CHAPTER ONE
INTRODUCTION

Sunflower (*Helianthus annuus* L.) is a member of the family composite (Khidir.1997). other name: Girasol (Spanish) Soleil (French): Abbad ash-shams (Arabic): Surajmkin (India). The crop originates from Mexico and the south west United State of American (USA) from where it has now been spread worldwide.

The total world production of seed is 9mt/ annul, Russia produces over 5mt, Asia less the 0.7mt, and Africa less than 0.2mt and Europe is the major imports. (Karem, 2006).

The first growing of sunflower in Sudan was in1932 at Gezira research station. More trials were conducted in 1946 which are actual possibility of growing the crop in Sudan. The real commercial production of sunflower in Sudan was started in the early eighties by the private sector (Sheikh Mustafa Elamin Agricultural company) in season 1987/88 an area of 36.6 hectares ware grown at Damazien Blue Nile state, the crop also was introduced to Rahed, Suki and White Nile schemes (Khidir,1997).The average seed yield of traditional - open pollinated cultivars on small scale forms- is about 500Kg/ha well managed crops of improved varieties have yielded over 1.5t/ha with an oil yield 700Kg/ha. At research and in field trial in Zambia and neighboring countries during the 1980, newly released hybrids 4t/ha and seeds had an oil content of more than 40% Domain 2001the total area under sunflower in season 2003/2004 was 6300ha.Out of this area 3360ha were irrigated and 2940ha were under rain fed. The total production was 385thousand metric tons, the productivity was 952.4Kg/ha under irrigation and 238.1Kg/ha under rain fed (Osman and Ahmed, 2005). Sunflower has a number of uses: the fresh green plant can be as silage or fodder.

After removed of the seed coat the seeds can be eaten raw or roosted the refined oil is used in salads, cooking and margarine. Also it used as a lubricant and in paints and varnishes, the decorticated seed cake is a good protein food for live stock (Karem, 2006). The major problems facing production of sunflower in Sudan are lack of adequate information about the crop under Sudan condition, distribution and fluctuation of rains, high percent of empty seeds, unavailability of good seeds and high yielding cultivars. In northern and central of Sudan sunflower is grown only under irrigated conditions because of its sufficient precipitation conditions is well known (Ozer *et al*., 2003).

The objective of this research is study the effect of different fertilitizes on growth and yield of sunflower genotypes.

CHAPTER TWO

LITERAURE REVLEW

2:1 plant description:-

Called crop bloomed flower move with the sun because the sun making the efforts to east in morning and west afternoon until sunset and the highest at midday and midnight. This phenomenon is known solar Heliotropism

2:1:1 The root:

Plant root and teddy deep to 3m long. Usually weaken the roots of the crop at maturity exposing the plant to shut-eye, especially in species with heads or upon exposure of the crop to rain fed and heavy winds

2:1:2: Stem:

Sunflower plant around and wooden stem, a list of non-branching in habit covered with thick and rough crops stem, height between 1.2 meter and 5-meter, diameter between 1cm and 10cm, length of the commercial varieties ranged between 60cm – 150cm.

2:1:3 leaves:-

Mutually in the middle and the end of the leg facing in the lower part leaf length from 10cm arrack and long neck.

2:1:4 Inflorescence:-

Bearing leg tip nova (CD) round branched leg in the upper part of them and end of each branch disk, but the CD leg home is the biggest and there tore branches unwanted flower in the sun because it leads to the heterogeneity of the seeds and the and the low quality and the difficulty of harvest

2:1:5 flowers:-

Total syphilis inflorescence vehicle round caring ranging between 60Cm depending on cultivar inflorescence or head surround by hushes and holds of two types of flowers A.X. ray flowers (ray or ligulae florets).

Conical shape, yellow, deep and there on the edge of the disc and the number between 40 and100 meter options is attached to attract insects and flowers are falling radial day after one of the open disc flowers, B-disc flowers (disc florets).

Running all the disc space exception of the edge of between 600 and 300 in the categories of oil was up to 8000 in non-oil items, hermaphrodite disc flowers and bloom outside to inside the disk it takes open – disc flowers from 10 days the orange pollen consists of 5.0 it is unfair ovary consists of two carpel joined at the crown and one egg and open long pay inside the tube by stigma and ends with two-pronged will be launched before the maturity of the pollen stigma and leaded NSH large cross-pollination by insects especially bees.

