

Evaluation of Pearl Millet (*Pennisetum glaucum L.*) varieties for adaptation to the semi-arid environments of the North West Province

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1. Presentation outline

- Introduction
- Problem Statement
- Objectives
- Materials and Methods
- Preliminary Results
- Discussions
- Recommendations and conclusions



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2. Introduction

- Widely grown as food crop in the arid and semi- arid regions (Africa & Asia)
- Staple food for more than 90 million people.
- Multiple uses (human food, poultry and Livestock feed)
- Main source of energy and protein for poor rural communities.
- Highly Nutritious crop- Health benefits –Exc. grain (diabetic)
- Well suited harsh conditions than other cereals
- Reliably produces grain – Annual Rainfall 250 mm-other cereals are likely to fail.



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Processed pearl millet



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3. Problem Statement

- Successive droughts in some areas of the North West Province have resulted in decreased maize productivity. South Africa is a water scarce country and only receives 492 mm of rainfall per annum, which is erratic.
- This has given rise to the need to find alternative crops, which are suitable for marginal areas.
- Pearl millet has the potential to end chronic food insecurity because of its ability to drought tolerance and can grow under low input conditions.
- Despite its important benefits there is no commercial production in South Africa at present and the agronomical performance of pearl millet varieties in marginal conditions has not been determined adequately.



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4 Objectives

Main Objectives

- To test the adaptability and yield potential of pearl millet in the semi-arid environments of the North West Province of South Africa.

Specific Objectives

- To test millet varieties under marginal conditions.
- To compare grain yields of pearl millet varieties.



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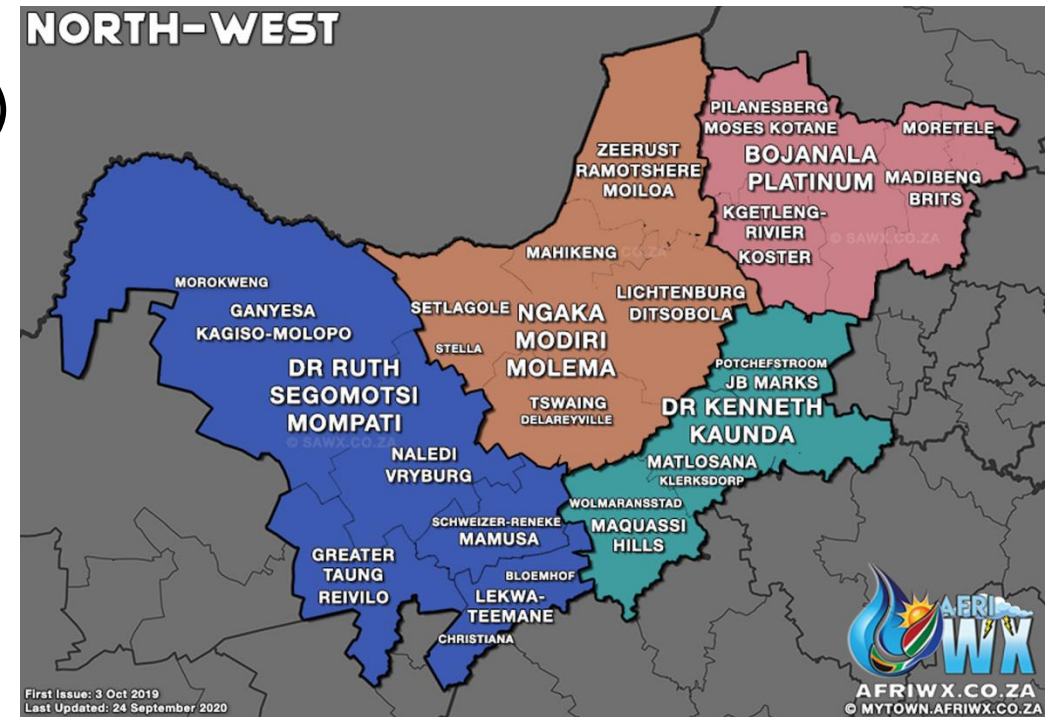


5. Materials and Methods

- **Research Site**

- Two field trials were conducted during the rainy season of 2019/20 season at two localities

Taung (Dr Ruth Segomotsi Mompati District)
Lehurutshe (Ngaka Modiri Molema District)



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5. Materials and Methods

• Trial Design

- RCBD- Ten Pearl millet varieties- 3 reps
- TRT- 10 Varieties: Okashana 1, Okasana 2 Local Check, SDMV 95022, GC14420, PMV2, SDMV 95045, SDMV 89005, SDMV 90031 & SDMV 90031
- 4 Rows-experimental units
- Plot sizes- 3.6 x 5 m- spacing 90cm x 20cm
- Two Seeds/hill- Thined to one/hill- 2WAP



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Materials and Methods

Trial Management

- Primary land preparation – Chisel Plough- Seedbed-Tiller
- Manual Weeding (2 & 6 WAP)
- Fertilization: basal (45 kg/N/ha, 19 kg/ha P205 and 5kg/ha K20 (3:2:1 (25)
Topdressing : Lime Ammonium Nitrate (LAN 28). 2 split applications
- Insecticide: Beta-cyfluthrin granules- 4 WAP
- After pollination, grain heads from the two middle rows.
- Bird netting (trial)



