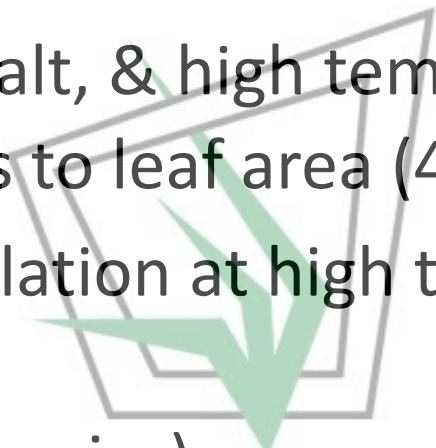


Effects of high temperatures on emergence, growth, and forage quality of a perennial forage sorghum



FV Nherera-Chokuda and MC Muya –ARC AP
/G Mushadu, VV Maphahla, MG Makgobatlou, NE Mm
Limpopo Department of Agriculture

Motivation

- Sorghum [*Sorghum bicolor* (L.) Moench, $2n = 20$],
 - 5th largest produced cereal
 - Well adapted -drought, salt, & high temperatures;
 - High ratio of roots to leaf area (4X maize)
 - efficient in carbon assimilation at high temperatures and in water-limited conditions
(40-50% less water than maize)
- 

Yields: Stalk 45-120 t/ha; grain 7-15 t/ha; 22% cellulose

***Nitrates & prussic acid : cyanogenic glucosides- (HCN)**

Genetic improvements

- Brown midrib
 - High tillering and recovery capacity
 - Reduced lignin-5 to 50% in stems and 5 to 25% in leaves.
 - Higher IVDMD upto 33%
 - Higher intake and palatability

	length of fibre (mm)	width of fibre (μm)	Length-width ratio
Sorghum stems	0.7-2.2	9-14	127.0
Straw	1.1-1.5	6-9	113.7
Haulm	1.7-2.3	17-19	120.0

Local Sorghum varieties

- Sudangrass- native & prolific
- Sweet sorghum & SS* Sudangrass (high stem yield)
- BMR*-low lignin

*******Declining trend in production of sorghum & other forage crops**



Objectives

- Evaluate the effect of high temperatures experienced in the Limpopo region on germination & growth of new perennial sorghum cultivars,
 - A. Germination
 - B. Growth performance
 - C. Forage quality



Materials and methods

- Temperature effects were assessed at two sites in communal areas:

Site 1: Vhembe (Vh) district

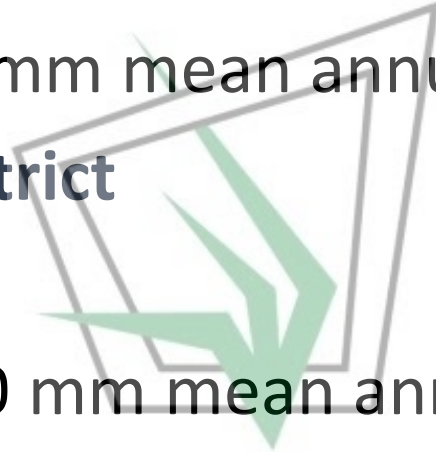
- Temperature Humidity index (THI) 72-83;
- mean maxi T-38 °C & 410 mm mean annual rainfall

Site 2: Sekhukhune (SK) district

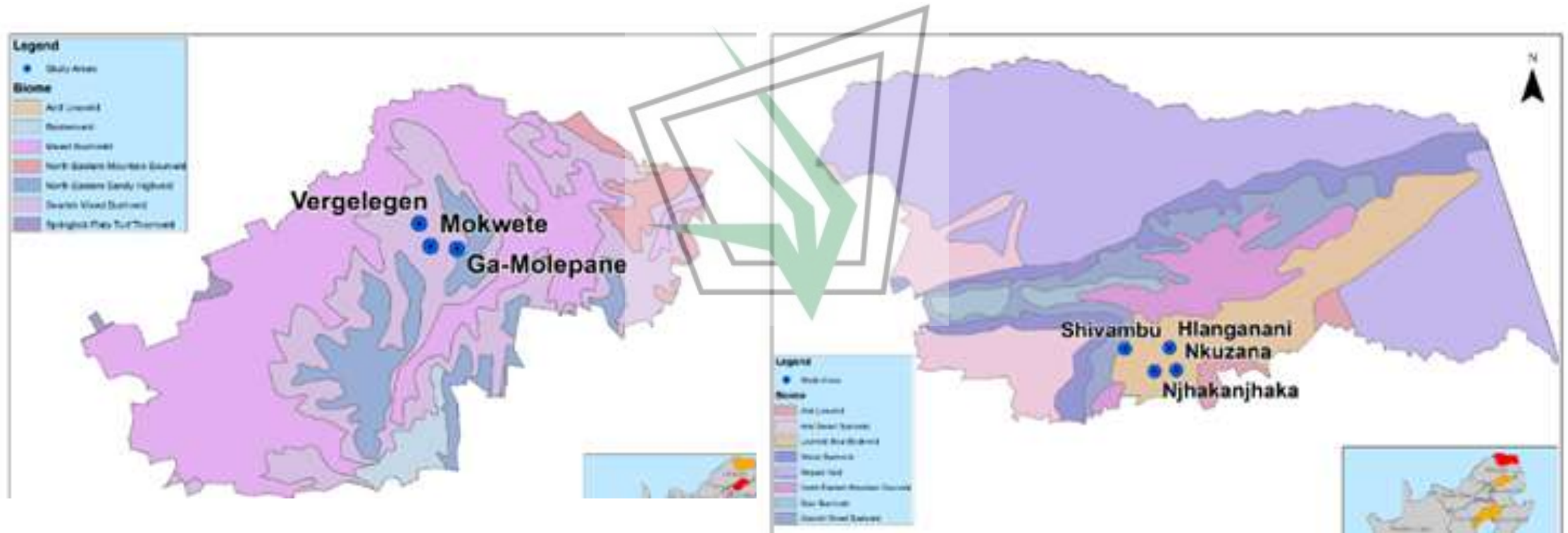
- THI =75-87;
- Mean max T of 40°C & 380 mm mean annual rainfall

