



بسم الله الرحمن الرحيم  
**Sudan University of Science and Technology**



**College of Agricultural Studies  
Department of Agronomy**

**A dissertation submitted to college of agriculture  
Studies in partial fulfillment of the requirements  
for degree of Bachelors of agriculture (Honors)**

**The effect Nitrophosca Fertilizer in  
Microdose on barley growth**

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## الآية

بسم الله الرحمن الرحيم

قال تعالى:

وَأَيَّةٌ لَهُمُ الْأَرْضُ الْمَيِّتَةُ أَحْيَيْنَاهَا وَأَخْرَجْنَا مِنْهَا حَبًّا فَمِنْهُ يَأْكُلُونَ ﴿٣٣﴾  
وَجَعَلْنَا فِيهَا جَنَّاتٍ مِّنْ نَّخِيلٍ وَأَعْنَابٍ وَفَجَّرْنَا فِيهَا مِنَ الْعُيُونِ ﴿٣٤﴾ لِيَأْكُلُوا  
مِنْ ثَمَرِهِ وَمَا عَمِلَتْهُ أَيْدِيهِمْ أَفَلَا يَشْكُرُونَ ﴿٣٥﴾

صدق الله العظيم

سورة يس الآيات 33-35

## **DEDICATION**

*To the soul of my Mother and father  
(God mercy them)*

*TO MY brothers*

*To My Sisters*

*To My friends*

*To all My Family*

*To My Sweet hard*

*To My teacher: Yassin Dagash*

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**First thanks to Allah for giving complete this  
Work successfully**

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**Thanks to our Broths, Sisters and all  
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## **Abstracts**

*A field Experiment was conducted 2016-2017 at collage of Agricultural, shambat, Sudan University of science and Technology to study the effect Nitrophosca fertilizer in microdosing on barley growth. Five Microdose ( control ,1gm,2gm 3gm,4gm )were added at sowing and 10 days after sowing in randomized complete design (RCBD)with the three replication three was significant difference for most parameters .control and 2gm Microdose was the best when added with sowing .*



## الخلاصة:-

تم إجراء التجربة في المزرعة التجريبية بجامعة السودان للعلوم والتكنولوجيا-كلية الدراسات الزراعية مجمع شمبات في الموسم الصيفي 2016-2017 م .  
لدراسة تأثير سماد النيتروفوسكا على محصول الشعير لإضافة خمسة مستويات من السماد في جرعات صغيرة الشاهد، 1جم ، 2جم، 3جم، 4جم. بتصميم القطاعات العشوائية الكاملة في ثلاثة مكررات بمسافة 60سم بين السرايات و20سم بين النباتات وواضحة النتائج هن هنالك فروقات معنوية بسيطة بين المعاملات الثلاثة طول النبات وعدد الاوراق وسمك الساق الذي تم قياسها وكانت إضافة الشاهد و2جم مع الزراعة افضل معاملة.

# CHAPTER ONE

## INTRODUCTION

Barley (*Hordeum vulgare*.) a member of the poaceae family is a major cereal grain.it was one

Of the first cultivated grains and is Now grown widely .barley is an important cereal crop which play a major role in the diet both for food and feed .Barley is Next to the maize, wheat and rice both in acreage and production of grain .the center of origin of barley is being lived to be oldest grain planted by mom and one of the ancient world crop.

Land degradation affected more than half of Africa, leading to loss of an estimated 42 billion and 5 Billion hectares of productive land each year. The majority of farmland produce poor yields due to poor Farming [technique] nutrient deficiency and irregular watering [ICRISAT,2009 ]the Microdose Technology is the application of small mineral Fertilizer dose in the seed hole when sowing or Next to the

Seeding after emergence { 10 days after

Sowing} .the advantages of this technology are [Agricultural Technology, Burkina Faso 2010]:-

- 1-To locate the fertilizer near the root to obtain high concentration area which makes assimilation of nutrients easier
- 2-To limit phosphorus fixation phenomena by the soil

3-To increase the efficiency of fertilizer use

4-To minimize production costs

5-To improve small produces income

6-To increase the number of mineral fertilizer

However TCRTSAT [2009] mentioned some difficulties as:

1- The technology is time consuming laborious and difficult to cover than each plant gets the right dose.