There is also salve –incompatibility is hereditary in some of the items to prevent self-fertilization in plants, leading to the presence of high cent empty fruit at maturity.

2:1:6 Fruit:

Poor, oval-shaped black or gray or brown or white with lines gray.

Fruit size and the color property of genetic and fruits in different size disk large then those near the center, of the disk.

Fruit containing seed once, thousand seed weight of 50g on verge.

2:2 Cultivars:-

The most appropriate items to environmental conditions prevailing in the Sudan are the varieties of Carty short and resistance to drought and with self-compatibility also proved to be hybrids better than open-pollinated because the latter have high proportion of fruits empty because of the failure of vaccination in writing and by birds of self.

Compatibility is no need for insects fertilized and produced the highest open pollinated varieties.

The by between 20% and 100% and homogeneous the by birds that success in the Sudan1224 seed Tec and seed tec-1560 and snared 280 Hyson 33 and Panar and north rub king and Pioneer 4680 and Declan G 100 and production concentrated in cultivars pioneer Hysun33 to provide tqnaorimra there are cultivar Mtouhp vaccination can be grown in the case of non-availability of seed species and hybrids including Hungarian and Rodeo Bolero and local varieties Damazin.

2:3 Chemical Installation:-

Seed containing about 25% oil which could reach the oil content in some improved varieties to more than 50% and oil is free of the acid linoleic and number of iodized 120-136 containing seed also acted to30% protein and up 40% in seed peeled and the legs of plant and dandruff rich in potassium (Hago, 2005).

2:4 Environmental Conditions:-

2:4:1 Climate:-

Requires warm weather sun flower especially in the process seeds. Crop equator to latitude 550N and 400C

Plant grow in wide range of temperatures between 19^{o} - 34^{o}c, but the most appropriate temperature ranging between 20^{o}-30^{o}c. And affect the higher temperature on the quality of oil leads to lower oil content of long day height local varieties Damazin

2:4:2 Soil:-

Be flood and highly land can be cultivated sunflower in different types of soils from sandy to clay provided that the soil deep and good drainage the crop does not work in acidic soil fertility be cans the plant grown vegetative for long period loading to the delayed harvest and the leading to of plants in harvest the needs of the sun flower similar to those maize

2:5 gricultural operations:-

2:5:1 Sowing dates:-

Cultivated sun flower crop summer crop or winter and most suitable dates for summer crop cultivation in Sudan in month July both under conditions of rain or irrigation until end of July in one experiment gave the highest productivity of crop when the conditions of rain and November when planted late in the draft Rahad irrigation (Khider 1997).

2:5:2 Land preparation:-

Comparable to prepare the ground for sun flower like other crops such as corn maize where to be tilling the land resolution and to provide the cradle of good germination and growth timeliness of land preparation depends on the production system applied in rain – fed sector on the preparation immediately after the rainfall and growth of weeds and for the proper preparation of the land and get rid of pests while in irrigated sector most suitable dates for the preparation of harvest of the session and the agricultural cycle in place and timing of harvest of the session and the availability of agricultural machinery it the crop is grown in the summer turn is highly recommended plowing the ground before the rainy season and the availability of agricultural machinery if the crop grown in summer turn is highly recommended plowing the ground before the rain to season paid tribute to help the rain to destroy the earth mounds and large lead to the growth of grass it is then the process of smoothing and get of weeds and the loop in the to start winter it is recommended to start plowing after the rainy season in the land such as flood cash the process of land preparation depends on the use of the dimensions of 80cm and depth of 15-20cm

2:5:3 Spacing and number of the plants and around of seed:-

Can be planted at distances varying as recommended for planting on the secret is away from each 80cm in the irrigated sector and spaces of 20 cm between the hole the other at rate of the plants on hole while in the rainy

grown in secret is at distance of 100-150 at rate of seed 50/30 to 50/60Kg /ha irrigated at rainy (ibranem, 1997).

2:6 Irrigation:-

Sunflower is characterized by total strong position of growth in few areas where the vain no successfully other crops.

