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Sudan University of Science and Technology

College of Agricultural Studies
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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 :-

إِنّا فَتَحْنَا لَكَ فَتْحًا مُّبِينًا ﴿١﴾ لِّيَغْفِرَ لَكَ اللّــهُ مَا تَقَدَّمَ مِن ذَنبِكَ وَمَا تَأَخَّرَ وَيُتِمَّ نِعْمَتَهُ عَلَيْكَ وَيَهْدِيَكَ صِرَاطًا مُّسْتَقِيمًا ﴿٢﴾

صدق الله العظيم

سورة الفتح الآيات 1-2

Dedication

To my mother,

To my dear father (God Mercy to hem).

To my sisters and brothers

To my Super visor: PROF: Yassin Dagash

Finally, to my all friends and my family.

ACKNOWLEDGEMENT

We would like to express our sincere gratitude and appreciation to prof.Yassin Dagash for his help full guidance, advice to through the research process

We also like to extend our deep appreciation to the staff of Agriculture Sudan University of Science and Technology for their help.

Our thanks also go to our family and my aunt Shadia Mohammed Matar for their patience, support and encouragement throughout the period of the study.

Thanks also extended to our friends, colleges and those who contributed in our way to this work and not mentioned.

List of contents

Title

List of Tables

List of figures

Abstracts

Afield Experiment was conducted2016-2017 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.4gm Microdose was the best when added tan days after 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 السرابات و20سم بين النباتات واوضحة النتائج هن هنالك فروقات معنوية بسيطة بين المعاملات الثلاثة طول النبات وعدد الاوراق وسمك الساق الذي تم قياسيها وكانت إضافة 4جم بعد عشرة ايام افضل معاملة.

CHAPTERONE

INTRDUCTION

Barley (*Hordeum vulgar.)* 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 degration affected more than half of Africa, leading to loss of an estimated42 billion and 5Billion hectors 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 incorne
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 TW0

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 monogestric animals. Over one – half of the world's barley production is used in feed stuffs for livestock.

Field experiments were carried out t0 study the effects of sowing dates (November to December) and nitrogen fertilizers on nitrogen utilization and some related characters of barley cultivars (Hordeum vulgar L.) Results indicated that sowing in the 1st and 2sd 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 in creased 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

MATERIALS 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 ten days after sowing immedictely beneath the plant.

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 flog 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.

Steam diameter (cm):

Three plants from each plot were taken and the diameter i9n the middle of the plant was measured using a strip and a ruler and then the mean stem diameter per plant was estimated.

Weight per plant:

The three plant from each plot used for fresh
Weight were dried at the oven (80c) for48 hours and then weighed and average dry weigh per plant was recorded.

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

RESULSTS AND DISCUSSION

4-1 Plant height (cm):

There were no significant differences between plant height. However the Microdose 4gm gave the highest plant (52 cm) followed by Microdose 2gm (51 cm). Microdose (3gm) gave the lower height (48 cm). The coefficient of variation (C.V) for the plant height was 4.88% 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 3gm, except 4gml Microdose which gave highest leaves Number, the coefficient of variation (C.V) of this parameter was (6.26).

4-3 stem diameter (cm):

There was no significant difference in stem diameter for the Microdose levels. Microdose 3gm gave the highest diameter (4 cm) followed by the (2gm)(3.76 cm).

The coefficient of variation for the Microdose levels (C.V) was high 10.10%.

