852166 | Maize |

**Eastern Free State**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Locality** | **GPS Coordinates** | **Farm Name** | **Farmer Details** | | **Previous crop on trial site** |
| **Name** | **Contact number** |
| Ficksburg | S28º47,494’/E027º57,893’ | Aletta | TI Wille | 0828071135 | Wheat |
| Bethlehem | S28º17,101’/E028º10,698’ | Prospect | D Terblanche | 0836308518 | Soybean |
| Danielsrus | S27º59,664’/E028º29,023’ | Vlakfontein | CF Fick | 0827735078 | Maize |
| Clarens | S28º22.376’//E028º25.103’ | Boomplaas | DP Viljoen | 0836275656 | Soybean |
| Harrismith | S27º55.906’//E029º04.554’ | Heritage | N Leslie | 0825533311 | Maize |

**South Western Free State**

The South Western Free State was not included in 2016 program. This was due to the severe drought in the area and there were no willing co-workers (dryland wheat farmers) in that area. A decision was therefore made not to plant trials in this region in 2016.

**Soil Analyses**

Soils samples were collected before planting from the 0 - 20 cm depths at all trial sites, using a graduated dutch auger. A simple random sampling procedure was also used to collect 3 samples from each of the fields. The samples were bulked, air dried (visible organic debris removed), ground (< 2 mm) and analysed for the following: pH (KCl) and exchangeable acid (KCl), Cations - Mg, K, Ca, Na and S (Ammonium acetate) and available P (Bray 1).

*Soil analyses results from various localities*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Locality** | **pH (KCl)** | **P (mg/kg)** | **K (mg/kg)** | **Ca (mg/kg)** | **Mg (mg/kg)** | **Na (mg/kg)** | **S (mg/kg** | **Exch. acid**  **(cmol/kg)** |
| Bultfontein | 5.2 | 35.7 | 144.4 | 215 | 53.8 | 0.9 | 7.79 | 0.00 |
| Wesselsbron (LO) | 4.5 | 36.3 | 135.5 | 137 | 45.1 | 2.6 | 2.15 | 0.16 |
| Bothaville | 4.9 | 21.6 | 138.8 | 204 | 75.9 | 1.4 | 8.98 | 0.00 |
| Wesselsbron (NM) | 5.6 | 36.6 | 82.6 | 188 | 53.3 | 0.0 | 0.00 | 0.00 |
| Petrus Steyn | 4.5 | 26 | 301 | 320 | 80.2 | 9.1 | 8.91 | 0.00 |
| Arlington v Tonder | 4.6 | 25.6 | 473.4 | 363 | 165.6 | 14.3 | 21.87 | 0.26 |
| Arlington Bertou | 4.5 | 26.6 | 231.9 | 333 | 82.8 | 9.4 | 9.31 | 0.27 |
| Cocolaan IG | 4.9 | 22.7 | 140 | 200 | 74.8 | 1.3 | 8.98 | 0.00 |
| Clocolaan O | 5 | 52.3 | 130.0 | 398 | 95.3 | 10.3 | 2.32 | 0.00 |
| Clarens | 4.7 | 17.7 | 167.7 | 371 | 71.7 | 3.1 | 21.16 | 0.26 |
| Ficksburg | 4.0 | 25.2 | 89.2 | 310 | 60.4 | 10.2 | 18.11 | 0.90 |
| Reitz | 5.8 | 32.8 | 179.0 | 417 | 67.4 | 3.4 | 2.52 | 0.00 |
| Harrismith | 4.8 | 48.7 | 173.3 | 611 | 106.4 | 4.8 | 44.38 | 0.00 |
| Bethlehem | 4.9 | 22.8 | 141 | 211 | 75 | 1.35 | 8.89 | 0.00 |

1. **ENTRIES FOR THE 2016 PROGRAM**

Three institutions, namely ARC-SGI, Sensako and Pannar provided 22 entries for the 2016 program. Two new entries, namely Wedzi and Kougas were included.

*Entries for the 2016 program*

|  |  |  |  |
| --- | --- | --- | --- |
| **Origin** | **Entry** | **Type** | **Released** |
| Small Grain Institute | Elands | Pure line | 1998 |
| Gariep | Pure line | Before 1996 |
| Koonap | Pure line | 2010 |
| Kougas \* | Pure Line | 2015 |
| Matlabas | Pure line | 2004 |
| Senqu | Pure line | 2010 |
| Wedzi \* | Pure Line | 2015 |
| Pannar | PAN 3111 | Pure line | 2012 |
| PAN 3118 | Pure line | 2002 |
| PAN 3120 | Pure line | 2003 |
| PAN 3161 | Pure line | 2007 |
| PAN 3195 | Pure line | 2010 |
| PAN 3198 | Pure line | 2010 |
| PAN 3368 | Pure line | 2007 |
| PAN 3379 | Pure line | 2008 |
| Sensako | SST 3149 | Pure line | 2014 |
| SST 316 | Pure line | 2011 |
| SST 317 | Pure line | 2011 |
| SST 347 | Pure line | 2004 |
| SST 356 | Pure line | 2005 |
| SST 374 | Pure line | 2008 |
| SST 387 | Pure line | 2008 |

\*New entries for the 2016 program

*Seed treatment and germination percentage*

The NCEP protocol stipulates that seed for the field trials must either be untreated, or treated with Vitavax. In the table below the seed treatment of each cultivar is indicated as it was received.

All untreated seed batches were treated with Vitavax in order to standardise this procedure across cultivars.

The germination percentage of all the cultivars is also indicated in the table. All seed batches had an excellent germination percentage of above 89%.

|  |  |  |  |
| --- | --- | --- | --- |
| **Origin** | **Entry** | **Seed treatment** | **Germination (%)** |
| Small Grain Institute | Elands | Untreated | 98% |
| Gariep | Untreated | 92% |
| Koonap | Untreated | 93% |
| Kougas | Untreated | 97% |
| Matlabas | Untreated | 90% |
| Senqu | Untreated | 98% |
| Wedzi | Untreated | 98% |
| Pannar | PAN 3111 | Vitavax | 89% |
| PAN 3118 | Vitavax | 98% |
| PAN 3120 | Vitavax | 93% |
| PAN 3161 | Vitavax | 94% |
| PAN 3195 | Vitavax | 97% |
| PAN 3198 | Vitavax | 95% |
| PAN 3368 | Vitavax | 94% |
| PAN 3379 | Vitavax | 98% |
| Sensako | SST 3149 | Untreated | 97% |
| SST 316 | Untreated | 94% |
| SST 317 | Untreated | 96% |
| SST 347 | Untreated | 97% |
| SST 356 | Untreated | 96% |
| SST 374 | Untreated | 94% |
| SST 387 | Untreated | 94% |

The seed was tested for germination percentage and impurities in line with the protocol. The thousand kernel mass (TKM) was used to realise equal plant population within the trials. The TKM values for the different cultivars are shown in the table below. The TKM values above were used to calcuier the amount of seed per plot to obtain the required seeding densities.

*Thousand Kernel mass (g/1000 kernels) and seeding densities (plants/m2)for all entries*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Cultivar** | **TKM** | **Earlier planting** | | | **Later planting** | | |
| **North Western Free State** | **Central Free State** | **Eastern Free State** | **North Western Free State** | **Central Free State** | **Eastern Free State** |
| Elands | 39.5 | 70 | 50 | 70 | 80 | 60 | 75 |
| Gariep | 32.0 | 70 | 50 | 70 | 80 | 60 | 75 |
| Koonap | 42.2 | 70 | 50 | 70 | 80 | 60 | 75 |
| Kougas | 31.6 | 70 | 50 | 70 | 80 | 60 | 75 |
| Matlabas | 41.8 | 70 | 50 | 70 | 80 | 60 | 75 |
| Senqu | 39.7 | 70 | 50 | 70 | 80 | 60 | 75 |
| Wedzi | 31.6 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3111 | 42.8 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3118 | 32.4 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3120 | 36.1 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3161 | 45.0 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3195 | 44.3 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3198 | 37.9 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3368 | 41.1 | 70 | 50 | 70 | 80 | 60 | 75 |
| PAN 3379 | 34.8 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 3149 | 29.5 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 316 | 23.5 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 317 | 37.5 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 347 | 36.8 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 356 | 24.8 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 374 | 36.5 | 70 | 50 | 70 | 80 | 60 | 75 |
| SST 387 | 36.6 | 70 | 50 | 70 | 80 | 60 | 75 |

1. **PLANTING AND TRIAL MONITORING**

**Planting and flowering dates**

Two planting dates (earlier and later planting) were chosen to cover the available planting spectrum in each region, also coinciding with the planting time of collaborators to simplify in season crop management.

*Planting dates*

|  |  |  |  |
| --- | --- | --- | --- |
| **Region** | **Locality** | **Planting (earlier/later)** | **Planting date** |
| North Western Free State | Wesselsbron (LO) | Earlier | 26/04/2016 |
| Wesselsbron (LO) | Later | 17/05/2016 |
| Bultfontein | Earlier | 25/04/2016 |
| Bultfontein | Later | 18/05/2016 |
| Bothaville | Earlier | 25/04/2016 |
| Bothaville | Later | 17/05/2016 |
| Wesselsbron (NM) | Earlier | 26/04/2016 |
| Wesselsbron (NM) | Later | 17/05/2016 |
| Central Free State | Arlington (JT) | Earlier | 27/06/2016 |
| Arlington (JT) | Later | 21/07/2016 |
| Arlington (FB) | Earlier | 27/06/2016 |
| Arlington (FB) | Later | 21/07/2016 |
| Petrus Steyn | Earlier | 23/06/2016 |
| Petrus Steyn | Later | 13/07/2016 |
| Clocolan (LO) | Earlier | 22/06/2016 |
| Clocolan (LO) | Later | 14/07/2016 |
| Clocolan (TW) | Earlier | 22/06/2016 |
| Clocolan (TW) | Later | 14/07/2016 |
| Eastern Free State | Bethlehem | Earlier | 29/06/2016 |
| Bethlehem | Later | 15/07/2016 |
| Clarens | Earlier | 09/06/2016 |
| Clarens | Later | 07/07/2016 |
| Danielsrus | Earlier | 23/06/2016 |
| Danielsrus | Later | 13/07/2016 |
| Ficksburg | Earlier | 22/06/2016 |
| Ficksburg | Later | 14/07/2016 |
| Harrismith | Earlier | 28/06/2016 |
| Harrismith | Later | 16/07/2016 |

*Early establishment and flowering dates*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Region** | **Locality** | **Planting (earlier/later)** | **Earlier establishment** | **Flowering dates** |
| North Western Free State | Wesselsbron (LO) | Earlier | Good emergence | 06/10/2016 |
| Wesselsbron (LO) | Later | Good emergence | 10/10/2016 |
| Bultfontein | Earlier | Good emergence | 06/10/2016 |
| Bultfontein | Later | Good emergence | 10/10/2016 |
| Bothaville | Earlier | Good emergence | 06/10/2016 |
| Bothaville | Later | Good emergence | 10/10/2016 |
| Wesselsbron (NM) | Earlier | Good emergence | 06/10/2016 |
| Wesselsbron (NM) | Later | Good emergence | 10/10/2016/ |
| Central Free State | Arlington (JT) | Earlier | Good emergence | 20/10/2016 |
| Arlington (JT) | Later | Good emergence | 26/10/2016 |
| Arlington (FB) | Earlier | Good emergence | 20/10/2016 |
| Arlington (FB) | Later | Good emergence | 26/10/2016 |
| Petrus Steyn | Earlier | Good emergence | 14/10/2016 |
| Petrus Steyn | Later | Good emergence | 26/10/2016 |
| Clocolan (LO) | Earlier | Good emergence | 14/10/2016 |
| Clocolan (LO) | Later | Good emergence | 25/10/2016 |
| Clocolan (TW) | Earlier | Good emergence | 14/10/2016 |
| Clocolan (TW) | Later | Good emergence | 25/10/2016 |
| Eastern Free State | Bethlehem | Earlier | Good emergence | 28/10/2016 |
| Bethlehem | Later | Good emergence | 30/10/2016 |
| Clarens | Earlier | Good emergence | 30/10/2016 |
| Clarens | Later | Good emergence | 02/11/2016 |
| Danielsrus | Earlier | Good emergence | 30/10/2016 |
| Danielsrus | Later | Good emergence | 02/11/2016 |
| Ficksburg | Earlier | Good emergence | 28/10/2016 |
| Ficksburg | Later | Good emergence | 09/11/2016 |
| Harrismith | Earlier | Good emergence | 30/10/2016 |
| Harrismith | Later | Good emergence | 08/11/2016 |

**Experimental design and trial layout**

The cultivar adaptation trials were planted according to a randomized block design with four replicates. The trial plots consisted of 5 rows of 5 m length each and an inter-row spacing of 45 cm. Seeding density (kg seed/ha) varied between cultivars dependant on relative thousand-kernel weight of seed batches, and seeding density recommendations for cultivars as supplied by respective owners were taken into consideration.

**Fertiliser application programs**

Fertilisation was optimised (according to farmer practice) including the use of soil analyses, and adjustments were made within the growing season where needed. The main aim is to optimise the production environment so that accurate relative cultivar responses can be measured. All trials were fertilised with a 7:2:1 (30) mixture. Fertiliser was applied according to the long-term yield potential of the area and recommendations as included in the Production Guidelines. The fertiliser program for 2016 is summarized in Table 5. All the fertilizer was applied at planting and there were no top dressings.

Fertilising program for the 2016 season in the summer rainfall area

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Locality** | **Fertiliser at planting (kg/ha) 7:2:1 (30)** | **Top dressing fertiliser (kg/ha)** | **Total N** | **Total P** | **Total K** |
| **North Western Free State** | 240 | 0 | 50 | 25 | 12.3 |
| **Central Free State** | 170 | 0 | 35 | 18 | 8.6 |
| **Eastern Free State** | 240 | 0 | 50 | 25 | 12.3 |

**Climatic conditions during 2016**

Rainfall and temperature, and in particular the distribution through the growing season is important for successful wheat production in the summer rainfall areas. The figures below show the rainfall for the 2016 season in comparison to the long-term occurrence for the localities.

Good rains occurred in the months prior to planting time in all the regions. This lead to optimum conditions during the first stages of development. Towards the end of July approximately 60 mm of “out of season” rain was recorded over the whole production area of the Free State. This winter downfall ensured that adequate soil moisture was available for the coming months. As was the case in the recent past, spring rains stayed away for the months of August, September and the first half of October. These dry months changed the potential of the crop from “excellent” to the “average” yields reported in the results for 2016.

**Weed, disease and insect management**

The objective of the NCEP is to have a weed, pest and disease free trials so that these do not compromise the yield of the entries in the trial. Pesticides were applied whenever necessary to keep the trials weed, insect and disease free. Since trials were planted inside the wheat crops of co-workers, much of the weed, pest and disease control was carried out by the co-workers. In addition, Bumper 250 EC was sprayed at a rate of 800 ml/ha on all trials against KB. There were no major problems with pests, weeds or diseases on all trials.

1. **HARVESTING AND OUTCOMES**

Many trials were severely affected by drought and not harvested. The table below summarises harvesting dates and outcomes of the trials.

*Harvesting dates and trial outcomes*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Region** | **Locality** | **Planting time** | **Harvesting date** | **Outcome of trial** |
| North Western Free State | Wesselsbron (LO) | Earlier | 21/11/2016 | Included |
| Wesselsbron (LO) | Later | 21/11/2016 | Included |
| Bultfontein | Earlier | 22/11/2016 | Included |
| Bultfontein | Later | 22/11/2016 | Included |
| Bothaville | Earlier | 21/11/2016 | Included |
| Bothaville | Later | 21/11/2016 | Included |
| Wesselsbron (NM) | Earlier | ---- | Written off: drought |
| Wesselsbron (NM) | Later | ---- | Written off: drought |
| Central Free State | Arlington (JT) | Earlier | 04/01/2017 | Included |
| Arlington (JT) | Later | 04/01/2017 | Included |
| Arlington (FB) | Earlier | --- | Written off: hail |
| Arlington (FB) | Later | --- | Written off: hail |
| Petrus Steyn | Earlier | 16/01/2017 | Included |
| Petrus Steyn | Later | 16/01/2017 | Included |
| Clocolan (LO) | Earlier | 21/12/2016 | Written off: technical error |
| Clocolan (LO) | Later | 21/12/2016 | Included |
| Clocolan (TW) | Earlier | 29/12/2016 | Included |
| Clocolan (TW) | Later | 29/12/2016 | Included |
| Eastern Free State | Bethlehem | Earlier | \_ | Written off: bird damage |
| Bethlehem | Later | \_ | Written off: bird damage |
| Clarens | Earlier | 19/12/2016 | Included |
| Clarens | Later | 11/01/2017 | Included |
| Danielsrus | Earlier | 09/01/2017 | Included |
| Danielsrus | Later | 09/01/2017 | Included |
| Ficksburg | Earlier | 21/12/2016 | Included |
| Ficksburg | Later | 21/12/2016 | Included |
| Harrismith | Earlier | 17/01/2017 | Written off: hail |
| Harrismith | Later | 17/01/2017 | Written off: hail |

# STATISTICAL ANALYSIS

Grain yield and quality measurements (hectolitre mass, protein content and falling number) for entries in the cultivar trials in the respective regions, AMMI analysis for genotype, cultivar x environment interaction (G x E), and combined analyses per region and over years are presented in included tables. The empirical ranking of the entries is indicated in the tables, although this does not necessarily mean that the cultivars differ significantly. For this purpose the LSD’s (P ≤ 0.05) for a significant effect are also included.

The AMMI-model (Additive Main Effects and Multiplicative Interaction) follows a unitary approach by integrating the analysis of variance of the main effects with the G x E interaction principal components analysis. The power of this statistical tool (AMMI) lies in the biplot whereby environments and genotypes showing the same reaction patterns are grouped. From the AMMI analysis, the four highest ranked cultivars for the respective analysis were also calculated. By studying the biplot, certain patterns attributed to the main effects (G and E), as well as the interaction (G x E) can be seen. The biplot gives an indication of average yields as well as the yield stability of the cultivar. The mean additive main effects of a cultivar or environment are stipulated on the X-axis while the multiplicative interaction (G x E) is described on the Y-axis as an IPCA-1 score and can be a negative or a positive value. An IPCA-1 score of zero (horizontal line) implicates that a cultivar or environment shows little interaction and therefore a stable yield response.

# SUMMARY OF RESULTS

**Eastern Free State**

***Earlier plantings***

For the earlier planting in 2016, an average yield of 3.26 ton/ha was obtained, and this was much higher than in 2015 (2.23 ton/ha). PAN 3111 had the highest yield of 3.76 ton/ha, followed by Matlabas and SST 387 (3.67 ton/ha) and SST 356 (3.65 ton/ha). Yields of the top seven cultivars were not significantly different from each other.

The top four cultivars selected by the AMMI analysis for the different localities are shown in the table below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting) estimates 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Locality** | **Yield (ton/ha)** | **Score** | **Cultivars** | | | |
| **Clarens** | 2.87 | 0.5395 | PAN3118 | PAN3120 | SST387 | Matlabas |
| **Danielsrus** | 2.26 | -1.1488 | SST3149 | SST347 | SST317 | SST387 |
| **Ficksburg** | 4.66 | 0.6093 | PAN3111 | SST356 | SST316 | PAN3118 |

The average hectolitre mass in 2016 was 80.58 kg/hl. All cultivars graded above 79 kg/hl.

The average protein content for the earlier planting in the Eastern Free State province was excellent at 14.70%. All cultivars had protein values higher than 13%.

The average falling numbers were 266 seconds, which reflects the rainy conditions before and during harvesting.

***Later plantings***

For the later planting, the average yield of 4.14 ton/ha was significantly higher than that of the earlier planting. SST 374 had the highest yield of 4.81 ton/ha, followed by Wedzi (a new entry) with 4.67 ton/ha, SST 317 (4.49 ton/ha) and SST 316 (4.48 ton/ha).

The top four cultivars selected by the AMMI analysis for the different localities are shown in the table below.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting) estimates 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Locality** | **Yield (ton/ha)** | **Score** | **Cultivars** | | | |
| **Clarens** | 3.14 | -1.1328 | SST356 | SST 374 | SST316 | Wedzi |
| **Danielsrus** | 4.15 | 0.5164 | SST317 | SST387 | Wedzi | SST356 |
| **Ficksburg** | 5.12 | 0.6164 | Wedzi | SST356 | PAN3111 | SST387 |

An average hectolitre mass of 78.09 kg/hl was obtained in the later planting. All cultivars graded above 77 kg/hl except for PAN 3111 and PAN 3161.

The mean protein content value was 14.76%. All cultivars had protein content values of above 13%.

The average falling numbers was low at 267 seconds, similar to the earlier planting, due to the occurrence of rain during harvesting.

**Central Free State**

***Earlier plantings***

The 2016 production season turned out to be more favourable than over the recent past. An average yield of 2.49 ton/ha was realised in the combined analyses. Matlabas had the highest yield (3.17 ton/ha), followed by Wedzi (2.88 ton/ha), Kougas (2.78 ton/ha) and SST 387 (2.77 ton/ha). The yield of Matlabas was significantly higher than those of the other entries.

The top four cultivars selected by the AMMI analysis for the different localities are shown in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earlier planting) estimates 2016** | | | | | | | |
|  |  |  |  |  |  | |  |
| **Locality** | **Yield (ton/ha)** | **Score** | **Cultivars** | | | | |
| **Arlington (JJ)** | 3.17 | 0.2734 | Matlabas | Wedzi | SST317 | PAN3111 | |
| **Clocolan (TW)** | 2.24 | -1.0502 | Kougas | PAN3161 | PAN3120 | PAN3195 | |
| **Petrus Steyn** | 2.06 | 0.7768 | SST347 | Matlabas | SST3149 | SST387 | |

The average hectolitre mass of the earlier planting was 78.18 kg/hl, and all cultivars, except SST 3149 and PAN 3368, had values of above 77 kg/hl.

The protein content was high, at 14.22%, and all cultivars showed values of above 13%.

Less problems were experienced with falling numbers in the Central Free State than in the Eastern Free State, with an average value of 308 seconds. All cultivars had values of above 220 seconds.

***Later plantings***

The average yield in the combined analyses for the later planting dates was 2.60 ton/ha, similar to the earlier planting. PAN 3161 had the highest yield (3.08 ton/ha), followed by PAN 3195 and SST 356 (2.91 ton/ha). The yields of these three cultivars did not differ significantly.

The top four cultivars selected by the AMMI analysis for the different localities are shown in the table below:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting) estimates 2016** | | | | | | | |
|  |  |  |  |  |  | |  |
| **Locality** | **Yield (ton/ha)** | **Score** | **Cultivars** | | | | |
| **Arlington JJ** | 2.14 | -1.4920 | PAN3161 | Koonap | Elands | PAN3379 | |
| **Clocolan (LO)** | 2.18 | 0.2875 | SST356 | PAN3161 | PAN3195 | SST387 | |
| **Clocolan (TW)** | 3.51 | 0.5847 | SST356 | SST387 | Senqu | PAN3195 | |
| **Petrus Steyn** | 2.59 | 0.6198 | SST316 | SST317 | PAN3161 | SST356 | |

The combined hectolitre mass value for the later planting was 75.98 kg/hl, reflecting the rainfall experienced during harvesting time.

Protien content values were high, at 14.82%, and all cultivars had values of above 14%

Falling number values were acceptable, with an average of 351 seconds for the combined data.

**North Western Free State**

***Earlier plantings***

An average yield of 2.55 ton/ha was obtained for the earlier planting in 2016, and this was lower than in 2015 (3.04). PAN 3118 (3.70 ton/ha) had the highest yield, followed by Matlabas (3.37 ton/ha) and SST 347 (3.19 ton/ha).

The top four cultivars selected by the AMMI analysis for the different localities are shown in the table below.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting) estimates 2016** | | | | | | | |
|  |  |  |  |  |  | |  |
| **Locality** | **Yield (ton/ha)** | **Score** | **Cultivars** | | | | |
| Bothaville | 1.47 | 0.5212 | PAN3118 | SST387 | Matlabas | PAN3120 | |
| Bultfontein | 3.04 | 0.8918 | PAN3118 | PAN3161 | SST356 | Matlabas | |
| Wesselsbron | 3.13 | -1.4130 | PAN3118 | SST347 | Matlabas | PAN3120 | |

The average hectolitre mass for earlier planted cultivars in 2016 (75.71 kg/hl) was lower than that of 2015 (77.23 kg/hl).

The average protein content for the earlier planting in the North Western Free State province was high at 15.65%. All cultivars had protein values higher than 14%.

The average falling numbers were very high at 306 seconds and all cultivars had a falling number higher than minimum requirement of 220 seconds.

***Later plantings***

The average yield of 2.28 ton/ha for the later planting was slighly lower than that of the earlier planting. Matlabas and PAN 3118 had the highest yield of 2.94 ton/ha, followed by SST 387 (2.68 ton/ha) and Senqu (2.49 ton/ha).

The top four cultivars selected by the AMMI analysis for the different localities are shown in the table below.

.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting) estimates 2016** | | | | | | | |
|  |  |  |  |  |  | |  |
| **Locality** | **Yield (ton/ha)** | **Score** | **Cultivars** | | | | |
| Bothaville | 1.76 | -0.4935 | Elands | Matlabas | PAN3118 | Senqu | |
| Bultfontein | 2.07 | -0.7010 | Matlabas | PAN3118 | PAN3161 | PAN3379 | |
| Wesselsbron | 3.01 | 1.1945 | SST387 | PAN3118 | Matlabas | SST347 | |

A mean hectolitre mass of 75.16 kg/hl was obtained. This was significantly lower than the 78.09 kg/hl during the previoes season.

The later planting also had excellent average protein content of 15.74. All cultivars had protein content values of above 14%.