The vegetation can give production will in the Rainfall of 250mm and the amount of irrigation water ranging from 300-500mm depending environmental condition that period ranging between 6-8 days in clay soils of light between 8-10 days and may be the period as other conditions ranging from 12-15 days they should avoid exposing the crop to their thirst in any period was one of the aroids of his life different need for the plant to water at different stages of plant life while plants consume about 23%of total water consumed in the length of her life during the period from germination to disk configuration syphilis and consumes almost 60% during the period for the disk configuration syphilis until the end of flowers that may be duration of about three weeks and the rate of consumes roughly 17y from the end flowering until the seed are recommended to be with irrigation recently after period ranging between (14-23 days mid flowers stage) and irrigation with moderated to avoid to irrigation when wind gusts or to using safe water for irrigation of different varieties in their resistance to salinity.

Can get high productivity cultivation of improved varieties within period appropriate with fertilization of appropriate methods technique in irrigation studies have shown that fertilization of an appropriate and method technique in irrigation studies shown that the overlap between the irrigation an fertilization lead to increased winning arrival times him under the irrigation and fertilization on their own however their relationship NES between climatic conditions and soil conditions (Bowl and Rashid 1990) .

2:7 pests and diseases:-

Sun flower relatively free of pests and diseases under the conditions of Sudan. But almost is sometimes worn America, but the greatest damage caused by birds that attack the crop in the maturity stage especially in the winter irrigated agriculture.

The American boll worm vigorously strikes the crop at the stage of the flowers.

The disease and egg white and powdered, and rust (Puccini a helianthi) and leaf spot caused by the fungus (Alternaria helianthi) and stem rot and is caused by fungus (Macrophonina phaseolii) the above-mentioned diseases , fungal diseases also infected crop disease tawarruq Allosteric (phylloy) a viral diseases transmitted by insect Gasid.

2:8 Resistance to pests:-

2:8:1Weed:-

Grass is the most important factors effecting in sunflower notes the lack of weeds in winter crops compared with summer cultivation generally when you See the grass there are many herbicides recommended

point of the winter of this crop, although there were some injuries but did not reach the limit of economic spraying.

2:9 Fertilization: -

Needs of this crop like other quantities of fertilization to meet the need of the plant and the shortage in the soil is fertilization of the key factors that increase in that increase the productivity of crops, result from fertilization on sunflower in irrigated sector of its response to nitrogen fertilizer where the addition of a dose or two doses it increases productivity, while in the rain-fed sector not mucking because of fluctuating rainfall and therefore there is a serious production (Ibrahem, 1997).

2:9:1 urea fertilization of sunflower:-

Urea, a white crystalline solid containing 46% nitrogen, is widely used in the agricultural industry as an animal feed additive fertilizer here we discuss it only as a nitrogen fertilizer.

Commercially, fertilizer of urea can be purchased as perils or as a granulated material. In the past, it was usually produced by dropping liquid urea forms a(periling tower) while drying the protect the perils formed a smaller an softer substance than other materials commonly used in fertilizer blends today, though, considerable urea is as granules. Granules are larger harder and more resistant to moisture. as a result granulated urea has become a more suitable material for fertilizer blends.

2:9:1:1 Advantages of urea:

1-urea can be applied to soil as a solid or solution or to certain little or no fire or explosion hazard.

2-urea high analysis, 46%N, helps reduce handing, storage and transportation costs over other dry N forms.

3-urea manufacture releases few pollutants to the environment.

4-urea, when properly applied, results in crop yield increases equal to other forms of nitrogen. In corporate urea for best use nitrogen from urea can be lost to the atmosphere if fertilizer urea remains on the soil surface for extended periods of time during warm weather the key to the most efficient use the soil be blended into with the soil be blended into the soil with irrigation water a rain full of as little as 0.25 inches is sufficient to the blend urea into the soil to a depth at which ammonia losses will not occur.

The chemical reaction is as follows:

$Co(NH_2)2+H_2O+Urease = 2NH_{3+}CO_2(Urea)$ the problem is the NH_3, because its ages, acts the same as in corporate anhydrous ammonia also, half of 28% liquid is urea and the same thing happens with this half as with regular urea.

