Chapter One

INTRODUCTION

Sorghum (Sorghum bicolor L Moench) is the fifth most important cereal crop in the world. It yields multiple products depending on it is variety.

Grain sorghums are used for human food ،while forage sorghums are used for animal feed، and sweet sorghums for edible syrup. The latter varieties accumulate a high amount of sugars in the stem during maturation.

Sorghum has a highly efficient photosynthetic pathway and is very efficient in the utilization of soil nutrients.

It requires less water than sugar cane and is tolerant to drought and flooding .It has a short production cycle and is capable of re-growth as ratoon crops.

A recent study comparing various crops found that sugarcane in Brazil and sweet sorghum in China are the most sustainable ecosystems for renewable fuel production.They provide the most efficient use of land water، nitrogen and energy resources (de Vries et al.، 2010) .

Sweet sorghum is grown in Sudan in small areas of traditionally farming in Kordofan، Darfur، Sennar and White Nile states and the local name for Sweet Sorghum in thisareas is ‘‘Ankolib ’’. the area of this crop is increasing with climatic changes ، where annual rainfall is (200__450 mm)_Drought is multidimensional stress، often coupled with heat stress effecting plants at various levels of their metabolic mechanisms (Blum، 1996)، and is generally accepted as the most widespread a_biotic stress experienced by crop plant (Quarrie*et al*., 1999)،.

If plan are to survive this biotic stresses they must havearange of morphological، biochemical and physiological mechanisms that enable them to grow and re produce despite water liminations (Turner، 1997).

Drought tolerance is defined as the relative ability to sustain plant function under dehydrated state and achieving an economic yield potential (Blum، 2005).Many studies were conducted to investigate sweet sorghum as adrought tolerant crop. Sweet sorghum is an annual warm season crop similar to grain sorghum in grain production and almost like sugarcane for sugar- rich stalks and high sugar accumulation as c4 crop، sweet sorghum features rapid growth، low water requirement، high biomass production and wide adaptation. However the objectives of this study were to estimate the variability among different grain sorghum.

Chapter Two

Literature Review

Climate variability is a characteristic feature of the tropics particularly West Africa where the summer monsoon starts May/ June and ends mostly in October thus، producing an unpredictably variable length of the growing season.Climate change is a threat to crop productivity in the most vulnerable regions of the world، especially the tropics and particularly the semi_ arid regions where higher temperatures and increases in rainfall variability could have substantially negative impacts. The 21st century is projected to experience arise of 1.8_4.0c in surface air temperature with very likely occurrence of unpredictable extreme events such as drought and floods.

Yield stability across different environments is an important consideration in crop breeding programs that target areas with variable climatic patterns for quantitative traits such as yield، for which the relative performances of cultivars often change from environment to another، extensive testing is required for identifying genotypes with minimal interaction with environments، or that possess greatest yield stability.

Accessions among any set of genetic materials being tested that would be adapted to a wide range of growing conditions can be considered as ideal for areas with variable climates.These accessions should produce above average grain yields and have below average variances across environments to be considered stable .stability can either by static (biological) or dynamic (agronomic) with the most desirable from being dependent on the trait under consideration. static stability is required when a constant performance (zero variance) of the trait across variable environments is desired(e.g disease tolerance) whiles dynamic stability is required when predictable responses to variable environments are desirable‹ examples being yield components and the quantity of yield. Indices for determining both types of stability of grain yield exist.

Chapter Three

Materials and Methods

3.1 Experiment site

A field experiment was carried out to achieve the objectives of this study during the season 2017/ 2018. At one site named Shambat latitudes 15.31 north attitudes 32.35 east high from sea 380m college of Agriculture study Sudan University For Science and Technology at El Khartoum state.

Plant material used in this study

One variety of sweet sorghum (Sorghum bicolor L.Moench) was used in this study.

The nutrient was induced by applying four doses of nitrogen regimes during the both vegetative and reproductive stages included control (zero gm) of nitrogen، (plot 2،24gm)of nitrogen

(Plot 3، 72gm) of nitrogen،(pol4، 48gm).

To layout the effect of nitrogen fertilizers on vegetative growth of sweet sorghum (Sorghum bicolor L.moench)

Irrigation system theirrigation was applied every 10 days but sometimes was more up to 14 days because of the irrigation was un accurate till maturity.

The design used was randomized complete block design (RCBD) with five replications in the study to know the plant high، number of leaves/plant and plant diameter.