Table 1 Summary of the ANOVA for barley Microdose technology:-

Source Of verity	Degree 0f Freedom	Plant Height (cm)	Leave Of Number (cm)	Steam Diameter (cm)	Fresh Weight (g)	dry Weight (g)
Replication	2	_	_	_	_	_
Microdose	4	1.85ns	12.73*	1.90ns	1.71*	1.54*
error	8	_	_	_	_	_
total	14	_	_	_	_	_
C.V	_	4.88	6.26	10.10	12.88	17.55
EMS	_	5.90	0.36	0.13	1.56	0.98

MS=not significant
*= significant (5%)
**= highly significant (1%)

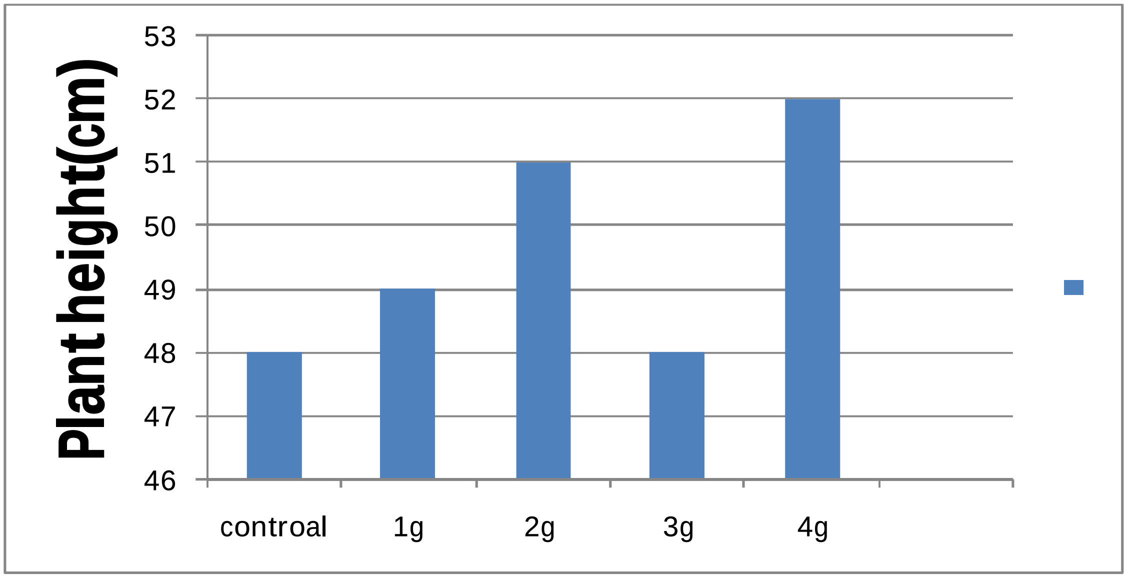


Fig I plant height of barley Microdose