THI (NRC 1971; temperature-AT and RH-relative humidity

- **Planting time: Jan 2018**
- **Three * 1 ha plots/site (households)**



	Site 1	Site 2
Location	Makhuduthamaga Sekhukhune	Makhado -Vhembe district
GPS	-24°44'59.99" S 29°44'59.99" E	23° 2' 46.468" S; 29° 54' 16.762" E





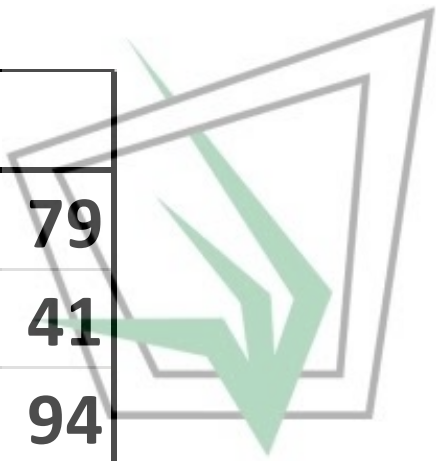
SK
plots

Soil nutrients (NPKS fertilization at sowing)

Sandy loam soils

CULTIVAR: perennial forage cultivar XX

mg/kg	Vh	SK
N	81	79
P	38	41
K	86	94
Ca	1207	1489
Mg	148	199
Na	31	45
pH	5.9	6.3



Sampling procedures & data collection

1. Germination and plant growth

- root length and mass and plant growth (density, height, leaf numbers and length & stem diameter & weight of tillers)

1. Eight quadrats/plot -1 m²

2. Germination was assessed daily over 14 days

3. Whole plants cut at 100 cm were sampled for forage quality

4. Statistical analysis: GLM –SAS, LSD @ P=0.05



Vhembe site





RESULTS: Germination & growth

	Germ %	emerge%	plants/ qrd	<u>4 wks height</u>	<u>Stem diam 4 wks cm</u>
Vh	86	79	90-144	9	1.1
SK	77	46	>40	7	0.8
P	*	**	***	ns	ns
LSD	13.3	16.7		2.8	0.3

	lateral roots #	Lateral roots cm	Leaf/st em	tillers/ m2	height at 1st cut	wt/tiller (g/plant DM)	growth rate kg DM/ha/d	total DM yield kg DM/ha/d
Vh	44	23	2.2	234	166	2.3	112	98
SK	57	29	1.6	118	146	1.8	93	77.1
P	**	*	*	*	ns	*	*	*
LSD	8	2.3	0.2	17	23	0.3	19.2	12.3

Forage quality

						Me (Mcal/kg DM)	
%	CP	NDF	ADF	NSC	lignin		%IVTD
Vh	14.3	67	36	5.9	7.7	2.4	69.7
SK	15.1	63	36.2	8.8	6.5	2.9	63.8
P	ns	ns	ns	*	ns	*	ns
LSD	2.8	5.4	2.6	1.7	2.1	0.3	3.5

Conclusion & recommendation

- Growth performance of the perennial cultivar was lower in the warmer area, which is of great concern;
- Declining trend in production of sorghum & other forage crops
 - Sk has a high human and cattle population including dairy cows
 - * dependency on external food supply
 - Growth performance in Vh was below average data
 - FURTHER R&D is critical to optimize resources under the Fetahlala program for CRDP which will enable increased uptake of the forage sorghum innovation platforms

THANK YOU

- **ACKNOWLEDGEMENTS**

- LIMPOPO DEPARTMENT OF AGRICULTURE (TOWOOMBA & MARA EXPERIMENTAL STATIONS)

- ARC –AP