2-Access to fertilizer is sufficient flow of information and training to farmer and in appropriate policies

3-the adoption of the technology requires supportive and complementary in situation of innovation as well as input and output market linkages.

As mentioned by May researcher the technology used about one tenth of amount typically used on wheat and one quarter .the amount potassium of ten double yields: [Bationo et al, 2015 and Builders, 2015.

The Main objectives of this work are to use the Microdose technology to help in reducing the cost and to determine the optimum Microdose level under shambat condition.

# CHAPTER TWO

## LITERATURE REVIEW

Soil is an important factor in crop production and its degradation is one of the limiting factors for sustainable agriculture FAO. (2004). With the ever-increasing population , soil fertility management by long fallow periods is practical soil fertility management method under intensive continuous cropping is also no longer feasible due to scarcity . High cost Akinrinde and okeleye (2005). And the numerous sides effected on the soil. Sanchez et, al. Sanchez et, al (2002). Reported soil that fertility depletion in small holder farming is the fundamental biophysical root cause of stagnant per capital food production in Africa

The shortage of fertilizer additions has resulted in enormous nutrient depletion and a reduction in yields, due to shortage in nutrients for plant.

Growth the rate of nutrient depletion has increased over the last 20 years and most of losses of nitrogen from the soil have occurred since 1985 Sheldrick WF (2004).currently, gross nitrogen losses from cultivated Africa soil exceed 4.4 TG (excluding South Africa) Sanchez et,al. (2004). The sub optimal application of fertilizers to agricultural soil and the removal of nutrients in from produce and erosion losses and reduction in soil organic matter due to the farming systems, result in mining of nutrients from the soil

(Nyamangara. Enhancing et, al. (2001). Degradation and a Reduction in crop yields. The reduction in crop yields affects food security on the continent and contributes to high levels of poverty, Galloway et,al. (2004) optimization nitrogen use to sustain life, and to minimize the negative impacts of nitrogen on the environment and human health is far most important.

N use efficiency (NUE), which is considered an important factor in the management of N application in crop productivity, is expressed as the total N accumulation (Rehman et,al. 2011). Beatty et, al. (2010) suggested the NUE in cereals should be improved through the optimal management for N applications as well as through use potential varieties to increase the crop yield. N applications are the most significant factors that con limit NUE and maize productivity. The assessment of the suitable N applications is a vital concern for the increase of N uptake efficiency (Norwood et, al. 2000).

Barley (*Hordeum vulgar L.*) is the cereal in many dry area of the world and is vital for the livelihood of many farmers. Barley is fourth most important cereal crop plant belonging to family poaceae. The land area in barley production and its important have greatly increased since its domestication. Barley has three primary uses: feed for livestock. human consumption, and malting barley for beer production (Jones and Clifford, 1983, Nevo, 1992) barley is extremely nutritious and can contain a protein content as high as 18% in addition barley contains considerably loss oil than maize (*Zea mays L.*), thus making it more appealing for low – fat diets due to the high fiber content in the hull, there is decreased

Digestibility in monogastric animals. Over one – half of the worlds Barley production is used in feed stuffs for livestock.

Field experiments were carried out to study the effects of sowing Dates (November to December) and nitrogen fertilizers on nitrogen utilization and some related characters of barley cultivars (*Hordeum vulgare* L.) Results indicated that sowing in the 1<sup>st</sup> and 2<sup>nd</sup> week of November resulted higher grain yield and total dry matter compared to other times.

Delay in sowing, I. e after 17 November decreased dry matter accumulation and nitrogen utilization. Accumulation of dry matter increased with higher doses of nitrogen but nitrogen use efficiency increased up to 90 kg/ha and nitrogen harvest index was more or less similar except in control (ALAM , at . 2005 ).

This study was aimed to evaluate the impact of N fertilizer applied at different growth stages on grain and protein yield as well as nitrogen use efficiency of some tow- row barley varieties in sandy soil. An experiment was carried out at Experimental farm faculty Agriculture, Sabah, University, Libya during 2008 / 2009 and 2009/ 2010 seasons. These experiments were lay in randomize complete blocks design (RCBD) using split – plot arrangement with three replicates

# CHAPTER THREE

## MATERIAL AND METHODS

### **Field experiment:-**

A field experiment was conducted at the Demonstration farm of the collage of Agricultural studies university of science and technology, shambat Sudan (15.40) N, 32, 32E, elevation 380 m). The climate is semi – desert a low relative humidity and annual rain fall rate of 150mm and a mean temperature of (20.3c – 36.1c) and cloy soil with a pH 7, 5 – 8 (Abdulhafeez2001).