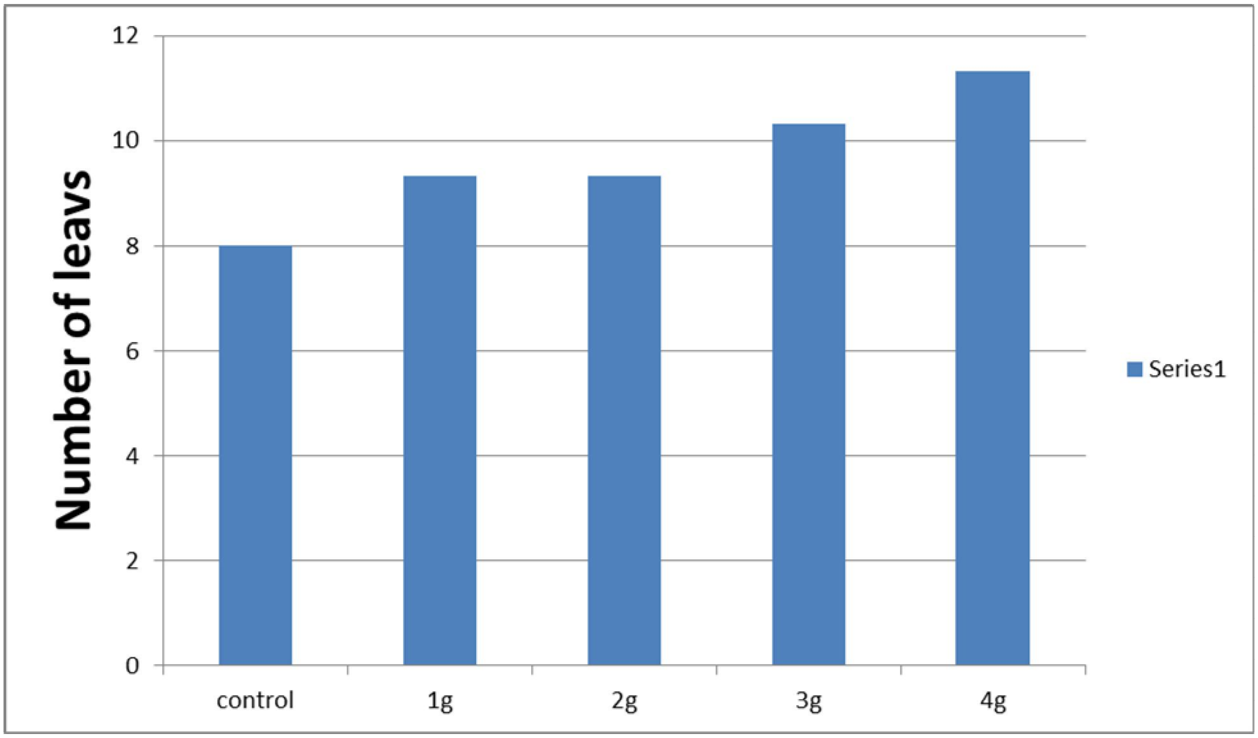


Fig II Leaf of barley/plant Microdose

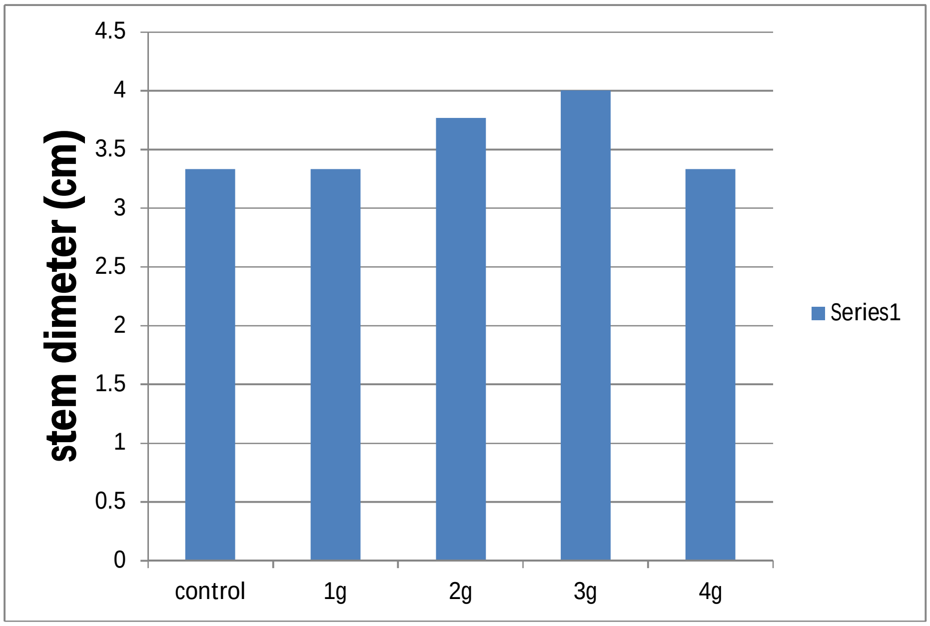


Fig III steam diameter (cm) of barley Microdose

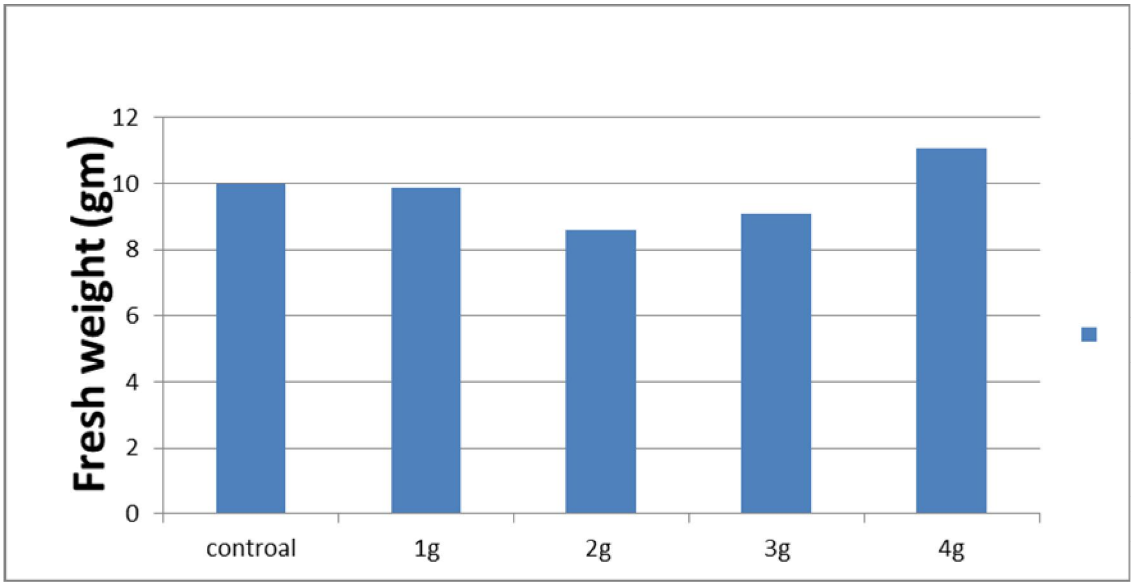
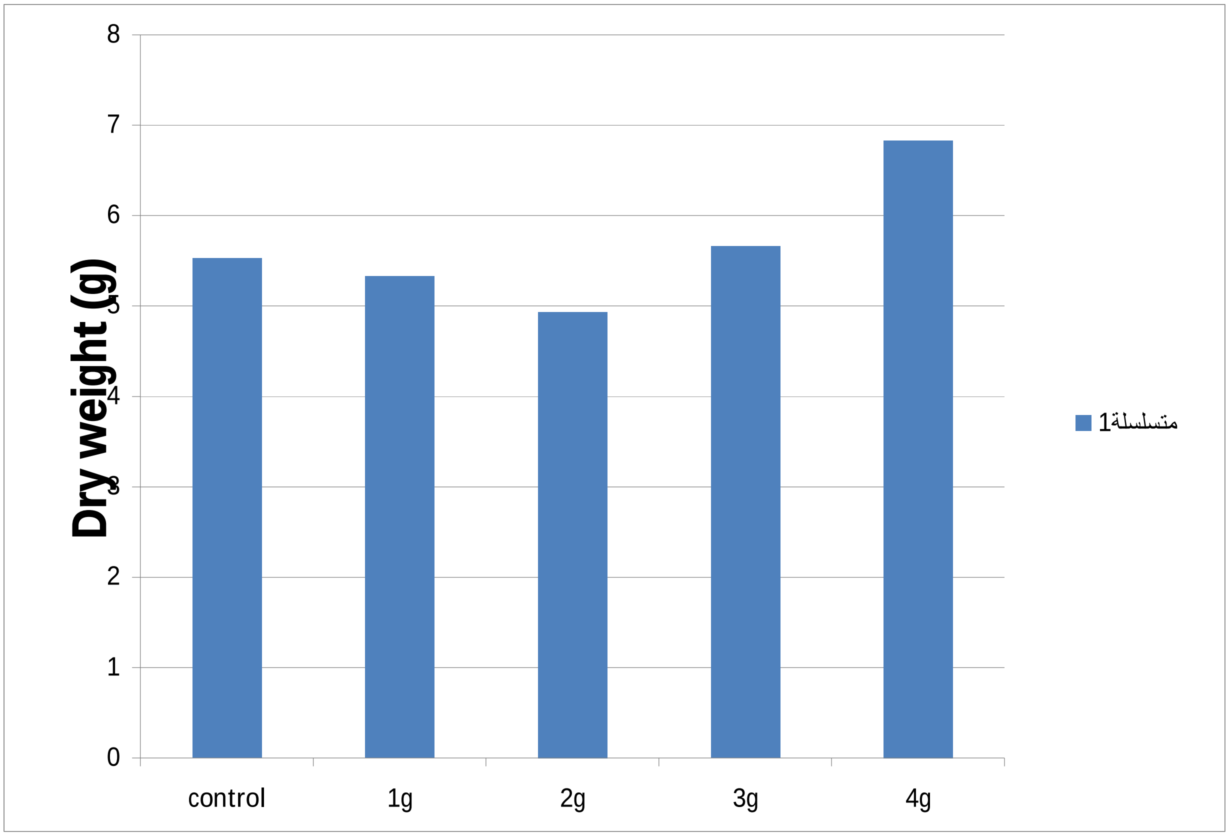