The average falling numbers was high, at 325 seconds. All cultivars graded above the minimum requirement of 220 seconds.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average yield (ton/ha) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 2.86 | 16 | 1.94 | 19 | 2.85 | 17 | 2.24 | 16 | 2.47 | 16 | 2.55 | 17 | 2.40 | 17 |
| **Gariep** | 2.99 | 15 | 2.23 | 13 | 3.09 | 14 | 1.84 | 17 | 2.54 | 14 | 2.77 | 13 | 2.61 | 14 |
| **Koonap** | 2.53 | 21 | 2.05 | 16 | 2.67 | 19 | 1.70 | 19 | 2.24 | 18 | 2.42 | 18 | 2.29 | 19 |
| **Kougas** | 2.82 | 18 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 3.67 | 2 | 2.29 | 7 | 3.80 | 4 | 3.74 | 1 | 3.38 | 1 | 3.26 | 3 | 2.98 | 4 |
| **PAN 3111** | 3.76 | 1 | 2.29 | 8 | 3.90 | 2 | 3.54 | 2 | 3.37 | 2 | 3.32 | 1 | 3.02 | 2 |
| **PAN 3118** | 3.35 | 12 | 2.44 | 1 | 3.30 | 11 | 2.66 | 10 | 2.94 | 10 | 3.03 | 9 | 2.90 | 8 |
| **PAN 3120** | 3.55 | 7 | 2.32 | 6 | 3.43 | 10 | 2.66 | 11 | 2.99 | 9 | 3.10 | 8 | 2.93 | 6 |
| **PAN 3161** | 3.43 | 10 | 2.33 | 5 | 3.26 | 12 | 2.57 | 12 | 2.90 | 11 | 3.01 | 11 | 2.88 | 9 |
| **PAN 3195** | 3.59 | 5 | 2.39 | 4 | 3.81 | 3 | 3.00 | 9 | 3.20 | 5 | 3.26 | 2 | 2.99 | 3 |
| **PAN 3198** | 3.23 | 13 | 2.40 | 3 | 2.83 | 18 | 2.27 | 15 | 2.68 | 12 | 2.82 | 12 | 2.81 | 12 |
| **PAN 3368** | 2.78 | 19 | 2.08 | 14 | 3.04 | 16 | 2.51 | 13 | 2.60 | 13 | 2.63 | 15 | 2.43 | 16 |
| **PAN 3379** | 2.85 | 17 | 2.05 | 15 | 3.18 | 13 | 1.73 | 18 | 2.45 | 17 | 2.69 | 14 | 2.45 | 15 |
| **Senqu** | 2.66 | 20 | 2.01 | 18 | 3.06 | 15 | 2.30 | 14 | 2.51 | 15 | 2.58 | 16 | 2.34 | 18 |
| **SST 3149** | 3.44 | 9 | 2.28 | 9 |  |  |  |  |  |  |  |  | 2.86 | 10 |
| **SST 316** | 3.56 | 6 | 2.25 | 11 | 3.57 | 6 | 3.23 | 5 | 3.15 | 7 | 3.13 | 7 | 2.91 | 7 |
| **SST 317** | 3.53 | 8 | 2.03 | 17 | 3.52 | 7 | 3.28 | 4 | 3.09 | 8 | 3.02 | 10 | 2.78 | 13 |
| **SST 347** | 3.38 | 11 | 2.27 | 10 | 3.93 | 1 | 3.21 | 7 | 3.20 | 6 | 3.19 | 5 | 2.82 | 11 |
| **SST 356** | 3.65 | 4 | 2.24 | 12 | 3.65 | 5 | 3.33 | 3 | 3.22 | 3 | 3.18 | 6 | 2.95 | 5 |
| **SST 387** | 3.67 | 3 | 2.42 | 2 | 3.49 | 8 | 3.22 | 6 | 3.20 | 4 | 3.19 | 4 | 3.05 | 1 |
| **SST 398** |  |  |  |  | 3.49 | 9 | 3.01 | 8 |  |  |  |  |  |  |
| **Wedzi** | 3.20 | 14 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Average** | **3.26** |  | **2.23** |  | **3.36** |  | **2.74** |  | **2.90** |  | **2.95** |  | **2.76** |  |
| **LSDt(0,05)** | **0.21** |  | **0.16** |  | **0.14** |  | **0.35** |  | **0.11** |  | **0.10** |  | **0.13** |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the yield of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 331.6 | 1.32 |  |  |
| **Treatments** | | 62 | 319.2 | 5.15 | 77.85 | <0,001 |
| **Genotypes** | | 20 | 35.2 | 1.76 | 26.58 | <0,001 |
| **Environments** | | 2 | 262.5 | 131.27 | 2567.66 | <0,001 |
| **Block** |  | 9 | 0.5 | 0.05 | 0.77 | 0.6415 |
| **Interactions** | | 40 | 21.5 | 0.54 | 8.13 | <0,001 |
| **IPCA** |  | 21 | 15.7 | 0.75 | 11.32 | <0,001 |
| **IPCA** |  | 19 | 5.8 | 0.30 | 4.61 | <0,001 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 180 | 11.9 | 0.07 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Elands | 2.86 | 16 | 0.06924 |  |  |
| 2 | Gariep | 2.99 | 15 | 0.16335 |  |  |
| 3 | Koonap | 2.53 | 21 | 0.38278 |  |  |
| 4 | Kougas | 2.82 | 18 | 0.08404 |  |  |
| 5 | Matlabas | 3.67 | 2 | -0.17668 |  |  |
| 6 | PAN 3111 | 3.76 | 1 | 0.18173 |  |  |
| 7 | PAN 3118 | 3.35 | 12 | 0.59928 |  |  |
| 8 | PAN 3120 | 3.55 | 7 | -0.09919 |  |  |
| 9 | PAN 3161 | 3.43 | 10 | 0.18844 |  |  |
| 10 | PAN 3195 | 3.59 | 5 | -0.04301 |  |  |
| 11 | PAN 3198 | 3.23 | 13 | 0.15043 |  |  |
| 12 | PAN 3368 | 2.78 | 19 | -0.03530 |  |  |
| 13 | PAN 3379 | 2.85 | 17 | 0.39386 |  |  |
| 14 | Senqu | 2.66 | 20 | -0.11940 |  |  |
| 15 | SST 3149 | 3.44 | 9 | -0.73292 |  |  |
| 16 | SST 316 | 3.56 | 6 | 0.06160 |  |  |
| 17 | SST 317 | 3.53 | 8 | -0.40282 |  |  |
| 18 | SST 347 | 3.38 | 11 | -0.58907 |  |  |
| 19 | SST 356 | 3.65 | 4 | 0.10005 |  |  |
| 20 | SST 387 | 3.67 | 3 | -0.25768 |  |  |
| 21 | Wedzi | 3.20 | 14 | 0.08126 |  |  |
| **Average** | | **3.26** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.90** |  |  |  |  |
| **LSDt(0.05)** | | **0.21** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Clarens | 2.87 | 2 | 0.53952 |  |  |
| 2 | Danielsrus | 2.26 | 3 | -1.14883 |  |  |
| 3 | Ficksburg | 4.66 | 1 | 0.60931 |  |  |
| **Average** | | **3.26** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.90** |  |  |  |  |
| **LSDt(0.05)** | | **0.08** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average hectolitre mass (kg/hl) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 80.24 | 14 | 79.77 | 5 | 78.48 | 11 | 76.34 | 13 | 78.71 | 8 | 79.50 | 7 | 80.01 | 7 |
| **Gariep** | 81.60 | 2 | 79.16 | 9 | 79.84 | 2 | 77.07 | 8 | 79.42 | 4 | 80.20 | 4 | 80.38 | 5 |
| **Koonap** | 80.81 | 6 | 79.44 | 7 | 79.05 | 4 | 77.95 | 2 | 79.31 | 5 | 79.77 | 6 | 80.13 | 6 |
| **Kougas** | 80.66 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 80.07 | 17 | 77.40 | 17 | 76.62 | 17 | 77.71 | 3 | 77.95 | 14 | 78.03 | 18 | 78.74 | 17 |
| **PAN 3111** | 80.61 | 10 | 78.88 | 12 | 78.71 | 6 | 77.25 | 6 | 78.86 | 7 | 79.40 | 8 | 79.75 | 8 |
| **PAN 3118** | 81.43 | 4 | 79.62 | 6 | 78.59 | 9 | 76.63 | 12 | 79.07 | 6 | 79.88 | 5 | 80.53 | 4 |
| **PAN 3120** | 81.44 | 3 | 81.46 | 2 | 79.07 | 3 | 76.98 | 9 | 79.74 | 2 | 80.66 | 2 | 81.45 | 2 |
| **PAN 3161** | 79.67 | 19 | 79.21 | 8 | 76.45 | 19 | 74.14 | 19 | 77.37 | 18 | 78.44 | 16 | 79.44 | 12 |
| **PAN 3195** | 80.41 | 12 | 78.17 | 14 | 78.04 | 14 | 75.97 | 14 | 78.15 | 12 | 78.87 | 10 | 79.29 | 13 |
| **PAN 3198** | 79.40 | 20 | 79.81 | 4 | 76.61 | 18 | 75.92 | 15 | 77.94 | 15 | 78.61 | 15 | 79.61 | 9 |
| **PAN 3368** | 79.40 | 20 | 78.97 | 10 | 77.72 | 16 | 77.22 | 7 | 78.33 | 11 | 78.70 | 13 | 79.19 | 14 |
| **PAN 3379** | 81.18 | 5 | 81.59 | 1 | 78.54 | 10 | 76.81 | 10 | 79.53 | 3 | 80.44 | 3 | 81.39 | 3 |
| **Senqu** | 80.11 | 16 | 78.96 | 11 | 78.16 | 13 | 76.66 | 11 | 78.47 | 10 | 79.08 | 9 | 79.54 | 10 |
| **SST 3149** | 80.58 | 11 | 78.36 | 13 |  |  |  |  |  |  |  |  | 79.47 | 11 |
| **SST 316** | 80.12 | 15 | 77.16 | 18 | 78.63 | 8 | 75.73 | 17 | 77.91 | 16 | 78.64 | 14 | 78.64 | 18 |
| **SST 317** | 80.40 | 13 | 77.48 | 16 | 78.66 | 7 | 77.70 | 4 | 78.56 | 9 | 78.85 | 11 | 78.94 | 16 |
| **SST 347** | 82.87 | 1 | 80.58 | 3 | 80.73 | 1 | 80.06 | 1 | 81.06 | 1 | 81.39 | 1 | 81.73 | 1 |
| **SST 356** | 79.78 | 18 | 76.44 | 19 | 78.44 | 12 | 75.16 | 18 | 77.46 | 17 | 78.22 | 17 | 78.11 | 19 |
| **SST 387** | 80.77 | 7 | 77.58 | 15 | 77.86 | 15 | 75.92 | 15 | 78.03 | 13 | 78.74 | 12 | 79.18 | 15 |
| **SST 398** |  |  |  |  | 79.02 | 5 | 77.28 | 5 |  |  |  |  |  |  |
| **Wedzi** | 80.63 | 9 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Average** | **80.58** |  | **78.95** |  | **78.38** |  | **76.76** |  | **78.66** |  | **79.30** |  | **79.76** |  |
| **LSDt(0,05)** | **0.41** |  | **0.75** |  | **0.80** |  | **0.86** |  | **0.38** |  | **0.41** |  | **0.42** |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the hectolitre mass of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 1999.6 | 8.0 |  |  |
| **Treatments** | | 62 | 1950.6 | 31.5 | 139.28 | <0,001 |
| **Genotypes** | | 20 | 159.7 | 8.0 | 35.35 | <0,001 |
| **Environments** | | 2 | 1698.9 | 849.5 | 915.79 | <0,001 |
| **Block** |  | 9 | 8.3 | 0.9 | 4.11 | <0,001 |
| **Interactions** | | 40 | 92.0 | 2.3 | 10.18 | <0,001 |
| **IPCA** |  | 21 | 77.0 | 3.7 | 16.24 | <0,001 |
| **IPCA** |  | 19 | 14.9 | 0.8 | 3.48 | <0,001 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 180 | 40.7 | 0.2 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Elands | 80.24 | 14 | -0.61328 |  |  |
| 2 | Gariep | 81.60 | 2 | -0.19677 |  |  |
| 3 | Koonap | 80.81 | 6 | 0.54000 |  |  |
| 4 | Kougas | 80.66 | 8 | -0.39287 |  |  |
| 5 | Matlabas | 80.07 | 17 | 0.63835 |  |  |
| 6 | PAN 3111 | 80.61 | 10 | 0.18022 |  |  |
| 7 | PAN 3118 | 81.43 | 4 | 0.18687 |  |  |
| 8 | PAN 3120 | 81.44 | 3 | 0.56436 |  |  |
| 9 | PAN 3161 | 79.67 | 19 | 0.03713 |  |  |
| 10 | PAN 3195 | 80.41 | 12 | 0.03542 |  |  |
| 11 | PAN 3198 | 79.40 | 20 | -0.69852 |  |  |
| 12 | PAN 3368 | 79.40 | 20 | 0.17901 |  |  |
| 13 | PAN 3379 | 81.18 | 5 | 0.02472 |  |  |
| 14 | Senqu | 80.11 | 16 | -0.18947 |  |  |
| 15 | SST 3149 | 80.58 | 11 | 0.41120 |  |  |
| 16 | SST 316 | 80.12 | 15 | -0.62515 |  |  |
| 17 | SST 317 | 80.40 | 13 | -0.15611 |  |  |
| 18 | SST 347 | 82.87 | 1 | 0.62420 |  |  |
| 19 | SST 356 | 79.78 | 18 | -0.95010 |  |  |
| 20 | SST 387 | 80.77 | 7 | 0.53094 |  |  |
| 21 | Wedzi | 80.63 | 9 | -0.13015 |  |  |
| **Average** | | **80.58** |  |  |  |  |
| **Coefficient of variation (%)** | | **0.60** |  |  |  |  |
| **LSDt(0.05)** | | **0.41** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Clarens | 81.40 | 2 | 1.68630 |  |  |
| 2 | Danielsrus | 77.07 | 3 | -1.09146 |  |  |
| 3 | Ficksburg | 83.27 | 1 | -0.59484 |  |  |
| **Average** | | **80.58** |  |  |  |  |
| **Coefficient of variation (%)** | | **0.60** |  |  |  |  |
| **LSDt(0.05)** | | **0.16** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average protein content (%) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 14.89 | 12 | 14.91 | 10 | 14.89 | 4 | 16.09 | 6 | 15.20 | 6 | 14.90 | 6 | 14.90 | 11 |
| **Gariep** | 15.08 | 11 | 14.74 | 16 | 14.68 | 5 | 16.58 | 4 | 15.27 | 5 | 14.83 | 8 | 14.91 | 10 |
| **Koonap** | 15.56 | 2 | 15.80 | 1 | 15.65 | 1 | 16.74 | 2 | 15.94 | 1 | 15.67 | 1 | 15.68 | 1 |
| **Kougas** | 15.32 | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 14.55 | 13 | 15.59 | 2 | 12.75 | 17 | 14.99 | 13 | 14.47 | 10 | 14.30 | 10 | 15.07 | 8 |
| **PAN 3111** | 13.94 | 17 | 14.43 | 18 | 12.67 | 18 | 14.46 | 18 | 13.88 | 18 | 13.68 | 16 | 14.19 | 16 |
| **PAN 3118** | 15.16 | 9 | 15.21 | 6 | 14.54 | 6 | 16.62 | 3 | 15.38 | 4 | 14.97 | 4 | 15.19 | 5 |
| **PAN 3120** | 15.44 | 3 | 15.34 | 4 | 13.88 | 10 | 15.76 | 10 | 15.11 | 8 | 14.89 | 7 | 15.39 | 3 |
| **PAN 3161** | 13.99 | 16 | 14.78 | 14 | 13.33 | 12 | 15.17 | 12 | 14.32 | 12 | 14.03 | 12 | 14.39 | 13 |
| **PAN 3195** | 13.54 | 20 | 14.53 | 17 | 12.87 | 16 | 15.34 | 11 | 14.07 | 13 | 13.65 | 18 | 14.04 | 19 |
| **PAN 3198** | 15.34 | 6 | 15.40 | 3 | 14.12 | 8 | 15.87 | 7 | 15.18 | 7 | 14.95 | 5 | 15.37 | 4 |
| **PAN 3368** | 15.98 | 1 | 15.16 | 7 | 15.07 | 3 | 16.76 | 1 | 15.74 | 2 | 15.40 | 2 | 15.57 | 2 |
| **PAN 3379** | 15.12 | 10 | 14.94 | 9 | 13.95 | 9 | 15.79 | 8 | 14.95 | 9 | 14.67 | 9 | 15.03 | 9 |
| **Senqu** | 15.42 | 4 | 14.87 | 12 | 15.20 | 2 | 16.39 | 5 | 15.47 | 3 | 15.16 | 3 | 15.15 | 6 |
| **SST 3149** | 15.35 | 5 | 14.84 | 13 |  |  |  |  |  |  |  |  | 15.10 | 7 |
| **SST 316** | 13.27 | 21 | 15.04 | 8 | 13.23 | 13 | 14.63 | 16 | 14.04 | 14 | 13.85 | 13 | 14.16 | 18 |
| **SST 317** | 14.15 | 15 | 15.29 | 5 | 13.40 | 11 | 14.89 | 14 | 14.43 | 11 | 14.28 | 11 | 14.72 | 12 |
| **SST 347** | 14.17 | 14 | 14.25 | 19 | 12.61 | 19 | 14.71 | 15 | 13.94 | 16 | 13.68 | 17 | 14.21 | 15 |
| **SST 356** | 13.55 | 19 | 14.77 | 15 | 12.97 | 14 | 14.30 | 19 | 13.90 | 17 | 13.76 | 15 | 14.16 | 17 |
| **SST 387** | 13.70 | 18 | 14.88 | 11 | 12.95 | 15 | 14.54 | 17 | 14.02 | 15 | 13.84 | 14 | 14.29 | 14 |
| **SST 398** |  |  |  |  | 14.33 | 7 | 15.78 | 9 |  |  |  |  |  |  |
| **Wedzi** | 15.18 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Average** | **14.70** |  | **14.99** |  | **13.85** |  | **15.55** |  | **14.74** |  | **14.47** |  | **14.82** |  |
| **LSDt(0,05)** | **0.42** |  | **0.62** |  | **0.64** |  | **0.56** |  | **0.30** |  | **0.35** |  | **0.39** |  |

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| **Eastern Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the protein content of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 294.19 | 1.172 |  |  |
| **Treatments** | | 62 | 243.09 | 3.921 | 14.60 | <0,001 |
| **Genotypes** | | 20 | 153.64 | 7.682 | 28.60 | <0,001 |
| **Environments** | | 2 | 43.65 | 21.826 | 71.25 | <0,001 |
| **Block** |  | 9 | 2.76 | 0.306 | 1.14 | 0.3364 |
| **Interactions** | | 40 | 45.80 | 1.145 | 4.26 | <0,001 |
| **IPCA** |  | 21 | 30.01 | 1.429 | 5.32 | <0,001 |
| **IPCA** |  | 19 | 15.79 | 0.831 | 3.09 | <0,001 |
| **Residuals** | | 0 | 0.00 |  |  |  |
| **Error** |  | 180 | 48.34 | 0.269 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | **Elands** | 14.89 | 12 | 0.33887 |  |  |
| 2 | **Gariep** | 15.08 | 11 | -0.44999 |  |  |
| 3 | **Koonap** | 15.56 | 2 | 0.19516 |  |  |
| 4 | **Kougas** | 15.32 | 7 | -0.31003 |  |  |
| 5 | **Matlabas** | 14.55 | 13 | 0.03361 |  |  |
| 6 | **PAN 3111** | 13.94 | 17 | -0.54666 |  |  |
| 7 | **PAN 3118** | 15.16 | 9 | 0.76080 |  |  |
| 8 | **PAN 3120** | 15.44 | 3 | 0.07750 |  |  |
| 9 | **PAN 3161** | 13.99 | 16 | 0.22110 |  |  |
| 10 | **PAN 3195** | 13.54 | 20 | 0.02223 |  |  |
| 11 | **PAN 3198** | 15.34 | 6 | -0.15307 |  |  |
| 12 | **PAN 3368** | 15.98 | 1 | 0.02327 |  |  |
| 13 | **PAN 3379** | 15.12 | 10 | 0.21455 |  |  |
| 14 | **Senqu** | 15.42 | 4 | 0.26132 |  |  |
| 15 | **SST 3149** | 15.35 | 5 | -0.99607 |  |  |
| 16 | **SST 316** | 13.27 | 21 | 0.06832 |  |  |
| 17 | **SST 317** | 14.15 | 15 | -0.20431 |  |  |
| 18 | **SST 347** | 14.17 | 14 | 0.30188 |  |  |
| 19 | **SST 356** | 13.55 | 19 | -0.00703 |  |  |
| 20 | **SST 387** | 13.70 | 18 | -0.11826 |  |  |
| 21 | **Wedzi** | 15.18 | 8 | 0.26682 |  |  |
| **Average** | | **14.70** |  |  |  |  |
| **Coefficient of variation (%)** | | **3.60** |  |  |  |  |
| **LSDt(0.05)** | | **0.42** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Clarens | 15.25 | 1 | -1.32762 |  |  |
| 2 | Danielsrus | 14.61 | 2 | 0.88181 |  |  |
| 3 | Ficksburg | 14.24 | 3 | 0.44582 |  |  |
| **Average** | | **14.70** |  |  |  |  |
| **Coefficient of variation (%)** | | **3.60** |  |  |  |  |
| **LSDt(0.05)** | | **0.16** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average falling number (s) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 265 | 10 | 344 | 8 | 349 | 6 | 237 | 14 | 299 | 11 | 319 | 8 | 305 | 9 |
| **Gariep** | 239 | 20 | 339 | 11 | 345 | 10 | 229 | 15 | 288 | 15 | 307 | 14 | 289 | 16 |
| **Koonap** | 329 | 1 | 342 | 10 | 353 | 4 | 266 | 9 | 323 | 1 | 341 | 1 | 335 | 1 |
| **Kougas** | 248 | 17 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 280 | 5 | 333 | 14 | 335 | 14 | 290 | 1 | 309 | 6 | 316 | 10 | 306 | 8 |
| **PAN 3111** | 260 | 15 | 360 | 2 | 347 | 7 | 279 | 4 | 311 | 5 | 322 | 7 | 310 | 7 |
| **PAN 3118** | 240 | 19 | 342 | 9 | 335 | 13 | 275 | 6 | 298 | 12 | 306 | 16 | 291 | 15 |
| **PAN 3120** | 264 | 12 | 336 | 12 | 328 | 19 | 289 | 3 | 304 | 10 | 310 | 12 | 300 | 11 |
| **PAN 3161** | 241 | 18 | 364 | 1 | 346 | 9 | 205 | 18 | 289 | 14 | 317 | 9 | 303 | 10 |
| **PAN 3195** | 292 | 3 | 331 | 15 | 356 | 2 | 246 | 13 | 306 | 9 | 326 | 4 | 311 | 5 |
| **PAN 3198** | 198 | 21 | 355 | 6 | 331 | 17 | 212 | 17 | 274 | 18 | 294 | 18 | 276 | 19 |
| **PAN 3368** | 269 | 9 | 318 | 17 | 333 | 16 | 251 | 12 | 293 | 13 | 307 | 15 | 294 | 14 |
| **PAN 3379** | 278 | 6 | 355 | 5 | 357 | 1 | 261 | 10 | 313 | 3 | 330 | 3 | 317 | 4 |
| **Senqu** | 273 | 8 | 348 | 7 | 350 | 5 | 257 | 11 | 307 | 7 | 324 | 6 | 311 | 6 |
| **SST 3149** | 265 | 11 | 301 | 19 |  |  |  |  |  |  |  |  | 283 | 18 |
| **SST 316** | 294 | 2 | 358 | 3 | 347 | 8 | 272 | 7 | 318 | 2 | 333 | 2 | 326 | 2 |
| **SST 317** | 264 | 13 | 328 | 16 | 345 | 11 | 290 | 2 | 307 | 8 | 312 | 11 | 296 | 12 |
| **SST 347** | 261 | 14 | 315 | 18 | 329 | 18 | 218 | 16 | 281 | 17 | 302 | 17 | 288 | 17 |
| **SST 356** | 278 | 7 | 357 | 4 | 341 | 12 | 271 | 8 | 312 | 4 | 325 | 5 | 317 | 3 |
| **SST 387** | 254 | 16 | 336 | 13 | 334 | 15 | 200 | 19 | 281 | 16 | 308 | 13 | 295 | 13 |
| **SST 398** |  |  |  |  | 355 | 3 | 277 | 5 |  |  |  |  |  |  |
| **Wedzi** | 292 | 4 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Average** | **266** |  | **340** |  | **343** |  | **254** |  | **301** |  | **317** |  | **303** |  |
| **LSDt(0,05)** | **19.44** |  | **15.92** |  | **15.39** |  | **30.77** |  | **10.30** |  | **9.80** |  | **12.80** |  |