2:9:2 Compost fertilizer of the sunflower:-

Compost is good for the garden, in part because it adds nutrients for the plant. That sound like a fertilizer but almost everything you read says that compost is not a fertilizer.

Before we look at compost we need to understand the term fertilizer .here are some definitions forms the internet dictionaries:

A chemical or natural substance added to soil or land to increase its fertility. Any of a large number of natural and synthetic materials, including manure, nitrogen, phosphorus, and potassium compounds, spread on or worked into soil to increase its capacity to support plant growth. It certainly sounds as if compost fits into this category, but none of the definitions found actually list compost.

Compost is made from plant material and inputs are very variable manufacturers having a hard time controlling the amount on nutrients in the final product. Because they can't legally label the compost as fertilizer. Compost is very important fertilizer if compost is 2% nitrogen and you add 10 times as much compost fertilizer than both applications are providing the same amount of nitrogen to the soil.

Compost also contains a reasonable amount of micro-nutrients. This makes sense, since plants need micro-nutrients material, the compost must also contain the micro-nutrients were absorbed by the plant .

Compost feed the soil clearly implying that compost does NOT feed plants

Compost makes nutrients available to living organisms. As we will see in future posts it also improves soil structure so it improve the environment for living things compost is a good organic fertilizer for productivity and growth of the sun flower.

2:9:3 Di ammonium phosphate (Dap) in sun flower:

High analysis nitrogen and phosphorus contained in every granule. Nominal 2-4mm size granule, free flowing product bulk density 0.9 tones per cubic meter.

2:9:3:1Blending:

Can be blended with most products and trace elements

2:9:3:2 Features:

-high analysis source of phosphorus

-N:P ratio 1:1 makes it an effective source of nitrogen

-Dap releases free ammonium, nitrogen in the as lower release form of nitrogen. The free ammonium gives a higher pH reaction immediately around the granule. The low cost of nitrogen in Dap makes it a cost effective source of nitrogen if phosphorus is also required.

2:9:3:3 Manufacture:-

Ammonia gas is combined with phosphoric acid in a ratio of 1:1, granulated, dried and screened.

2:9:3:4 Uses of Dap:

One of the major cropping fertilizers used in Australia as a source of both phosphorus and nitrogen . The high phosphorus content makes it a true high analysis fertilizer. Dap blends are used on arrange of crops in broad acre farming cereals, sugar cane, sowing pastures, dairy pastures, fodder crops, and also in horticultural crop : for example vegetable and tree crops.

2:9:3:5 Storage and handling:-

-Does tend to take up moisture, both in storage and in the field.

-storage in a bulk shed is the fertilizer and increase any handling problem.

-do not leave exposed to moist air.

-either fill or empty the drill or air seeder fertilizer box overnight.

-cover seeding equipment with a tarp.

-raise the equipment tunes from the soil to stop moist moving up the tubes.

2:10 Restrictions:

- for sowing there is little risk of affecting germination, even at high rates the general rule a maximum 20kg/ha of nitrogen at seeding of serials should be used.

- when applying Dap, the fertilizer should be banded 5cm away from the seed either below or to the side Dap is low in sulphur 15% it's not recommended for a high sulphur requiring crops such as canola, unless blended with sulphate of ammonia, don't store in the silos.

2:11 Agricultural rotational:-

Research indicates that there must be not plant a flower of the sun in the same land, as it would be vulnerable to disease if plant in the same land for several consecutive seasons and is advisable not grown after crops that become rot-carbon (charcoal rot) such as sorghum.

2:12 Harvesting:-

Until the data of harvest flower when the sun becomes yellow stems and leaves, dry leaves, bottom, starting in precipitation, and turns bake the CD to the color yellow, brownish, and bow down, and turns Alqnabat brown and wilt and dry flowers, radial, and falling a large proportion of floral disc and becomes a seed ready to break up Early harvest before maturity, leads to falling plant, which leads to loss part of the seed and pick up another part by birds.

