

DEDICATION

**To my dear mother, late father (ALLAH mercy him) brothers, wife,
daughters, colleagues and friends.**

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TABLE OF CONTENTS

Dedication.....	i
Acknowledgements.....	ii
Table of contents.....	iii
ABSTRACT.....	vii
ARABIC ABSTRACT.....	viii
CHAPTER ONE.....	1
INTRODUCTION.....	1
CHAPTER TWO.....	4
LITERATURE REVIEW.....	4
2 – 1 General background.....	4
2-1-1 Uses of sorghum in Sudan.....	4
2-2 Drought as production limiting factors.....	5
2-3 Mechanisms of drought resistance.....	5
2-3-1 Drought escape.....	6
2-3-2 Drought avoidance.....	6
2.3.3. Drought tolerance.....	6
2.4: Effect of drought on yield and yield components.....	7
2.4.1. Methods of determining of drought tolerance.....	7
2-5 Variability in Grain Sorghum.....	8
2-5-1 Genetic Variability.....	8
2-5-2 Phenotypic and Genotypic Variability.....	9

2-5-3 Phenotypic (PCV) and Genotypic (GCV) coefficients of Variation	10
2-6 Heritability and Genetic Advance	10
2-7 Phenotypic correlations	11
CHAPTER THREE.....	12
MATERIALS AND METHODS	12
3.1. Genetic materials used in the study.....	12
3. 2. Field experiments	12
3.2.1. Locations and years	12
3.2.2 Design and Description of the experiment	12
3.3. Data collection	13
3.3.1. Growth characters	13
3.3.1.1. Plant height (cm)	13
3.3.1.2. Stem diameter (cm)	13
3.3.1.3. Number of leaves/ plants	13
3.3.1.4. Leaf area (cm ²)	13
3.3.1.5. Plant dry weight (g)	15
3.3.1.6. Days to 50% flowering	15
3.3.1.7. Days to maturity	15
3.3.2. Yield characters	15
3.3.2.1. Panicle length (cm)	15
3.3.2.2. Grain yield /plant (g)	15

3.3.2.3. Thousand Seed weight (g)	15
3.3.2.4. Grain yield (Ton/ha)	15
3.4. Statistical analysis	16
3.4.1 Coefficient of variation (C.V).....	16
3.4.2. Comparison between seasons	16
3.5. Phenotypic (σ^2_{ph}) and genotypic (σ^2_g) variances	19
3.6. Heritability (h^2)	19
3.7. Phenotypic and genotypic coefficients of variation	20
3.8 Genetic advance	20
3.9. Phenotypic correlation	20
3.10. Drought tolerance measurements	22
4. CHAPTER FOUR: RESULTS	22
4.1 Growth characters	22
4.1.1 Plant height (cm).....	22
4.1.2 Stem diameter (cm).....	22
4.1.3 Number of leaves /plant.....	23
4.1.4 Leaf area (cm).....	23
4.1.5 Dry weight /plant (g).....	28
4.1.6 Days to 50% flowering.....	28
4.1.7 Days to maturity.....	28
4.2 Grain yield character	32
4.2 .1 Panicle length (cm).....	32

4.2 .2 Grain yield / plant (g).....	32
4.2 .3 Thousand seed weight (g).....	33
4.2 .4 Grain yield (Ton/ha).....	33
4.3 Genotypic (σ^2_g) and Phenotypic (σ^2_{ph}), variances and heritability (h^2)....	38
4.4 Genotypic (GCV), Phenotypic (PCV), coefficients of variation and Genetic advance (GA) in the two seasons (2012 – 2013).....	38
4.5 Phenotypic correlation.....	40
4.6 Drought tolerance parameters.....	40
4.7 Phenotypic correlation	42
5. CHAPTER FIVE.....	47
DISCUSSION.....	47
5.1 Drought effect on growth characters	47
5.2 Drought effect of on yield and yield components	47
5.3 Phenotypic and genotypic Variability.....	48
5.4 Phenotypic coefficients of variation (PCV), genotypic coefficients of variation (GCV), Genetic advance (GA) and Heritability (h^2)	48
5.5 Drought tolerance and yield relationships	49
5.6. Phenotypic correlations	50
6. CHAPTER SIX.....	51
REFERENCES.....	52
APPENDICES	59