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| **Eastern Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the falling number of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 1272812 | 5071 |  |  |
| **Treatments** | | 62 | 1163640 | 18768 | 32.16 | <0,001 |
| **Genotypes** | | 20 | 168380 | 8419 | 14.42 | <0,001 |
| **Environments** | | 2 | 721987 | 360993 | 790.44 | <0,001 |
| **Block** |  | 9 | 4110 | 457 | 0.78 | 0.6328 |
| **Interactions** | | 40 | 273274 | 6832 | 11.70 | <0,001 |
| **IPCA** |  | 21 | 185777 | 8847 | 15.16 | <0,001 |
| **IPCA** |  | 19 | 87496 | 4605 | 7.89 | <0,001 |
| **Residuals** | | 0 |  | 0 |  |  |
| **Error** |  | 180 | 105062 | 584 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Elands | 265 | 10 | -0.90720 |  |  |
| 2 | Gariep | 239 | 20 | 0.00206 |  |  |
| 3 | Koonap | 329 | 1 | 1.64536 |  |  |
| 4 | Kougas | 248 | 17 | -4.56002 |  |  |
| 5 | Matlabas | 280 | 5 | 3.66076 |  |  |
| 6 | PAN 3111 | 260 | 15 | -0.94512 |  |  |
| 7 | PAN 3118 | 240 | 19 | 1.24570 |  |  |
| 8 | PAN 3120 | 264 | 12 | 1.60011 |  |  |
| 9 | PAN 3161 | 241 | 18 | -3.19065 |  |  |
| 10 | PAN 3195 | 292 | 3 | 3.09570 |  |  |
| 11 | PAN 3198 | 198 | 21 | -10.59223 |  |  |
| 12 | PAN 3368 | 269 | 9 | -1.23816 |  |  |
| 13 | PAN 3379 | 278 | 6 | 0.03529 |  |  |
| 14 | Senqu | 273 | 8 | -0.10474 |  |  |
| 15 | SST 3149 | 265 | 11 | 2.93182 |  |  |
| 16 | SST 316 | 294 | 2 | -0.03003 |  |  |
| 17 | SST 317 | 264 | 13 | 3.35301 |  |  |
| 18 | SST 347 | 261 | 14 | 3.89320 |  |  |
| 19 | SST 356 | 278 | 7 | 0.11462 |  |  |
| 20 | SST 387 | 254 | 16 | 1.45565 |  |  |
| 21 | Wedzi | 292 | 4 | -1.46512 |  |  |
| **Average** | | **266** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.10** |  |  |  |  |
| **LSDt(0.05)** | | **19.44** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Clarens | 298 | 2 | 11.98609 |  |  |
| 2 | Danielsrus | 190 | 3 | -6.06421 |  |  |
| 3 | Ficksburg | 309 | 1 | -5.92188 |  |  |
| **Average** | | **266** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.10** |  |  |  |  |
| **LSDt(0.05)** | | **7.35** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Eastern Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Clarens 2016-06-09** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.59 | fghij | 16 | 7.50 | 80.05 | 18 | 14.88 | 14 | 287 | 15 |
| **Gariep** | 2.38 | ij | 19 | 8.62 | 82.05 | 7 | 16.17 | 5 | 270 | 18 |
| **Koonap** | 2.61 | fghij | 15 | 7.37 | 82.47 | 5 | 15.86 | 6 | 381 | 1 |
| **Kougas** | 2.29 | j | 21 | 4.88 | 80.80 | 14 | 16.35 | 3 | 225 | 20 |
| **Matlabas** | 3.29 | a | 4 | 2.58 | 82.00 | 9 | 14.95 | 12 | 355 | 3 |
| **PAN 3111** | 3.11 | abcd | 9 | 8.75 | 81.57 | 10 | 15.35 | 11 | 280 | 17 |
| **PAN 3118** | 3.38 | a | 1 | 7.89 | 82.57 | 3 | 14.74 | 15 | 287 | 14 |
| **PAN 3120** | 3.31 | a | 2 | 10.50 | 83.20 | 2 | 15.85 | 7 | 316 | 8 |
| **PAN 3161** | 3.12 | abcd | 8 | 13.24 | 80.57 | 16 | 14.23 | 18 | 235 | 19 |
| **PAN 3195** | 3.20 | ab | 6 | 6.96 | 81.32 | 11 | 14.10 | 19 | 361 | 2 |
| **PAN 3198** | 2.69 | efghi | 14 | 12.22 | 78.95 | 21 | 16.19 | 4 | 102 | 21 |
| **PAN 3368** | 2.44 | hij | 18 | 8.24 | 80.47 | 17 | 16.48 | 2 | 286 | 16 |
| **PAN 3379** | 2.74 | efgh | 13 | 7.85 | 82.02 | 8 | 15.47 | 9 | 311 | 10 |
| **Senqu** | 2.54 | ghij | 17 | 6.29 | 80.62 | 15 | 15.60 | 8 | 304 | 12 |
| **SST 3149** | 2.38 | ij | 20 | 8.28 | 82.12 | 6 | 17.14 | 1 | 332 | 6 |
| **SST 316** | 3.14 | abc | 7 | 10.65 | 79.92 | 19 | 13.72 | 21 | 326 | 7 |
| **SST 317** | 2.81 | defg | 11 | 8.30 | 80.95 | 13 | 14.91 | 13 | 336 | 5 |
| **SST 347** | 2.90 | bcdef | 10 | 9.21 | 84.80 | 1 | 14.24 | 17 | 339 | 4 |
| **SST 356** | 3.21 | ab | 5 | 8.36 | 79.07 | 20 | 14.10 | 19 | 312 | 9 |
| **SST 387** | 3.30 | a | 3 | 3.36 | 82.57 | 3 | 14.42 | 16 | 303 | 13 |
| **Wedzi** | 2.75 | efgh | 12 | 11.35 | 81.27 | 12 | 15.46 | 10 | 307 | 11 |
| **Average** | **2.87** |  |  |  | **81.40** |  | **15.25** |  | **298** |  |
| **Coefficient of variation (%)** | **7.84** |  |  |  | **0.65** |  | **2.87** |  | **11.58** |  |
| **LSDt(0,05)** | **0.32** |  |  |  | **0.76** |  | **0.63** |  | **48.18** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Eastern Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Danielsrus 2016-06-23** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 1.77 | hi | 17 | 7.57 | 77.50 | 6 | 14.68 | 10 | 218 | 6 |
| **Gariep** | 1.81 | hi | 15 | 9.11 | 78.12 | 2 | 14.39 | 11 | 146 | 20 |
| **Koonap** | 1.07 | k | 21 | 7.01 | 76.37 | 16 | 15.67 | 3 | 286 | 1 |
| **Kougas** | 1.72 | i | 18 | 7.93 | 77.50 | 6 | 15.24 | 9 | 205 | 9 |
| **Matlabas** | 2.87 | bc | 5 | 7.88 | 76.02 | 20 | 14.07 | 12 | 183 | 11 |
| **PAN 3111** | 2.56 | d | 8 | 5.23 | 76.17 | 19 | 13.91 | 16 | 154 | 15 |
| **PAN 3118** | 1.66 | ij | 19 | 9.06 | 77.77 | 3 | 15.91 | 1 | 151 | 16 |
| **PAN 3120** | 2.65 | cd | 6 | 6.77 | 77.25 | 10 | 15.30 | 8 | 184 | 10 |
| **PAN 3161** | 2.21 | ef | 11 | 8.50 | 76.20 | 18 | 14.05 | 14 | 160 | 14 |
| **PAN 3195** | 2.64 | cd | 7 | 5.73 | 77.02 | 12 | 13.63 | 18 | 181 | 12 |
| **PAN 3198** | 2.06 | fgh | 13 | 8.15 | 76.22 | 17 | 15.50 | 6 | 167 | 13 |
| **PAN 3368** | 1.81 | ghi | 14 | 8.06 | 75.47 | 21 | 15.84 | 2 | 230 | 5 |
| **PAN 3379** | 1.39 | j | 20 | 5.53 | 77.55 | 5 | 15.58 | 5 | 208 | 7 |
| **Senqu** | 1.78 | hi | 16 | 7.80 | 76.87 | 14 | 15.46 | 7 | 205 | 8 |
| **SST 3149** | 3.29 | a | 1 | 7.12 | 76.75 | 15 | 14.07 | 12 | 150 | 19 |
| **SST 316** | 2.49 | de | 10 | 8.84 | 77.45 | 8 | 13.19 | 21 | 261 | 2 |
| **SST 317** | 3.00 | b | 3 | 5.10 | 77.02 | 12 | 13.65 | 17 | 151 | 17 |
| **SST 347** | 3.05 | ab | 2 | 8.65 | 78.95 | 1 | 14.03 | 15 | 137 | 21 |
| **SST 356** | 2.54 | d | 9 | 7.76 | 77.67 | 4 | 13.43 | 20 | 235 | 4 |
| **SST 387** | 2.96 | b | 4 | 5.71 | 77.10 | 11 | 13.57 | 19 | 151 | 17 |
| **Wedzi** | 2.10 | fg | 12 | 11.71 | 77.45 | 8 | 15.66 | 4 | 240 | 3 |
| **Average** | **2.26** |  |  |  | **77.07** |  | **14.61** |  | **190** |  |
| **Coefficient of variation (%)** | **9.42** |  |  |  | **0.65** |  | **3.01** |  | **9.21** |  |
| **LSDt(0,05)** | **0.29** |  |  |  | **0.72** |  | **0.64** |  | **24.65** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Eastern Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Ficksburg 2016-06-22** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 4.21 | l | 17 | 7.23 | 83.18 | 10 | 15.10 | 5 | 292 | 18 |
| **Gariep** | 4.77 | fghi | 10 | 9.07 | 84.63 | 2 | 14.68 | 8 | 300 | 15 |
| **Koonap** | 3.90 | m | 20 | 4.64 | 83.60 | 8 | 15.16 | 3 | 321 | 6 |
| **Kougas** | 4.43 | k | 15 | 5.08 | 83.68 | 7 | 14.36 | 11 | 313 | 8 |
| **Matlabas** | 4.86 | defgh | 8 | 5.48 | 82.18 | 21 | 14.64 | 9 | 301 | 14 |
| **PAN 3111** | 5.61 | a | 1 | 8.65 | 84.08 | 3 | 12.56 | 21 | 345 | 1 |
| **PAN 3118** | 5.02 | cd | 4 | 5.70 | 83.93 | 5 | 14.83 | 7 | 282 | 21 |
| **PAN 3120** | 4.69 | hi | 13 | 6.47 | 83.88 | 6 | 15.15 | 4 | 294 | 17 |
| **PAN 3161** | 4.97 | cde | 5 | 6.44 | 82.25 | 19 | 13.68 | 16 | 330 | 4 |
| **PAN 3195** | 4.95 | cdef | 6 | 6.02 | 82.88 | 14 | 12.90 | 20 | 335 | 2 |
| **PAN 3198** | 4.93 | cdefg | 7 | 7.29 | 83.03 | 12 | 14.33 | 12 | 324 | 5 |
| **PAN 3368** | 4.08 | lm | 19 | 6.64 | 82.25 | 19 | 15.61 | 1 | 291 | 19 |
| **PAN 3379** | 4.41 | k | 16 | 7.11 | 83.98 | 4 | 14.31 | 13 | 316 | 7 |
| **Senqu** | 3.67 | n | 21 | 5.93 | 82.83 | 16 | 15.20 | 2 | 310 | 10 |
| **SST 3149** | 4.66 | ij | 14 | 6.95 | 82.88 | 14 | 14.84 | 6 | 313 | 8 |
| **SST 316** | 5.05 | bc | 3 | 8.14 | 83.00 | 13 | 12.91 | 19 | 297 | 16 |
| **SST 317** | 4.79 | efghi | 9 | 6.44 | 83.23 | 9 | 13.88 | 15 | 305 | 13 |
| **SST 347** | 4.21 | l | 17 | 6.26 | 84.85 | 1 | 14.25 | 14 | 306 | 12 |
| **SST 356** | 5.21 | b | 2 | 6.62 | 82.58 | 18 | 13.13 | 17 | 288 | 20 |
| **SST 387** | 4.76 | ghi | 11 | 6.15 | 82.63 | 17 | 13.11 | 18 | 307 | 11 |
| **Wedzi** | 4.74 | hi | 12 | 8.08 | 83.18 | 10 | 14.42 | 10 | 330 | 3 |
| **Average** | **4.66** |  |  |  | **83.27** |  | **14.24** |  | **309** |  |
| **Coefficient of variation (%)** | **2.79** |  |  |  | **0.31** |  | **2.76** |  | **4.04** |  |
| **LSDt(0,05)** | **0.19** |  |  |  | **0.37** |  | **0.57** |  | **18.09** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting)** | | | | | | | | | | | | | | |
| **Average yield (ton/ha) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 4.39 | 5 | 2.55 | 5 | 3.77 | 8 | 3.35 | 13 | 3.52 | 6 | 3.57 | 3 | 3.47 | 4 |
| **Gariep** | 4.25 | 9 | 2.34 | 13 | 3.25 | 14 | 3.00 | 17 | 3.21 | 14 | 3.28 | 13 | 3.29 | 9 |
| **Koonap** | 3.94 | 16 | 2.38 | 11 | 3.17 | 15 | 3.21 | 15 | 3.17 | 15 | 3.16 | 15 | 3.16 | 14 |
| **Kougas** | 3.94 | 17 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3111** | 4.12 | 11 | 2.24 | 15 | 4.21 | 1 | 4.03 | 1 | 3.65 | 1 | 3.52 | 5 | 3.18 | 13 |
| **PAN 3118** | 3.93 | 18 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3161** | 3.99 | 14 | 2.59 | 4 | 3.78 | 7 | 3.53 | 7 | 3.47 | 7 | 3.45 | 7 | 3.29 | 10 |
| **PAN 3195** | 4.37 | 6 | 2.49 | 8 | 4.09 | 2 | 3.45 | 9 | 3.60 | 5 | 3.65 | 1 | 3.43 | 6 |
| **PAN 3198** | 4.13 | 10 | 2.52 | 7 | 3.12 | 16 | 3.36 | 12 | 3.28 | 12 | 3.26 | 13 | 3.32 | 7 |
| **PAN 3368** | 3.73 | 19 | 2.44 | 10 | 3.97 | 5 | 3.26 | 14 | 3.35 | 10 | 3.38 | 9 | 3.08 | 16 |
| **PAN 3379** | 3.98 | 15 | 2.63 | 2 | 3.60 | 12 | 3.05 | 16 | 3.31 | 11 | 3.40 | 8 | 3.30 | 8 |
| **Senqu** | 4.10 | 12 | 2.35 | 12 | 3.63 | 10 | 3.38 | 11 | 3.36 | 9 | 3.36 | 10 | 3.23 | 12 |
| **SST 3149** | 2.81 | 20 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 4.48 | 4 | 2.60 | 3 | 3.62 | 11 | 3.72 | 4 | 3.61 | 4 | 3.57 | 3 | 3.54 | 2 |
| **SST 317** | 4.49 | 3 | 2.47 | 9 | 3.91 | 6 | 3.69 | 5 | 3.64 | 2 | 3.63 | 2 | 3.48 | 3 |
| **SST 347** | 4.27 | 7 | 2.26 | 14 | 3.98 | 4 | 3.45 | 10 | 3.49 | 6 | 3.50 | 5 | 3.27 | 11 |
| **SST 356** | 4.07 | 13 | 2.20 | 16 | 3.74 | 9 | 3.79 | 3 | 3.45 | 8 | 3.33 | 11 | 3.13 | 15 |
| **SST 374** | 4.81 | 1 | 2.52 | 6 |  |  | 3.62 | 6 |  |  |  |  | 3.67 | 1 |
| **SST 387** | 4.26 | 8 | 2.67 | 1 | 3.52 | 13 | 3.98 | 2 | 3.61 | 3 | 3.48 | 6 | 3.46 | 5 |
| **SST 398** |  |  |  |  | 4.07 | 3 | 3.51 | 8 |  |  |  |  |  |  |
| **Wedzi** | 4.67 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **4.14** |  | **2.45** |  | **3.71** |  | **3.49** |  | **3.45** |  | **3.44** |  | **3.33** |  |
| **LSDt(0,05)** | **0.24** |  | **0.15** |  | **0.15** |  | **0.25** |  | **0.11** |  | **0.11** |  | **0.15** |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the yield of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 239 | 235.73 | 0.986 |  |  |
| **Treatments** | | 59 | 218.40 | 3.702 | 43.63 | <0,001 |
| **Genotypes** | | 19 | 39.05 | 2.055 | 24.22 | <0,001 |
| **Environments** | | 2 | 156.66 | 78.332 | 249.12 | <0,001 |
| **Block** |  | 9 | 2.83 | 0.314 | 3.71 | <0,001 |
| **Interactions** | | 38 | 22.69 | 0.597 | 7.04 | <0,001 |
| **IPCA** |  | 20 | 14.90 | 0.745 | 8.78 | <0,001 |
| **IPCA** |  | 18 | 7.79 | 0.433 | 5.10 | <0,001 |
| **Residuals** | | 0 | 0.00 |  |  |  |
| **Error** |  | 171 | 14.51 | 0.085 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Elands | 4.39 | 5 | 0.04088 |  |  |
| 2 | Gariep | 4.25 | 9 | 0.19182 |  |  |
| 3 | Koonap | 3.94 | 16 | -0.44748 |  |  |
| 4 | Kougas | 3.94 | 17 | 0.21957 |  |  |
| 5 | PAN 3111 | 4.12 | 11 | 0.56663 |  |  |
| 6 | PAN 3118 | 3.93 | 18 | 0.29806 |  |  |
| 7 | PAN 3161 | 3.99 | 14 | -0.42227 |  |  |
| 8 | PAN 3195 | 4.37 | 6 | -0.08771 |  |  |
| 9 | PAN 3198 | 4.13 | 10 | 0.17384 |  |  |
| 10 | PAN 3368 | 3.73 | 19 | -0.20116 |  |  |
| 11 | PAN 3379 | 3.98 | 15 | 0.03432 |  |  |
| 12 | Senqu | 4.10 | 12 | 0.02446 |  |  |
| 13 | SST 3149 | 2.81 | 20 | 0.08768 |  |  |
| 14 | SST 316 | 4.48 | 4 | -0.52232 |  |  |
| 15 | SST 317 | 4.49 | 3 | -0.37877 |  |  |
| 16 | SST 347 | 4.27 | 7 | 0.09597 |  |  |
| 17 | SST 356 | 4.07 | 13 | 0.04341 |  |  |
| 18 | SST 374 | 4.81 | 1 | -0.43530 |  |  |
| 19 | SST 387 | 4.26 | 8 | 0.57360 |  |  |
| 20 | Wedzi | 4.67 | 2 | 0.14477 |  |  |
| **Mean** | | **4.14** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.20** |  |  |  |  |
| **LSDt(0.05)** | | **0.24** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Clarens | 3.14 | 3 | -1.13279 |  |  |
| 2 | Danielsrus | 4.15 | 2 | 0.51642 |  |  |
| 3 | Ficksburg | 5.12 | 1 | 0.61637 |  |  |
| **Mean** | | **4.14** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.20** |  |  |  |  |
| **LSDt(0.05)** | | **0.09** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting)** | | | | | | | | | | | | | | |
| **Average hectolitre mass (kg/hl) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 79.63 | 3 | 80.38 | 2 | 78.67 | 3 | 79.44 | 4 | 79.53 | 2 | 79.56 | 2 | 80.01 | 2 |
| **Gariep** | 80.52 | 1 | 78.70 | 9 | 78.61 | 4 | 79.17 | 5 | 79.25 | 3 | 79.28 | 3 | 79.61 | 4 |
| **Koonap** | 80.01 | 2 | 79.85 | 3 | 78.97 | 2 | 81.16 | 2 | 80.00 | 1 | 79.61 | 1 | 79.93 | 3 |
| **Kougas** | 78.63 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3111** | 76.08 | 19 | 77.60 | 11 | 76.20 | 10 | 78.96 | 8 | 77.21 | 12 | 76.63 | 14 | 76.84 | 16 |
| **PAN 3118** | 77.99 | 11 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3161** | 76.49 | 18 | 79.28 | 5 | 74.43 | 16 | 77.73 | 15 | 76.98 | 12 | 76.73 | 12 | 77.89 | 10 |
| **PAN 3195** | 77.45 | 16 | 77.67 | 10 | 75.92 | 12 | 76.80 | 17 | 76.96 | 13 | 77.01 | 11 | 77.56 | 12 |
| **PAN 3198** | 77.36 | 17 | 79.44 | 4 | 75.03 | 14 | 78.03 | 12 | 77.47 | 9 | 77.28 | 10 | 78.40 | 7 |
| **PAN 3368** | 77.80 | 13 | 78.97 | 7 | 78.01 | 7 | 78.84 | 11 | 78.41 | 6 | 78.26 | 5 | 78.39 | 8 |
| **PAN 3379** | 79.63 | 3 | 80.76 | 1 | 76.70 | 9 | 79.03 | 6 | 79.03 | 3 | 79.03 | 3 | 80.20 | 1 |
| **Senqu** | 79.20 | 6 | 78.91 | 8 | 78.32 | 5 | 79.49 | 3 | 78.98 | 4 | 78.81 | 4 | 79.06 | 5 |
| **SST 3149** | 73.21 | 20 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 77.89 | 12 | 79.15 | 6 | 76.03 | 11 | 77.85 | 14 | 77.73 | 8 | 77.69 | 7 | 78.52 | 6 |
| **SST 317** | 78.20 | 9 | 77.29 | 12 | 77.21 | 8 | 78.91 | 9 | 77.90 | 7 | 77.57 | 8 | 77.75 | 11 |
| **SST 347** | 77.67 | 14 | 76.57 | 16 | 79.83 | 1 | 81.44 | 1 | 78.88 | 5 | 78.02 | 6 | 77.12 | 14 |
| **SST 356** | 79.07 | 7 | 77.18 | 13 | 75.89 | 13 | 77.49 | 16 | 77.41 | 10 | 77.38 | 9 | 78.13 | 9 |
| **SST 374** | 78.18 | 10 | 76.87 | 14 |  |  | 78.03 | 12 |  |  |  |  | 77.53 | 13 |
| **SST 387** | 77.48 | 15 | 76.60 | 15 | 74.56 | 15 | 79.03 | 6 | 76.92 | 14 | 76.21 | 14 | 77.04 | 15 |
| **SST 398** |  |  |  |  | 78.02 | 6 | 78.90 | 10 |  |  |  |  |  |  |
| **Wedzi** | 79.26 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **78.09** |  | **78.45** |  | **77.03** |  | **78.84** |  | **78.18** |  | **77.94** |  | **78.37** |  |
| **LSDt(0,05)** | **0.58** |  | **0.64** |  | **0.61** |  | **0.53** |  | **0.30** |  | **0.36** |  | **0.44** |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the hectolitre mass of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 239 | 2169.0 | 9.08 |  |  |
| **Treatments** | | 59 | 2070.4 | 35.09 | 77.48 | <0,001 |
| **Genotypes** | | 19 | 603.3 | 31.75 | 70.11 | <0,001 |
| **Environments** | | 2 | 1171.6 | 585.79 | 249.84 | <0,001 |
| **Block** |  | 9 | 21.1 | 2.34 | 5.18 | <0,001 |
| **Interactions** | | 38 | 295.5 | 7.78 | 17.17 | <0,001 |
| **IPCA** |  | 20 | 246.7 | 12.34 | 27.24 | <0,001 |
| **IPCA** |  | 18 | 48.8 | 2.71 | 5.98 | <0,001 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 171 | 77.5 | 0.45 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Elands | 79.63 | 3 | 0.37908 |  |  |
| 2 | Gariep | 80.52 | 1 | 0.31737 |  |  |
| 3 | Koonap | 80.01 | 2 | -0.06867 |  |  |
| 4 | Kougas | 78.63 | 8 | 0.22569 |  |  |
| 5 | PAN 3111 | 76.08 | 19 | 0.21520 |  |  |
| 6 | PAN 3118 | 77.99 | 11 | 0.02591 |  |  |
| 7 | PAN 3161 | 76.49 | 18 | -0.44439 |  |  |
| 8 | PAN 3195 | 77.45 | 16 | 0.09916 |  |  |
| 9 | PAN 3198 | 77.36 | 17 | 0.35686 |  |  |
| 10 | PAN 3368 | 77.80 | 13 | 0.29535 |  |  |
| 11 | PAN 3379 | 79.63 | 3 | 0.25943 |  |  |
| 12 | Senqu | 79.20 | 6 | 0.37167 |  |  |
| 13 | SST 3149 | 73.21 | 20 | -2.57077 |  |  |
| 14 | SST 316 | 77.89 | 12 | 0.44124 |  |  |
| 15 | SST 317 | 78.20 | 9 | 0.00073 |  |  |
| 16 | SST 347 | 77.67 | 14 | -0.10488 |  |  |
| 17 | SST 356 | 79.07 | 7 | 0.12338 |  |  |
| 18 | SST 374 | 78.18 | 10 | -0.00306 |  |  |
| 19 | SST 387 | 77.48 | 15 | -0.11233 |  |  |
| 20 | Wedzi | 79.26 | 5 | 0.19303 |  |  |
| **Mean** | | **78.09** |  |  |  |  |
| **Coefficient of variation (%)** | | **0.90** |  |  |  |  |
| **LSDt(0.05)** | | **0.58** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Clarens | 76.57 | 2 | -1.14170 |  |  |
| 2 | Danielsrus | 76.49 | 3 | -1.14654 |  |  |
| 3 | Ficksburg | 81.21 | 1 | 2.28824 |  |  |
| **Mean** | | **78.09** |  |  |  |  |
| **Coefficient of variation (%)** | | **0.90** |  |  |  |  |
| **LSDt(0.05)** | | **0.23** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting)** | | | | | | | | | | | | | | |
| **Average protein content (%) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 14.81 | 11 | 13.35 | 16 | 13.15 | 6 | 14.54 | 7 | 13.96 | 9 | 13.77 | 13 | 14.08 | 15 |
| **Gariep** | 14.72 | 12 | 15.06 | 11 | 13.90 | 2 | 14.95 | 4 | 14.66 | 3 | 14.56 | 4 | 14.89 | 9 |
| **Koonap** | 15.11 | 6 | 15.99 | 1 | 15.00 | 1 | 15.27 | 3 | 15.34 | 1 | 15.37 | 1 | 15.55 | 1 |
| **Kougas** | 15.18 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3111** | 15.00 | 7 | 15.23 | 5 | 11.60 | 16 | 13.64 | 14 | 13.87 | 12 | 13.94 | 10 | 15.12 | 5 |
| **PAN 3118** | 15.86 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3161** | 15.00 | 7 | 15.21 | 6 | 12.45 | 12 | 14.27 | 10 | 14.23 | 6 | 14.22 | 6 | 15.11 | 6 |
| **PAN 3195** | 14.48 | 14 | 15.14 | 8 | 11.95 | 14 | 14.62 | 6 | 14.05 | 8 | 13.86 | 11 | 14.81 | 10 |
| **PAN 3198** | 15.42 | 4 | 15.28 | 4 | 13.19 | 5 | 14.43 | 9 | 14.58 | 4 | 14.63 | 3 | 15.35 | 3 |
| **PAN 3368** | 15.89 | 1 | 15.03 | 13 | 13.46 | 3 | 15.64 | 1 | 15.01 | 2 | 14.79 | 2 | 15.46 | 2 |
| **PAN 3379** | 14.53 | 13 | 14.86 | 14 | 12.51 | 11 | 14.47 | 8 | 14.09 | 7 | 13.97 | 9 | 14.70 | 12 |
| **Senqu** | 15.00 | 7 | 15.06 | 11 | 13.31 | 4 | 14.72 | 5 | 14.52 | 5 | 14.46 | 5 | 15.03 | 7 |
| **SST 3149** | 15.76 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 13.98 | 18 | 13.96 | 15 | 12.53 | 10 | 13.34 | 16 | 13.45 | 14 | 13.49 | 14 | 13.97 | 16 |
| **SST 317** | 13.14 | 20 | 15.40 | 3 | 12.58 | 8 | 13.83 | 12 | 13.74 | 13 | 13.71 | 13 | 14.27 | 13 |
| **SST 347** | 14.48 | 14 | 15.79 | 2 | 11.70 | 15 | 13.72 | 13 | 13.92 | 9 | 13.99 | 8 | 15.14 | 4 |
| **SST 356** | 14.82 | 10 | 15.09 | 10 | 12.56 | 9 | 13.16 | 17 | 13.91 | 10 | 14.16 | 7 | 14.96 | 8 |
| **SST 374** | 13.20 | 19 | 15.11 | 9 |  |  | 13.96 | 11 |  |  |  |  | 14.16 | 14 |
| **SST 387** | 14.39 | 16 | 15.20 | 7 | 11.98 | 13 | 13.46 | 15 | 13.76 | 12 | 13.86 | 11 | 14.80 | 11 |
| **SST 398** |  |  |  |  | 12.64 | 7 | 15.50 | 2 |  |  |  |  |  |  |
| **Wedzi** | 14.37 | 17 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **14.76** |  | **15.05** |  | **12.78** |  | **14.32** |  | **14.21** |  | **14.18** |  | **14.84** |  |
| **LSDt(0,05)** | **0.66** |  | **1.00** |  | **0.67** |  | **0.45** |  | **0.35** |  | **0.46** |  | **0.60** |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the protein content of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 239 | 418.8 | 1.752 |  |  |
| **Treatments** | | 59 | 298.1 | 5.053 | 8.56 | <0,001 |
| **Genotypes** | | 19 | 126.6 | 6.663 | 11.29 | <0,001 |
| **Environments** | | 2 | 103.9 | 51.929 | 23.59 | <0,001 |
| **Block** |  | 9 | 19.8 | 2.202 | 3.73 | <0,001 |
| **Interactions** | | 38 | 67.7 | 1.781 | 3.02 | <0,001 |
| **IPCA** |  | 20 | 59.4 | 2.972 | 5.04 | <0,001 |
| **IPCA** |  | 18 | 8.2 | 0.458 | 0.78 | 0.7266 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 171 | 100.9 | 0.590 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Elands | 14.81 | 11 | 0.20952 |  |  |
| 2 | Gariep | 14.72 | 12 | -0.24563 |  |  |
| 3 | Koonap | 15.11 | 6 | 0.50076 |  |  |
| 4 | Kougas | 15.18 | 5 | -0.37334 |  |  |
| 5 | PAN 3111 | 15.00 | 7 | -0.83223 |  |  |
| 6 | PAN 3118 | 15.86 | 2 | -0.69137 |  |  |
| 7 | PAN 3161 | 15.00 | 7 | 0.32094 |  |  |
| 8 | PAN 3195 | 14.48 | 14 | -0.26570 |  |  |
| 9 | PAN 3198 | 15.42 | 4 | 0.14252 |  |  |
| 10 | PAN 3368 | 15.89 | 1 | -0.37599 |  |  |
| 11 | PAN 3379 | 14.53 | 13 | 0.00993 |  |  |
| 12 | Senqu | 15.00 | 7 | -0.04141 |  |  |
| 13 | SST 3149 | 15.76 | 3 | -0.43751 |  |  |
| 14 | SST 316 | 13.98 | 18 | 0.61600 |  |  |
| 15 | SST 317 | 13.14 | 20 | 0.37206 |  |  |
| 16 | SST 347 | 14.48 | 14 | 0.56947 |  |  |
| 17 | SST 356 | 14.82 | 10 | -0.33263 |  |  |
| 18 | SST 374 | 13.20 | 19 | 0.82069 |  |  |
| 19 | SST 387 | 14.39 | 16 | -0.11366 |  |  |
| 20 | Wedzi | 14.37 | 17 | 0.14759 |  |  |
| **Mean** | | **14.76** |  |  |  |  |
| **Coefficient of variation (%)** | | **5.60** |  |  |  |  |
| **LSDt(0.05)** | | **0.66** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Clarens | 15.67 | 1 | -1.49048 |  |  |
| 2 | Danielsrus | 14.48 | 2 | 1.25624 |  |  |
| 3 | Ficksburg | 14.13 | 3 | 0.23425 |  |  |
| **Mean** | | **14.76** |  |  |  |  |
| **Coefficient of variation (%)** | | **5.36** |  |  |  |  |
| **LSDt(0.05)** | | **0.26** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting)** | | | | | | | | | | | | | | |
| **Average falling number (s) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 276 | 9 | 341 | 10 | 392 | 11 | 279 | 11 | 322 | 7 | 336 | 7 | 308 | 8 |
| **Gariep** | 251 | 16 | 347 | 6 | 392 | 12 | 267 | 14 | 314 | 11 | 330 | 10 | 299 | 13 |
| **Koonap** | 304 | 2 | 333 | 11 | 407 | 3 | 318 | 1 | 341 | 1 | 348 | 3 | 319 | 4 |
| **Kougas** | 269 | 10 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3111** | 218 | 19 | 329 | 13 | 399 | 8 | 294 | 5 | 310 | 13 | 315 | 13 | 274 | 14 |
| **PAN 3118** | 264 | 12 |  |  |  |  |  |  |  |  |  |  |  |  |
| **PAN 3161** | 255 | 14 | 345 | 8 | 380 | 15 | 219 | 17 | 300 | 13 | 327 | 10 | 300 | 12 |
| **PAN 3195** | 223 | 18 | 324 | 14 | 398 | 10 | 306 | 2 | 313 | 11 | 315 | 13 | 273 | 15 |
| **PAN 3198** | 256 | 13 | 353 | 2 | 363 | 16 | 290 | 6 | 316 | 9 | 324 | 11 | 305 | 9 |
| **PAN 3368** | 281 | 8 | 321 | 16 | 391 | 13 | 276 | 12 | 317 | 8 | 331 | 8 | 301 | 11 |
| **PAN 3379** | 302 | 3 | 345 | 7 | 410 | 1 | 303 | 3 | 340 | 2 | 353 | 2 | 324 | 2 |
| **Senqu** | 289 | 7 | 348 | 3 | 404 | 6 | 288 | 7 | 332 | 4 | 347 | 4 | 318 | 5 |
| **SST 3149** | 230 | 17 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 290 | 6 | 332 | 12 | 406 | 5 | 299 | 4 | 332 | 5 | 343 | 5 | 311 | 6 |
| **SST 317** | 312 | 1 | 348 | 4 | 409 | 2 | 281 | 10 | 337 | 3 | 356 | 1 | 330 | 1 |
| **SST 347** | 267 | 11 | 355 | 1 | 387 | 14 | 264 | 15 | 318 | 7 | 336 | 6 | 311 | 7 |
| **SST 356** | 254 | 15 | 347 | 5 | 402 | 7 | 287 | 8 | 323 | 6 | 334 | 7 | 301 | 10 |
| **SST 374** | 298 | 4 | 342 | 9 |  |  | 283 | 9 |  |  |  |  | 320 | 3 |
| **SST 387** | 214 | 20 | 324 | 14 | 399 | 9 | 247 | 16 | 296 | 14 | 312 | 14 | 269 | 16 |
| **SST 398** |  |  |  |  | 406 | 4 | 272 | 13 |  |  |  |  |  |  |
| **Wedzi** | 296 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **267** |  | **340** |  | **397** |  | **281** |  | **321** |  | **334** |  | **304** |  |
| **LSDt(0,05)** | **20.90** |  | **21.40** |  | **12.83** |  | **17.26** |  | **8.80** |  | **10.20** |  | **14.90** |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Eastern Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the falling number of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 239 | 1259826 | 5271 |  |  |
| **Treatments** | | 59 | 1137574 | 19281 | 28.95 | <0,001 |
| **Genotypes** | | 19 | 204429 | 10759 | 16.15 | <0,001 |
| **Environments** | | 2 | 730136 | 365068 | 393.06 | <0,001 |
| **Block** |  | 9 | 8359 | 929 | 1.39 | 0.194 |
| **Interactions** | | 38 | 203010 | 5342 | 8.02 | <0,001 |
| **IPCA** |  | 20 | 137834 | 6892 | 10.35 | <0,001 |
| **IPCA** |  | 18 | 65176 | 3621 | 5.44 | <0,001 |
| **Residuals** | | 0 |  | 0 |  |  |
| **Error** |  | 171 | 113893 | 666 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Elands | 276 | 9 | 1.56751 |  |  |
| 2 | Gariep | 251 | 16 | 1.90758 |  |  |
| 3 | Koonap | 304 | 2 | 1.18028 |  |  |
| 4 | Kougas | 269 | 10 | -1.87629 |  |  |
| 5 | PAN 3111 | 218 | 19 | -4.32030 |  |  |
| 6 | PAN 3118 | 264 | 12 | 2.62492 |  |  |
| 7 | PAN 3161 | 255 | 14 | -3.92056 |  |  |
| 8 | PAN 3195 | 223 | 18 | -5.36492 |  |  |
| 9 | PAN 3198 | 256 | 13 | -4.63448 |  |  |
| 10 | PAN 3368 | 281 | 8 | 3.43987 |  |  |
| 11 | PAN 3379 | 302 | 3 | 0.34725 |  |  |
| 12 | Senqu | 289 | 7 | 0.01855 |  |  |
| 13 | SST 3149 | 230 | 17 | 3.10939 |  |  |
| 14 | SST 316 | 290 | 6 | 2.66160 |  |  |
| 15 | SST 317 | 312 | 1 | 1.95880 |  |  |
| 16 | SST 347 | 267 | 11 | 1.24452 |  |  |
| 17 | SST 356 | 254 | 15 | 1.02761 |  |  |
| 18 | SST 374 | 298 | 4 | 2.43588 |  |  |
| 19 | SST 387 | 214 | 20 | -5.97843 |  |  |
| 20 | Wedzi | 296 | 5 | 2.57122 |  |  |
| **Mean** | | **267** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.70** |  |  |  |  |
| **LSDt(0.05)** | | **20.90** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Clarens | 236 | 2 | 8.27991 |  |  |
| 2 | Danielsrus | 221 | 3 | 2.29413 |  |  |
| 3 | Ficksburg | 345 | 1 | -10.57404 |  |  |
| **Mean** | | **267** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.70** |  |  |  |  |
| **LSDt(0.05)** | | **8.10** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Eastern Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Clarens 2016-07-07** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 3.35 | cd | 8 | 8.87 | 77.63 | 4 | 15.36 | 13 | 272 | 8 |
| **Gariep** | 3.04 | e | 12 | 5.56 | 78.93 | 1 | 16.00 | 8 | 262 | 9 |
| **Koonap** | 3.45 | c | 6 | 6.92 | 78.83 | 2 | 15.14 | 15 | 283 | 5 |
| **Kougas** | 2.69 | f | 16 | 6.34 | 76.10 | 14 | 16.58 | 5 | 214 | 14 |
| **PAN 3111** | 2.49 | f | 19 | 4.93 | 74.28 | 20 | 17.17 | 4 | 156 | 19 |
| **PAN 3118** | 2.61 | f | 17 | 4.73 | 76.53 | 11 | 17.77 | 1 | 254 | 11 |
| **PAN 3161** | 3.45 | c | 7 | 7.97 | 74.75 | 18 | 15.34 | 14 | 171 | 17 |
| **PAN 3195** | 3.48 | c | 5 | 6.66 | 76.58 | 10 | 15.97 | 10 | 173 | 16 |
| **PAN 3198** | 2.94 | e | 15 | 4.34 | 74.78 | 17 | 16.27 | 6 | 167 | 18 |
| **PAN 3368** | 2.96 | e | 14 | 7.30 | 75.95 | 16 | 17.21 | 3 | 278 | 7 |
| **PAN 3379** | 2.96 | e | 13 | 7.12 | 78.63 | 3 | 15.58 | 11 | 293 | 2 |
| **Senqu** | 3.08 | e | 10 | 6.89 | 77.00 | 7 | 16.00 | 8 | 248 | 12 |
| **SST 3149** | 1.68 | g | 20 | 8.51 | 74.60 | 19 | 17.27 | 2 | 187 | 15 |
| **SST 316** | 3.94 | b | 3 | 7.18 | 77.28 | 5 | 13.43 | 19 | 290 | 3 |
| **SST 317** | 3.14 | de | 9 | 6.87 | 76.88 | 9 | 14.44 | 17 | 254 | 10 |
| **SST 347** | 3.04 | e | 11 | 6.47 | 76.10 | 14 | 16.13 | 7 | 216 | 13 |
| **SST 356** | 4.32 | a | 1 | 7.25 | 77.03 | 6 | 12.91 | 20 | 284 | 4 |
| **SST 374** | 4.08 | b | 2 | 5.86 | 76.23 | 13 | 14.07 | 18 | 283 | 6 |
| **SST 387** | 2.60 | f | 18 | 5.72 | 76.43 | 12 | 15.55 | 12 | 132 | 20 |
| **Wedzi** | 3.51 | c | 4 | 7.78 | 76.95 | 8 | 15.12 | 16 | 299 | 1 |
| **Mean** | **3.14** |  |  |  | **76.57** |  | **15.67** |  | **236** |  |
| **Coefficient of variation (%)** | **4.92** |  |  |  | **0.54** |  | **3.08** |  | **10.18** |  |
| **LSDt(0,05)** | **0.22** |  |  |  | **0.60** |  | **0.70** |  | **34.70** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Eastern Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Danielsrus 2016-07-13** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 4.38 | b | 5 | 6.24 | 77.65 | 5 | 14.72 | 7 | 212 | 15 |
| **Gariep** | 4.30 | bc | 8 | 6.86 | 78.28 | 2 | 14.14 | 15 | 170 | 17 |
| **Koonap** | 3.68 | ef | 19 | 4.93 | 78.23 | 3 | 15.24 | 2 | 259 | 3 |
| **Kougas** | 4.06 | cd | 14 | 5.05 | 77.53 | 6 | 14.32 | 13 | 230 | 10 |