### **Treatments:-**

The treatments were added in a hole, then covered with soil and the seeds were put over and covered with soil. The treatments consisted of five treatments which were:

- 1-control (without fertilizer)
- 2-1gm compound fertilizer
- 3-2gm compound fertilizer
- 4-3gm compound fertilizer
- 5-4gm compound fertilizer

### **Source of seed:**

Barley (*Hordeum vulgar*) local variety, were obtained from college of Agricultural studies, Sudan university of science Technology (shambat)

### **Land preparation:-**

The experimental site was disc plough, disc harrowed, and then followed by harrowing and riding up north-south. The spacing between ridges was 60cm. four replication were divided in to four posts; each plot was 2\*3m, consisting of three rows. Soil sample was taken before sowing and after harvesting to determine the amount of nitrogen crop was sown at first December 2016.

The depth of seeds was 2cm with fertilizer in the same hole; seeds were planted as per the treatments. Weeding was done two times after three weeks from sowing and after one month from the first hand weeding. Soil sample were taken before planting and after harvesting.

### **Plant height (cm):**

Three plants of barley were randomly selected from each plot and the plant height was measured from soil surface to the tip of the flag leaf using a measuring tape, and then the mean height was obtained.

### **Number of leaves per plant:**

Three plants from each plot were taken and the average number of leaves per plant was counted.

### **Stem diameter (cm):**

Three plants from each plot were taken and the diameter in the middle of the plant was measured using a strip and a ruler and then the mean stem diameter per plant was estimated.

### **Statistical analysis:**

The data were analyzed according to the standard statistical procedure of a randomized complete block design as described, by Gomez and Gomez (1984) using MSTAT.C computer package.



# CHAPTER FOUR

## RESULTS AND DISCUSSION

### **4-1 Plant height (cm):**

There were no significant differences between plant height. However the Microdose 3gm gave the highest plant (57.66 cm) followed by Microdose 2gm (57 cm). Microdose (1gm and control) gave the lower height (54 cm). The coefficient of variation (C.V) for the plant height was 8.25% which was reasonable.

### **4-2 leaves Number (cm):**

The number of leaves showed no significant different between the Microdose levels. The Microdose levels were all equal Number as the 1gm, except control Microdose which gave highest leaves Number, the coefficient of variation (C.V) of this parameter was (7.17).

### **4-3 stem diameter (cm):**

There was no significant difference in stem diameter for the Microdose levels. Microdose control gave the highest diameter (3.6 cm) followed by the (1gm)(3.4 cm).

The coefficient of variation for the Microdose levels (C.V) was high 10.67%.

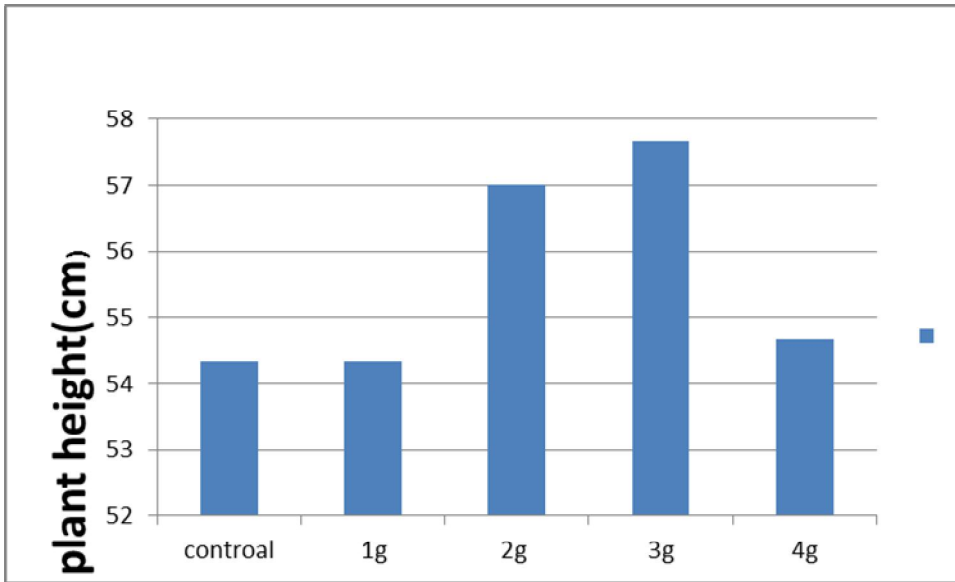
**Table (1): Summering of the ANOVA for barley technology**

