

3.1 MAIZE SMALL PLOT CULTIVAR TRIALS

Summary

This series of trials which compares the performance of new maize varieties against standard ones was conducted at 32 sites ranging in altitudes from 950 to 1 500 metres above sea level. Of the 32 sites established, three were written off due to insufficient moisture. Commercial farming sites recorded average falls of 471 mm while communal area sites received 482 mm which was far below the long-term averages of high and middle veld areas of Zimbabwe. The grain yield ranged from 2.67 t/ha to 11.34 t/ha under large scale farming environments increasing to a range of 4.25 t/ha to 8.26 t/ha in communal areas.

Introduction

The current economic and financial situation is causing producers to look for opportunities to control production costs. One effective way of reducing direct costs without lowering grain yields is through choosing the right varieties/hybrids to grow. But with more than 60 varieties/hybrids from over six seed houses now commercially available on the market, choosing the best one for an area can be tricky. The main objective of this programme is to provide, to both maize producers and seed houses, unbiased data on cultivar performance on which rational decisions on hybrid selection can be made. A close look at the hybrid performance data presented in this report will help the farmer narrow down the range of cultivars to choose from. The following letters before variety numbers

indicate the respective seed house, SC for Seed Co, PAN for PANNAR, ZAP, Agriseeds, PGS and PGEX for Progene Seeds, NTS for National Tested Seeds, ZAMS for Zamseeds, SY, SEE, MRI and SZ for Syngenta Seeds.

Methods and management

Trial sites comprised of twelve irrigated commercial area sites with 87 entries, twenty dryland commercial area sites with 42 entries and eight communal area sites with 42 entries. The entries were supplied by eight Seed houses as follows, Seed Co, 22 entries, Pioneer, 17 entries, Klein Karoo, 11 entries, Syngenta, 16 entries, NTS, 3 hybrids, Zamseeds 6 entries, Agriseeds, 6 entries and Pannar, 3 entries. Pioneer hybrids were sown at 10 irrigated sites. The trials were carried out at the following sites: Arcturus - Ivordale Farm (A Pascoe); Harare - Agricultural Research Trust Farm, with an early planting (ART 1) and a late planting (ART 2); Lions' Den - Ramsey Farm (Doug Taylor Freeme); Beatrice; Nengwa Farm (Mr Mangena); Chegutu Central Mudavanhu Farm (M. Shoko); Chinhoyi-Avalon Farm (Mr Swanepoel); Chiweshe- Chirimuta Farm (Mr Chirimuta); Enterprise- Rattray Arnold Research Station (Mr. Soko); Gutu-Chingwe/Musasa (Mr Nyengera); Madziva - Chinyani Farm (Mr Chirume); Mutare- Africa University Farm (Mr Kies); Selous - Sambro Farm (Mr Kajese); Musana- Shaire Farm (Mr Tichagwa); Zvimba- Muhalazi; Chirau-Gwaze Farm (Mr G. Muchetu); Murewa - Matongorere Farm; Mutorashanga- Northwood Farm (Mr Mutonga); Chitomborwizi- Nharire Farm (Mr E. Mutemeri); Mvuma- Maketo Farm (Dr Maketo); Chakari- Gura Farm (Mr C Gura); Masvingo- Chitekete (Mr. Mazetese); Raffingora-

Karimawanga Farm (Mr. Madzingo); Shamva- Hopedell Farm (Hon. P Shiri); Mhangura- Victory Farm (Mr Cakana); Wedza- Gorejena Farm (Mr Nyakonda); Marondera- Sambok Farm (Mr JM Campbell) and Mvurwi- Forrester B (Mr Brooker).

At ART Farm each hybrid was planted on two dates. The first planting was delayed because of late on 8 November 2019 with irrigation and the second planting was on 19 December 2019 under rainfed conditions. The planting dates at the other sites depended mainly on the farmer's planting time, which was dictated by the arrival of first effective planting rains (**Table 3.1**).

The trials were all hand planted by the ART staff at a target population of 55 556 plants/ha. Four kernels were planted per station and then subsequently thinned to two plants per station at the 2 to 3 leaf growth stage. Gaucho[®] 70 WS was applied on the seed at a rate of 250g/50kg seed. Land preparation weed, and pest control and all other cultural practices were carried out by the farmer to the standard farm practice and in line with recommendations for maize. The data for cultural practices, rainfall and irrigation at each site are presented in **Tables 3.1.and3.1.1**

The varieties were combined in a randomised complete block design replicated three times. Treatments were randomised separately for each site. The gross plot was 4 rows of 0.9 m by 12 plant stations at 0.40 m in-row. A net plot 7.2 m² (2 centre rows by 10 plant stations) was hand harvested for yield assessment. Unshelled cobs were weighed and then one replicate was shelled and weighed to give an estimate of shelling

percentage. Grain moisture content was determined on these samples and yields were adjusted to 12.5 percent moisture.

Results and discussion

To avoid big losses, harvesting had to start much earlier than usual (**Table 3.1 and 3.1.1**). The rainfall figures are presented in **Table 3.1**. The summary of mean grain yield of the hybrids is presented in **Tables 3.2 and 3.2.1**. Averaged across sites SC 659 was the highest yielding hybrid at a yield level of 8.76 t/ha and 7.26 t/ha under irrigated and rain fed conditions. Hybrids SC 529, SC 649 and PGS 65 produced similar yields of over 8.0 t/ha under commercial areas. Under communal areas, PGS 51 and ZAP 73 yielded over 7.0 t/ha. The highest yielding site was Marondera which topped 11.34 t/ha followed by ART Farm at a yield level of 10.44 t/ha. Other sites which attained average yields of over nine tons per hectare were Mutare, ART Farm December planting, Mvurwi, Raffingora and Bindura. Low yields of below 5.0 t/ha were recorded at Chegutu and Chakari. NTS 43 produced the lowest yield of 6.44 t/ha across all sites.

Under communal area sites, Mahusekwa gave the highest yield of 8.26 t/ha followed by Murewa (6.23 t/ha), Chiweshe (6.77 t/ha), Zvimba (6.61t//ha) and Gutu at a yield level of 6.36 t/ha. The lowest yields were recorded at Chitomborwizi (4.25 t/ha). Averaged across sites SC 659 gave the highest yield of 7.26 t/ha. Other hybrids that yielded above 7.0 t/ha were PGS 51 and ZAP 73. The least yielding variety was ZAP 55 at a yield level of 5.15 t/ha. The average yields attained were slightly better

than last season. The viability of seed was generally good and acceptable plant stands were achieved at most sites (**Tables 3.1 and 3.13**). All hybrids took significantly different times to pollinate ($P < 0.001$) and to form silks ($P < 0.001$) (Tables 3.2 and 3.3) SC 301 generally took the least time for both traits, and SC 719 and SC 727 the longest time.

Low levels of root and stalk lodging were recorded at all sites (Tables 3.5 and 3.6), but significant differences between the hybrids occurred only at some sites. Significant ($P < 0.01$) differences in grain yield were recorded at all sites both in commercial and communal area sites.

Practical applications

Seed houses are now producing high yielding stable hybrids that can be selected to suit the current diverse environments. Some of which are the ultra-early three months maturing with outstanding heat and drought stress tolerance.

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