| **PAN 3111** | 4.30 | bc | 7 | 6.43 | 74.28 | 20 | 13.72 | 19 | 154 | 19 |
| **PAN 3118** | 3.81 | de | 16 | 5.65 | 76.28 | 9 | 14.66 | 9 | 224 | 14 |
| **PAN 3161** | 4.19 | bc | 9 | 6.12 | 76.13 | 11 | 14.98 | 3 | 229 | 11 |
| **PAN 3195** | 4.35 | b | 6 | 3.90 | 74.98 | 18 | 14.19 | 14 | 125 | 20 |
| **PAN 3198** | 4.16 | bc | 10 | 7.39 | 76.00 | 12 | 15.58 | 1 | 227 | 13 |
| **PAN 3368** | 3.73 | e | 18 | 4.65 | 75.85 | 14 | 14.89 | 4 | 242 | 7 |
| **PAN 3379** | 3.83 | de | 15 | 3.51 | 76.93 | 8 | 14.53 | 11 | 229 | 12 |
| **Senqu** | 4.12 | bc | 13 | 6.09 | 77.43 | 7 | 14.71 | 8 | 257 | 4 |
| **SST 3149** | 3.42 | f | 20 | 3.52 | 74.58 | 19 | 14.84 | 5 | 246 | 6 |
| **SST 316** | 4.13 | bc | 12 | 12.69 | 76.00 | 12 | 13.22 | 20 | 281 | 1 |
| **SST 317** | 4.77 | a | 1 | 6.08 | 75.58 | 16 | 14.75 | 6 | 211 | 16 |
| **SST 347** | 3.78 | e | 17 | 4.62 | 78.63 | 1 | 13.96 | 18 | 231 | 9 |
| **SST 356** | 4.40 | b | 4 | 4.74 | 76.23 | 10 | 13.99 | 17 | 262 | 2 |
| **SST 374** | 4.13 | bc | 11 | 5.21 | 75.43 | 17 | 14.64 | 10 | 247 | 5 |
| **SST 387** | 4.72 | a | 2 | 7.52 | 75.68 | 15 | 14.11 | 16 | 156 | 18 |
| **Wedzi** | 4.72 | a | 3 | 7.66 | 78.00 | 4 | 14.38 | 12 | 237 | 8 |
| **Mean** | **4.15** |  |  |  | **76.49** |  | **14.48** |  | **221** |  |
| **Coefficient of variation (%)** | **4.70** |  |  |  | **0.63** |  | **5.18** |  | **14.21** |  |
| **LSDt(0,05)** | **0.28** |  |  |  | **0.70** |  | **1.08** |  | **45.51** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Eastern Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Ficksburg 2016-07-14** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 5.44 | bcd | 5 | 9.29 | 83.62 | 2 | 14.34 | 9 | 344 | 13 |
| **Gariep** | 5.41 | bcde | 7 | 8.18 | 84.37 | 1 | 14.03 | 13 | 321 | 17 |
| **Koonap** | 4.68 | hi | 17 | 4.66 | 82.97 | 5 | 14.95 | 4 | 370 | 3 |
| **Kougas** | 5.05 | fg | 15 | 6.11 | 82.27 | 8 | 14.64 | 6 | 363 | 7 |
| **PAN 3111** | 5.57 | abc | 3 | 7.98 | 79.70 | 18 | 14.11 | 12 | 344 | 12 |
| **PAN 3118** | 5.35 | cdef | 9 | 8.64 | 81.17 | 14 | 15.14 | 3 | 314 | 18 |
| **PAN 3161** | 4.32 | j | 19 | 8.87 | 78.60 | 19 | 14.69 | 5 | 365 | 6 |
| **PAN 3195** | 5.29 | cdef | 10 | 13.37 | 80.80 | 15 | 13.27 | 17 | 369 | 4 |
| **PAN 3198** | 5.29 | cdef | 11 | 4.40 | 81.30 | 12 | 14.43 | 7 | 374 | 2 |
| **PAN 3368** | 4.50 | ij | 18 | 7.43 | 81.60 | 10 | 15.56 | 1 | 322 | 16 |
| **PAN 3379** | 5.16 | defg | 13 | 7.36 | 83.35 | 3 | 13.48 | 16 | 385 | 1 |
| **Senqu** | 5.11 | efg | 14 | 9.55 | 83.17 | 4 | 14.30 | 10 | 362 | 8 |
| **SST 3149** | 3.32 | k | 20 | 10.53 | 70.45 | 20 | 15.18 | 2 | 258 | 20 |
| **SST 316** | 5.41 | bcde | 6 | 7.35 | 81.32 | 11 | 12.77 | 19 | 366 | 5 |
| **SST 317** | 4.90 | gh | 16 | 5.46 | 80.55 | 16 | 14.24 | 11 | 335 | 15 |
| **SST 347** | 5.38 | cde | 8 | 8.93 | 82.47 | 7 | 14.38 | 8 | 314 | 18 |
| **SST 356** | 5.72 | ab | 2 | 9.67 | 81.30 | 12 | 12.71 | 20 | 349 | 11 |
| **SST 374** | 5.22 | defg | 12 | 3.64 | 82.02 | 9 | 13.24 | 18 | 341 | 14 |
| **SST 387** | 5.45 | bcd | 4 | 8.33 | 80.35 | 17 | 13.50 | 15 | 354 | 9 |
| **Wedzi** | 5.78 | a | 1 | 5.02 | 82.82 | 6 | 13.60 | 14 | 353 | 10 |
| **Mean** | **5.12** |  |  |  | **81.21** |  | **14.13** |  | **345** |  |
| **Coefficient of variation (%)** | **4.45** |  |  |  | **0.66** |  | **3.09** |  | **4.76** |  |
| **LSDt(0,05)** | **0.33** |  |  |  | **0.77** |  | **0.63** |  | **23.75** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earler planting)** | | | | | | | | | | |
| **Average yield (ton/ha) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **\* 2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 2.07 | 19 | 1.57 | 17 | 1.57 | 18 | 1.74 | 18 | 1.82 | 19 |
| **Gariep** | 2.13 | 17 | 1.53 | 19 | 1.41 | 19 | 1.69 | 19 | 1.83 | 18 |
| **Koonap** | 2.11 | 18 | 1.63 | 15 | 1.57 | 16 | 1.77 | 17 | 1.87 | 17 |
| **Kougas** | 2.78 | 3 |  |  |  |  |  |  |  |  |
| **Matlabas** | 3.17 | 1 | 3.00 | 2 | 2.07 | 4 | 2.75 | 1 | 3.08 | 1 |
| **PAN 3111** | 2.74 | 6 | 2.61 | 5 | 2.40 | 2 | 2.58 | 3 | 2.67 | 4 |
| **PAN 3118** | 2.50 | 11 | 1.57 | 17 | 1.77 | 10 | 1.95 | 14 | 2.04 | 14 |
| **PAN 3120** | 2.49 | 12 | 2.20 | 10 | 2.01 | 7 | 2.23 | 9 | 2.35 | 9 |
| **PAN 3161** | 2.75 | 5 | 2.56 | 7 | 1.82 | 8 | 2.37 | 6 | 2.65 | 6 |
| **PAN 3195** | 2.57 | 10 | 2.75 | 4 | 2.07 | 5 | 2.46 | 4 | 2.66 | 5 |
| **PAN 3198** | 2.32 | 15 | 2.29 | 8 | 1.80 | 9 | 2.13 | 10 | 2.30 | 10 |
| **PAN 3368** | 2.03 | 20 | 2.18 | 11 | 1.65 | 14 | 1.95 | 13 | 2.10 | 13 |
| **PAN 3379** | 1.88 | 21 | 1.87 | 14 | 1.57 | 17 | 1.77 | 16 | 1.88 | 16 |
| **Senqu** | 2.25 | 16 | 1.61 | 16 | 1.67 | 12 | 1.85 | 15 | 1.93 | 15 |
| **SST 3149** | 2.58 | 9 |  |  |  |  |  |  |  |  |
| **SST 316** | 2.46 | 14 | 1.95 | 13 | 1.67 | 13 | 2.03 | 12 | 2.20 | 12 |
| **SST 317** | 2.64 | 8 | 2.27 | 9 | 2.05 | 6 | 2.32 | 8 | 2.45 | 8 |
| **SST 347** | 2.68 | 7 | 3.03 | 1 | 2.41 | 1 | 2.71 | 2 | 2.86 | 2 |
| **SST 356** | 2.47 | 13 | 1.99 | 12 | 1.63 | 15 | 2.03 | 11 | 2.23 | 11 |
| **SST 387** | 2.77 | 4 | 2.87 | 3 | 1.70 | 11 | 2.45 | 5 | 2.82 | 3 |
| **SST 398** |  |  | 2.58 | 6 | 2.16 | 3 | 2.37 | 7 | 2.58 | 7 |
| **Wedzi** | 2.88 | 2 |  |  |  |  |  |  |  |  |
| **Mean** | **2.49** |  | **2.21** |  | **1.84** |  | **2.17** |  | **2.33** |  |
| **LSDt(0,05)** | **0.18** |  | **0.21** |  | **0.22** |  | **0.12** |  | **0.15** |  |
| *Due to severe drought conditions during the growing season no results are available for the 2015 season* | | | | | | | | | | |
| *\* Only Ladybrand data* | | | |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the yield of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 113.8 | 0.453 |  |  |
| **Treatments** | | 62 | 103.8 | 1.674 | 41.59 | <0,001 |
| **Genotypes** | | 20 | 25.04 | 1.252 | 31.1 | <0,001 |
| **Environments** | | 2 | 59.38 | 29.688 | 97.03 | <0,001 |
| **Block** |  | 9 | 2.75 | 0.306 | 7.6 | <0,001 |
| **Interactions** | | 40 | 19.38 | 0.485 | 12.04 | <0,001 |
| **IPCA** |  | 21 | 12.69 | 0.604 | 15.01 | <0,001 |
| **IPCA** |  | 19 | 6.69 | 0.352 | 8.75 | <0,001 |
| **Residuals** | | 0 | 0 |  |  |  |
| **Error** |  | 180 | 7.25 | 0.04 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Elands | 2.07 | 19 | 0.00012 |  |  |
| 2 | Gariep | 2.13 | 17 | 0.17554 |  |  |
| 3 | Koonap | 2.11 | 18 | -0.24605 |  |  |
| 4 | Kougas | 2.78 | 3 | -0.31652 |  |  |
| 5 | Matlabas | 3.17 | 1 | 0.22316 |  |  |
| 6 | PAN 3111 | 2.74 | 6 | -0.09089 |  |  |
| 7 | PAN 3118 | 2.50 | 11 | -0.02781 |  |  |
| 8 | PAN 3120 | 2.49 | 12 | -0.29479 |  |  |
| 9 | PAN 3161 | 2.75 | 5 | -0.27146 |  |  |
| 10 | PAN 3195 | 2.57 | 10 | -0.27569 |  |  |
| 11 | PAN 3198 | 2.32 | 15 | -0.29288 |  |  |
| 12 | PAN 3368 | 2.03 | 20 | 0.28568 |  |  |
| 13 | PAN 3379 | 1.88 | 21 | -0.29490 |  |  |
| 14 | Senqu | 2.25 | 16 | 0.23249 |  |  |
| 15 | SST 3149 | 2.58 | 9 | 0.46364 |  |  |
| 16 | SST 316 | 2.46 | 14 | -0.33147 |  |  |
| 17 | SST 317 | 2.64 | 8 | 0.33842 |  |  |
| 18 | SST 347 | 2.68 | 7 | 0.72478 |  |  |
| 19 | SST 356 | 2.47 | 13 | -0.11805 |  |  |
| 20 | SST 387 | 2.77 | 4 | 0.04644 |  |  |
| 21 | Wedzi | 2.88 | 2 | 0.07025 |  |  |
| **Mean** | | **2.49** |  |  |  |  |
| **Coefficient of variation (%)** | | **8.80** |  |  |  |  |
| **LSDt(0.05)** | | **0.18** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 3.17 | 1 | 0.27335 |  |  |
| 2 | Clocolan TW | 2.24 | 2 | -1.05018 |  |  |
| 3 | Petrus Steyn | 2.06 | 3 | 0.77683 |  |  |
| **Mean** | | **2.49** |  |  |  |  |
| **Coefficient of variation (%)** | | **8.80** |  |  |  |  |
| **LSDt(0.05)** | | **0.07** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earler planting)** | | | | | | | | | | |
| **Average hectolitre mass (kg/hl) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **\* 2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 78.20 | 10 | 75.35 | 5 | 78.46 | 6 | 77.34 | 6 | 76.78 | 6 |
| **Gariep** | 79.45 | 2 | 74.68 | 13 | 78.74 | 5 | 77.62 | 4 | 77.07 | 3 |
| **Koonap** | 78.78 | 5 | 74.80 | 10 | 79.96 | 2 | 77.85 | 2 | 76.79 | 5 |
| **Kougas** | 79.42 | 3 |  |  |  |  |  |  |  |  |
| **Matlabas** | 77.96 | 13 | 75.63 | 4 | 78.16 | 9 | 77.25 | 7 | 76.80 | 4 |
| **PAN 3111** | 78.07 | 11 | 74.65 | 14 | 77.78 | 14 | 76.83 | 10 | 76.36 | 11 |
| **PAN 3118** | 78.72 | 6 | 74.80 | 10 | 77.71 | 16 | 77.08 | 9 | 76.76 | 7 |
| **PAN 3120** | 78.71 | 7 | 75.88 | 3 | 78.76 | 4 | 77.78 | 3 | 77.30 | 2 |
| **PAN 3161** | 77.55 | 17 | 75.18 | 6 | 76.88 | 18 | 76.54 | 14 | 76.37 | 10 |
| **PAN 3195** | 77.63 | 15 | 74.95 | 7 | 77.76 | 15 | 76.78 | 11 | 76.29 | 12 |
| **PAN 3198** | 77.53 | 18 | 74.80 | 10 | 77.95 | 12 | 76.76 | 12 | 76.17 | 13 |
| **PAN 3368** | 76.94 | 20 | 74.88 | 8 | 77.80 | 13 | 76.54 | 13 | 75.91 | 16 |
| **PAN 3379** | 77.48 | 19 | 75.90 | 2 | 79.16 | 3 | 77.51 | 5 | 76.69 | 8 |
| **Senqu** | 78.53 | 8 | 74.85 | 9 | 78.33 | 7 | 77.24 | 8 | 76.69 | 8 |
| **SST 3149** | 76.28 | 21 |  |  |  |  |  |  |  |  |
| **SST 316** | 77.99 | 12 | 74.18 | 16 | 77.08 | 17 | 76.42 | 16 | 76.09 | 14 |
| **SST 317** | 77.90 | 14 | 71.70 | 19 | 77.98 | 11 | 75.86 | 18 | 74.80 | 18 |
| **SST 347** | 79.75 | 1 | 77.43 | 1 | 80.99 | 1 | 79.39 | 1 | 78.59 | 1 |
| **SST 356** | 77.62 | 16 | 74.50 | 15 | 76.83 | 19 | 76.32 | 17 | 76.06 | 15 |
| **SST 387** | 78.27 | 9 | 72.88 | 17 | 78.21 | 8 | 76.45 | 15 | 75.58 | 17 |
| **SST 398** |  |  | 72.20 | 18 | 78.10 | 10 | 75.15 | 19 | 72.20 | 19 |
| **Wedzi** | 78.97 | 4 |  |  |  |  |  |  |  |  |
| **Mean** | **78.18** |  | **74.70** |  | **78.24** |  | **76.98** |  | **76.28** |  |
| **LSDt(0,05)** | **0.67** |  | **1.31** |  | **0.62** |  | **0.45** |  | **0.61** |  |
| *Due to severe drought conditions during the growing season no results are available for the 2015 season* | | | | | | | | | | |
| *\* Only Ladybrand data* | | | |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the hectolitre mass of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 1627.2 | 6.48 |  |  |
| **Treatments** | | 62 | 1485.2 | 23.95 | 38.12 | <0,001 |
| **Genotypes** | | 20 | 174.5 | 8.72 | 13.88 | <0,001 |
| **Environments** | | 2 | 1208.6 | 604.31 | 188.18 | <0,001 |
| **Block** |  | 9 | 28.9 | 3.21 | 5.11 | <0,001 |
| **Interactions** | | 40 | 102.1 | 2.55 | 4.06 | <0,001 |
| **IPCA** |  | 21 | 81.2 | 3.87 | 6.16 | <0,001 |
| **IPCA** |  | 19 | 20.9 | 1.10 | 1.75 | 0.0323 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 180 | 113.1 | 0.63 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Elands | 78.20 | 10 | -0.53113 |  |  |
| 2 | Gariep | 79.45 | 2 | -0.01519 |  |  |
| 3 | Koonap | 78.78 | 5 | -0.45483 |  |  |
| 4 | Kougas | 79.42 | 3 | 0.05690 |  |  |
| 5 | Matlabas | 77.96 | 13 | 0.33348 |  |  |
| 6 | PAN 3111 | 78.07 | 11 | 0.21604 |  |  |
| 7 | PAN 3118 | 78.72 | 6 | -0.05688 |  |  |
| 8 | PAN 3120 | 78.71 | 7 | 0.11405 |  |  |
| 9 | PAN 3161 | 77.55 | 17 | -0.46323 |  |  |
| 10 | PAN 3195 | 77.63 | 15 | 0.07788 |  |  |
| 11 | PAN 3198 | 77.53 | 18 | -0.46218 |  |  |
| 12 | PAN 3368 | 76.94 | 20 | 0.15390 |  |  |
| 13 | PAN 3379 | 77.48 | 19 | -1.11103 |  |  |
| 14 | Senqu | 78.53 | 8 | 0.02675 |  |  |
| 15 | SST 3149 | 76.28 | 21 | 0.65096 |  |  |
| 16 | SST 316 | 77.99 | 12 | 0.18798 |  |  |
| 17 | SST 317 | 77.90 | 14 | 0.73852 |  |  |
| 18 | SST 347 | 79.75 | 1 | 0.94484 |  |  |
| 19 | SST 356 | 77.62 | 16 | -0.46454 |  |  |
| 20 | SST 387 | 78.27 | 9 | -0.09777 |  |  |
| 21 | Wedzi | 78.97 | 4 | 0.15547 |  |  |
| **Mean** | | **78.18** |  |  |  |  |
| **Coefficient of variation (%)** | | **1.10** |  |  |  |  |
| **LSDt(0.05)** | | **0.67** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 78.31 | 2 | -0.37805 |  |  |
| 2 | Clocolan TW | 80.79 | 1 | -1.27589 |  |  |
| 3 | Petrus Steyn | 75.43 | 3 | 1.65394 |  |  |
| **Mean** | | **78.18** |  |  |  |  |
| **Coefficient of variation (%)** | | **1.10** |  |  |  |  |
| **LSDt(0.05)** | | **0.25** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earler planting)** | | | | | | | | | | |
| **Average protein content (%) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **\* 2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 14.96 | 4 | 15.85 | 2 | 14.95 | 4 | 15.25 | 1 | 15.41 | 2 |
| **Gariep** | 14.80 | 6 | 15.29 | 8 | 15.05 | 2 | 15.05 | 5 | 15.05 | 6 |
| **Koonap** | 15.13 | 2 | 15.89 | 1 | 14.46 | 8 | 15.16 | 3 | 15.51 | 1 |
| **Kougas** | 14.19 | 9 |  |  |  |  |  |  |  |  |
| **Matlabas** | 13.21 | 20 | 15.50 | 5 | 13.90 | 10 | 14.20 | 11 | 14.36 | 12 |
| **PAN 3111** | 13.11 | 21 | 14.66 | 15 | 13.50 | 14 | 13.76 | 16 | 13.89 | 18 |
| **PAN 3118** | 14.03 | 12 | 15.34 | 7 | 15.52 | 1 | 14.96 | 6 | 14.69 | 8 |
| **PAN 3120** | 14.15 | 11 | 15.75 | 3 | 14.26 | 9 | 14.72 | 8 | 14.95 | 7 |
| **PAN 3161** | 14.43 | 8 | 14.87 | 10 | 13.86 | 11 | 14.39 | 9 | 14.65 | 9 |
| **PAN 3195** | 13.69 | 18 | 14.72 | 14 | 13.70 | 12 | 14.04 | 14 | 14.21 | 14 |
| **PAN 3198** | 14.85 | 5 | 15.38 | 6 | 14.60 | 6 | 14.94 | 7 | 15.12 | 4 |
| **PAN 3368** | 15.21 | 1 | 14.98 | 9 | 14.97 | 3 | 15.05 | 4 | 15.10 | 5 |
| **PAN 3379** | 14.57 | 7 | 13.66 | 19 | 14.56 | 7 | 14.26 | 10 | 14.12 | 16 |
| **Senqu** | 15.09 | 3 | 15.64 | 4 | 14.84 | 5 | 15.19 | 2 | 15.37 | 3 |
| **SST 3149** | 13.88 | 16 |  |  |  |  |  |  |  |  |
| **SST 316** | 14.19 | 9 | 14.85 | 11 | 13.36 | 15 | 14.13 | 12 | 14.52 | 10 |
| **SST 317** | 14.03 | 12 | 14.83 | 12 | 13.51 | 13 | 14.12 | 13 | 14.43 | 11 |
| **SST 347** | 13.92 | 14 | 14.39 | 17 | 12.91 | 19 | 13.74 | 17 | 14.16 | 15 |
| **SST 356** | 13.83 | 17 | 14.81 | 13 | 13.19 | 17 | 13.94 | 15 | 14.32 | 13 |
| **SST 387** | 13.41 | 19 | 14.61 | 16 | 13.02 | 18 | 13.68 | 18 | 14.01 | 17 |
| **SST 398** |  |  | 13.75 | 18 | 13.34 | 16 | 13.55 | 19 | 13.75 | 19 |
| **Wedzi** | 13.91 | 15 |  |  |  |  |  |  |  |  |
| **Mean** | **14.22** |  | **14.99** |  | **14.08** |  | **14.43** |  | **14.61** |  |
| **LSDt(0,05)** | **0.82** |  | **1.12** |  | **0.85** |  | **0.54** |  | **0.67** |  |
| *Due to severe drought conditions during the growing season no results are available for the 2015 season* | | | | | | | | | | |
| *\* Only Ladybrand data* | | | |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the protein content of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 553.5 | 2.21 |  |  |
| **Treatments** | | 62 | 349.4 | 5.64 | 5.71 | <0,001 |
| **Genotypes** | | 20 | 93.0 | 4.65 | 4.71 | <0,001 |
| **Environments** | | 2 | 181.6 | 90.80 | 30.92 | <0,001 |
| **Block** |  | 9 | 26.4 | 2.94 | 2.97 | 0.0025 |
| **Interactions** | | 40 | 74.8 | 1.87 | 1.89 | 0.0026 |
| **IPCA** |  | 21 | 60.4 | 2.88 | 2.91 | <0,001 |
| **IPCA** |  | 19 | 14.4 | 0.76 | 0.77 | 0.7407 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 180 | 177.7 | 0.99 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Elands | 14.96 | 4 | -0.63217 |  |  |
| 2 | Gariep | 14.80 | 6 | -0.48431 |  |  |
| 3 | Koonap | 15.13 | 2 | -0.79430 |  |  |
| 4 | Kougas | 14.19 | 9 | 0.02224 |  |  |
| 5 | Matlabas | 13.21 | 20 | 0.69583 |  |  |
| 6 | PAN 3111 | 13.11 | 21 | 0.03848 |  |  |
| 7 | PAN 3118 | 14.03 | 12 | -0.16635 |  |  |
| 8 | PAN 3120 | 14.15 | 11 | 0.31647 |  |  |
| 9 | PAN 3161 | 14.43 | 8 | -0.20654 |  |  |
| 10 | PAN 3195 | 13.69 | 18 | 0.31227 |  |  |
| 11 | PAN 3198 | 14.85 | 5 | 0.31802 |  |  |
| 12 | PAN 3368 | 15.21 | 1 | -0.62165 |  |  |
| 13 | PAN 3379 | 14.57 | 7 | -0.16130 |  |  |
| 14 | Senqu | 15.09 | 3 | -0.15902 |  |  |
| 15 | SST 3149 | 13.88 | 16 | 0.55794 |  |  |
| 16 | SST 316 | 14.19 | 9 | 0.11594 |  |  |
| 17 | SST 317 | 14.03 | 12 | 0.17929 |  |  |
| 18 | SST 347 | 13.92 | 14 | 0.91603 |  |  |
| 19 | SST 356 | 13.83 | 17 | -0.35287 |  |  |
| 20 | SST 387 | 13.41 | 19 | 0.03248 |  |  |
| 21 | Wedzi | 13.91 | 15 | 0.07350 |  |  |
| **Mean** | | **14.22** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.20** |  |  |  |  |
| **LSDt(0.05)** | | **0.82** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 13.45 | 3 | 0.61409 |  |  |
| 2 | Clocolan TW | 13.81 | 2 | 0.98126 |  |  |
| 3 | Petrus Steyn | 15.40 | 1 | -1.59535 |  |  |
| **Mean** | | **14.22** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.20** |  |  |  |  |
| **LSDt(0.05)** | | **0.31** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earler planting)** | | | | | | | | | | |
| **Average falling number (s) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **\* 2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 301 | 16 | 294 | 3 | 260 | 3 | 285 | 2 | 297 | 5 |
| **Gariep** | 292 | 20 | 227 | 16 | 201 | 16 | 240 | 15 | 259 | 16 |
| **Koonap** | 325 | 3 | 285 | 5 | 269 | 1 | 293 | 1 | 305 | 1 |
| **Kougas** | 322 | 4 |  |  |  |  |  |  |  |  |
| **Matlabas** | 327 | 2 | 277 | 9 | 235 | 9 | 280 | 5 | 302 | 3 |
| **PAN 3111** | 302 | 14 | 170 | 19 | 219 | 14 | 230 | 17 | 236 | 19 |
| **PAN 3118** | 295 | 19 | 255 | 13 | 227 | 11 | 259 | 13 | 275 | 14 |
| **PAN 3120** | 309 | 9 | 277 | 9 | 244 | 5 | 276 | 8 | 293 | 8 |
| **PAN 3161** | 312 | 7 | 241 | 14 | 167 | 19 | 240 | 16 | 276 | 13 |
| **PAN 3195** | 297 | 18 | 183 | 18 | 187 | 17 | 222 | 19 | 240 | 18 |
| **PAN 3198** | 287 | 21 | 235 | 15 | 218 | 15 | 247 | 14 | 261 | 15 |
| **PAN 3368** | 301 | 15 | 277 | 8 | 252 | 4 | 277 | 7 | 289 | 11 |
| **PAN 3379** | 310 | 8 | 296 | 1 | 243 | 6 | 283 | 3 | 303 | 2 |
| **Senqu** | 305 | 12 | 294 | 2 | 240 | 8 | 280 | 4 | 300 | 4 |
| **SST 3149** | 317 | 6 |  |  |  |  |  |  |  |  |
| **SST 316** | 305 | 13 | 279 | 7 | 221 | 13 | 268 | 12 | 292 | 9 |
| **SST 317** | 308 | 10 | 273 | 11 | 226 | 12 | 269 | 11 | 290 | 10 |
| **SST 347** | 322 | 5 | 269 | 12 | 243 | 7 | 278 | 6 | 295 | 6 |
| **SST 356** | 308 | 11 | 282 | 6 | 234 | 10 | 275 | 10 | 295 | 7 |
| **SST 387** | 299 | 17 | 215 | 17 | 169 | 18 | 227 | 18 | 257 | 17 |
| **SST 398** |  |  | 288 | 4 | 263 | 2 | 275 | 9 | 288 | 12 |
| **Wedzi** | 334 | 1 |  |  |  |  |  |  |  |  |
| **Mean** | **308** |  | **259** |  | **227** |  | **263** |  | **282** |  |
| **LSDt(0,05)** | **15.13** |  | **44.35** |  | **34.66** |  | **15.50** |  | **16.12** |  |
| *Due to severe drought conditions during the growing season no results are available for the 2015 season* | | | | | | | | | | |
| *\* Only Ladybrand data* | | | |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the falling number of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 220288 | 878 |  |  |
| **Treatments** | | 62 | 153151 | 2470 | 7.140 | <0,001 |
| **Genotypes** | | 20 | 36374 | 1819 | 5.260 | <0,001 |
| **Environments** | | 2 | 5555 | 2777 | 5.130 | 0.0068 |
| **Block** |  | 9 | 4877 | 542 | 1.570 | 0.1283 |
| **Interactions** | | 40 | 111223 | 2781 | 8.040 | <0,001 |
| **IPCA** |  | 21 | 104427 | 4973 | 14.380 | <0,001 |
| **IPCA** |  | 19 | 6795 | 358 | 1.030 | 0.4246 |
| **Residuals** | | 0 | 0 |  |  |  |
| **Error** |  | 180 | 62260 | 346 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Elands | 301 | 16 | -2.30776 |  |  |
| 2 | Gariep | 292 | 20 | 0.06817 |  |  |
| 3 | Koonap | 325 | 3 | 1.44828 |  |  |
| 4 | Kougas | 322 | 4 | 1.33086 |  |  |
| 5 | Matlabas | 327 | 2 | 3.13091 |  |  |
| 6 | PAN 3111 | 302 | 14 | -3.99487 |  |  |
| 7 | PAN 3118 | 295 | 19 | -0.23495 |  |  |
| 8 | PAN 3120 | 309 | 9 | 1.51568 |  |  |
| 9 | PAN 3161 | 312 | 7 | -6.08063 |  |  |
| 10 | PAN 3195 | 297 | 18 | -2.16392 |  |  |
| 11 | PAN 3198 | 287 | 21 | -4.31992 |  |  |
| 12 | PAN 3368 | 301 | 15 | 0.67914 |  |  |
| 13 | PAN 3379 | 310 | 8 | 0.68870 |  |  |
| 14 | Senqu | 305 | 12 | -1.45015 |  |  |
| 15 | SST 3149 | 317 | 6 | 3.33624 |  |  |
| 16 | SST 316 | 305 | 13 | 0.66903 |  |  |
| 17 | SST 317 | 308 | 10 | 2.52161 |  |  |
| 18 | SST 347 | 322 | 5 | 2.27273 |  |  |
| 19 | SST 356 | 308 | 11 | 1.46822 |  |  |
| 20 | SST 387 | 299 | 17 | -3.45022 |  |  |
| 21 | Wedzi | 334 | 1 | 4.87283 |  |  |
| **Mean** | | **308** |  |  |  |  |
| **Coefficient of variation (%)** | | **6.10** |  |  |  |  |
| **LSDt(0.05)** | | **15.13** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 313 | 1 | -2.54185 |  |  |
| 2 | Clocolan TW | 310 | 2 | -7.44356 |  |  |
| 3 | Petrus Steyn | 302 | 3 | 9.98542 |  |  |
| **Mean** | | **308** |  |  |  |  |
| **Coefficient of variation (%)** | | **6.10** |  |  |  |  |
| **LSDt(0.05)** | | **5.72** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Arlington JvT 2016-06-27** | | | | | | | | | |
|  | **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.91 | hij | 19 | 5.24 | 79.03 | 6 | 14.20 | 2 | 317 | 9 |
| **Gariep** | 3.04 | fghi | 14 | 6.58 | 79.28 | 2 | 14.13 | 4 | 294 | 21 |
| **Koonap** | 3.08 | fghi | 13 | 7.23 | 78.55 | 7 | 14.20 | 2 | 317 | 8 |
| **Kougas** | 3.24 | cdef | 8 | 6.94 | 79.25 | 3 | 13.26 | 15 | 318 | 7 |
| **Matlabas** | 4.08 | a | 1 | 7.36 | 78.50 | 10 | 13.30 | 14 | 321 | 4 |
| **PAN 3111** | 3.36 | cd | 4 | 7.37 | 77.48 | 18 | 11.82 | 21 | 301 | 19 |
| **PAN 3118** | 3.26 | cdef | 7 | 7.18 | 78.55 | 7 | 12.64 | 19 | 311 | 15 |
| **PAN 3120** | 2.48 | k | 21 | 7.06 | 78.48 | 11 | 13.62 | 10 | 313 | 12 |
| **PAN 3161** | 3.34 | cde | 6 | 6.55 | 77.90 | 16 | 13.63 | 9 | 331 | 1 |
| **PAN 3195** | 3.01 | ghi | 16 | 7.57 | 77.30 | 20 | 12.94 | 17 | 295 | 20 |
| **PAN 3198** | 3.01 | ghi | 17 | 7.95 | 78.13 | 12 | 14.55 | 1 | 314 | 11 |
| **PAN 3368** | 3.04 | fghi | 15 | 3.96 | 77.43 | 19 | 13.76 | 8 | 307 | 17 |
| **PAN 3379** | 2.69 | jk | 20 | 5.48 | 78.53 | 9 | 13.54 | 11 | 312 | 13 |
| **Senqu** | 3.14 | defg | 10 | 7.30 | 79.05 | 4 | 13.97 | 5 | 316 | 10 |
| **SST 3149** | 3.16 | defg | 9 | 4.85 | 76.43 | 21 | 13.92 | 6 | 325 | 2 |
| **SST 316** | 3.13 | efgh | 11 | 5.68 | 78.08 | 13 | 13.78 | 7 | 307 | 16 |
| **SST 317** | 3.43 | c | 3 | 6.60 | 78.00 | 15 | 13.51 | 12 | 311 | 14 |
| **SST 347** | 3.35 | cde | 5 | 7.76 | 79.83 | 1 | 13.45 | 13 | 322 | 3 |
| **SST 356** | 3.00 | ghi | 18 | 7.05 | 78.05 | 14 | 12.85 | 18 | 307 | 18 |
| **SST 387** | 3.09 | fghi | 12 | 7.07 | 77.65 | 17 | 12.26 | 20 | 319 | 5 |
| **Wedzi** | 3.66 | b | 2 | 8.74 | 79.05 | 4 | 13.07 | 16 | 319 | 5 |
| **Mean** | **3.17** |  |  |  | **78.31** |  | **13.45** |  | **313** |  |
| **Coefficient of variation (%)** | **5.08** |  |  |  | **1.05** |  | **8.24** |  | **3.75** |  |
| **LSDt(0,05)** | **0.23** |  |  |  | **1.18** |  | **1.59** |  | **16.76** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Clocolan TW 2016-06-22** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 1.78 | hi | 17 | 14.10 | 81.15 | 9 | 13.59 | 16 | 316 | 7 |
| **Gariep** | 1.64 | ij | 20 | 13.54 | 82.30 | 2 | 13.57 | 17 | 295 | 18 |
| **Koonap** | 2.02 | gh | 14 | 10.77 | 82.35 | 1 | 13.67 | 11 | 322 | 4 |
| **Kougas** | 2.90 | a | 1 | 7.63 | 82.15 | 3 | 13.94 | 7 | 318 | 6 |
| **Matlabas** | 2.63 | abcd | 5 | 7.30 | 79.78 | 18 | 13.12 | 20 | 307 | 11 |
| **PAN 3111** | 2.59 | abcde | 6 | 15.57 | 80.85 | 11 | 13.21 | 19 | 344 | 2 |
| **PAN 3118** | 2.26 | fg | 12 | 13.15 | 81.63 | 4 | 13.90 | 8 | 291 | 19 |
| **PAN 3120** | 2.72 | abc | 3 | 7.35 | 81.40 | 6 | 14.00 | 6 | 297 | 16 |
| **PAN 3161** | 2.79 | ab | 2 | 11.64 | 80.73 | 14 | 13.73 | 9 | 360 | 1 |
| **PAN 3195** | 2.66 | abcd | 4 | 12.84 | 80.45 | 16 | 13.73 | 9 | 324 | 3 |
| **PAN 3198** | 2.35 | defg | 11 | 10.51 | 80.53 | 15 | 14.52 | 3 | 314 | 9 |
| **PAN 3368** | 1.41 | j | 21 | 19.60 | 79.08 | 20 | 14.45 | 4 | 296 | 17 |
| **PAN 3379** | 1.88 | hi | 16 | 15.67 | 81.18 | 8 | 14.13 | 5 | 308 | 10 |
| **Senqu** | 1.72 | hij | 19 | 17.37 | 80.83 | 12 | 14.74 | 1 | 316 | 7 |
| **SST 3149** | 1.90 | hi | 15 | 7.56 | 77.88 | 21 | 13.62 | 15 | 286 | 21 |
| **SST 316** | 2.53 | bcdef | 8 | 21.00 | 80.35 | 17 | 13.64 | 14 | 302 | 14 |
| **SST 317** | 2.03 | gh | 13 | 17.85 | 79.40 | 19 | 13.67 | 11 | 287 | 20 |
| **SST 347** | 1.73 | hij | 18 | 7.36 | 80.95 | 10 | 14.63 | 2 | 306 | 12 |
| **SST 356** | 2.37 | def | 10 | 5.63 | 80.75 | 13 | 13.05 | 21 | 300 | 15 |
| **SST 387** | 2.57 | abcdef | 7 | 19.41 | 81.55 | 5 | 13.37 | 18 | 321 | 5 |
| **Wedzi** | 2.53 | bcdef | 9 | 6.28 | 81.38 | 7 | 13.67 | 11 | 305 | 13 |
| **Mean** | **2.24** |  |  |  | **80.79** |  | **13.81** |  | **310** |  |
| **Coefficient of variation (%)** | **10.15** |  |  |  | **0.74** |  | **7.66** |  | **6.76** |  |
| **LSDt(0,05)** | **0.33** |  |  |  | **0.86** |  | **1.52** |  | **30.22** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Petrus Steyn 2016-06-23** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 1.53 | jk | 19 | 6.03 | 74.43 | 16 | 17.10 | 3 | 270 | 17 |
| **Gariep** | 1.70 | ij | 16 | 7.95 | 76.78 | 3 | 16.70 | 4 | 287 | 13 |
| **Koonap** | 1.24 | l | 20 | 5.59 | 75.45 | 13 | 17.54 | 1 | 335 | 5 |
| **Kougas** | 2.20 | fg | 9 | 12.32 | 76.85 | 2 | 15.36 | 11 | 330 | 6 |
| **Matlabas** | 2.79 | ab | 2 | 8.20 | 75.60 | 10 | 13.23 | 21 | 353 | 2 |
| **PAN 3111** | 2.26 | ef | 8 | 6.44 | 75.88 | 8 | 14.31 | 18 | 260 | 18 |
| **PAN 3118** | 1.99 | gh | 13 | 8.08 | 75.98 | 7 | 15.55 | 9 | 283 | 15 |
| **PAN 3120** | 2.28 | ef | 7 | 5.81 | 76.25 | 6 | 14.82 | 15 | 316 | 9 |
| **PAN 3161** | 2.12 | fg | 10 | 7.39 | 74.03 | 19 | 15.93 | 7 | 245 | 20 |
| **PAN 3195** | 2.05 | gh | 11 | 9.42 | 75.15 | 14 | 14.40 | 17 | 273 | 16 |
| **PAN 3198** | 1.59 | jk | 18 | 6.67 | 73.93 | 20 | 15.49 | 10 | 235 | 21 |
| **PAN 3368** | 1.64 | jk | 17 | 5.61 | 74.33 | 17 | 17.43 | 2 | 301 | 12 |
| **PAN 3379** | 1.07 | l | 21 | 7.63 | 72.75 | 21 | 16.03 | 6 | 311 | 10 |
| **Senqu** | 1.90 | hi | 14 | 7.63 | 75.70 | 9 | 16.57 | 5 | 284 | 14 |
| **SST 3149** | 2.67 | bc | 3 | 3.87 | 74.53 | 15 | 14.11 | 19 | 341 | 3 |
| **SST 316** | 1.71 | ij | 15 | 10.08 | 75.55 | 12 | 15.15 | 12 | 305 | 11 |
| **SST 317** | 2.46 | cde | 5 | 7.26 | 76.30 | 5 | 14.91 | 14 | 325 | 7 |
| **SST 347** | 2.97 | a | 1 | 4.77 | 78.48 | 1 | 13.68 | 20 | 338 | 4 |
| **SST 356** | 2.03 | gh | 12 | 7.65 | 74.08 | 18 | 15.57 | 8 | 317 | 8 |
| **SST 387** | 2.65 | bcd | 4 | 3.27 | 75.60 | 10 | 14.60 | 16 | 256 | 19 |
| **Wedzi** | 2.45 | de | 6 | 9.16 | 76.48 | 4 | 14.99 | 13 | 379 | 1 |
| **Mean** | **2.06** |  |  |  | **75.43** |  | **15.40** |  | **302** |  |
| **Coefficient of variation (%)** | **7.31** |  |  |  | **0.99** |  | **4.50** |  | **8.16** |  |
| **LSDt(0,05)** | **0.21** |  |  |  | **1.07** |  | **1.00** |  | **34.58** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting)** | | | | | | | | | | |
| **Average yield (ton/ha) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 2.50 | 14 | 1.89 | 14 | 2.54 | 5 | 2.31 | 12 | 2.19 | 15 |
| **Gariep** | 2.71 | 5 | 1.83 | 16 | 2.22 | 16 | 2.25 | 14 | 2.27 | 14 |
| **Koonap** | 2.36 | 16 | 1.72 | 17 | 2.39 | 8 | 2.16 | 15 | 2.04 | 16 |
| **Kougas** | 2.53 | 12 |  |  |  |  |  |  |  |  |
| **PAN 3111** | 2.67 | 8 | 3.33 | 1 | 2.61 | 2 | 2.87 | 1 | 3.00 | 2 |
| **PAN 3118** | 2.25 | 19 | 2.58 | 6 | 2.55 | 4 | 2.46 | 8 | 2.42 | 11 |
| **PAN 3161** | 3.08 | 1 | 2.80 | 4 | 2.26 | 12 | 2.71 | 3 | 2.94 | 3 |
| **PAN 3195** | 2.91 | 2 | 3.20 | 2 | 2.32 | 10 | 2.81 | 2 | 3.06 | 1 |
| **PAN 3198** | 2.40 | 15 | 2.17 | 12 | 1.87 | 18 | 2.15 | 16 | 2.29 | 12 |
| **PAN 3368** | 2.69 | 7 | 2.17 | 12 | 2.49 | 6 | 2.45 | 9 | 2.43 | 10 |
| **PAN 3379** | 2.63 | 10 | 2.25 | 10 | 2.24 | 14 | 2.37 | 11 | 2.44 | 8 |
| **Senqu** | 2.69 | 6 | 1.87 | 15 | 2.23 | 15 | 2.26 | 13 | 2.28 | 13 |
| **SST 316** | 2.67 | 8 | 2.19 | 11 | 2.32 | 11 | 2.39 | 10 | 2.43 | 9 |
| **SST 317** | 2.56 | 11 | 2.47 | 7 | 2.57 | 3 | 2.53 | 6 | 2.51 | 7 |
| **SST 347** | 2.32 | 17 | 3.02 | 3 | 2.42 | 7 | 2.59 | 4 | 2.67 | 5 |
| **SST 356** | 2.91 | 3 | 2.33 | 8 | 2.37 | 9 | 2.54 | 5 | 2.62 | 6 |
| **SST 374** | 2.50 | 13 |  |  | 2.26 | 13 |  |  |  |  |
| **SST 387** | 2.80 | 4 | 2.66 | 5 | 2.10 | 17 | 2.52 | 7 | 2.73 | 4 |
| **SST 398** |  |  | 2.27 |  | 2.79 |  |  |  |  |  |
| **Wedzi** | 2.26 | 18 |  |  |  |  |  |  |  |  |
| **Mean** | **2.60** |  | **2.40** |  | **2.36** |  | **2.46** |  | **2.52** |  |
| **LSDt(0,05)** | **0.17** |  | **0.22** |  | **0.30** |  | **0.13** |  | **0.14** |  |