All cultural practices was done by machine as recommended

3.2 Sources of seeds:

Seed shop seller al Bahri Market

3.3 The high from the Sea:

Is about 380m high

Chapter Four

Results and Discussion

Table (1): Summering of ANOVA table for nitrogen

Source	**D. f.**	**F Value**		
		Stem diameter	**Number of leaves**	**Plant high(cm)**
Rep	٣	_	_	_
Fertilizer	٣	٠.70 ns	٠.٣٦ ns	١.٥٢
Error	٩	_	_	_
Total	١٥	_	_	_
Ems	_	١.٦٤	٤.٧٨	٤٩٧.١٥
C .v.	_	١٣.١٢	١٢.٩١	٣٠.٤١

NS= not significant

* = significant (5%)

** =highly significant(1%)

The analysis revealed a significant variance differences detected between nitrogen doses for most characters under study (Table1) pointed that there is no significant between a number of leaves but, there is a significant between plant height and highly significant on stem diameter.

The plant height was higher for 48g nitrogen (398.50cm) than the other treatments، while the control and 24g nitrogen gave the lowest height (fig 1).

Number of leaves per plant were higher for 72g nitrogen (22.00) and the lowest number was detected for the control (fig 2).

The stem diameter was higher for 24g nitrogen (10.55cm) while the lowest diameter was detected for control (fig 3).

The control for most treatment was the lowest.this might be due to the effect of nitrogen on the plant.

The higher dose promote the plant growth.the results were supported by (Azrage and Dagash 2015).

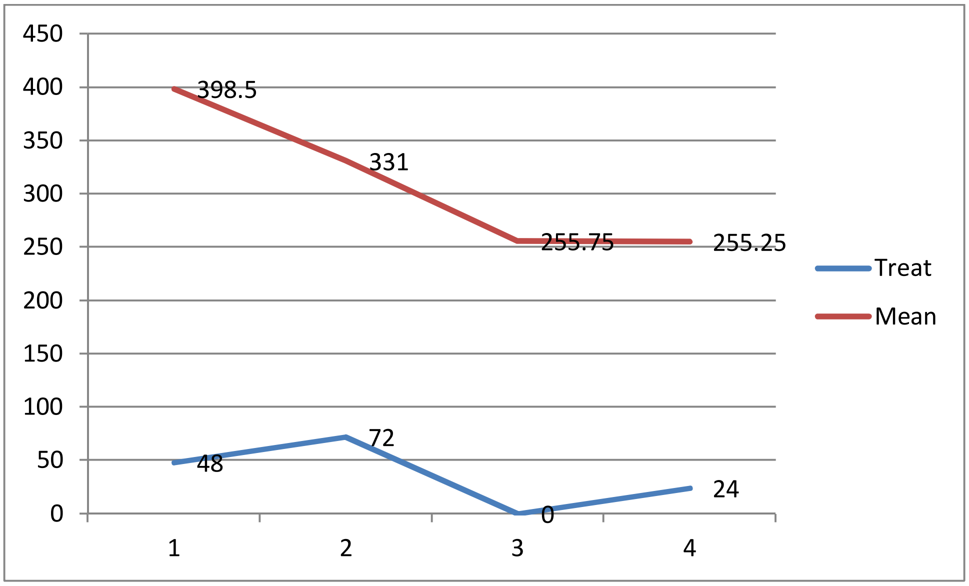

Figure (1): Plant Height (Cm)