Camel medium length and short maturity of the regular harvest vehicles (Alcolmbian Combine) should preferably take place this process in the early morning where the ratio of moisture in the seed more than 20% for fear of disintegration of moisture of the seeds. Among the problem of harvesting open-pollinated varieties (not hybrids) to grow and mature non-liner which requires cutting the disks in the field per Oktrmen time. Kmaon maturity leads to uneven dispersion of seed and their vulnerability to attack the birds for a

longer period, especially in shall not exceed the degree of humidity than storing seeds shall not exceed than 9% so as not to rot and lose their vitality.

2:13 Production constraints:

There are many constrains of sunflower:

Fluctuating rainfall and poor distribution, High proportion of empty seeds in the open-pollinated varieties because lack of insects from vaccinated animals the most important bee. The percentage of empty seeds in the yield to 80%.

Failure to provide seed of improved varieties highly productive, lack of production inputs machinery and faull spare parts, After the production areas for markets and the poor condition of roads and means of production, Import hybrids from outside the country increase production costs. Problems of marketing and prices alternate, Birds and difficult to control.

CHAPTER THREE

MATERIALS AND METHODS

Experiment was conducted in season 2016/2017 in experimental farm of College of Agriculture Studies Sudan University of Science and Technology – Shambat- to study the effect of different fertilizers on three genotypes of Sunflower.

3-1 Experiment site:

The area of experiment is located at latitude 150 and 150 and 400 and longitude 0.32 and 0.23 and rising 380 meters above sea level, the terrain Loewy basket is cricket but weak in fusion, high pH(8.7 to 7.6) and weak. containing nitrogen as described by (Oliver 1965 local climate is semi desert with allow percentage of moisture, the average annual rainy 151.8mm per year and the average temperature in winter 23.9^{o}c (Abdalla 1989).

3.2 Treatments and design:

The treatments used in this experiment consist of: compost (comp) at dose of 15 ton/ha, urea46%N (ur) at dose of 186.7kg/ha, Di amonium phosphate (DAP) at dose of 50 kg/ha and control (C) without. All treatments added to the experiment units follows: Compost (comp)13.5g/plot, Urea (Ur) 168g/plot, DAP 45g/plot. The seeds of the Three genotypes (V1:0398, V2: SIRANA and V3:MR1362) used in the experiment were obtained from National Research Center Khartoum.

A factorial experiment was condected ranged in randomized completes design (RCBD) in three replicates the full 36 units, pelvis (3*3)m.

3.3 Method of agriculture:

Use mechanical for the land preparation (plowing, harrowing, leveling and ridging).Settlement by between the lines of 75cm and the distance between

holes 25cm each piece consist of 3 lines (ridge),but 4seeds in the hole, two weeks after germination is the process of socks and leave the two plants in the hole.

3.4 Irrigation:

An irrigation interval was 7days in maximum; sixteen times irrigation were added at the season.

3.5 Weeding:

Manual weeding was practiced two times after three weeks from sowing date and after one month from the first one.

3.6Data collection:

The data collection in this experiment following:

3.6.1 Plant height (cm):

Eight Plants were selected randomly form each plot to measurement plant height, used meter from soil surface to plant tip, three times 30, 60 and 90 days after sowing (DAS).

3.6.2 Number of Leaves per plant:

It was determined by counting all green Leaves of eight plants and obtaining mean number of leaves plant to every treatment alone, two times at 60days after sowing (DAS) and after flowering.

3.6.3 Stem diameter (cm):

Stem diameter measurement as the average thickness of the stem using thread on main stem of eight randomly selected plants and the mean obtained.

3.6.4 Leaf area (cm^2):

Measured from the middle plant leaves by using graph papers and mean was counted in cm^2.

3.6.5 Head diameter (cm):

Three heads were chosen from each plot and head diameter was measured in cm to count mean.

3.6.6 Grain yield (ton/ha):

The total seed of plant in squire meter was collected and the grain yield in (ton/ha) was calculated.

3.6.7 Statistical analyses:

Data collected in this investigation were statistically analyses in accordance to analysis of variance (ANOVA), and means were separated for significant by leas significant different (LSD) test according to Gomez and Gomez (1984), using Statistix 8 computer Program.