*Due to severe drought conditions during the growing season no results are available for the 2015 season*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the yield of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 303 | 177.39 | 0.585 |  |  |
| **Treatments** | | 75 | 162.39 | 2.165 | 39.05 | <0,001 |
| **Genotypes** | | 18 | 14.88 | 0.827 | 14.91 | <0,001 |
| **Environments** | | 3 | 92.18 | 30.725 | 122.18 | <0,001 |
| **Block** |  | 12 | 3.02 | 0.251 | 4.54 | <0,001 |
| **Interactions** | | 54 | 55.34 | 1.025 | 18.48 | <0,001 |
| **IPCA** |  | 20 | 36.84 | 1.842 | 33.22 | <0,001 |
| **IPCA** |  | 18 | 13.4 | 0.744 | 13.42 | <0,001 |
| **Residuals** | | 16 | 5.1 | 0.319 | 5.75 | <0,001 |
| **Error** |  | 216 | 11.98 | 0.055 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Elands | 2.50 | 14 | -0.62926 |  |  |
| 2 | Gariep | 2.71 | 5 | -0.20535 |  |  |
| 3 | Koonap | 2.36 | 16 | -0.75040 |  |  |
| 4 | Kougas | 2.53 | 12 | -0.33044 |  |  |
| 5 | PAN 3111 | 2.67 | 8 | 0.43473 |  |  |
| 6 | PAN 3118 | 2.25 | 19 | 0.46106 |  |  |
| 7 | PAN 3161 | 3.08 | 1 | -0.47130 |  |  |
| 8 | PAN 3195 | 2.91 | 2 | 0.05600 |  |  |
| 9 | PAN 3198 | 2.40 | 15 | -0.11869 |  |  |
| 10 | PAN 3368 | 2.69 | 7 | -0.04891 |  |  |
| 11 | PAN 3379 | 2.63 | 10 | -0.34014 |  |  |
| 12 | Senqu | 2.69 | 6 | -0.16226 |  |  |
| 13 | SST 316 | 2.67 | 8 | 0.50242 |  |  |
| 14 | SST 317 | 2.56 | 11 | 0.43066 |  |  |
| 15 | SST 347 | 2.32 | 17 | 0.39345 |  |  |
| 16 | SST 356 | 2.91 | 3 | 0.54024 |  |  |
| 17 | SST 374 | 2.50 | 13 | -0.23976 |  |  |
| 18 | SST 387 | 2.80 | 4 | 0.44234 |  |  |
| 19 | Wedzi | 2.26 | 18 | 0.03562 |  |  |
| **Mean** | | **2.60** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.40** |  |  |  |  |
| **LSDt(0.05)** | | **0.17** |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 2.14 | 4 | -1.49199 |  |  |
| 2 | Clocolan LO | 2.17 | 3 | 0.28747 |  |  |
| 3 | Clocolan TW | 3.51 | 1 | 0.58472 |  |  |
| 4 | Petrus Steyn | 2.59 | 2 | 0.61980 |  |  |
| **Mean** | | **2.60** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.40** |  |  |  |  |
| **LSDt(0.05)** | | **0.08** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting)** | | | | | | | | | | |
| **Average hectolitre mass (kg/hl) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 78.07 | 2 | 78.79 | 3 | 79.71 | 2 | 78.86 | 2 | 78.43 | 1 |
| **Gariep** | 77.41 | 4 | 78.41 | 5 | 78.99 | 7 | 78.27 | 5 | 77.91 | 4 |
| **Koonap** | 78.54 | 1 | 78.19 | 6 | 80.69 | 1 | 79.14 | 1 | 78.37 | 2 |
| **Kougas** | 77.49 | 3 |  |  |  |  |  |  |  |  |
| **PAN 3111** | 75.04 | 14 | 77.27 | 15 | 77.79 | 11 | 76.70 | 12 | 76.16 | 12 |
| **PAN 3118** | 75.92 | 11 | 77.42 | 13 | 78.94 | 8 | 77.43 | 7 | 76.67 | 9 |
| **PAN 3161** | 75.95 | 10 | 77.56 | 9 | 77.69 | 12 | 77.07 | 9 | 76.76 | 7 |
| **PAN 3195** | 74.48 | 17 | 77.29 | 14 | 76.81 | 16 | 76.19 | 14 | 75.89 | 15 |
| **PAN 3198** | 75.23 | 13 | 77.47 | 12 | 77.55 | 13 | 76.75 | 11 | 76.35 | 10 |
| **PAN 3368** | 75.52 | 12 | 77.84 | 7 | 78.71 | 10 | 77.36 | 8 | 76.68 | 8 |
| **PAN 3379** | 76.38 | 7 | 79.04 | 2 | 79.09 | 6 | 78.17 | 6 | 77.71 | 6 |
| **Senqu** | 77.10 | 5 | 78.51 | 4 | 79.50 | 3 | 78.37 | 4 | 77.81 | 5 |
| **SST 316** | 74.45 | 18 | 77.55 | 11 | 76.43 | 17 | 76.14 | 15 | 76.00 | 14 |
| **SST 317** | 74.50 | 16 | 77.60 | 8 | 78.76 | 9 | 76.95 | 10 | 76.05 | 13 |
| **SST 347** | 76.39 | 6 | 79.85 | 1 | 79.41 | 5 | 78.55 | 3 | 78.12 | 3 |
| **SST 356** | 74.81 | 15 | 77.56 | 9 | 76.35 | 18 | 76.24 | 13 | 76.19 | 11 |
| **SST 374** | 76.01 | 9 |  |  | 76.86 | 15 |  |  |  |  |
| **SST 387** | 74.21 | 19 | 76.59 | 16 | 77.15 | 14 | 75.98 | 16 | 75.40 | 16 |
| **SST 398** |  |  | 75.17 | 17 | 79.50 | 3 |  |  |  |  |
| **Wedzi** | 76.13 | 8 |  |  |  |  |  |  |  |  |
| **Mean** | **75.98** |  | **77.77** |  | **78.33** |  | **77.39** |  | **76.90** |  |
| **LSDt(0,05)** | **1.12** |  | **1.32** |  | **0.84** |  | **0.72** |  | **0.91** |  |