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Materials and Methods

DATA COLLECTION

- 2 middle Rows considered. Other parameters:
- ✓ Attainment of 50% bloom (days),
- ✓ Plant count (the number of plants per net plot at harvest),
- ✓ Ear-length (cm) (Five ear heads of pearl millet were used to measure the length from the basal whorl to the tip of the ear head. The length of ear head was measured in centimetres and the mean length calculated.
- ✓ Number of tillers per plant (at harvest per plot)
- ✓ Plant height (Measuring tape:at the base of the stem up to the last leaf of the plant)
- ✓ 1000 grain mass (g): A random sample of grains was taken from the produce of the net plot. 1000-grains of pearl millet were counted and their weight was recorded as test weight.

Harvesting



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Preliminary Results Cont...

Table 1. Time to reach 50% flowering (days), Plant height (cm), number of tillers as affected by pearl millet genotypes at Taung Experimental during 2019/20 season.

<u>Variety</u>	<u>Days to 50% bloom (days)</u>	<u>Number of tillers/pant</u>	<u>Plant height at harvest (cm)</u>
Local Check	<u>47</u>	3.9	<u>212</u>
SDMV 95022	49	<u>5.1</u>	178
GCI 4420	50	4.2	205
PMV2	53	3.6	199
SDMV89005	53	<u>5.3</u>	184
OKASHANA 1	49	3.5	<u>168</u>
SDMV 95045	<u>45</u>	<u>3.0</u>	207
Okashana 2	52	<u>4.7</u>	209
SDMV 90031	49	4.3	169
SDMV 96041	47	4.1	210
Mean	49	4.2	194



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6. Preliminary results

Table 2. Performance of Pearl Millet varieties conducted in Taung Experimental farm, 2019/20 planting season

Variety	Plant count (ha⁻¹)	1000-grain mass(g)	Earlength (cm)	grain yield (t ha⁻¹)
Local Check	54632	9.05	29.04	0.81
SDMV 95022	52150	9.23	27.95	0.95
GCI 4420	54561	<u>10.01</u>	28.59	<u>1.23</u>
PMV2	52987	<u>10.22</u>	<u>30.43</u>	<u>1.12</u>
SDMV89005	52769	8.90	28.37	0.98
OKASHANA 1	51884	9.93	27.36	1.01
SDMV 95045	55123	9.54	<u>26.02</u>	0.96
Okashana 2	52399	<u>10.37</u>	29.26	<u>1.18</u>
SDMV 90031	55422	8.58	26.54	1.02
SDMV 96041	55109	9.71	27.81	0.75
Mean	53703	9.55	28.10	0.88



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Preliminary Results Cont...

Table 3 Performance of Pearl Millet varieties in Lehurutshe during 2019/20 planting season

Variety	Plant count (ha⁻¹)	1000-grain (g)	No. of tillers/plant	Earlength (cm)	grain yield (t ha⁻¹)
Local Check	53102	8.95	3.6	27.71	0.81
SDMV 95022	53390	9.15	3.9	<u>25.05</u>	0.70
GCI 4420	54890	9.37	4.0	26,44	<u>1.06</u>
PMV2	51795	<u>10.03</u>	4.2	28.11	1.02
SDMV89005	52111	8.96	3.8	27.35	0.72
OKASHANA 1	50423	9.49	3.7	27.02	0.77
SDMV 95045	54127	9.45	<u>3.4</u>	25.06	<u>0.63</u>
Okashana 2	52152	<u>10.12</u>	<u>4.3</u>	<u>29.47</u>	1.00
SDMV 90031	53064	<u>8.69</u>	3.9	26.98	0.70
SDMV 96041	54002	9.76	3.8	27.90	0,64
_Mean	52.90	9.39	3.88	27.10	0.80



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7. Discussions

- Varieties SDMV 96041, Local Check and SDMV 90031, were the earliest to reach 50% flowering stage, whilst PMV2, GCI 4420, SDMV 89005, SDMV 95022, OKASHANA 1 and OKASHANA 2 varieties were the latest to attain this stage.
- Variety GCI 4420 gave the highest yield at both localities compared with the SDMV 96045 which gave the lowest yield.
- SDMV 95022 SDMV 96041, SDMV 89005 produced many tillers compared to other varieties under study
- Okashana 2 had the largest grain mass, whereas SDMV 90031 had the smallest grain mass
- The tallest plants were produced by local check followed closely by SDMV 96041, and then GCI 4420, whilst the shortest plants were SDMV 90031, Okashana 1 and SDMV 89005.
- PMV 2, Okashana 2 and local check produced the longest earheads compared to other varieties under study



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8. Recommendations and Conclusions

- The preliminary findings showed that variety GCI 4420 outperformed other varieties evaluated under study.
- Varieties GCI 4420. OKASHANA 2 PMV2 gave the highest yields
- These results suggest to some extent that the above mentioned varieties are more adaptable to semi arid regions of the Province
- Data still to be analysed statistically to be able to do proper comparisons.



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9. AKNOWLWDGEMENTS

- North West Department of Agriculture and Rural Development
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9. The End

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➤ THANK YOU



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