CHABTER FOUR

RESULTS

4:1 Plant height (cm):

statical analysis results showed a significant differences among fertilizers, but no significant differences among genotypes. Also on significant differences at interaction between fertilizers and genotyps at ($P \geq 0.05$) at all samples occasions Appendix 1. The height mean of plant height was obtained by V2xcom (54.82 cm) Table (1) and the lower mean of plant hieght was obtained by V2 xUrea 24.297.

4:2 Number of leave per plant:

The analysis of variance showed significant differences among genotypes at all samples occasions Appendix 2.The highest number of Leaves was obtained by V2xcomp (26.5) in read 1, and V2xcomp (28.3) in read 2, and the lower leaves number per plant was (19. 7, 20.2) obtained by V3xDap at read 1, and read 2 respectively (Table 2).

Table 1: mean of plant height (cm) at three reading in sunflower genotypes treated by different fertilizers.

Plant height1

Var	Control	Comp	Ura	Dap
V 1	36.3^{a}	32.3^{ab}	29.1^{ab}	27.5^{ab}
V 2	29.3^{ab}	28.2^{a}	24.2^{b}	32.8^{ab}
V 3	31.4^{ab}	35.5^{a}	29.6^{ab}	30.5^{ab}
LSD	**10.78**			

Plant height2

V 1	39.7^{ab}	39.2^{ab}	32.5^{bc}	31.7^{BC}
V 2	33.5^{abc}	42.1^{a}	29.7^{c}	38.1^{ABC}
V 3	34.2^{abc}	38.4^{abc}	34.8^{abc}	33.3^{ABC}

Plant height3

V 1	51.6^{ab}	51.2^{ab}	42.3^{bc}	41.2^{bc}
V 2	43.6^{abc}	54.8^{a}	38.6^{c}	49.5^{abc}
V 3	44.5^{abc}	49.9^{abc}	45.3^{abc}	43.3^{abc}

Table 2: mean leaves number at two reading in sunflower genotypes treated by different fertilizers.

Leave number1

Var	Control	Comp	Ura	Dap
V 1	25.4^{ab}	24.5^{abc}	24.4^{abc}	22.9^{abc}
V 2	23.2^{abc}	26.5^{a}	21.4^{abc}	25.5^{ab}
V 3	21.9^{abc}	23.2^{abc}	21.4^{bc}	19.7^{c}

Leave number2

V 1	26.8^{ab}	26.8^{ab}	25.9^{abc}	26.8^{abc}
V 2	25.8^{abc}	28.3^{a}	26.3^{abc}	27.6^{a}
V 3	24.2^{abcd}	22.1^{cd}	22.3^{bcd}	20.7^{d}

After data collection and statistical analysis rusult showed no significal pariwis deifference among the means, teast rep*var*treat, 22 DF

There are no significant pairwise differences among the means.

Table 3:mean of discdiamitor at two in sunflower genotypes treated by different fertilizers.

Var	Control	Comp	Ura	Dap
V 1	4.26^{ab}	4.73^{ab}	13.4^{bc}	4.80^{b}
V 2	6.35^{a}	4.59^{ab}	13.8^{bc}	4.50^{ab}
V 3	4.14^{ab}	4.53^{b}	13.1^{bc}	4.13^{b}

4-1-4(4)leave area:-

After data collection and statistical analysis results showed no significant pairwise difference among the means of the teast of the leave area for varities, teast of leave aera for treats there are 2 group (And B) in the terat 3cmp 17,081 is the hight treat and best treat of all treat which the meanc are not significantly different from one another.

TABIE4:mean leaves number at two reading in sunflower genotypes treated by different fertilizers.

Var	Control	Comp	Ura	Dap
V 1	12.6^{bc}	15.3^{ab}	13.4^{bc}	13.1^{bc}
V 2	12.8^{bc}	17.6^{a}	13.8^{bc}	13.6^{bc}
V 3	11.4^{c}	18.3^{a}	13.1^{bc}	15.6^{abc}

4-1-5(5) stemdiam :-

After data collection and statistical analysis showed no significant pairwise difference among the means of the teast of the stemdiam for varities

Table4: the mean of stemdiam:

Var	Control	Comp	Ura	Dap
V 1	4.68^{abc}	5.01^{ab}	4.49^{abcd}	3.25^{d}
V 2	3.61^{cd}	5.54^{a}	3.94^{bcd}	4.52^{abcd}
V 3	3.92^{bcd}	5.62^{a}	4.62^{abc}	4.57^{abcd}