*Due to severe drought conditions during the growing season no results are available for the 2015 season*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the hectolitre mass of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 303 | 2611.3 | 8.62 |  |  |
| **Treatments** | | 75 | 1995.5 | 26.61 | 13.13 | <0,001 |
| **Genotypes** | | 18 | 477.2 | 26.51 | 13.08 | <0,001 |
| **Environments** | | 3 | 1133.6 | 377.87 | 25.46 | <0,001 |
| **Block** |  | 12 | 178.1 | 14.84 | 7.32 | <0,001 |
| **Interactions** | | 54 | 384.6 | 7.12 | 3.52 | <0,001 |
| **IPCA** |  | 20 | 228.6 | 11.43 | 5.64 | <0,001 |
| **IPCA** |  | 18 | 130.8 | 7.27 | 3.59 | <0,001 |
| **Residuals** | | 16 | 25.3 | 1.58 | 0.78 | 0.7085 |
| **Error** |  | 216 | 437.7 | 2.03 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Elands | 78.07 | 2 | 0.15366 |  |  |
| 2 | Gariep | 77.41 | 4 | -0.33222 |  |  |
| 3 | Koonap | 78.54 | 1 | -0.10592 |  |  |
| 4 | Kougas | 77.49 | 3 | 0.21722 |  |  |
| 5 | PAN 3111 | 75.04 | 14 | 0.32700 |  |  |
| 6 | PAN 3118 | 75.92 | 11 | 0.39596 |  |  |
| 7 | PAN 3161 | 75.95 | 10 | 0.30133 |  |  |
| 8 | PAN 3195 | 74.48 | 17 | -0.34340 |  |  |
| 9 | PAN 3198 | 75.23 | 13 | -0.28340 |  |  |
| 10 | PAN 3368 | 75.52 | 12 | 0.19705 |  |  |
| 11 | PAN 3379 | 76.38 | 7 | -1.09622 |  |  |
| 12 | Senqu | 77.10 | 5 | -0.30323 |  |  |
| 13 | SST 316 | 74.45 | 18 | -0.10058 |  |  |
| 14 | SST 317 | 74.50 | 16 | 0.21342 |  |  |
| 15 | SST 347 | 76.39 | 6 | 1.92010 |  |  |
| 16 | SST 356 | 74.81 | 15 | 0.00314 |  |  |
| 17 | SST 374 | 76.01 | 9 | -0.27187 |  |  |
| 18 | SST 387 | 74.21 | 19 | -1.24203 |  |  |
| 19 | Wedzi | 76.13 | 8 | 0.34998 |  |  |
| **Mean** | | **75.98** |  |  |  |  |
| **Coefficient of variation (%)** | | **2.10** |  |  |  |  |
| **LSDt(0.05)** | | **1.12** |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 73.96 | 4 | 0.99714 |  |  |
| 2 | Clocolan LO | 76.35 | 2 | 0.30074 |  |  |
| 3 | Clocolan TW | 78.97 | 1 | -2.32705 |  |  |
| 4 | Petrus Steyn | 74.64 | 3 | 1.02917 |  |  |
| **Mean** | | **75.98** |  |  |  |  |
| **Coefficient of variation (%)** | | **2.10** |  |  |  |  |
| **LSDt(0.05)** | | **0.51** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting)** | | | | | | | | | | |
| **Average protein content (%) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 15.13 | 6 | 15.78 | 5 | 13.77 | 6 | 14.89 | 6 | 15.46 | 5 |
| **Gariep** | 14.51 | 13 | 15.83 | 3 | 13.59 | 7 | 14.64 | 7 | 15.17 | 7 |
| **Koonap** | 15.65 | 1 | 16.15 | 1 | 14.09 | 1 | 15.30 | 1 | 15.90 | 1 |
| **Kougas** | 14.90 | 8 |  |  |  |  |  |  |  |  |
| **PAN 3111** | 14.27 | 17 | 14.31 | 14 | 12.57 | 17 | 13.72 | 14 | 14.29 | 13 |
| **PAN 3118** | 15.62 | 2 | 15.86 | 2 | 14.04 | 2 | 15.17 | 2 | 15.74 | 2 |
| **PAN 3161** | 14.22 | 18 | 13.85 | 16 | 13.37 | 10 | 13.81 | 13 | 14.04 | 16 |
| **PAN 3195** | 14.52 | 12 | 14.53 | 13 | 13.06 | 12 | 14.04 | 11 | 14.53 | 12 |
| **PAN 3198** | 15.51 | 4 | 15.53 | 7 | 13.89 | 4 | 14.98 | 4 | 15.52 | 4 |
| **PAN 3368** | 15.26 | 5 | 15.65 | 6 | 13.91 | 3 | 14.94 | 5 | 15.46 | 5 |
| **PAN 3379** | 14.49 | 14 | 15.27 | 8 | 13.28 | 11 | 14.35 | 8 | 14.88 | 9 |
| **Senqu** | 15.53 | 3 | 15.82 | 4 | 13.86 | 5 | 15.07 | 3 | 15.68 | 3 |
| **SST 316** | 14.29 | 16 | 14.83 | 11 | 13.04 | 13 | 14.05 | 10 | 14.56 | 10 |
| **SST 317** | 14.95 | 7 | 15.07 | 10 | 12.79 | 15 | 14.27 | 9 | 15.01 | 8 |
| **SST 347** | 14.76 | 9 | 13.65 | 17 | 12.65 | 16 | 13.69 | 15 | 14.21 | 14 |
| **SST 356** | 14.34 | 15 | 14.75 | 12 | 12.97 | 14 | 14.02 | 12 | 14.55 | 11 |
| **SST 374** | 14.73 | 11 |  |  | 13.38 | 9 |  |  |  |  |
| **SST 387** | 14.10 | 19 | 14.26 | 15 | 12.48 | 18 | 13.61 | 16 | 14.18 | 15 |
| **SST 398** |  |  | 15.12 | 9 | 13.48 | 8 |  |  |  |  |
| **Wedzi** | 14.75 | 10 |  |  |  |  |  |  |  |  |
| **Mean** | **14.82** |  | **15.07** |  | **13.35** |  | **14.41** |  | **14.95** |  |
| **LSDt(0,05)** | **0.55** |  | **0.50** |  | **0.71** |  | **0.37** |  | **0.42** |  |

*Due to severe drought conditions during the growing season no results are available for the 2015 season*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the protein content of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 303 | 771.4 | 2.55 |  |  |
| **Treatments** | | 75 | 623.8 | 8.32 | 15.59 | <0,001 |
| **Genotypes** | | 18 | 74.0 | 4.11 | 7.71 | <0,001 |
| **Environments** | | 3 | 477.7 | 159.24 | 59.14 | <0,001 |
| **Block** |  | 12 | 32.3 | 2.69 | 5.05 | <0,001 |
| **Interactions** | | 54 | 72.1 | 1.34 | 2.50 | <0,001 |
| **IPCA** |  | 20 | 35.4 | 1.77 | 3.31 | <0,001 |
| **IPCA** |  | 18 | 31.0 | 1.72 | 3.22 | <0,001 |
| **Residuals** | | 16 | 5.8 | 0.36 | 0.68 | 0.8155 |
| **Error** |  | 216 | 115.3 | 0.53 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Elands | 15.13 | 6 | 0.11836 |  |  |
| 2 | Gariep | 14.51 | 13 | -0.43106 |  |  |
| 3 | Koonap | 15.65 | 1 | -0.25720 |  |  |
| 4 | Kougas | 14.90 | 8 | 0.09441 |  |  |
| 5 | PAN 3111 | 14.27 | 17 | 0.01223 |  |  |
| 6 | PAN 3118 | 15.62 | 2 | 0.65900 |  |  |
| 7 | PAN 3161 | 14.22 | 18 | 0.66283 |  |  |
| 8 | PAN 3195 | 14.52 | 12 | 0.36307 |  |  |
| 9 | PAN 3198 | 15.51 | 4 | -0.25388 |  |  |
| 10 | PAN 3368 | 15.26 | 5 | 0.35789 |  |  |
| 11 | PAN 3379 | 14.49 | 14 | -0.76419 |  |  |
| 12 | Senqu | 15.53 | 3 | -0.35773 |  |  |
| 13 | SST 316 | 14.29 | 16 | 0.02760 |  |  |
| 14 | SST 317 | 14.95 | 7 | 0.03044 |  |  |
| 15 | SST 347 | 14.76 | 9 | 0.55617 |  |  |
| 16 | SST 356 | 14.34 | 15 | 0.06527 |  |  |
| 17 | SST 374 | 14.73 | 11 | -0.55348 |  |  |
| 18 | SST 387 | 14.10 | 19 | -0.40180 |  |  |
| 19 | Wedzi | 14.75 | 10 | 0.07206 |  |  |
| **Mean** | | **14.82** |  |  |  |  |
| **Coefficient of variation (%)** | | **5.30** |  |  |  |  |
| **LSDt(0.05)** | | **0.55** |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 14.87 | 2 | 0.32627 |  |  |
| 2 | Clocolan LO | 16.84 | 1 | -0.00746 |  |  |
| 3 | Clocolan TW | 13.63 | 4 | 1.02717 |  |  |
| 4 | Petrus Steyn | 13.93 | 3 | -1.34597 |  |  |
| **Mean** | | **14.82** |  |  |  |  |
| **Coefficient of variation (%)** | | **5.30** |  |  |  |  |
| **LSDt(0.05)** | | **0.25** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting)** | | | | | | | | | | |
| **Average falling number (s) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2014** | **R** | **2013** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013, 2014 & 2016** | **2014 & 2016** |
| **Elands** | 363 | 6 | 292 | 4 | 286 | 17 | 314 | 7 | 327 | 3 |
| **Gariep** | 349 | 12 | 274 | 13 | 265 | 18 | 296 | 15 | 312 | 10 |
| **Koonap** | 368 | 2 | 293 | 3 | 311 | 2 | 324 | 1 | 331 | 2 |
| **Kougas** | 358 | 8 |  |  |  |  |  |  |  |  |
| **PAN 3111** | 341 | 16 | 260 | 15 | 325 | 1 | 309 | 8 | 301 | 15 |
| **PAN 3118** | 332 | 17 | 287 | 7 | 302 | 6 | 307 | 9 | 309 | 11 |
| **PAN 3161** | 378 | 1 | 301 | 1 | 290 | 14 | 323 | 2 | 339 | 1 |
| **PAN 3195** | 316 | 19 | 244 | 17 | 310 | 3 | 290 | 16 | 280 | 16 |
| **PAN 3198** | 346 | 13 | 259 | 16 | 304 | 5 | 303 | 12 | 303 | 14 |
| **PAN 3368** | 331 | 18 | 274 | 12 | 296 | 8 | 301 | 14 | 303 | 13 |
| **PAN 3379** | 359 | 7 | 294 | 2 | 306 | 4 | 319 | 3 | 326 | 5 |
| **Senqu** | 363 | 4 | 288 | 6 | 301 | 7 | 317 | 4 | 326 | 6 |
| **SST 316** | 365 | 3 | 285 | 8 | 296 | 9 | 315 | 6 | 325 | 7 |
| **SST 317** | 350 | 11 | 276 | 11 | 287 | 16 | 304 | 11 | 313 | 8 |
| **SST 347** | 341 | 15 | 283 | 9 | 290 | 15 | 305 | 10 | 312 | 9 |
| **SST 356** | 363 | 4 | 290 | 5 | 294 | 11 | 315 | 5 | 326 | 4 |
| **SST 374** | 352 | 10 |  |  | 291 | 13 |  |  |  |  |
| **SST 387** | 344 | 14 | 268 | 14 | 292 | 12 | 301 | 13 | 306 | 12 |
| **SST 398** |  |  | 280 | 10 | 295 | 10 |  |  |  |  |
| **Wedzi** | 357 | 9 |  |  |  |  |  |  |  |  |
| **Mean** | **351** |  | **279** |  | **297** |  | **309** |  | **315** |  |
| **LSDt(0,05)** | **14.90** |  | **12.55** |  | **12.89** |  | **8.60** |  | **10.70** |  |