Source of verity	Degree of freedom	Plant height (Cm)	Leave number (Cm)	Stem Diameter (Cm)	Fresh weight (g)	Dry Weight (g)
Replication	2	–	–	–	–	–
Microdose	4	0.37ns	5.29ns	2.29ns	3.54*	4.02*
Error	8	–	–	–	–	–
Total	14	–	–	–	–	–
C.V	–	8.25	7.17	10.67	13.44	18.38
EMS	–	21.03	0.23	0.11	1.13	0.42

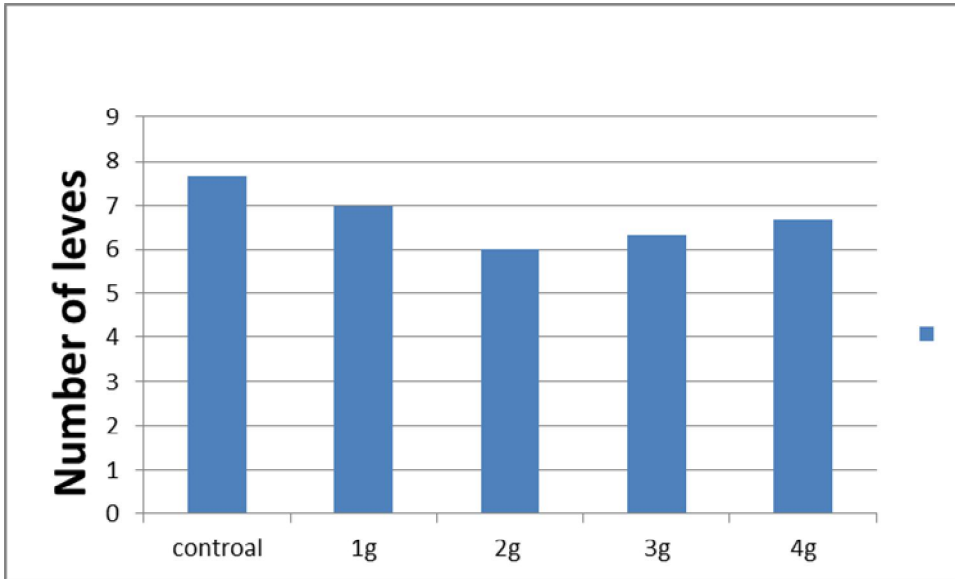
NS=not significant

\*=significant (5%)

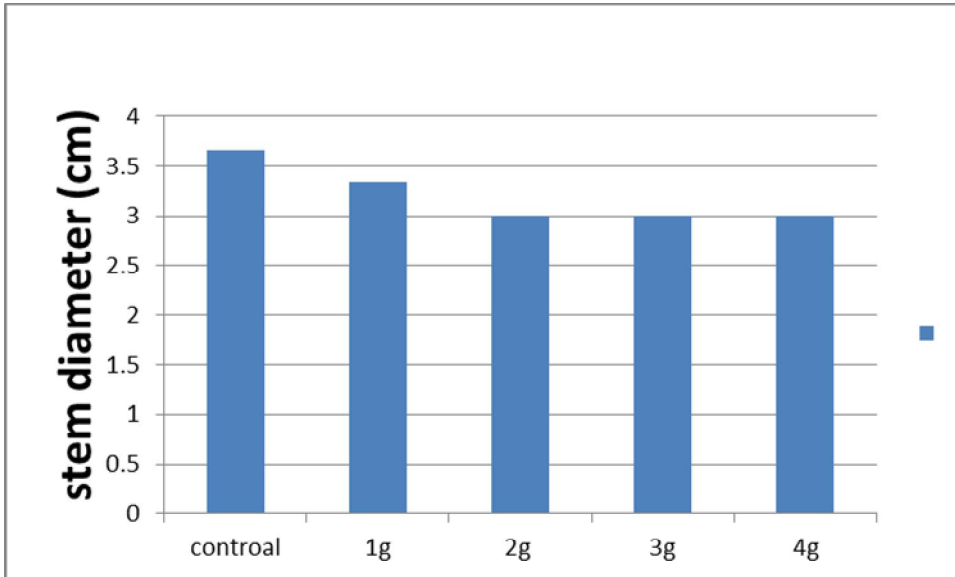
\*\*=highly significant (1%)