LSD of plant height 91.071

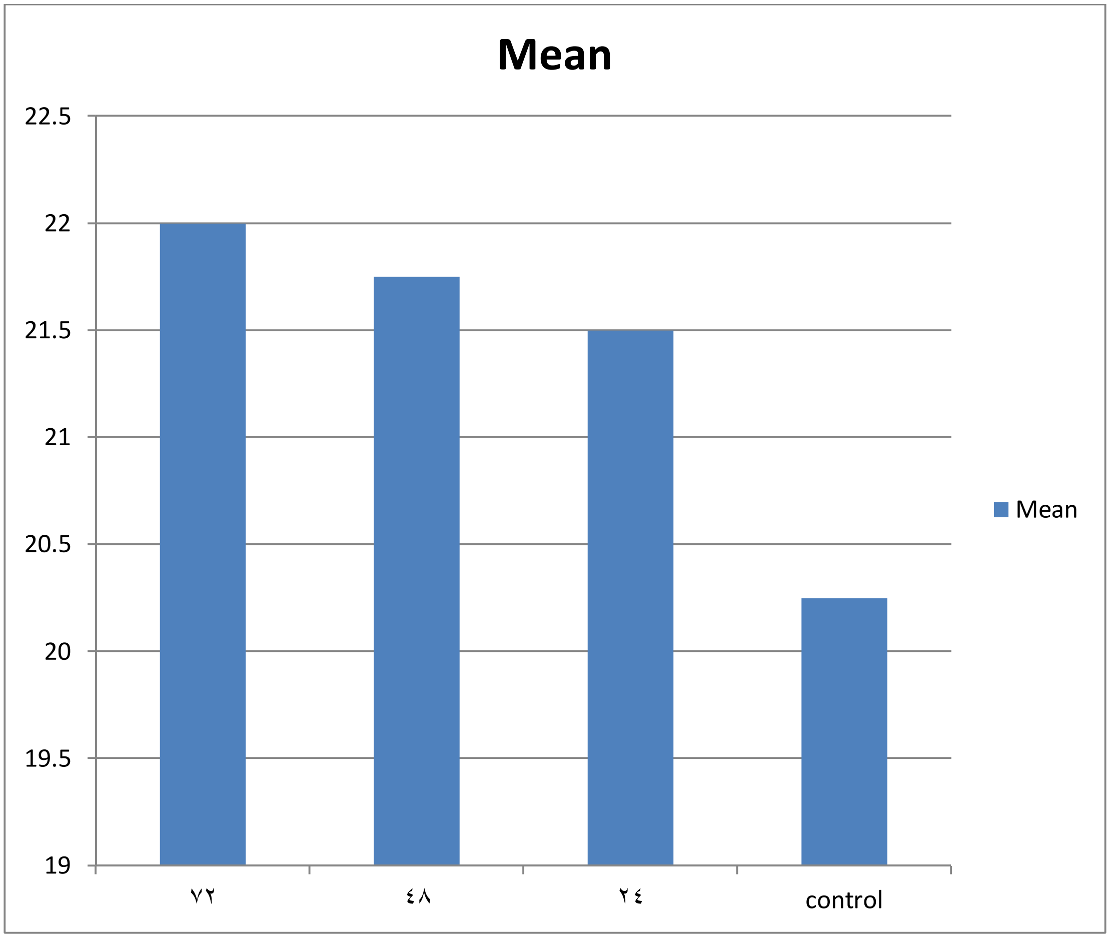

Figure (2): Number of leaves

LSD of number of leaves 4.2405

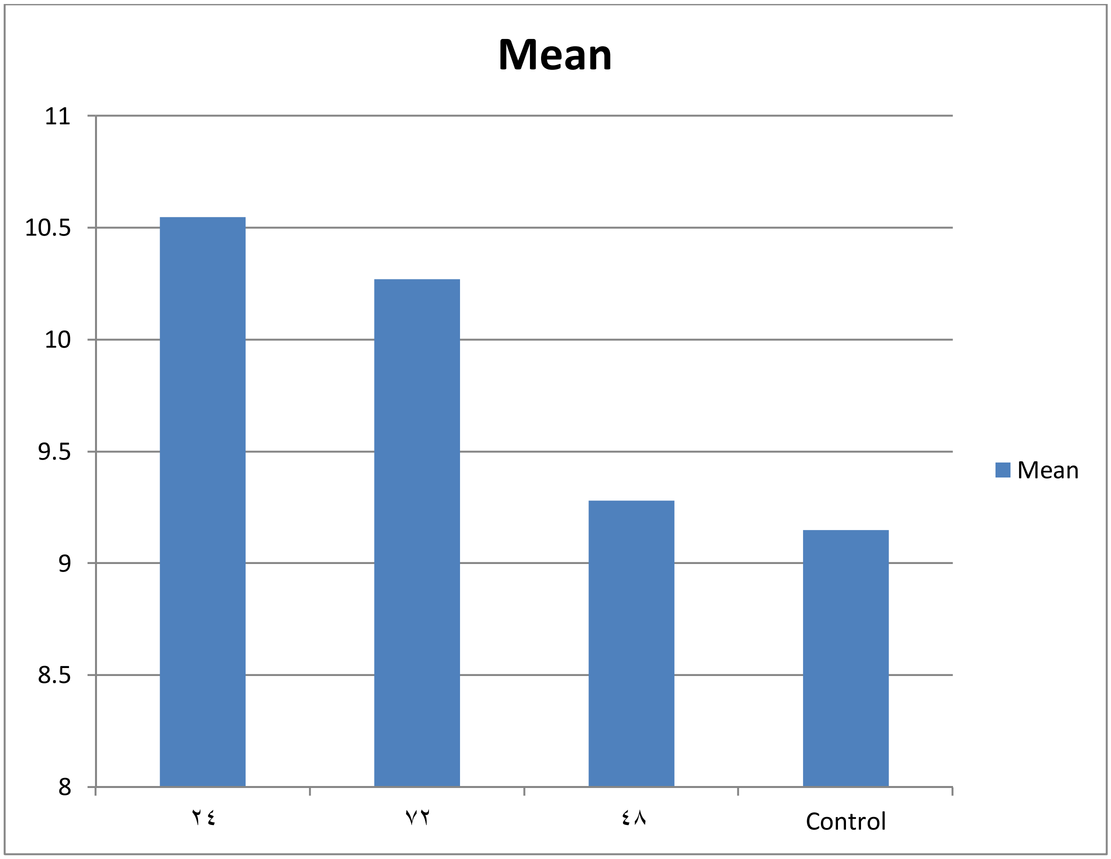

Figure (3): Stem Diameter

LSD of stem diameter 1.2347

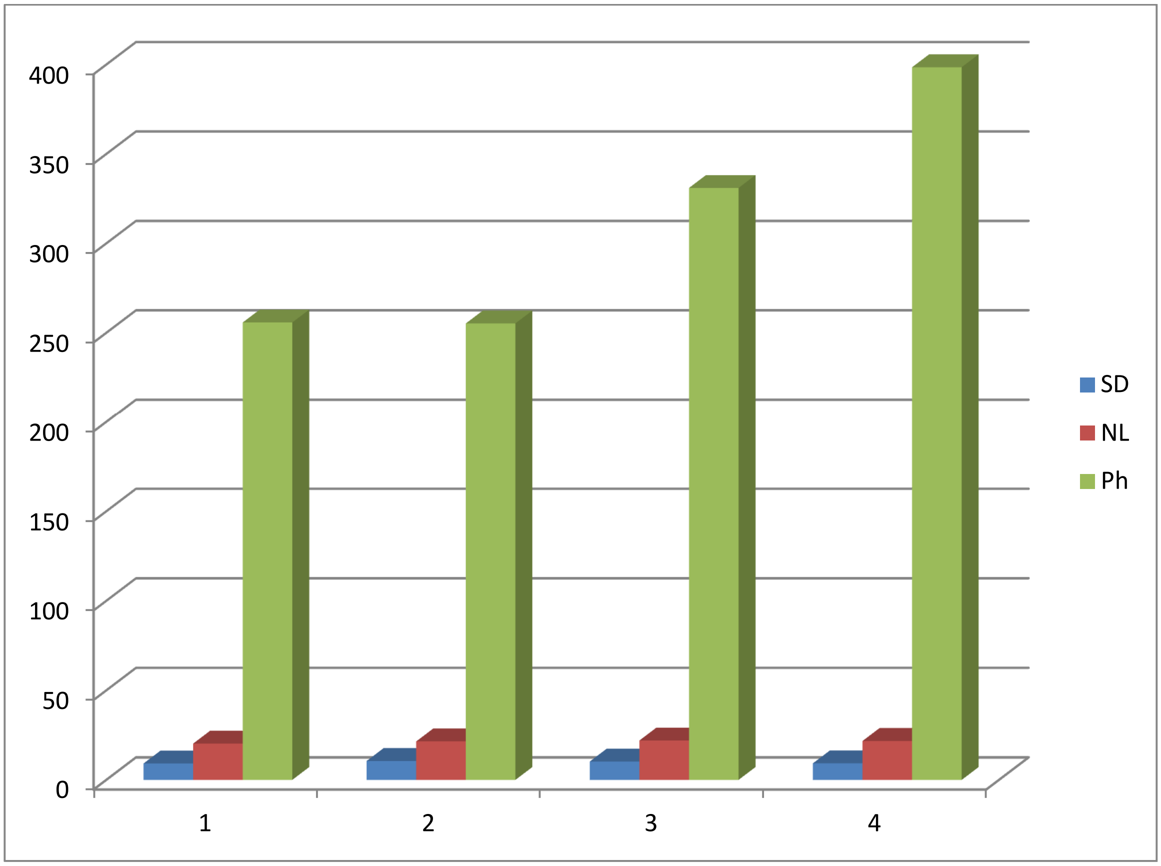

Figure (4): Plant Height, Number of leaves and Stem Diameter

CHAPTER FIVE

Conclusion

It could be concluded that there is a differential response of sweet sorghum on vegetative growth with different doses of nitrogen.

The addition of nitrogen improved the plant characters on the revealed environmental condition.

References

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