*Due to severe drought conditions during the growing season no results are available for the 2015 season*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Central Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the falling number of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 303 | 501398 | 1655 |  |  |
| **Treatments** | | 75 | 395365 | 5272 | 11.45 | <0,001 |
| **Genotypes** | | 18 | 64792 | 3600 | 7.82 | <0,001 |
| **Environments** | | 3 | 224478 | 74826 | 136.07 | <0,001 |
| **Block** |  | 12 | 6599 | 550 | 1.19 | 0.2883 |
| **Interactions** | | 54 | 106095 | 1965 | 4.27 | <0,001 |
| **IPCA** |  | 20 | 73439 | 3672 | 7.98 | <0,001 |
| **IPCA** |  | 18 | 25127 | 1396 | 3.03 | <0,001 |
| **Residuals** | | 16 | 7530 | 471 | 1.02 | 0.4342 |
| **Error** |  | 216 | 99434 | 460 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Elands | 363 | 6 | 2.16521 |  |  |
| 2 | Gariep | 349 | 12 | -0.20406 |  |  |
| 3 | Koonap | 368 | 2 | 0.64216 |  |  |
| 4 | Kougas | 358 | 8 | -0.75275 |  |  |
| 5 | PAN 3111 | 341 | 16 | -1.17279 |  |  |
| 6 | PAN 3118 | 332 | 17 | -1.66088 |  |  |
| 7 | PAN 3161 | 378 | 1 | 1.07037 |  |  |
| 8 | PAN 3195 | 316 | 19 | -9.27568 |  |  |
| 9 | PAN 3198 | 346 | 13 | -1.82211 |  |  |
| 10 | PAN 3368 | 331 | 18 | 1.98178 |  |  |
| 11 | PAN 3379 | 359 | 7 | 1.52106 |  |  |
| 12 | Senqu | 363 | 4 | 2.66346 |  |  |
| 13 | SST 316 | 365 | 3 | 1.02203 |  |  |
| 14 | SST 317 | 350 | 11 | 0.44428 |  |  |
| 15 | SST 347 | 341 | 15 | 1.77276 |  |  |
| 16 | SST 356 | 363 | 4 | 1.79861 |  |  |
| 17 | SST 374 | 352 | 10 | -0.68241 |  |  |
| 18 | SST 387 | 344 | 14 | -2.36428 |  |  |
| 19 | Wedzi | 357 | 9 | 2.85324 |  |  |
| **Mean** | | **351** |  |  |  |  |
| **Coefficient of variation (%)** | | **6.10** |  |  |  |  |
| **LSDt(0.05)** | | **14.90** |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Arlington JvT | 366 | 2 | 9.12976 |  |  |
| 2 | Clocolan LO | 384 | 1 | -0.34528 |  |  |
| 3 | Clocolan TW | 344 | 3 | -6.98478 |  |  |
| 4 | Petrus Steyn | 311 | 4 | -1.79970 |  |  |
| **Mean** | | **351** |  |  |  |  |
| **Coefficient of variation (%)** | | **6.10** |  |  |  |  |
| **LSDt(0.05)** | | **6.80** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Arlington JvT 2016-07-21** | | | | | | | | | |
|  | **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.96 | b | 3 | 9.07 | 76.73 | 2 | 14.83 | 10 | 399 | 5 |
| **Gariep** | 2.53 | cde | 6 | 6.02 | 74.48 | 10 | 14.08 | 19 | 357 | 13 |
| **Koonap** | 2.96 | b | 2 | 8.31 | 76.87 | 1 | 15.50 | 2 | 390 | 8 |
| **Kougas** | 2.58 | cd | 5 | 8.15 | 75.75 | 3 | 14.73 | 11 | 366 | 11 |
| **PAN 3111** | 1.59 | ghi | 15 | 6.31 | 72.54 | 16 | 14.85 | 9 | 347 | 16 |
| **PAN 3118** | 1.09 | k | 19 | 4.29 | 75.00 | 6 | 16.15 | 1 | 323 | 18 |
| **PAN 3161** | 3.37 | a | 1 | 7.97 | 74.74 | 7 | 14.46 | 14 | 400 | 3 |
| **PAN 3195** | 2.41 | cde | 8 | 3.23 | 71.38 | 17 | 15.17 | 7 | 244 | 19 |
| **PAN 3198** | 2.13 | f | 11 | 5.37 | 72.98 | 14 | 15.18 | 6 | 351 | 15 |
| **PAN 3368** | 2.30 | ef | 10 | 5.19 | 74.50 | 8 | 15.31 | 5 | 361 | 12 |
| **PAN 3379** | 2.65 | c | 4 | 6.71 | 73.67 | 12 | 14.32 | 18 | 393 | 6 |
| **Senqu** | 2.52 | cde | 7 | 9.95 | 75.14 | 5 | 15.40 | 3 | 401 | 2 |
| **SST 316** | 1.44 | ij | 17 | 1.77 | 71.33 | 18 | 14.37 | 17 | 400 | 4 |
| **SST 317** | 1.47 | hi | 16 | 6.77 | 73.56 | 13 | 15.33 | 4 | 368 | 10 |
| **SST 347** | 1.22 | jk | 18 | 7.63 | 75.30 | 4 | 14.40 | 16 | 357 | 14 |
| **SST 356** | 1.68 | gh | 13 | 6.54 | 72.88 | 15 | 14.87 | 8 | 405 | 1 |
| **SST 374** | 2.41 | de | 9 | 3.92 | 74.19 | 11 | 14.43 | 15 | 373 | 9 |
| **SST 387** | 1.63 | ghi | 14 | 6.81 | 69.80 | 19 | 14.60 | 12 | 336 | 17 |
| **Wedzi** | 1.75 | g | 12 | 9.73 | 74.49 | 9 | 14.49 | 13 | 392 | 7 |
| **Mean** | **2.14** |  |  |  | **73.96** |  | **14.87** |  | **366** |  |
| **Coefficient of variation (%)** | **7.67** |  |  |  | **2.04** |  | **4.01** |  | **5.88** |  |
| **LSDt(0,05)** | **0.24** |  |  |  | **2.20** |  | **0.87** |  | **31.34** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Clocolan LO 2016-07-14** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 1.98 | ghij | 15 | 10.80 | 77.65 | 5 | 16.92 | 10 | 396 | 6 |
| **Gariep** | 2.43 | bc | 3 | 14.05 | 77.70 | 3 | 16.53 | 18 | 394 | 7 |
| **Koonap** | 2.12 | efghi | 12 | 11.41 | 78.30 | 2 | 17.20 | 6 | 401 | 3 |
| **Kougas** | 1.90 | ij | 17 | 8.42 | 77.70 | 3 | 17.26 | 4 | 398 | 5 |
| **PAN 3111** | 2.23 | cdef | 7 | 8.63 | 77.10 | 8 | 16.56 | 17 | 366 | 17 |
| **PAN 3118** | 2.07 | fghij | 13 | 8.65 | 77.15 | 7 | 17.24 | 5 | 366 | 18 |
| **PAN 3161** | 2.18 | defg | 9 | 8.73 | 76.33 | 11 | 15.91 | 20 | 410 | 1 |
| **PAN 3195** | 2.19 | defg | 8 | 6.29 | 76.25 | 13 | 16.91 | 11 | 355 | 20 |
| **PAN 3198** | 1.87 | j | 19 | 7.13 | 75.30 | 15 | 17.27 | 3 | 368 | 15 |
| **PAN 3368** | 2.17 | defgh | 10 | 6.61 | 74.90 | 18 | 16.71 | 14 | 368 | 15 |
| **PAN 3379** | 2.25 | cdef | 6 | 11.65 | 76.00 | 14 | 16.59 | 16 | 376 | 13 |
| **Senqu** | 1.88 | j | 18 | 5.90 | 76.30 | 12 | 17.34 | 2 | 399 | 4 |
| **SST 316** | 2.61 | ab | 2 | 18.00 | 75.05 | 17 | 16.98 | 8 | 380 | 12 |
| **SST 317** | 2.17 | defgh | 11 | 5.40 | 72.55 | 20 | 17.17 | 7 | 390 | 10 |
| **SST 347** | 2.35 | cde | 5 | 8.72 | 78.45 | 1 | 16.91 | 11 | 394 | 9 |
| **SST 356** | 2.38 | bcd | 4 | 7.10 | 75.15 | 16 | 16.93 | 9 | 371 | 14 |
| **SST 374** | 1.93 | hij | 16 | 6.89 | 74.90 | 18 | 16.00 | 19 | 362 | 19 |
| **SST 387** | 2.78 | a | 1 | 6.37 | 76.60 | 10 | 16.70 | 15 | 394 | 8 |
| **Wedzi** | 1.85 | j | 20 | 6.89 | 77.20 | 6 | 16.87 | 13 | 406 | 2 |
| **Mean** | **2.17** |  |  |  | **76.35** |  | **16.84** |  | **384** |  |
| **Coefficient of variation (%)** | **7.60** |  |  |  | **2.04** |  | **2.92** |  | **4.95** |  |
| **LSDt(0,05)** | **0.24** |  |  |  | **2.25** |  | **0.71** |  | **27.44** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Clocolan TW 2016-07-14** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.70 | j | 19 | 18.99 | 80.87 | 5 | 14.47 | 6 | 344 | 12 |
| **Gariep** | 3.21 | fgh | 13 | 6.79 | 81.17 | 3 | 13.13 | 15 | 336 | 15 |
| **Koonap** | 2.72 | ij | 18 | 9.65 | 81.90 | 2 | 14.54 | 4 | 359 | 5 |
| **Kougas** | 3.12 | ghi | 15 | 16.25 | 80.02 | 6 | 13.81 | 11 | 355 | 8 |
| **PAN 3111** | 3.97 | abcd | 5 | 10.50 | 76.92 | 18 | 12.58 | 17 | 345 | 11 |
| **PAN 3118** | 3.50 | efg | 10 | 17.76 | 77.82 | 14 | 15.15 | 2 | 318 | 17 |
| **PAN 3161** | 3.50 | efg | 9 | 13.11 | 78.25 | 11 | 13.93 | 9 | 358 | 6 |
| **PAN 3195** | 4.05 | abc | 4 | 17.81 | 77.95 | 13 | 13.17 | 14 | 371 | 1 |
| **PAN 3198** | 3.59 | def | 8 | 11.01 | 78.92 | 9 | 14.41 | 7 | 362 | 4 |
| **PAN 3368** | 3.95 | bcd | 6 | 3.79 | 78.27 | 10 | 14.85 | 3 | 304 | 18 |
| **PAN 3379** | 3.69 | cde | 7 | 7.99 | 82.00 | 1 | 12.46 | 19 | 350 | 10 |
| **Senqu** | 4.08 | abc | 3 | 0.97 | 81.02 | 4 | 14.13 | 8 | 337 | 14 |
| **SST 316** | 3.09 | ghij | 16 | 12.64 | 77.62 | 16 | 12.72 | 16 | 368 | 2 |
| **SST 317** | 3.38 | efgh | 12 | 4.58 | 77.50 | 17 | 13.47 | 13 | 340 | 13 |
| **SST 347** | 3.41 | efg | 11 | 6.93 | 74.67 | 19 | 14.48 | 5 | 294 | 19 |
| **SST 356** | 4.39 | a | 1 | 2.19 | 77.80 | 15 | 12.58 | 17 | 358 | 6 |
| **SST 374** | 3.15 | gh | 14 | 8.86 | 79.92 | 7 | 13.51 | 12 | 367 | 3 |
| **SST 387** | 4.14 | ab | 2 | 6.60 | 79.57 | 8 | 11.77 | 20 | 354 | 9 |
| **Wedzi** | 2.97 | hij | 17 | 13.43 | 78.17 | 12 | 13.85 | 10 | 322 | 16 |
| **Mean** | **3.51** |  |  |  | **78.97** |  | **13.63** |  | **344** |  |
| **Coefficient of variation (%)** | **8.61** |  |  |  | **0.99** |  | **3.89** |  | **6.25** |  |
| **LSDt(0,05)** | **0.42** |  |  |  | **1.12** |  | **0.77** |  | **30.63** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **Central Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Petrus Steyn 2016-07-13** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.35 | fg | 13 | 6.61 | 77.00 | 3 | 14.30 | 7 | 311 | 9 |
| **Gariep** | 2.67 | de | 7 | 6.83 | 76.28 | 5 | 14.32 | 6 | 308 | 11 |
| **Koonap** | 1.65 | j | 20 | 5.14 | 77.10 | 2 | 15.35 | 1 | 323 | 2 |
| **Kougas** | 2.52 | ef | 9 | 6.96 | 76.48 | 4 | 13.82 | 13 | 317 | 6 |
| **PAN 3111** | 2.91 | cd | 6 | 6.34 | 73.48 | 17 | 13.10 | 16 | 304 | 15 |
| **PAN 3118** | 2.36 | fg | 12 | 15.84 | 73.73 | 15 | 13.95 | 10 | 321 | 3 |
| **PAN 3161** | 3.25 | b | 2 | 5.87 | 74.45 | 10 | 12.59 | 20 | 343 | 1 |
| **PAN 3195** | 3.00 | bc | 5 | 11.61 | 72.43 | 19 | 12.85 | 19 | 293 | 20 |
| **PAN 3198** | 2.04 | hi | 18 | 4.67 | 73.73 | 15 | 15.16 | 3 | 306 | 14 |
| **PAN 3368** | 2.32 | fg | 14 | 13.56 | 74.38 | 11 | 14.18 | 8 | 293 | 19 |
| **PAN 3379** | 1.94 | i | 19 | 6.45 | 73.83 | 13 | 14.59 | 5 | 316 | 7 |
| **Senqu** | 2.28 | fgh | 16 | 7.01 | 76.03 | 6 | 15.23 | 2 | 315 | 8 |
| **SST 316** | 3.55 | a | 1 | 4.34 | 73.80 | 14 | 13.06 | 17 | 311 | 10 |
| **SST 317** | 3.22 | b | 3 | 7.54 | 74.35 | 12 | 13.85 | 11 | 301 | 17 |
| **SST 347** | 2.30 | fgh | 15 | 7.19 | 77.18 | 1 | 13.24 | 15 | 321 | 4 |
| **SST 356** | 3.19 | b | 4 | 9.88 | 73.48 | 17 | 12.99 | 18 | 320 | 5 |
| **SST 374** | 2.51 | ef | 10 | 5.91 | 75.03 | 7 | 14.97 | 4 | 308 | 12 |
| **SST 387** | 2.63 | e | 8 | 9.21 | 70.85 | 20 | 13.33 | 14 | 294 | 18 |
| **Wedzi** | 2.47 | ef | 11 | 7.03 | 74.60 | 9 | 13.84 | 12 | 307 | 13 |
| **Mean** | **2.59** |  |  |  | **74.64** |  | **13.93** |  | **311** |  |
| **Coefficient of variation (%)** | **7.32** |  |  |  | **1.10** |  | **6.58** |  | **6.09** |  |
| **LSDt(0,05)** | **0.27** |  |  |  | **1.19** |  | **1.33** |  | **27.37** |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average yield (ton/ha) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 2.49 | 10 | 2.36 | 17 | 2.11 | 17 | 2.67 | 18 | 2.41 | 16 | 2.32 | 15 | 2.42 | 15 |
| **Gariep** | 2.50 | 9 | 2.73 | 14 | 2.27 | 13 | 3.16 | 12 | 2.67 | 12 | 2.50 | 13 | 2.62 | 13 |
| **Koonap** | 2.01 | 19 | 2.18 | 19 | 2.26 | 14 | 3.22 | 10 | 2.42 | 15 | 2.15 | 18 | 2.09 | 18 |
| **Kougas** | 2.22 | 16 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 3.37 | 2 | 3.50 | 5 | 2.54 | 6 | 4.22 | 2 | 3.41 | 2 | 3.14 | 2 | 3.43 | 2 |
| **PAN 3111** | 2.78 | 7 | 3.65 | 2 | 2.31 | 11 | 3.95 | 5 | 3.17 | 6 | 2.91 | 6 | 3.21 | 6 |
| **PAN 3118** | 3.70 | 1 | 3.58 | 3 | 2.61 | 3 | 4.20 | 3 | 3.52 | 1 | 3.29 | 1 | 3.64 | 1 |
| **PAN 3120** | 3.11 | 4 | 3.49 | 6 | 2.28 | 12 | 4.33 | 1 | 3.30 | 3 | 2.96 | 5 | 3.30 | 4 |
| **PAN 3161** | 2.29 | 15 | 3.40 | 8 | 2.67 | 2 | 3.56 | 7 | 3.18 | 5 | 3.06 | 4 | 3.26 | 5 |
| **PAN 3195** | 2.04 | 17 | 3.54 | 4 | 2.67 | 1 | 3.18 | 11 | 2.92 | 8 | 2.83 | 7 | 2.91 | 8 |
| **PAN 3198** | 2.32 | 14 | 3.43 | 7 | 2.20 | 16 | 2.83 | 16 | 2.62 | 14 | 2.55 | 11 | 2.73 | 10 |
| **PAN 3368** | 1.97 | 20 | 2.33 | 18 | 1.90 | 19 | 2.81 | 17 | 2.34 | 18 | 2.18 | 17 | 2.32 | 17 |
| **PAN 3379** | 1.73 | 21 | 3.34 | 9 | 2.61 | 3 | 3.26 | 9 | 2.79 | 10 | 2.64 | 10 | 2.66 | 12 |
| **Senqu** | 2.37 | 13 | 2.42 | 16 | 2.43 | 8 | 2.87 | 15 | 2.36 | 17 | 2.19 | 16 | 2.07 | 19 |
| **SST 3149** | 2.37 | 12 | 2.52 | 15 |  |  |  |  |  |  |  |  | 2.45 | 14 |
| **SST 316** | 2.03 | 18 | 2.96 | 11 | 2.23 | 15 | 2.99 | 13 | 2.64 | 13 | 2.52 | 12 | 2.67 | 11 |
| **SST 317** | 2.81 | 6 | 2.78 | 13 | 2.50 | 7 | 4.00 | 4 | 2.83 | 9 | 2.44 | 14 | 2.41 | 16 |
| **SST 347** | 3.19 | 3 | 3.00 | 10 | 2.55 | 5 | 3.49 | 8 | 2.96 | 7 | 2.78 | 9 | 2.90 | 9 |
| **SST 356** | 2.48 | 11 | 2.86 | 12 | 2.35 | 10 | 2.60 | 19 | 2.75 | 11 | 2.80 | 8 | 3.02 | 7 |
| **SST 387** | 3.07 | 5 | 3.78 | 1 | 2.41 | 9 | 3.70 | 6 | 3.24 | 4 | 3.09 | 3 | 3.43 | 3 |
| **SST 398** |  |  |  |  | 1.97 | 18 | 2.97 | 14 |  |  |  |  |  |  |
| **Wedzi** | 2.65 | 8 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **2.55** |  | **3.04** |  | **2.36** |  | **3.37** |  | **2.86** |  | **2.69** |  | **2.82** |  |
| **LSDt(0,05)** | **0.22** |  | **0.18** |  | **0.18** |  | **0.42** |  | **0.12** |  | **0.11** |  | **0.14** |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the yield of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 264.56 | 1.054 |  |  |
| **Treatments** | | 62 | 251.07 | 4.050 | 58.18 | <0,001 |
| **Genotypes** | | 20 | 63.03 | 3.152 | 45.28 | <0,001 |
| **Environments** | | 2 | 146.22 | 73.111 | 684.69 | <0,001 |
| **Block** |  | 9 | 0.96 | 0.107 | 1.53 | 0.1389 |
| **Interactions** | | 40 | 41.82 | 1.045 | 15.02 | <0,001 |
| **IPCA** |  | 21 | 37.54 | 1.787 | 25.68 | <0,001 |
| **IPCA** |  | 19 | 4.28 | 0.225 | 3.24 | <0,001 |
| **Residuals** | | 0 | 0.00 |  |  |  |
| **Error** |  | 180 | 12.53 | 0.070 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Elands | 2.49 | 10 | -0.14103 |  |  |
| 2 | Gariep | 2.50 | 9 | 0.03640 |  |  |
| 3 | Koonap | 2.01 | 19 | 0.36588 |  |  |
| 4 | Kougas | 2.22 | 16 | -0.06229 |  |  |
| 5 | Matlabas | 3.37 | 2 | -0.49777 |  |  |
| 6 | PAN 3111 | 2.78 | 7 | -0.19730 |  |  |
| 7 | PAN 3118 | 3.70 | 1 | -0.37054 |  |  |
| 8 | PAN 3120 | 3.11 | 4 | -0.48898 |  |  |
| 9 | PAN 3161 | 2.29 | 15 | 0.65226 |  |  |
| 10 | PAN 3195 | 2.04 | 17 | 0.53694 |  |  |
| 11 | PAN 3198 | 2.32 | 14 | 0.35129 |  |  |
| 12 | PAN 3368 | 1.97 | 20 | 0.04324 |  |  |
| 13 | PAN 3379 | 1.73 | 21 | 0.68310 |  |  |
| 14 | Senqu | 2.37 | 13 | 0.03037 |  |  |
| 15 | SST 3149 | 2.37 | 12 | -0.09392 |  |  |
| 16 | SST 316 | 2.03 | 18 | 0.26247 |  |  |
| 17 | SST 317 | 2.81 | 6 | -0.30845 |  |  |
| 18 | SST 347 | 3.19 | 3 | -0.69687 |  |  |
| 19 | SST 356 | 2.48 | 11 | 0.34037 |  |  |
| 20 | SST 387 | 3.07 | 5 | -0.39768 |  |  |
| 21 | Wedzi | 2.65 | 8 | -0.04750 |  |  |
| **Mean** | | **2.55** |  |  |  |  |
| **Coefficient of variation (%)** | | **10.50** |  |  |  |  |
| **LSDt(0.05)** | | **0.22** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 1.47 | 3 | 0.52121 |  |  |
| 2 | Bultfontein | 3.04 | 2 | 0.89176 |  |  |
| 3 | Wesselsbron | 3.13 | 1 | -1.41297 |  |  |
| **Mean** | | **2.55** |  |  |  |  |
| **Coefficient of variation (%)** | | **10.50** |  |  |  |  |
| **LSDt(0.05)** | | **0.08** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average hectolitre mass (kg/hl) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 75.93 | 11 | 77.91 | 5 | 77.30 | 5 | 76.58 | 14 | 76.93 | 9 | 77.05 | 7 | 76.92 | 7 |
| **Gariep** | 76.23 | 10 | 76.42 | 16 | 77.18 | 6 | 77.69 | 11 | 76.88 | 11 | 76.61 | 12 | 76.33 | 12 |
| **Koonap** | 76.86 | 4 | 77.50 | 9 | 77.86 | 3 | 79.05 | 6 | 77.82 | 4 | 77.41 | 3 | 77.18 | 5 |
| **Kougas** | 75.64 | 13 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 75.86 | 12 | 77.32 | 10 | 76.74 | 10 | 78.93 | 7 | 77.21 | 8 | 76.64 | 9 | 76.59 | 9 |
| **PAN 3111** | 77.42 | 3 | 78.63 | 3 | 75.39 | 14 | 79.78 | 4 | 77.80 | 5 | 77.15 | 5 | 78.03 | 3 |
| **PAN 3118** | 77.90 | 2 | 77.63 | 7 | 76.50 | 11 | 79.58 | 5 | 77.90 | 3 | 77.34 | 4 | 77.77 | 4 |
| **PAN 3120** | 78.87 | 1 | 79.22 | 1 | 78.51 | 1 | 81.36 | 1 | 79.49 | 1 | 78.87 | 1 | 79.05 | 1 |
| **PAN 3161** | 75.34 | 14 | 77.70 | 6 | 77.05 | 7 | 76.62 | 13 | 77.56 | 6 | 77.87 | 2 | 78.29 | 2 |
| **PAN 3195** | 74.94 | 16 | 76.63 | 13 | 74.61 | 17 | 75.76 | 17 | 75.58 | 16 | 75.53 | 16 | 75.99 | 16 |
| **PAN 3198** | 76.49 | 8 | 77.07 | 11 | 76.75 | 8 | 77.72 | 10 | 76.62 | 12 | 76.25 | 13 | 76.01 | 15 |
| **PAN 3368** | 73.76 | 19 | 77.55 | 8 | 75.84 | 12 | 76.52 | 16 | 76.60 | 13 | 76.63 | 10 | 77.02 | 6 |
| **PAN 3379** | 76.65 | 6 | 78.78 | 2 | 77.80 | 4 | 78.64 | 8 | 77.24 | 7 | 76.78 | 8 | 76.27 | 13 |
| **Senqu** | 74.03 | 18 | 76.43 | 14 | 76.75 | 8 | 76.54 | 15 | 76.59 | 14 | 76.61 | 11 | 76.54 | 10 |
| **SST 3149** | 75.07 | 15 | 75.45 | 19 |  |  |  |  |  |  |  |  | 74.74 | 18 |
| **SST 316** | 71.80 | 21 | 75.77 | 17 | 74.46 | 18 | 74.86 | 19 | 75.04 | 18 | 75.10 | 17 | 75.42 | 17 |
| **SST 317** | 74.86 | 17 | 76.93 | 12 | 75.56 | 13 | 78.49 | 9 | 75.70 | 15 | 74.76 | 18 | 74.37 | 19 |
| **SST 347** | 76.67 | 5 | 78.38 | 4 | 77.99 | 2 | 80.39 | 2 | 77.90 | 2 | 77.08 | 6 | 76.62 | 8 |
| **SST 356** | 72.61 | 20 | 75.57 | 18 | 74.35 | 19 | 75.00 | 18 | 75.40 | 17 | 75.53 | 15 | 76.12 | 14 |
| **SST 387** | 76.32 | 9 | 76.43 | 14 | 74.64 | 16 | 80.23 | 3 | 76.91 | 10 | 75.80 | 14 | 76.38 | 11 |
| **SST 398** |  |  |  |  | 75.05 | 15 | 77.40 | 12 |  |  |  |  |  |  |
| **Wedzi** | 76.56 | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **75.71** |  | **77.23** |  | **76.33** |  | **77.95** |  | **76.95** |  | **76.61** |  | **76.61** |  |
| **LSDt(0,05)** | **1.48** |  | **0.52** |  | **0.60** |  | **1.03** |  | **0.55** |  | **0.63** |  | **0.80** |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the hectolitre mass of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 2209.3 | 8.80 |  |  |
| **Treatments** | | 62 | 1579.3 | 25.47 | 7.56 | <0,001 |
| **Genotypes** | | 20 | 675.0 | 33.75 | 10.01 | <0,001 |
| **Environments** | | 2 | 509.9 | 254.97 | 98.80 | <0,001 |
| **Block** |  | 9 | 23.2 | 2.58 | 0.77 | 0.6484 |
| **Interactions** | | 40 | 394.4 | 9.86 | 2.93 | <0,001 |
| **IPCA** |  | 21 | 226.8 | 10.80 | 3.20 | <0,001 |
| **IPCA** |  | 19 | 167.7 | 8.82 | 2.62 | <0,001 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 180 | 606.7 | 3.37 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Elands | 75.93 | 11 | 0.26388 |  |  |
| 2 | Gariep | 76.23 | 10 | 0.07432 |  |  |
| 3 | Koonap | 76.86 | 4 | 0.24026 |  |  |
| 4 | Kougas | 75.64 | 13 | -0.07931 |  |  |
| 5 | Matlabas | 75.86 | 12 | -0.10729 |  |  |
| 6 | PAN 3111 | 77.42 | 3 | -0.47713 |  |  |
| 7 | PAN 3118 | 77.90 | 2 | -0.46520 |  |  |
| 8 | PAN 3120 | 78.87 | 1 | -0.28918 |  |  |
| 9 | PAN 3161 | 75.34 | 14 | 0.56651 |  |  |
| 10 | PAN 3195 | 74.94 | 16 | 0.07226 |  |  |
| 11 | PAN 3198 | 76.49 | 8 | 0.43615 |  |  |
| 12 | PAN 3368 | 73.76 | 19 | 0.06548 |  |  |
| 13 | PAN 3379 | 76.65 | 6 | -0.15250 |  |  |
| 14 | Senqu | 74.03 | 18 | 0.26300 |  |  |
| 15 | SST 3149 | 75.07 | 15 | 1.58666 |  |  |
| 16 | SST 316 | 71.80 | 21 | 0.27833 |  |  |
| 17 | SST 317 | 74.86 | 17 | -0.28951 |  |  |
| 18 | SST 347 | 76.67 | 5 | -1.60732 |  |  |
| 19 | SST 356 | 72.61 | 20 | 0.54742 |  |  |
| 20 | SST 387 | 76.32 | 9 | -0.81437 |  |  |
| 21 | Wedzi | 76.56 | 7 | -0.11245 |  |  |
| **Mean** | | **75.71** |  |  |  |  |
| **Coefficient of variation (%)** | | **2.40** |  |  |  |  |
| **LSDt(0.05)** | | **1.48** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 73.76 | 3 | 1.30872 |  |  |
| 2 | Bultfontein | 76.22 | 2 | 0.92046 |  |  |
| 3 | Wesselsbron | 77.13 | 1 | -2.22918 |  |  |
| **Mean** | | **75.71** |  |  |  |  |
| **Coefficient of variation (%)** | | **2.40** |  |  |  |  |
| **LSDt(0.05)** | | **0.56** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average protein content (%) of entries during the full or partial period from2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 15.53 | 14 | 14.67 | 3 | 15.55 | 12 | 14.27 | 6 | 15.00 | 7 | 15.25 | 10 | 15.10 | 7 |
| **Gariep** | 14.72 | 21 | 13.94 | 15 | 15.32 | 14 | 14.12 | 9 | 14.52 | 15 | 14.66 | 16 | 14.33 | 17 |
| **Koonap** | 16.44 | 1 | 14.94 | 1 | 15.89 | 8 | 14.69 | 2 | 15.49 | 1 | 15.76 | 1 | 15.69 | 1 |
| **Kougas** | 15.44 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 16.08 | 3 | 14.37 | 9 | 15.54 | 13 | 14.75 | 1 | 15.19 | 3 | 15.33 | 6 | 15.23 | 4 |
| **PAN 3111** | 15.36 | 17 | 13.24 | 18 | 15.20 | 16 | 13.36 | 18 | 14.29 | 17 | 14.60 | 17 | 14.30 | 18 |
| **PAN 3118** | 15.91 | 8 | 14.18 | 12 | 15.94 | 4 | 13.70 | 14 | 14.93 | 10 | 15.34 | 5 | 15.05 | 8 |
| **PAN 3120** | 16.10 | 2 | 14.53 | 5 | 15.90 | 6 | 14.06 | 10 | 15.15 | 4 | 15.51 | 2 | 15.32 | 3 |
| **PAN 3161** | 15.78 | 9 | 14.30 | 11 | 15.30 | 15 | 13.52 | 17 | 14.80 | 11 | 15.23 | 11 | 15.20 | 5 |
| **PAN 3195** | 15.55 | 13 | 13.61 | 17 | 14.98 | 18 | 13.72 | 13 | 14.52 | 16 | 14.79 | 15 | 14.70 | 15 |
| **PAN 3198** | 16.03 | 5 | 14.54 | 4 | 15.89 | 7 | 13.92 | 11 | 14.98 | 8 | 15.33 | 7 | 15.05 | 8 |
| **PAN 3368** | 15.66 | 12 | 14.87 | 2 | 15.59 | 11 | 14.30 | 5 | 15.20 | 2 | 15.50 | 3 | 15.45 | 2 |
| **PAN 3379** | 14.83 | 20 | 12.88 | 19 | 14.26 | 19 | 13.53 | 16 | 14.08 | 18 | 14.27 | 18 | 14.27 | 19 |
| **Senqu** | 15.97 | 7 | 14.52 | 6 | 15.69 | 10 | 14.14 | 8 | 14.80 | 12 | 15.01 | 13 | 14.68 | 16 |
| **SST 3149** | 15.44 | 15 | 13.65 | 16 |  |  |  |  |  |  |  |  | 14.81 | 14 |
| **SST 316** | 16.03 | 5 | 14.38 | 8 | 16.12 | 2 | 14.46 | 4 | 15.10 | 5 | 15.31 | 8 | 14.91 | 10 |
| **SST 317** | 15.72 | 10 | 14.35 | 10 | 15.79 | 9 | 13.61 | 15 | 14.94 | 9 | 15.39 | 4 | 15.19 | 6 |
| **SST 347** | 15.17 | 18 | 14.08 | 13 | 15.06 | 17 | 13.76 | 12 | 14.65 | 14 | 14.95 | 14 | 14.90 | 11 |
| **SST 356** | 16.05 | 4 | 14.46 | 7 | 15.91 | 5 | 14.65 | 3 | 15.05 | 6 | 15.18 | 12 | 14.82 | 13 |
| **SST 387** | 15.69 | 11 | 14.01 | 14 | 16.20 | 1 | 13.25 | 19 | 14.79 | 13 | 15.30 | 9 | 14.85 | 12 |
| **SST 398** |  |  |  |  | 16.09 | 3 | 14.17 | 7 |  |  |  |  |  |  |
| **Wedzi** | 15.16 | 19 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **15.65** |  | **14.19** |  | **15.59** |  | **14.00** |  | **14.86** |  | **15.15** |  | **14.94** |  |
| **LSDt(0,05)** | **0.49** |  | **0.55** |  | **0.58** |  | **0.91** |  | **0.31** |  | **0.32** |  | **0.37** |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the protein content of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 374.3 | 1.49 |  |  |
| **Treatments** | | 62 | 297.0 | 4.79 | 15.83 | <0,001 |
| **Genotypes** | | 20 | 46.3 | 2.31 | 7.65 | <0,001 |
| **Environments** | | 2 | 158.6 | 79.32 | 31.28 | <0,001 |
| **Block** |  | 9 | 22.8 | 2.54 | 8.38 | <0,001 |
| **Interactions** | | 40 | 92.0 | 2.30 | 7.60 | <0,001 |
| **IPCA** |  | 21 | 73.9 | 3.52 | 11.63 | <0,001 |
| **IPCA** |  | 19 | 18.2 | 0.96 | 3.16 | <0,001 |
| **Residuals** | | 0 | 0.0 |  |  |  |
| **Error** |  | 180 | 54.5 | 0.30 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Elands | 15.53 | 14 | 0.20153 |  |  |
| 2 | Gariep | 14.72 | 21 | 0.03870 |  |  |
| 3 | Koonap | 16.44 | 1 | -0.60279 |  |  |
| 4 | Kougas | 15.44 | 15 | 0.33674 |  |  |
| 5 | Matlabas | 16.08 | 3 | 0.34025 |  |  |
| 6 | PAN 3111 | 15.36 | 17 | -0.03239 |  |  |
| 7 | PAN 3118 | 15.91 | 8 | 0.54922 |  |  |
| 8 | PAN 3120 | 16.10 | 2 | 0.42419 |  |  |
| 9 | PAN 3161 | 15.78 | 9 | -0.41067 |  |  |
| 10 | PAN 3195 | 15.55 | 13 | -0.61980 |  |  |
| 11 | PAN 3198 | 16.03 | 5 | -0.23792 |  |  |
| 12 | PAN 3368 | 15.66 | 12 | -0.21087 |  |  |
| 13 | PAN 3379 | 14.83 | 20 | -1.15038 |  |  |
| 14 | Senqu | 15.97 | 7 | -0.07342 |  |  |
| 15 | SST 3149 | 15.44 | 15 | 0.42188 |  |  |
| 16 | SST 316 | 16.03 | 5 | -0.32155 |  |  |
| 17 | SST 317 | 15.72 | 10 | 0.01053 |  |  |
| 18 | SST 347 | 15.17 | 18 | 0.71337 |  |  |
| 19 | SST 356 | 16.05 | 4 | -0.05713 |  |  |
| 20 | SST 387 | 15.69 | 11 | 0.63389 |  |  |
| 21 | Wedzi | 15.16 | 19 | 0.04662 |  |  |
| **Mean** | | **15.65** |  |  |  |  |
| **Coefficient of variation (%)** | | **3.90** |  |  |  |  |
| **LSDt(0.05)** | | **0.49** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 16.57 | 1 | 0.40866 |  |  |
| 2 | Bultfontein | 15.74 | 2 | 1.21817 |  |  |
| 3 | Wesselsbron | 14.64 | 3 | -1.62683 |  |  |
| **Mean** | | **15.65** |  |  |  |  |
| **Coefficient of variation (%)** | | **3.90** |  |  |  |  |
| **LSDt(0.05)** | | **0.19** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting)** | | | | | | | | | | | | | | |
| **Average falling number (s) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 337 | 2 | 396 | 3 | 297 | 9 | 274 | 14 | 326 | 2 | 343 | 1 | 367 | 1 |
| **Gariep** | 284 | 19 | 356 | 19 | 279 | 14 | 258 | 18 | 294 | 16 | 306 | 17 | 320 | 19 |
| **Koonap** | 304 | 12 | 379 | 9 | 321 | 2 | 298 | 2 | 325 | 3 | 335 | 5 | 341 | 10 |
| **Kougas** | 331 | 4 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 340 | 1 | 364 | 17 | 299 | 8 | 294 | 6 | 324 | 5 | 334 | 6 | 352 | 4 |
| **PAN 3111** | 290 | 15 | 398 | 2 | 245 | 18 | 294 | 5 | 307 | 13 | 311 | 15 | 344 | 8 |
| **PAN 3118** | 301 | 13 | 376 | 12 | 262 | 16 | 283 | 11 | 306 | 14 | 313 | 13 | 339 | 11 |
| **PAN 3120** | 270 |  | 375 | 13 | 291 | 12 | 276 | 12 | 303 | 15 | 312 | 14 | 322 | 18 |
| **PAN 3161** | 318 | 7 | 394 | 4 | 295 | 10 | 272 | 15 | 308 | 10 | 319 | 10 | 332 | 15 |
| **PAN 3195** | 273 | 20 | 380 | 8 | 181 | 19 | 262 | 17 | 285 | 18 | 293 | 18 | 349 | 5 |
| **PAN 3198** | 289 | 16 | 377 | 10 | 283 | 13 | 298 | 3 | 308 | 11 | 311 | 16 | 325 | 17 |
| **PAN 3368** | 309 | 10 | 374 | 14 | 291 | 11 | 275 | 13 | 307 | 12 | 318 | 11 | 332 | 16 |
| **PAN 3379** | 287 | 18 | 398 | 1 | 303 | 5 | 288 | 9 | 325 | 4 | 337 | 4 | 353 | 3 |
| **Senqu** | 296 | 14 | 386 | 6 | 307 | 4 | 292 | 8 | 318 | 7 | 326 | 7 | 336 | 13 |
| **SST 3149** | 322 | 6 | 369 | 15 |  |  |  |  |  |  |  |  | 333 | 14 |
| **SST 316** | 306 | 11 | 389 | 5 | 316 | 3 | 284 | 10 | 328 | 1 | 342 | 2 | 355 | 2 |
| **SST 317** | 327 | 5 | 366 | 16 | 300 | 6 | 294 | 7 | 317 | 8 | 324 | 8 | 336 | 12 |
| **SST 347** | 315 | 9 | 359 | 18 | 274 | 15 | 296 | 4 | 314 | 9 | 320 | 9 | 343 | 9 |
| **SST 356** | 287 | 17 | 381 | 7 | 325 | 1 | 271 | 16 | 323 | 6 | 340 | 3 | 348 | 6 |
| **SST 387** | 315 | 8 | 377 | 11 | 252 | 17 | 221 | 19 | 291 | 17 | 315 | 12 | 346 | 7 |
| **SST 398** |  |  |  |  | 299 | 7 | 299 | 1 |  |  |  |  |  |  |
| **Wedzi** | 333 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **306** |  | **379** |  | **285** |  | **280** |  | **312** |  | **322** |  | **341** |  |
| **LSDt(0,05)** | **7.20** |  | **19.22** |  | **17.73** |  | **22.83** |  | **9.82** |  | **10.99** |  | **13.20** |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (earlier planting) AMMI Analysis** | | | | | | |
| **Anova of the falling number of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 571278 | 2276 |  |  |
| **Treatments** | | 62 | 479953 | 7741 | 16.02 | <0,001 |
| **Genotypes** | | 20 | 106251 | 5313 | 10.99 | <0,001 |
| **Environments** | | 2 | 156477 | 78239 | 162.49 | <0,001 |
| **Block** |  | 9 | 4333 | 481 | 1.00 | 0.4448 |
| **Interactions** | | 40 | 217224 | 5431 | 11.24 | <0,001 |
| **IPCA** |  | 21 | 181112 | 8624 | 17.85 | <0,001 |
| **IPCA** |  | 19 | 36112 | 1901 | 3.93 | <0,001 |
| **Residuals** | | 0 | 0 |  |  |  |
| **Error** |  | 180 | 86992 | 483 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Elands | 337 | 2 | -2.13445 |  |  |
| 2 | Gariep | 284 | 19 | 4.01842 |  |  |
| 3 | Koonap | 304 | 12 | 1.68051 |  |  |
| 4 | Kougas | 331 | 4 | 0.11576 |  |  |
| 5 | Matlabas | 340 | 1 | -2.88192 |  |  |
| 6 | PAN 3111 | 290 | 15 | 2.21037 |  |  |
| 7 | PAN 3118 | 301 | 13 | -6.11844 |  |  |
| 8 | PAN 3120 | 270 | 21 | -1.85882 |  |  |
| 9 | PAN 3161 | 318 | 7 | -4.96396 |  |  |
| 10 | PAN 3195 | 273 | 20 | 7.11199 |  |  |
| 11 | PAN 3198 | 289 | 16 | 3.72580 |  |  |
| 12 | PAN 3368 | 309 | 10 | 0.38895 |  |  |
| 13 | PAN 3379 | 287 | 18 | 3.51421 |  |  |
| 14 | Senqu | 296 | 14 | 2.19592 |  |  |
| 15 | SST 3149 | 322 | 6 | -3.96474 |  |  |
| 16 | SST 316 | 306 | 11 | 1.50884 |  |  |
| 17 | SST 317 | 327 | 5 | -1.95928 |  |  |
| 18 | SST 347 | 315 | 9 | -2.42219 |  |  |
| 19 | SST 356 | 287 | 17 | 0.60755 |  |  |
| 20 | SST 387 | 315 | 8 | -0.81562 |  |  |
| 21 | Wedzi | 333 | 3 | 0.04110 |  |  |
| **Mean** | | **306** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.20** |  |  |  |  |
| **LSDt(0.05)** | | **17.76** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 292 | 2 | 6.49891 |  |  |
| 2 | Bultfontein | 342 | 1 | -11.89331 |  |  |
| 3 | Wesselsbron | 286 | 3 | 5.39440 |  |  |
| **Mean** | | **306** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.20** |  |  |  |  |
| **LSDt(0.05)** | | **6.71** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **North Western Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Bothaville 2016-04-25** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 1.30 | cdef | 16 | 5.07 | 76.60 | 2 | 15.56 | 21 | 306 | 7 |
| **Gariep** | 1.37 | cd | 13 | 16.22 | 74.50 | 11 | 15.76 | 19 | 319 | 4 |
| **Koonap** | 1.21 | defg | 19 | 6.44 | 75.85 | 3 | 17.30 | 3 | 287 | 14 |
| **Kougas** | 1.22 | cdefg | 17 | 20.81 | 74.25 | 12 | 16.43 | 12 | 329 | 1 |
| **Matlabas** | 2.16 | a | 3 | 1.22 | 74.60 | 9 | 16.63 | 10 | 311 | 5 |
| **PAN 3111** | 1.38 | cd | 12 | 19.57 | 74.80 | 7 | 16.64 | 9 | 311 | 6 |
| **PAN 3118** | 2.22 | a | 1 | 8.44 | 75.65 | 4 | 17.52 | 2 | 243 | 20 |
| **PAN 3120** | 1.76 | b | 4 | 6.81 | 76.65 | 1 | 17.64 | 1 | 252 | 19 |
| **PAN 3161** | 1.43 | cd | 8 | 8.17 | 73.90 | 13 | 16.66 | 8 | 242 | 21 |
| **PAN 3195** | 1.32 | cd | 14 | 14.61 | 73.65 | 14 | 16.41 | 14 | 296 | 10 |
| **PAN 3198** | 1.38 | cd | 11 | 9.17 | 74.55 | 10 | 17.01 | 5 | 285 | 16 |
| **PAN 3368** | 0.69 | h | 21 | 4.25 | 72.20 | 17 | 16.15 | 18 | 320 | 3 |
| **PAN 3379** | 1.09 | efg | 20 | 7.66 | 75.00 | 6 | 15.60 | 20 | 286 | 15 |
| **Senqu** | 1.42 | cd | 9 | 10.41 | 71.70 | 18 | 16.42 | 13 | 279 | 17 |
| **SST 3149** | 1.21 | defg | 18 | 11.43 | 74.75 | 8 | 16.41 | 14 | 293 | 13 |
| **SST 316** | 1.44 | c | 7 | 7.21 | 68.15 | 21 | 16.36 | 16 | 298 | 9 |
| **SST 317** | 1.75 | b | 5 | 23.10 | 72.50 | 16 | 16.70 | 6 | 296 | 10 |
| **SST 347** | 1.67 | b | 6 | 10.79 | 71.00 | 19 | 16.59 | 11 | 299 | 8 |
| **SST 356** | 1.42 | cd | 10 | 6.73 | 69.85 | 20 | 16.69 | 7 | 256 | 18 |
| **SST 387** | 2.16 | a | 2 | 20.14 | 73.65 | 14 | 17.30 | 3 | 294 | 12 |
| **Wedzi** | 1.30 | cde | 15 | 21.43 | 75.20 | 5 | 16.27 | 17 | 322 | 2 |
| **Mean** | **1.47** |  |  |  | **73.76** |  | **16.57** |  | **292** |  |
| **Coefficient of variation (%)** | **11.14** |  |  |  | **3.68** |  | **2.79** |  | **8.78** |  |
| **LSDt(0,05)** | **0.22** |  |  |  | **3.88** |  | **0.67** |  | **36.94** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **North Western Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Bultfontein 2016-04-26** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.90 | cdefghi | 13 | 5.00 | 74.15 | 20 | 16.57 | 2 | 398 | 5 |