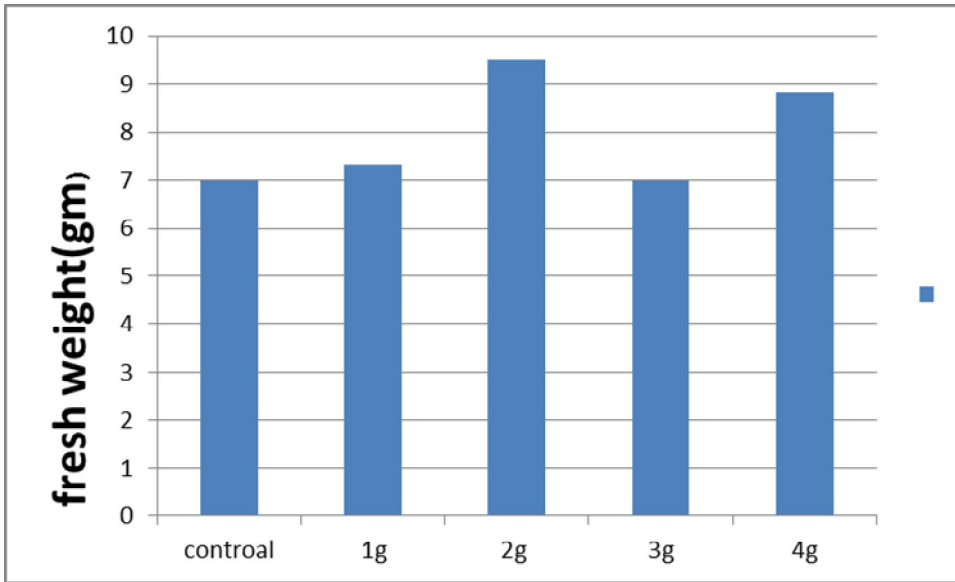
**Fig 1 plant height of barley Microdose**



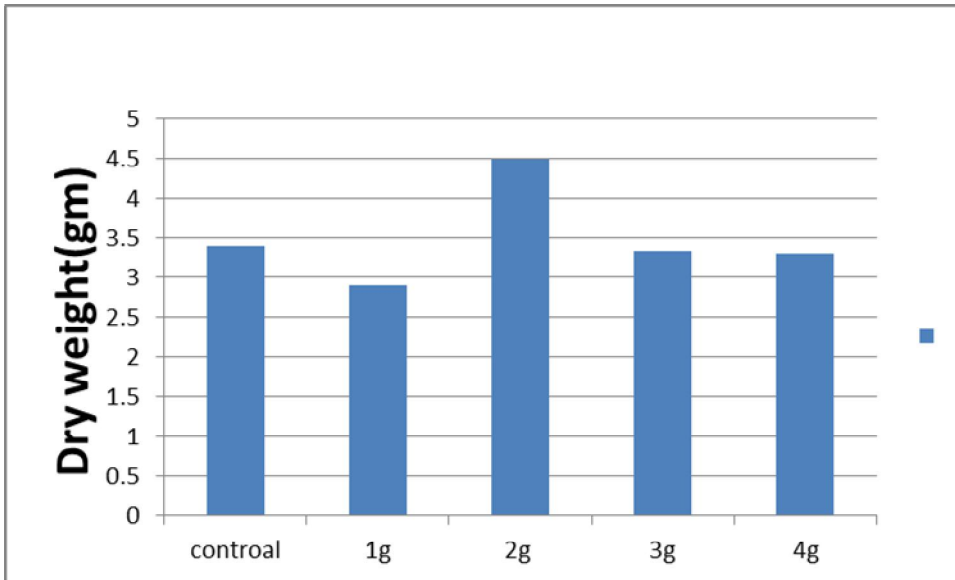
**Fig 2 leaf of barley/plant Microdose**



**Fig 3 Stem diameter (cm) of barley Microdose**



**Fig 4 Fresh weight (gm) of barley Microdose**



**Fig 5 Dry weight (gm) of barley Microdose**

**Fresh weight (gm):**

The fresh weight per plant was not significant for the Microdose level. The 2gm gave the highest fresh weight (9.5 gm) While Microdose 3gm and control had the lowest (7 gm).