ABSTRACT

The experiments was conducted during two successive summer seasons (2012 and 2013), in Demonstration Farm of the Collage of Agricultural Studies at Shambat , Sudan University of Science and Technology, to evaluate twenty two genotypes of grain sorghum (*Sorghum bicolour* L Moench), for growth and yield characters, under two different water regimes, well watering (7days) and drought stress (21days) using split plot trail in three replications. The objectives of this study were to assess the genetic variability among grain sorghum genotypes under drought stress condition, to estimates the phenotypic correlation between different characters and to identify the most drought tolerance genotypes under drought stress conditions. Characters studied were plant height, stem diameter, number of leaves per plant, leaf area, days to 50% flowering, days to maturity, panicle length, yield/plant, thousand seed weight, yield (Ton/ha). The results showed that there were significant differences among most of the characters studied in both seasons. Highly heritability were showed in this study among growth characters, plant height (0.69-0.90), plant dry weight (0.89-0.92), 50% flowering (0.72-0.91) and days to maturity (0.79-0.80) for the two seasons. Genotypic coefficient of variation (GCV) was maximum in leaf area (2149.74, 1599.89) for the two seasons and plant height (1529.29, 1231.71) and it was not different with phenotypic coefficient of variation (PCV). It was also showed maximum value in leaf area (975.71, 486.19) for the two seasons and plant height (1051.97, 1114.53). This result was indicating that these traits were affected by environmental fluctuations. The high value of (GCV) and (PCV) suggested that there is possibility to utilize environmental effects through direct selection for these traits.

مستخلص

أجريت هذه الدراسة بالمزرعة التجريبية التابعة لكلية الدراسات الزراعية جامعة السودان للعلوم والتكنولوجيا (شمبات). خلال الصيف لموسمى (٢٠١٢-٢٠١٣) ، ٢٢ طراز من الذرة الرفيعة تم تقييم صفات النمو والانتاجية لها تحت تأثير الجفاف ، الرى العادى كل ٧ أيام بين الريات و التعطيش كل ٢١ يوم بين الريات لمعرفة تأثير الجفاف بنظام القطاعات المنشقة، لدراسة تقييم التباين الوراثى والإرطبات المظهرى للطرز تحت الدراسة. القياسات التى أخذت للصفات كانت طول النبات، سمك الساق، عدد الاوراق، مساحة الورقة، الوزن الجاف للنبات، عدد الأيام ل٥٠% إزهار، عدد الأيام للنضج، طول السنبله، وزن البذور للنبات، وزن الألف بذرة والإنتاجية بالطن للهكتار. أظهرت النتائج فروقات معنوية بين المعاملات للموسمين . معظم الصفات تحت الدراسة أظهرت فروقات معنوية عالية، أظهرت صفات النمو درجة توريث (h^2) عالية مقارنة بصفات الإنتاجية وكانت أعلى فى طول النبات (٠.٦٩-٠.٩٠)، والوزن الجاف للنبات (٠.٨٩-٠.٩٢)، ٥٠% إزهار (٠.٧٢-٠.٩١) والنضج (٠.٧٩-٠.٨٠) للموسمين على التوالى. درجة الإختلاف فى الصفات الوراثية (GCV) سجلت أعلى درجة لصفتى مساحة الورقة وطوالنبات حيث سجلت مساحة الورقة (٢١٤٩.٧٤-١٥٩٩.٨٩) وطول النبات (١٢٣١.٧١-١٥٢٩.٢٩)، للموسمين على التوالى. أما درجة الإختلاف فى الصفات المظهرية (PCV) فلا تختلف عن (GCV) حيث نجدها سجلت أعلى درجات لصفتى مساحة الورقة وطول النبات وكانت النتائج (975.71, 486.19) و (1051.97, 1114.53) للصفتين للموسمين على التوالى. وأوضحت الدراسة أن هذه الصفات قد تأثرت مما يجعل الإستفادة من هذه التأثيرات المناخية والبيئية على هذه الصفات من خلال الإنتخاب لهذه الصفات فى تربية المحصول.