| **Gariep** | 3.09 | bcdefgh | 10 | 8.54 | 76.68 | 8 | 14.78 | 19 | 273 | 20 |
| **Koonap** | 2.75 | fghi | 18 | 2.45 | 76.90 | 7 | 15.67 | 15 | 318 | 14 |
| **Kougas** | 2.57 | hi | 20 | 7.22 | 75.35 | 14 | 15.99 | 10 | 366 | 9 |
| **Matlabas** | 3.31 | bcd | 4 | 13.01 | 75.35 | 14 | 16.95 | 1 | 410 | 1 |
| **PAN 3111** | 3.28 | bcdef | 6 | 8.57 | 77.55 | 4 | 15.14 | 18 | 301 | 17 |
| **PAN 3118** | 4.03 | a | 1 | 5.99 | 77.65 | 3 | 16.34 | 4 | 409 | 3 |
| **PAN 3120** | 3.18 | bcdefg | 7 | 6.29 | 79.00 | 1 | 16.38 | 3 | 328 | 12 |
| **PAN 3161** | 3.46 | b | 2 | 8.73 | 76.65 | 9 | 15.29 | 16 | 410 | 1 |
| **PAN 3195** | 2.94 | bcdefghi | 11 | 22.68 | 74.90 | 18 | 14.75 | 20 | 223 | 21 |
| **PAN 3198** | 3.15 | bcdefg | 8 | 18.87 | 78.05 | 2 | 15.73 | 14 | 279 | 19 |
| **PAN 3368** | 2.69 | ghi | 19 | 17.27 | 74.00 | 21 | 15.75 | 13 | 341 | 11 |
| **PAN 3379** | 2.76 | efghi | 17 | 4.49 | 76.47 | 10 | 13.29 | 21 | 279 | 18 |
| **Senqu** | 2.79 | defghi | 16 | 6.52 | 75.60 | 13 | 16.28 | 5 | 304 | 16 |
| **SST 3149** | 2.81 | defghi | 15 | 7.45 | 77.55 | 4 | 16.14 | 8 | 405 | 4 |
| **SST 316** | 2.45 | i | 21 | 13.99 | 74.90 | 18 | 16.06 | 9 | 323 | 13 |
| **SST 317** | 2.87 | defghi | 14 | 10.90 | 75.15 | 17 | 15.79 | 12 | 386 | 6 |
| **SST 347** | 3.13 | bcdefg | 9 | 6.50 | 77.52 | 6 | 15.99 | 10 | 380 | 7 |
| **SST 356** | 3.42 | bc | 3 | 14.09 | 75.35 | 14 | 16.25 | 6 | 314 | 15 |
| **SST 387** | 2.90 | cdefghi | 12 | 2.35 | 75.70 | 12 | 16.25 | 6 | 360 | 10 |
| **Wedzi** | 3.29 | bcde | 5 | 14.88 | 76.15 | 11 | 15.19 | 17 | 368 | 8 |
| **Mean** | **3.04** |  |  |  | **76.22** |  | **15.74** |  | **342** |  |
| **Coefficient of variation (%)** | **12.60** |  |  |  | **2.24** |  | **2.07** |  | **7.61** |  |
| **LSDt(0,05)** | **0.55** |  |  |  | **2.44** |  | **0.47** |  | **36.48** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **North Western Free State (earlier planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Wesselsbron 2016-04-25** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 3.29 | fgh | 9 | 12.11 | 77.05 | 12 | 14.47 | 12 | 308 | 2 |
| **Gariep** | 3.05 | gh | 11 | 9.28 | 77.50 | 10 | 13.61 | 19 | 260 | 18 |
| **Koonap** | 2.06 | lm | 18 | 11.10 | 77.83 | 8 | 16.36 | 1 | 307 | 3 |
| **Kougas** | 2.88 | hi | 13 | 6.47 | 77.33 | 11 | 13.90 | 16 | 299 | 10 |
| **Matlabas** | 4.64 | ab | 3 | 3.87 | 77.63 | 9 | 14.65 | 11 | 300 | 8 |
| **PAN 3111** | 3.69 | ef | 7 | 7.46 | 79.90 | 4 | 14.29 | 13 | 260 | 19 |
| **PAN 3118** | 4.84 | a | 1 | 6.29 | 80.40 | 3 | 13.87 | 17 | 251 | 20 |
| **PAN 3120** | 4.39 | bc | 4 | 5.60 | 80.95 | 2 | 14.26 | 14 | 231 | 21 |
| **PAN 3161** | 1.97 | m | 19 | 7.24 | 75.48 | 16 | 15.40 | 5 | 301 | 6 |
| **PAN 3195** | 1.85 | m | 20 | 8.08 | 76.28 | 15 | 15.49 | 4 | 300 | 9 |
| **PAN 3198** | 2.41 | jkl | 16 | 1.44 | 76.88 | 14 | 15.36 | 6 | 303 | 5 |
| **PAN 3368** | 2.53 | ijk | 15 | 8.33 | 75.08 | 17 | 15.09 | 9 | 265 | 17 |
| **PAN 3379** | 1.34 | n | 21 | 6.88 | 78.48 | 6 | 15.59 | 3 | 295 | 12 |
| **Senqu** | 2.89 | hi | 12 | 6.08 | 74.78 | 18 | 15.20 | 7 | 306 | 4 |
| **SST 3149** | 3.10 | gh | 10 | 5.39 | 72.90 | 19 | 13.77 | 18 | 268 | 15 |
| **SST 316** | 2.19 | klm | 17 | 6.64 | 72.35 | 21 | 15.67 | 2 | 298 | 11 |
| **SST 317** | 3.80 | de | 6 | 11.64 | 76.93 | 13 | 14.68 | 10 | 301 | 7 |
| **SST 347** | 4.77 | ab | 2 | 6.83 | 81.48 | 1 | 12.94 | 21 | 267 | 16 |
| **SST 356** | 2.62 | ij | 14 | 7.05 | 72.63 | 20 | 15.20 | 7 | 292 | 13 |
| **SST 387** | 4.16 | cd | 5 | 5.16 | 79.60 | 5 | 13.53 | 20 | 292 | 14 |
| **Wedzi** | 3.34 | fg | 8 | 8.65 | 78.33 | 7 | 14.03 | 15 | 310 | 1 |
| **Mean** | **3.13** |  |  |  | **77.13** |  | **14.64** |  | **286** |  |
| **Coefficient of variation (%)** | **9.85** |  |  |  | **0.57** |  | **4.09** |  | **5.17** |  |
| **LSDt(0,05)** | **0.42** |  |  |  | **0.63** |  | **0.87** |  | **21.62** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting)** | | | | | | | | | | | | | | |
| **Average yield (ton/ha) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **\* 2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 2.42 | 8 | 2.56 | 12 | 1.91 | 18 | 3.75 | 18 | 2.66 | 16 | 2.30 | 10 | 2.49 | 8 |
| **Gariep** | 2.47 | 5 | 2.60 | 11 | 2.14 | 9 | 4.37 | 13 | 2.90 | 10 | 2.40 | 7 | 2.53 | 7 |
| **Koonap** | 2.08 | 16 | 2.46 | 13 | 2.09 | 11 | 4.72 | 11 | 2.84 | 11 | 2.21 | 13 | 2.27 | 15 |
| **Kougas** | 2.09 | 15 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 2.94 | 1 | 2.64 | 10 | 2.62 | 1 | 5.54 | 5 | 3.44 | 2 | 2.73 | 1 | 2.79 | 4 |
| **PAN 3111** | 2.36 | 10 | 3.46 | 1 | 2.25 | 6 | 5.44 | 7 | 3.38 | 3 | 2.69 | 3 | 2.91 | 1 |
| **PAN 3118** | 2.94 | 1 | 2.67 | 7 | 2.47 | 2 | 5.99 | 1 | 3.52 | 1 | 2.69 | 2 | 2.81 | 3 |
| **PAN 3161** | 2.30 | 11 | 2.78 | 5 | 2.46 | 3 | 5.60 | 3 | 3.29 | 5 | 2.52 | 6 | 2.54 | 6 |
| **PAN 3195** | 2.44 | 6 | 3.08 | 2 | 2.27 | 5 | 5.70 | 2 | 3.37 | 4 | 2.60 | 5 | 2.76 | 5 |
| **PAN 3198** | 2.09 | 14 | 2.71 | 6 | 1.99 | 15 | 4.26 | 16 | 2.77 | 14 | 2.27 | 11 | 2.40 | 10 |
| **PAN 3368** | 1.84 | 20 | 2.22 | 15 | 2.04 | 14 | 4.18 | 17 | 2.57 | 17 | 2.04 | 17 | 2.03 | 18 |
| **PAN 3379** | 1.96 | 18 | 2.82 | 4 | 2.24 | 7 | 5.46 | 6 | 3.12 | 7 | 2.34 | 9 | 2.39 | 11 |
| **Senqu** | 2.49 | 4 | 2.07 | 18 | 2.07 | 12 | 4.27 | 15 | 2.72 | 15 | 2.21 | 12 | 2.28 | 14 |
| **SST 3149** | 1.71 | 21 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 2.02 | 17 | 2.17 | 17 | 2.07 | 13 | 4.84 | 10 | 2.77 | 13 | 2.08 | 16 | 2.09 | 17 |
| **SST 317** | 2.16 | 13 | 2.28 | 14 | 2.13 | 10 | 5.58 | 4 | 3.04 | 8 | 2.19 | 14 | 2.22 | 16 |
| **SST 347** | 2.42 | 7 | 2.20 | 16 | 2.43 | 4 | 5.04 | 8 | 3.02 | 9 | 2.35 | 8 | 2.31 | 12 |
| **SST 356** | 1.92 | 19 | 2.65 | 8 | 1.99 | 16 | 4.57 | 12 | 2.78 | 12 | 2.19 | 15 | 2.28 | 13 |
| **SST 374** | 2.19 | 12 | 2.65 | 8 |  |  | 4.28 | 14 |  |  |  |  | 2.42 | 9 |
| **SST 387** | 2.68 | 3 | 3.02 | 3 | 2.17 | 8 | 4.91 | 9 | 3.19 | 6 | 2.62 | 4 | 2.85 | 2 |
| **SST 398** |  |  |  |  | 1.92 | 17 | 3.68 | 19 |  |  |  |  |  |  |
| **Wedzi** | 2.39 | 9 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **2.28** |  | **2.61** |  | **2.18** |  | **4.85** |  | **3.02** |  | **2.38** |  | **2.47** |  |
| **LSDt(0,05)** | **0.17** |  | **0.17** |  | **0.15** |  | **0.77** |  | **0.13** |  | **0.10** |  | **0.12** |  |
| **\* Only Bultfontein M2 data** | | | |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the yield of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 128.90 | 0.514 |  |  |
| **Treatments** | | 62 | 120.54 | 1.944 | 47.63 | <0,001 |
| **Genotypes** | | 20 | 25.96 | 1.298 | 31.79 | <0,001 |
| **Environments** | | 2 | 70.47 | 35.235 | 310.53 | <0,001 |
| **Block** |  | 9 | 1.02 | 0.113 | 2.78 | 0.0045 |
| **Interactions** | | 40 | 24.11 | 0.603 | 14.77 | <0,001 |
| **IPCA** |  | 21 | 18.69 | 0.890 | 21.81 | <0,001 |
| **IPCA** |  | 19 | 5.41 | 0.285 | 6.98 | <0,001 |
| **Residuals** | | 0 | 0.00 |  |  |  |
| **Error** |  | 180 | 7.35 | 0.041 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Elands | 2.42 | 8 | -0.04367 |  |  |
| 2 | Gariep | 2.47 | 5 | 0.09662 |  |  |
| 3 | Koonap | 2.08 | 16 | -0.24612 |  |  |
| 4 | Kougas | 2.09 | 15 | -0.09418 |  |  |
| 5 | Matlabas | 2.94 | 1 | 0.07834 |  |  |
| 6 | PAN 3111 | 2.36 | 10 | 0.14574 |  |  |
| 7 | PAN 3118 | 2.94 | 1 | 0.26452 |  |  |
| 8 | PAN 3161 | 2.30 | 11 | -0.37262 |  |  |
| 9 | PAN 3195 | 2.44 | 6 | 0.00400 |  |  |
| 10 | PAN 3198 | 2.09 | 14 | -0.25885 |  |  |
| 11 | PAN 3368 | 1.84 | 20 | -0.18567 |  |  |
| 12 | PAN 3379 | 1.96 | 18 | -0.52846 |  |  |
| 13 | Senqu | 2.49 | 4 | 0.30691 |  |  |
| 14 | SST 3149 | 1.71 | 21 | -0.75884 |  |  |
| 15 | SST 316 | 2.02 | 17 | 0.02940 |  |  |
| 16 | SST 317 | 2.16 | 13 | 0.09162 |  |  |
| 17 | SST 347 | 2.42 | 7 | 0.53733 |  |  |
| 18 | SST 356 | 1.92 | 19 | -0.11107 |  |  |
| 19 | SST 374 | 2.19 | 12 | 0.45641 |  |  |
| 20 | SST 387 | 2.68 | 3 | 0.52049 |  |  |
| 21 | Wedzi | 2.39 | 9 | 0.06808 |  |  |
| **Mean** | | **2.28** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.10** |  |  |  |  |
| **LSDt(0.05)** | | **0.17** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for yield (ton/ha)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Yield** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 1.76 | 3 | -0.49350 |  |  |
| 2 | Bultfontein | 2.07 | 2 | -0.70102 |  |  |
| 3 | Wesselsbron | 3.01 | 1 | 1.19452 |  |  |
| **Mean** | | **2.28** |  |  |  |  |
| **Coefficient of variation (%)** | | **9.10** |  |  |  |  |
| **LSDt(0.05)** | | **0.06** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting)** | | | | | | | | | | | | | | |
| **Average hectolitre mass (kg/hl) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **\* 2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 76.05 | 10 | 79.25 | 3 | 76.78 | 9 | 78.78 | 8 | 77.71 | 7 | 77.36 | 6 | 77.65 | 3 |
| **Gariep** | 75.61 | 12 | 78.45 | 8 | 75.84 | 14 | 80.09 | 1 | 77.50 | 8 | 76.63 | 12 | 77.03 | 9 |
| **Koonap** | 75.71 | 11 | 79.34 | 2 | 77.79 | 3 | 79.66 | 4 | 78.12 | 3 | 77.61 | 3 | 77.52 | 4 |
| **Kougas** | 77.18 | 3 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 75.16 | 14 | 76.38 | 18 | 78.46 | 2 | 77.69 | 17 | 76.92 | 12 | 76.67 | 11 | 75.77 | 14 |
| **PAN 3111** | 76.80 | 5 | 79.40 | 1 | 76.66 | 10 | 78.11 | 13 | 77.74 | 5 | 77.62 | 2 | 78.10 | 1 |
| **PAN 3118** | 76.97 | 4 | 78.85 | 5 | 76.79 | 8 | 80.03 | 2 | 78.16 | 2 | 77.54 | 4 | 77.91 | 2 |
| **PAN 3161** | 76.19 | 6 | 78.30 | 10 | 77.50 | 5 | 78.93 | 7 | 77.73 | 6 | 77.33 | 7 | 77.25 | 8 |
| **PAN 3195** | 75.12 | 15 | 78.53 | 7 | 75.19 | 16 | 78.29 | 11 | 76.78 | 13 | 76.28 | 13 | 76.82 | 12 |
| **PAN 3198** | 76.08 | 8 | 77.85 | 12 | 77.21 | 6 | 78.57 | 9 | 77.43 | 9 | 77.05 | 9 | 76.96 | 11 |
| **PAN 3368** | 74.97 | 16 | 77.93 | 11 | 75.64 | 15 | 77.88 | 15 | 76.60 | 14 | 76.18 | 14 | 76.45 | 13 |
| **PAN 3379** | 76.08 | 8 | 78.90 | 4 | 77.56 | 4 | 79.95 | 3 | 78.12 | 4 | 77.51 | 5 | 77.49 | 5 |
| **Senqu** | 75.22 | 13 | 78.75 | 6 | 76.39 | 12 | 78.15 | 12 | 77.13 | 10 | 76.79 | 10 | 76.99 | 10 |
| **SST 3149** | 66.67 | 21 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 72.88 | 19 | 77.10 | 15 | 74.71 | 17 | 78.06 | 14 | 75.69 | 16 | 74.90 | 16 | 74.99 | 17 |
| **SST 317** | 73.84 | 17 | 76.70 | 17 | 76.10 | 13 | 79.46 | 5 | 76.53 | 15 | 75.55 | 15 | 75.27 | 16 |
| **SST 347** | 77.67 | 1 | 77.13 | 14 | 80.11 | 1 | 78.49 | 10 | 78.35 | 1 | 78.30 | 1 | 77.40 | 6 |
| **SST 356** | 72.73 | 20 | 76.95 | 16 | 73.69 | 18 | 77.80 | 16 | 75.29 | 17 | 74.46 | 17 | 74.84 | 18 |
| **SST 374** | 73.80 | 18 | 77.43 | 13 |  |  | 78.95 | 6 |  |  |  |  | 75.61 | 15 |
| **SST 387** | 76.19 | 6 | 78.45 | 8 | 76.51 | 11 | 77.22 | 18 | 77.09 | 11 | 77.05 | 8 | 77.32 | 7 |
| **SST 398** |  |  |  |  | 76.85 | 7 | 76.14 | 19 |  |  |  |  |  |  |
| **Wedzi** | 77.48 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **75.16** |  | **78.09** |  | **76.65** |  | **78.54** |  | **77.23** |  | **76.75** |  | **76.74** |  |
| **LSDt(0,05)** | **2.42** |  | **0.57** |  | **0.63** |  | **1.94** |  | **0.51** |  | **0.45** |  | **0.59** |  |
| **\* Only Bultfontein M2 data** | | | |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the hectolitre mass of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 4304 | 17.15 |  |  |
| **Treatments** | | 62 | 2572 | 41.49 | 4.83 | <0,001 |
| **Genotypes** | | 20 | 1365 | 68.25 | 7.94 | <0,001 |
| **Environments** | | 2 | 414 | 207.02 | 10.09 | <0,001 |
| **Block** |  | 9 | 185 | 20.52 | 2.39 | 0.0141 |
| **Interactions** | | 40 | 793 | 19.83 | 2.31 | <0,001 |
| **IPCA** |  | 21 | 758 | 36.12 | 4.20 | <0,001 |
| **IPCA** |  | 19 | 35 | 1.83 | 0.21 | 0.9998 |
| **Residuals** | | 0 | 0 |  |  |  |
| **Error** |  | 180 | 1547 | 8.59 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Elands | 76.05 | 10 | 0.22010 |  |  |
| 2 | Gariep | 75.61 | 12 | 0.16483 |  |  |
| 3 | Koonap | 75.71 | 11 | 0.14567 |  |  |
| 4 | Kougas | 77.18 | 3 | 0.12621 |  |  |
| 5 | Matlabas | 75.16 | 14 | -0.10036 |  |  |
| 6 | PAN 3111 | 76.80 | 5 | 0.18283 |  |  |
| 7 | PAN 3118 | 76.97 | 4 | 0.18147 |  |  |
| 8 | PAN 3161 | 76.19 | 6 | 0.01014 |  |  |
| 9 | PAN 3195 | 75.12 | 15 | 0.46192 |  |  |
| 10 | PAN 3198 | 76.08 | 8 | 0.46595 |  |  |
| 11 | PAN 3368 | 74.97 | 16 | 0.11243 |  |  |
| 12 | PAN 3379 | 76.08 | 8 | 0.29270 |  |  |
| 13 | Senqu | 75.22 | 13 | 0.04054 |  |  |
| 14 | SST 3149 | 66.67 | 21 | -3.55184 |  |  |
| 15 | SST 316 | 72.88 | 19 | 0.28283 |  |  |
| 16 | SST 317 | 73.84 | 17 | 0.10329 |  |  |
| 17 | SST 347 | 77.67 | 1 | 0.12001 |  |  |
| 18 | SST 356 | 72.73 | 20 | 0.54102 |  |  |
| 19 | SST 374 | 73.80 | 18 | 0.17954 |  |  |
| 20 | SST 387 | 76.19 | 6 | -0.03699 |  |  |
| 21 | Wedzi | 77.48 | 2 | 0.05772 |  |  |
| **Mean** | | **75.16** |  |  |  |  |
| **Coefficient of variation (%)** | | **4.00** |  |  |  |  |
| **LSDt(0.05)** | | **2.42** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for hectolitre mass (kg/hl)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Hectolitre mass** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 74.02 | 3 | 2.01216 |  |  |
| 2 | Bultfontein | 74.51 | 2 | -2.96782 |  |  |
| 3 | Wesselsbron | 76.95 | 1 | 0.95565 |  |  |
| **Mean** | | **75.16** |  |  |  |  |
| **Coefficient of variation (%)** | | **4.00** |  |  |  |  |
| **LSDt(0.05)** | | **0.92** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting)** | | | | | | | | | | | | | | |
| **Average protein content (%) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **\* 2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 15.51 | 16 | 14.51 | 11 | 15.78 | 9 | 15.05 | 7 | 15.21 | 9 | 15.27 | 11 | 15.01 | 11 |
| **Gariep** | 14.90 | 19 | 14.13 | 14 | 15.78 | 10 | 14.46 | 11 | 14.82 | 13 | 14.94 | 14 | 14.52 | 16 |
| **Koonap** | 16.30 | 3 | 14.72 | 5 | 15.89 | 7 | 15.17 | 4 | 15.52 | 3 | 15.64 | 3 | 15.51 | 3 |
| **Kougas** | 16.20 | 5 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 16.21 | 4 | 14.69 | 7 | 15.21 | 15 | 15.71 | 1 | 15.45 | 5 | 15.37 | 10 | 15.45 | 4 |
| **PAN 3111** | 15.54 | 14 | 14.04 | 15 | 15.03 | 16 | 13.82 | 15 | 14.61 | 16 | 14.87 | 15 | 14.79 | 14 |
| **PAN 3118** | 16.08 | 8 | 14.78 | 3 | 15.59 | 12 | 14.47 | 10 | 15.23 | 8 | 15.48 | 7 | 15.43 | 5 |
| **PAN 3161** | 16.16 | 6 | 14.64 | 9 | 15.48 | 13 | 14.82 | 9 | 15.28 | 7 | 15.43 | 8 | 15.40 | 6 |
| **PAN 3195** | 15.70 | 11 | 13.56 | 17 | 15.81 | 8 | 13.89 | 14 | 14.74 | 14 | 15.02 | 13 | 14.63 | 15 |
| **PAN 3198** | 16.40 | 2 | 14.75 | 4 | 16.24 | 2 | 15.13 | 6 | 15.63 | 1 | 15.80 | 2 | 15.57 | 2 |
| **PAN 3368** | 16.00 | 9 | 14.66 | 8 | 16.12 | 4 | 15.28 | 3 | 15.51 | 4 | 15.59 | 5 | 15.33 | 9 |
| **PAN 3379** | 14.58 | 21 | 13.34 | 18 | 15.03 | 17 | 13.46 | 17 | 14.10 | 17 | 14.32 | 17 | 13.96 | 18 |
| **Senqu** | 15.53 | 15 | 14.70 | 6 | 16.23 | 3 | 15.16 | 5 | 15.41 | 6 | 15.49 | 6 | 15.12 | 10 |
| **SST 3149** | 15.70 | 11 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 15.97 | 10 | 14.80 | 2 | 16.09 | 5 | 13.03 | 18 | 14.97 | 11 | 15.62 | 4 | 15.39 | 7 |
| **SST 317** | 16.10 | 7 | 14.57 | 10 | 15.46 | 14 | 14.13 | 13 | 15.06 | 10 | 15.38 | 9 | 15.33 | 8 |
| **SST 347** | 15.47 | 17 | 14.16 | 12 | 14.78 | 18 | 14.97 | 8 | 14.84 | 12 | 14.80 | 16 | 14.81 | 13 |
| **SST 356** | 16.46 | 1 | 14.84 | 1 | 16.70 | 1 | 14.33 | 12 | 15.58 | 2 | 16.00 | 1 | 15.65 | 1 |
| **SST 374** | 14.86 | 20 | 14.14 | 13 |  |  | 13.47 | 16 |  |  |  |  | 14.50 | 17 |
| **SST 387** | 15.70 | 11 | 14.03 | 16 | 15.73 | 11 | 12.99 | 19 | 14.61 | 15 | 15.15 | 12 | 14.86 | 12 |
| **SST 398** |  |  |  |  | 16.01 | 6 | 15.52 | 2 |  |  |  |  |  |  |
| **Wedzi** | 15.23 | 18 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **15.74** |  | **14.39** |  | **15.72** |  | **14.46** |  | **15.09** |  | **15.30** |  | **15.07** |  |
| **LSDt(0,05)** | **0.53** |  | **0.95** |  | **0.52** |  | **1.07** |  | **0.36** |  | **0.39** |  | **0.49** |  |
| **\* Only Bultfontein M2 data** | | | |  |  |  |  |  |  |  |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the protein content of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 223.08 | 0.889 |  |  |
| **Treatments** | | 62 | 143.27 | 2.311 | 6.25 | <0,001 |
| **Genotypes** | | 20 | 66.58 | 3.329 | 9.01 | <0,001 |
| **Environments** | | 2 | 46.49 | 23.243 | 15.77 | <0,001 |
| **Block** |  | 9 | 13.27 | 1.474 | 3.99 | <0,001 |
| **Interactions** | | 40 | 30.21 | 0.755 | 2.04 | <0,001 |
| **IPCA** |  | 21 | 23.91 | 1.139 | 3.08 | <0,001 |
| **IPCA** |  | 19 | 6.29 | 0.331 | 0.90 | 0.5884 |
| **Residuals** | | 0 | 0.00 |  |  |  |
| **Error** |  | 180 | 66.53 | 0.370 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Elands | 15.51 | 16 | -0.47086 |  |  |
| 2 | Gariep | 14.90 | 19 | 0.10704 |  |  |
| 3 | Koonap | 16.30 | 3 | 0.00350 |  |  |
| 4 | Kougas | 16.20 | 5 | -0.20817 |  |  |
| 5 | Matlabas | 16.21 | 4 | 0.13952 |  |  |
| 6 | PAN 3111 | 15.54 | 14 | 0.04156 |  |  |
| 7 | PAN 3118 | 16.08 | 8 | 0.36665 |  |  |
| 8 | PAN 3161 | 16.16 | 6 | 0.04653 |  |  |
| 9 | PAN 3195 | 15.70 | 11 | 0.16731 |  |  |
| 10 | PAN 3198 | 16.40 | 2 | -0.33332 |  |  |
| 11 | PAN 3368 | 16.00 | 9 | -0.75185 |  |  |
| 12 | PAN 3379 | 14.58 | 21 | -0.54802 |  |  |
| 13 | Senqu | 15.53 | 15 | 0.10534 |  |  |
| 14 | SST 3149 | 15.70 | 11 | 0.38245 |  |  |
| 15 | SST 316 | 15.97 | 10 | 0.24735 |  |  |
| 16 | SST 317 | 16.10 | 7 | 0.09071 |  |  |
| 17 | SST 347 | 15.47 | 17 | 0.14924 |  |  |
| 18 | SST 356 | 16.46 | 1 | 0.14476 |  |  |
| 19 | SST 374 | 14.86 | 20 | 0.06952 |  |  |
| 20 | SST 387 | 15.70 | 11 | 0.71691 |  |  |
| 21 | Wedzi | 15.23 | 18 | -0.46616 |  |  |
| **Mean** | | **15.74** |  |  |  |  |
| **Coefficient of variation (%)** | | **4.20** |  |  |  |  |
| **LSDt(0.05)** | | **0.53** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for protein content (%)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Protein content** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 16.27 | 1 | 0.36980 |  |  |
| 2 | Bultfontein | 15.74 | 2 | 0.87339 |  |  |
| 3 | Wesselsbron | 15.22 | 3 | -1.24320 |  |  |
| **Mean** | | **15.74** |  |  |  |  |
| **Coefficient of variation (%)** | | **4.20** |  |  |  |  |
| **LSDt(0.05)** | | **0.20** |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting)** | | | | | | | | | | | | | | |
| **Average falling number (s) of entries during the full or partial period from 2013 - 2016** | | | | | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **2016** | **R** | **2015** | **R** | **2014** | **R** | **\* 2013** | **R** | **4 year average** | **R** | **3 year average** | **R** | **2 year average** | **R** |
| **2013-2016** | **2014-2016** | **2015-2016** |
| **Elands** | 342 | 5 | 311 | 10 | 308 | 7 | 302 | 9 | 315 | 6 | 320 | 6 | 326 | 5 |
| **Gariep** | 313 | 14 | 312 | 9 | 283 | 15 | 295 | 13 | 301 | 11 | 302 | 12 | 312 | 11 |
| **Koonap** | 353 | 1 | 316 | 4 | 319 | 5 | 324 | 2 | 328 | 1 | 329 | 3 | 334 | 2 |
| **Kougas** | 340 | 7 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Matlabas** | 331 | 12 | 304 | 15 | 285 | 13 | 245 | 19 | 291 | 16 | 307 | 10 | 318 | 10 |
| **PAN 3111** | 283 | 21 | 313 | 5 | 299 | 9 | 278 | 16 | 293 | 15 | 298 | 15 | 298 | 18 |
| **PAN 3118** | 291 | 20 | 317 | 3 | 277 | 17 | 296 | 12 | 295 | 13 | 295 | 16 | 304 | 17 |
| **PAN 3161** | 347 | 3 | 313 | 6 | 336 | 1 | 272 | 18 | 317 | 5 | 332 | 2 | 330 | 3 |
| **PAN 3195** | 310 | 16 | 307 | 14 | 292 | 12 | 321 | 3 | 307 | 10 | 303 | 11 | 308 | 14 |
| **PAN 3198** | 335 | 10 | 324 | 1 | 327 | 3 | 305 | 7 | 323 | 3 | 329 | 4 | 329 | 4 |
| **PAN 3368** | 315 | 13 | 294 | 18 | 297 | 10 | 291 | 14 | 299 | 12 | 302 | 13 | 304 | 16 |
| **PAN 3379** | 305 | 19 | 312 | 8 | 316 | 6 | 327 | 1 | 315 | 7 | 311 | 8 | 308 | 13 |
| **Senqu** | 351 | 2 | 320 | 2 | 328 | 2 | 300 | 10 | 325 | 2 | 333 | 1 | 335 | 1 |
| **SST 3149** | 310 | 16 |  |  |  |  |  |  |  |  |  |  |  |  |
| **SST 316** | 336 | 8 | 313 | 7 | 323 | 4 | 302 | 8 | 319 | 4 | 324 | 5 | 325 | 7 |
| **SST 317** | 335 | 9 | 302 | 16 | 296 | 11 | 310 | 6 | 311 | 8 | 311 | 9 | 318 | 9 |
| **SST 347** | 312 | 15 | 297 | 17 | 233 | 18 | 299 | 11 | 285 | 17 | 281 | 17 | 305 | 15 |
| **SST 356** | 343 | 4 | 309 | 12 | 300 | 8 | 289 | 15 | 310 | 9 | 317 | 7 | 326 | 6 |
| **SST 374** | 341 | 6 | 308 | 13 |  |  | 313 | 5 |  |  |  |  | 324 | 8 |
| **SST 387** | 310 | 16 | 310 | 11 | 280 | 16 | 276 | 17 | 294 | 14 | 300 | 14 | 310 | 12 |
| **SST 398** |  |  |  |  | 284 | 14 | 315 | 4 |  |  |  |  |  |  |
| **Wedzi** | 332 | 11 |  |  |  |  |  |  |  |  |  |  |  |  |
| **Mean** | **325** |  | **310** |  | **299** |  | **298** |  | **308** |  | **311** |  | **318** |  |
| **LSDt(0,05)** | **18.42** |  | **14.36** |  | **27.23** |  | **49.58** |  | **12.34** |  | **11.99** |  | **12.40** |  |
| **\* Only Bultfontein M2 data** | | | |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **North Western Free State (later planting) AMMI Analysis** | | | | | | |
| **Anova of the falling number of entries for 2016** | | | | | | |
|  |  |  |  |  |  |  |
| **Source** |  | **Df** | **SS** | **MS** | **F-Value** | **Pr> F** |
| **Total** |  | 251 | 860162 | 3427 |  |  |
| **Treatments** | | 62 | 760171 | 12261 | 23.28 | <0,001 |
| **Genotypes** | | 20 | 94236 | 4712 | 8.95 | <0,001 |
| **Environments** | | 2 | 573605 | 286802 | 498.15 | <0,001 |
| **Block** |  | 9 | 5182 | 576 | 1.09 | 0.3700 |
| **Interactions** | | 40 | 92330 | 2308 | 4.38 | <0,001 |
| **IPCA** |  | 21 | 72827 | 3468 | 6.58 | <0,001 |
| **IPCA** |  | 19 | 19503 | 1026 | 1.95 | 0.0131 |
| **Residuals** | | 0 | 0 |  |  |  |
| **Error** |  | 180 | 94809 | 527 |  |  |
|  |  |  |  |  |  |  |
| **Genotype means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Genotype** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Elands | 342 | 5 | -0.04723 |  |  |
| 2 | Gariep | 313 | 14 | 3.65215 |  |  |
| 3 | Koonap | 353 | 1 | -1.04337 |  |  |
| 4 | Kougas | 340 | 7 | 0.30175 |  |  |
| 5 | Matlabas | 331 | 12 | 0.80113 |  |  |
| 6 | PAN 3111 | 283 | 21 | -3.44522 |  |  |
| 7 | PAN 3118 | 291 | 20 | 4.93182 |  |  |
| 8 | PAN 3161 | 347 | 3 | -0.63444 |  |  |
| 9 | PAN 3195 | 310 | 16 | -6.63363 |  |  |
| 10 | PAN 3198 | 335 | 10 | -1.31017 |  |  |
| 11 | PAN 3368 | 315 | 13 | 3.03838 |  |  |
| 12 | PAN 3379 | 305 | 19 | -4.55867 |  |  |
| 13 | Senqu | 351 | 2 | -0.55996 |  |  |
| 14 | SST 3149 | 310 | 16 | 0.83186 |  |  |
| 15 | SST 316 | 336 | 8 | 0.96042 |  |  |
| 16 | SST 317 | 335 | 9 | 1.07487 |  |  |
| 17 | SST 347 | 312 | 15 | 2.01421 |  |  |
| 18 | SST 356 | 343 | 4 | -0.16106 |  |  |
| 19 | SST 374 | 341 | 6 | 0.10156 |  |  |
| 20 | SST 387 | 310 | 16 | 0.22264 |  |  |
| 21 | Wedzi | 332 | 11 | 0.46295 |  |  |
| **Mean** | | **325** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.00** |  |  |  |  |
| **LSDt(0.05)** | | **18.42** |  |  |  |  |
|  |  |  |  |  |  |  |
| **Environment means and scores for falling number (s)** | | | | |  |  |
|  |  |  |  |  |  |  |
| **Entry** | **Environment** | **Falling number** | **Rank** | **Score** |  |  |
| 1 | Bothaville | 300 | 2 | -2.62407 |  |  |
| 2 | Bultfontein | 392 | 1 | 9.20518 |  |  |
| 3 | Wesselsbron | 284 | 3 | -6.58111 |  |  |
| **Mean** | | **325** |  |  |  |  |
| **Coefficient of variation (%)** | | **7.00** |  |  |  |  |
| **LSDt(0.05)** | | **6.96** |  |  |  |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **North Western Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Bothaville 2016-05-17** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 2.31 | a | 1 | 15.99 | 75.55 | 7 | 15.71 | 18 | 309 | 9 |
| **Gariep** | 1.90 | bcde | 7 | 7.00 | 73.80 | 15 | 16.11 | 13 | 304 | 11 |
| **Koonap** | 1.68 | defghi | 14 | 3.88 | 74.95 | 10 | 16.63 | 7 | 329 | 2 |
| **Kougas** | 1.65 | efghij | 15 | 10.68 | 76.45 | 3 | 16.71 | 4 | 313 | 7 |
| **Matlabas** | 2.17 | ab | 2 | 18.47 | 74.35 | 14 | 16.76 | 3 | 300 | 13 |
| **PAN 3111** | 1.72 | cdefg | 12 | 15.16 | 76.00 | 6 | 16.01 | 15 | 278 | 17 |
| **PAN 3118** | 2.01 | abc | 3 | 13.70 | 76.25 | 4 | 16.88 | 2 | 251 | 21 |
| **PAN 3161** | 1.85 | cdefg | 10 | 9.14 | 75.40 | 9 | 16.71 | 4 | 317 | 4 |
| **PAN 3195** | 1.85 | cdefg | 9 | 6.82 | 74.55 | 13 | 16.47 | 11 | 300 | 12 |
| **PAN 3198** | 1.41 | hijk | 18 | 7.71 | 76.25 | 4 | 16.63 | 7 | 297 | 15 |
| **PAN 3368** | 1.29 | k | 21 | 15.05 | 74.65 | 11 | 16.39 | 12 | 280 | 16 |
| **PAN 3379** | 1.38 | ijk | 19 | 1.96 | 75.50 | 8 | 15.10 | 21 | 305 | 10 |
| **Senqu** | 2.01 | abc | 4 | 16.91 | 73.80 | 15 | 16.09 | 14 | 338 | 1 |
| **SST 3149** | 1.95 | bcde | 6 | 21.49 | 58.35 | 21 | 15.91 | 16 | 298 | 14 |
| **SST 316** | 1.56 | ghijk | 17 | 10.09 | 71.80 | 20 | 16.63 | 7 | 316 | 5 |
| **SST 317** | 1.75 | cdefg | 11 | 2.71 | 73.15 | 17 | 16.70 | 6 | 314 | 6 |
| **SST 347** | 1.71 | cdefgh | 13 | 1.62 | 77.10 | 1 | 15.85 | 17 | 272 | 19 |
| **SST 356** | 1.59 | fghijk | 16 | 11.66 | 72.95 | 18 | 17.03 | 1 | 320 | 3 |
| **SST 374** | 1.36 | jk | 20 | 12.05 | 72.40 | 19 | 15.52 | 19 | 309 | 8 |
| **SST 387** | 1.98 | bcd | 5 | 5.65 | 74.60 | 12 | 16.53 | 10 | 268 | 20 |
| **Wedzi** | 1.88 | bcdef | 8 | 22.09 | 76.60 | 2 | 15.32 | 20 | 277 | 18 |
| **Mean** | **1.76** |  |  |  | **74.02** |  | **16.27** |  | **300** |  |
| **Coefficient of variation (%)** | **12.51** |  |  |  | **6.22** |  | **3.19** |  | **9.80** |  |
| **LSDt(0,05)** | **0.31** |  |  |  | **6.61** |  | **0.75** |  | **42.92** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **North Western Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Bultfontein 2016-05-18** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 1.90 | ghi | 14 | 7.72 | 74.80 | 10 | 15.20 | 17 | 410 | 1 |
| **Gariep** | 2.20 | de | 7 | 7.17 | 74.20 | 14 | 14.51 | 20 | 407 | 12 |
| **Koonap** | 2.04 | fg | 10 | 6.65 | 74.65 | 11 | 16.45 | 2 | 410 | 1 |
| **Kougas** | 1.91 | gh | 12 | 6.40 | 76.20 | 4 | 15.96 | 11 | 410 | 1 |
| **Matlabas** | 2.88 | a | 1 | 6.22 | 74.95 | 9 | 16.36 | 4 | 406 | 13 |
| **PAN 3111** | 2.09 | ef | 8 | 6.53 | 75.60 | 6 | 15.64 | 14 | 316 | 21 |
| **PAN 3118** | 2.80 | a | 2 | 6.19 | 75.80 | 5 | 16.29 | 6 | 404 | 14 |
| **PAN 3161** | 2.46 | b | 3 | 7.32 | 75.60 | 6 | 16.20 | 8 | 410 | 1 |
| **PAN 3195** | 2.28 | cd | 6 | 9.21 | 73.00 | 17 | 15.70 | 13 | 316 | 20 |
| **PAN 3198** | 2.32 | bcd | 5 | 7.20 | 74.15 | 15 | 16.23 | 7 | 394 | 16 |
| **PAN 3368** | 1.87 | hij | 15 | 5.07 | 74.15 | 15 | 15.23 | 16 | 410 | 1 |
| **PAN 3379** | 2.41 | bc | 4 | 7.65 | 74.55 | 12 | 13.94 | 21 | 326 | 19 |
| **Senqu** | 1.90 | ghi | 13 | 6.84 | 74.35 | 13 | 15.62 | 15 | 410 | 1 |
| **SST 3149** | 1.69 | k | 20 | 7.02 | 76.55 | 3 | 16.38 | 3 | 380 | 18 |
| **SST 316** | 1.72 | jk | 19 | 5.34 | 71.25 | 20 | 16.15 | 10 | 410 | 1 |
| **SST 317** | 1.76 | ijk | 17 | 6.88 | 72.95 | 18 | 16.16 | 9 | 410 | 1 |
| **SST 347** | 1.77 | hijk | 16 | 4.67 | 76.75 | 1 | 15.75 | 12 | 400 | 15 |
| **SST 356** | 1.67 | k | 21 | 3.03 | 70.55 | 21 | 16.58 | 1 | 408 | 11 |
| **SST 374** | 1.73 | jk | 18 | 3.29 | 72.45 | 19 | 14.83 | 19 | 410 | 1 |
| **SST 387** | 2.04 | fg | 10 | 4.42 | 75.55 | 8 | 16.30 | 5 | 383 | 17 |
| **Wedzi** | 2.08 | ef | 9 | 6.17 | 76.70 | 2 | 15.02 | 18 | 410 | 1 |
| **Mean** | **2.07** |  |  |  | **74.51** |  | **15.74** |  | **392** |  |
| **Coefficient of variation (%)** | **4.95** |  |  |  | **0.78** |  | **1.62** |  | **2.16** |  |
| **LSDt(0,05)** | **0.15** |  |  |  | **0.84** |  | **0.37** |  | **12.22** |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2016 Wheat cultivar adaptation trial** | | | | | | | | | | |
| **North Western Free State (later planting)** | | | | | | | | | | |
|  |  |  |  |  |  |  |  |  |  |  |
| **Cultivar** | **Wesselsbron 2016-05-17** | | | | | | | | | |
| **Yield** | | **Rank** | **C.V.** | **Hectolitre mass** | **Rank** | **Protein content** | **Rank** | **Falling number** | **Rank** |
| **Elands** | 3.05 | efg | 11 | 11.32 | 77.80 | 10 | 15.60 | 6 | 307 | 6 |
| **Gariep** | 3.31 | cde | 7 | 7.92 | 78.82 | 5 | 14.09 | 21 | 228 | 20 |
| **Koonap** | 2.51 | ij | 17 | 4.34 | 77.52 | 13 | 15.82 | 4 | 319 | 1 |
| **Kougas** | 2.70 | hi | 14 | 10.10 | 78.90 | 3 | 15.92 | 3 | 298 | 10 |
| **Matlabas** | 3.79 | ab | 3 | 7.79 | 76.17 | 16 | 15.52 | 8 | 287 | 11 |
| **PAN 3111** | 3.27 | cdef | 8 | 11.38 | 78.80 | 6 | 14.99 | 13 | 256 | 17 |
| **PAN 3118** | 4.02 | a | 2 | 7.24 | 78.87 | 4 | 15.06 | 12 | 219 | 21 |
| **PAN 3161** | 2.60 | ij | 15 | 6.77 | 77.57 | 12 | 15.58 | 7 | 315 | 2 |
| **PAN 3195** | 3.18 | def | 10 | 8.18 | 77.80 | 10 | 14.92 | 14 | 313 | 4 |
| **PAN 3198** | 2.54 | ij | 16 | 5.47 | 77.85 | 9 | 16.33 | 2 | 314 | 3 |
| **PAN 3368** | 2.36 | jk | 19 | 2.40 | 76.12 | 17 | 16.38 | 1 | 255 | 18 |
| **PAN 3379** | 2.09 | kl | 20 | 8.27 | 78.17 | 8 | 14.69 | 18 | 283 | 12 |
| **Senqu** | 3.56 | bc | 5 | 10.24 | 77.50 | 14 | 14.87 | 15 | 305 | 7 |
| **SST 3149** | 1.48 | m | 21 | 7.14 | 65.10 | 21 | 14.81 | 16 | 251 | 19 |
| **SST 316** | 2.77 | ghi | 13 | 4.91 | 75.57 | 18 | 15.13 | 11 | 283 | 13 |
| **SST 317** | 2.98 | fgh | 12 | 7.29 | 75.42 | 19 | 15.46 | 9 | 282 | 14 |
| **SST 347** | 3.78 | ab | 4 | 6.28 | 79.15 | 1 | 14.81 | 16 | 265 | 16 |
| **SST 356** | 2.50 | ij | 18 | 5.21 | 74.70 | 20 | 15.75 | 5 | 302 | 9 |
| **SST 374** | 3.47 | cd | 6 | 10.76 | 76.55 | 15 | 14.22 | 20 | 303 | 8 |
| **SST 387** | 4.02 | a | 1 | 4.37 | 78.42 | 7 | 14.28 | 19 | 279 | 15 |
| **Wedzi** | 3.19 | def | 9 | 6.98 | 79.15 | 1 | 15.35 | 10 | 309 | 5 |
| **Mean** | **3.01** |  |  |  | **76.95** |  | **15.22** |  | **284** |  |
| **Coefficient of variation (%)** | **7.53** |  |  |  | **1.20** |  | **4.47** |  | **7.00** |  |
| **LSDt(0,05)** | **0.31** |  |  |  | **1.33** |  | **0.99** |  | **29.10** |  |