4-1-6(6) seed yield (kg/ha):-

After data collection and statistical analysis showed that there are 2 group (And B) in which the means another, varities 1V is the beast varities the means is 1.1092 hight varities between another varities. Teast of yield for treat means there are 3 groups (A,B,etc) in which the means are not significantly different from one another the best treat ment and hight yielder is cmp the mean 1,3800 than all another treat mean, teast of yield for var*treat founded there are 5 groups (A, B, etc) in which the means are not significantly different from one another .

Table 5: the yield(kg\ha):

Var	Control	Comp	Ura	Dap
V 1	0.91^{cd}	1.58^{a}	1.23^{c}	0.91^{cd}
V 2	0.85^{de}	1.32^{b}	0.94^{cd}	0.80^{de}
V 3	0.72^{e}	1.23^{b}	0.84^{de}	0.92^{cd}

CHAPTER FIVE

DISCUSSION

After data collection and statistical analysis result showed no significal differences between varities. But there are 2 group (Aand B) of treat meant in which the means are not significantly different from one another hight mean founded in the v2, hight teartmeant is comp than all treatmeant , the beast varities is growth of the sunflower blant.

5-1 first factor =fertilization :-

5-1-1 blant hight :-

The result observed hightly mean in the teast of the plant heigt founded in the v2, but the high treatmeant founded in the comp, there are no significant difference under fertilization.

5-1-2 yield:-

After data collection and statistical analysis results showed that there are 2 group (And B) in which the means are not significantly different form one another varities, v1 is the best varities the mean of the v1 in the test of yield is (1-1092) it agood varities for productivity of the sunflower, the test of yield for treat meant there are 3group (A,B, etc) in which the means are not significantly different from one another, the best treatmeant and hight yielder is comp the mean is (1,3800) than all another treatmeant.

5-2 The second factor : the varieties :-

5-2-1 Plant hight :-

The different between varieties show siginificant differences among the variet

5-2-2 yield :-

Betweenthe varieties it shows no significant among the varieties for the other characters and the in teraction between the fertilization and the varieties shows no significant difference except the characters of plant height shows high siginficant differences.

CHAPTER SIXE

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A ppendix 1: mean sum squire for plant height (cm)of sunflower genotypes affected by different fertilizers.

Source of variation	DF	Ms PH1	Ms PH2	Ms PH3
Rep	2	7.76 ^{ns}	15.50^{ns}	26.21^{ns}
Var	2	1.30^{ns}	1.56^{ns}	2.63^{ns}
Treat	3	95.37*	92.50*	156.39*
Var*treat	6	36.92^{ns}	32.43^{ns}	54.75^{ns}
Error	22	40.54	31.32	52.92
Total	35			
CV%		20.25	15.70	15.70

*:significant

**:highly significant

ns: non significant

A ppendix 2: mean sum squire for leaves number &stem diameter (cm)of sunflower genotypes affected by different fertilizers.

Source of variation	Df	Ms LN1	Ms LN2	Stem diamter
Rep	2	0.82	11.66	2.22
Var	2	29.93*	77.38**	3.11^{ns}
Treat	3	11.48^{ns}	2.68^{ns}	37.17*
Var*treat	6	7.25^{ns}	4.11^{ns}	3.20^{ns}
Error	22	10.33	7.53	4.46
Total	35			
CV%		13.78	10.85	17.54

*:significant

**:highly significant

ns: non significant

A ppendix 3: mean sum squire for leave area (cm2), disc diameter (cm) and yield (ton/ha) of sunflower genotypes affected by different fertilizers.

Source of variation	Df	Ms leave area	Ms disc diameter	Ms yield
Rep	2	2.22	0.44	0.00
Var	2	3.11^{ns}	1.70^{ns}	0.10**
Teratments	3	37.17**	0.76^{ns}	0.57**
Var*treat	6	3.20^{ns}	1.18^{ns}	0.02*
Error	22	4.46	1.71	0.01
Total	35			
CV%		14.87	29.01	8.77

*:significant

**:highly significant

n. s: non significant