Simulation of Post Anthesis Drought Effect on Sorghum Using Chemical Desiccants

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Introduction

Post anthesis Drought, is a major stress in sorghum production around the world. Field evaluation of breeding materials against terminal drought is challenging partly because of inappropriate techniques for imposing drought stress. Post anthesis drought stress could be mimicked by disrupting current photosynthesis through leaf sprays with desiccants (Nicolas and Turner1993). This approach would allow evaluation of breeding materials under optimal environments.

Goal of the study

To elucidate the suitability of using chemical desiccants in screening post anthesis drought in sorghum.

Specifically;

- ❖ **Evaluate genotypic response to desiccation stress**
- ❖ **Quantify yield reduction dues to desiccation stress**
- ❖ **Assess relationship between yield and stress tolerance**
- ❖ **Asses efficacy of different desiccants in imposing post-anthesis stress**

Materials and methods

Testing efficacy of Desiccants

- Chemicals: **KI, NaClO3 and KClO3**,
- Rates: (**0.4% , 0.6% and 1%)W/V**
- Used 3genotypes, 3replications, 2years

Testing genotype sensitivity to KI stress

- Two experimental sets: one sprayed with **KI (0.6%W/V)** and a control
- Laid as RCBD, 2 replications
- Used 18 diverse genotypes
- Sprayed 14 days after flowering

Measured parameters

- Grain yield, 100 seed weight, stress tolerance index (STI), stem dry matter.

Desiccant application

Desiccation effect on sorghum

Results

Table 1. Genotype response to KI stress

		Mean squares			
Source	d.f	SWt(g)	GY(g/plt)	RE(%)	STI(%)
Rep	1	0.01	9.7	45.5	32.0
Entry	**17**	**0.3*** **	**58.7*** **	**397** **	**246.7*** **
Error	17	0.035	11.38	114.6	
Total	35				

SWt =seed weight; GY = grain yield; RE= remobilization efficiency
STI = Stress Tolerance Index

Table 2. Grain yield reduction due to KI stress

Entry	Stressed	Control	Difference
AG2102	12.52	36.30	23.78***
B35	19.66	34.37	14.70***
HD1	17.38	40.76	23.38***
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P898012	15.28	17.64	2.36^{ns}
TX623B	16.64	35.56	18.92***
TX7078	7.12	33.46	26.34***
XG3103	11.10	32.35	21.25***
Mean	17.22	39.56	22.34
Paired t-test			11.64***

Figure 1. Relation between yield and stress tolerance

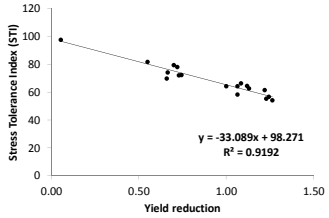

Table 3. Desiccants efficacy in imposing stress

		MS	
Source	d.f	Seed wt(g)	Yield(g/plt)
Rep	2	0.07	0.01
Trt comb	26	0.7***	0.2***
Genotypes	**2**	**7.8*** **	**2.1*** **
Chem	**2**	**0.8*** **	**0.2*** **
Dose	2	0.04	0.01
GenxChem	**4**	**0.2*** **	**0.04** **
GenxDose	4	0.02	0.02
ChemxDose	4	0.05	0.02
GenxChemxDose	8	0.01	0.01
Residual	52	0.03	0.01
Total	80		

Table4. Mean comparison of 3 different desiccants

	Yield (g/plant)			
Genotypes	$KClO_3$	KI	$NaClO_3$	**Mean**
P89001	31.90	32.71	28.63	**31.08 c**
P898012	22.18	27.17	18.92	**22.76 b**
TX7078	10.82	11.04	6.14	**9.33 a**
Mean	**21.63 b**	**23.64 b**	**17.90 a**	

Conclusion

These preliminary results demonstrated the possibility of using Desiccants for post anthesis stress evaluation in sorghum

Reference

Nicolas, M.E and Turner, N.C. 1993. Use of chemical desiccants and senescing agents to select wheat lines maintaining stable grain size during post-anthesis drought. *Field Crops Research*