**Dry weight (gm):**

There were no significant differences between the dry weight per plant for barley Microdose levels. Microdose of 2gm had highest dry weight (4.5 gm) while Microdose 1gm had the lowest (2.9 gm). The coefficient of variation (C.V) for dry weight per plant was (18.38%).



## CHAPER FIVE

### *Conclusion*

As shown in the tables and figures there was no consistency in the Microdose levels for the different parameters. There significant in fresh the 2gm gave the highest fresh weight (9.5 gm) while microdose 3gm and control had the lowest (7gm). The microdose of 2gm had highest dry weight (4.5gm) while microdose 1gm had the lowest (2.9gm).

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**Randomized Complete Block AOV Table for P**

Source	DF	SS	MS	F	P
REP	2	24.400	12.2000		
TREAT	4	30.933	7.7333	0.37	0.8254
Error	8	168.267	21.0333		
Total	14	223.600			

Grand Mean 55.600      CV 8.25

**Tukey's 1 Degree of Freedom Test for Nonadditivity**

Source	DF	SS	MS	F	P
Nonadditivity	1	0.301	0.3012	0.01	0.9139
Remainder	7	167.965	23.9951		

Relative Efficiency, RCB 0.91

**Means of P for TREAT**

TREAT	Mean
1	54.333
2	54.333
3	57.000
4	57.667
5	54.667

Observations per Mean                      3  
Standard Error of a Mean                  2.6479  
Std Error (Diff of 2 Means)              3.7446

**Randomized Complete Block AOV Table for N**

Source	DF	SS	MS	F	P
REP	2	0.13333	0.06667		
TREAT	4	4.93333	1.23333	5.29	0.0222
Error	8	1.86667	0.23333		
Total	14	6.93333			

Grand Mean 6.7333      CV 7.17

**Tukey's 1 Degree of Freedom Test for Nonadditivity**

Source	DF	SS	MS	F	P
Nonadditivity	1	0.23829	0.23829	1.02	0.3452
Remainder	7	1.62838	0.23263		

Relative Efficiency, RCB 0.87

**Means of N for TREAT**

TREAT	Mean
1	7.6667
2	7.0000
3	6.0000
4	6.3333
5	6.6667

**LSD All-Pairwise Comparisons Test of P for TREAT**

TREAT	Mean	Homogeneous Groups
4	57.667	A
3	57.000	A
5	54.667	A
1	54.333	A
2	54.333	A

Alpha 0.05 Standard Error for Comparison 3.7446  
Critical T Value 2.306 Critical Value for Comparison 8.6351  
Error term used: REP\*TREAT, 8 DF  
There are no significant pairwise differences among the means.

**LSD All-Pairwise Comparisons Test of N for TREAT**

TREAT	Mean	Homogeneous Groups
1	7.6667	A
2	7.0000	AB
5	6.6667	BC
4	6.3333	BC
3	6.0000	C

Alpha 0.05 Standard Error for Comparison 0.3944  
Critical T Value 2.306 Critical Value for Comparison 0.9095  
Error term used: REP\*TREAT, 8 DF  
There are 3 groups (A, B, etc.) in which the means are not significantly different from one another.

**LSD All-Pairwise Comparisons Test of S for TREAT**

TREAT	Mean	Homogeneous Groups
1	3.6667	A
2	3.3333	AB
3	3.0000	B
4	3.0000	B
5	3.0000	B

Alpha 0.05 Standard Error for Comparison 0.2789  
Critical T Value 2.306 Critical Value for Comparison 0.6431  
Error term used: REP\*TREAT, 8 DF  
There are 2 groups (A and B) in which the means are not significantly different from one another.

**LSD All-Pairwise Comparisons Test of F for TREAT**

TREAT	Mean	Homogeneous Groups
3	9.5000	A
5	8.8333	AB
2	7.3333	B
1	7.0000	B
4	7.0000	B

Alpha 0.05 Standard Error for Comparison 0.8708