Fig IV fresh weight (gm.) of barley Microdose



Figs V dry weight (g) of barley Microdose

Fresh weight (gm):

The fresh weight per plant not significant for the Microdose level. The 4gm gave the highest fresh weight (11.667 gm) Wile Microdose 2gm had the lowest (8.6 gm).

Dry weight (gm):

There were no significant differences between the dry weight per plant for barley Microdose levels. Microdose of 4gm had highest dry weight (6.38 gm) while Microdose 2gm had the lowest (4.93gm).

The coefficient of variation (C.V) for dry weight per plant was (17.55%).

CHABTRE FIVE

Conclusion

As shown in the tables and figures there
Was no consistency in the Microdose levels for the different parameters. There were significant in fresh and dry weight with the highest fresh weight in 4gm gave (11.067 gm) microdose. While microdose 3gm had lowest (8.6 gm).
The microdose of 4gm had highest dry weight (6.38) while microdose 2gm had the lowest (4.93 gm).

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Randomized Complete Block AOV Table for P

Source	DF	SS	MS	F	P
REP	2	40.133	20.0667		
TREAT	4	43.600	10.9000	1.85	0.2133
Error	8	47.200	5.9000		
Total	14	130.933			

Grand Mean 49.733 CV 4.88

Tukey's 1 Degree of Freedom Test for Nonadditivity

Source	DF	SS	MS	F	P
Nonadditivity	1	6.6951	6.69514	1.16	0.3177
Remainder	7	40.5049	5.78641		

Relative Efficiency, RCB 1.30

Means of P for TREAT

TREAT	Mean
1	48.000
2	49.333
3	51.000
4	48.000
5	52.333

Observations per Mean 3

Standard Error of a Mean 1.4024
Std Error (Diff of 2 Means) 1.9833

Randomized Complete Block AOV Table for N

Source	DF	SS	MS	F	P
REP	2	1.7333	0.86667		
TREAT	4	18.6667	4.66667	12.73	0.0015
Error	8	2.9333	0.36667		
Total	14	23.3333			

Grand Mean 9.6667 CV 6.26

Tukey's 1 Degree of Freedom Test for Nonadditivity

Source	DF	SS	MS	F	P
Nonadditivity	1	0.50572	0.50572	1.46	0.2664
Remainder	7	2.42761	0.34680		

Relative Efficiency, RCB 1.16

Means of N for TREAT

TREAT	Mean
1	8.000
2	9.333
3	9.333
4	10.333
5	11.333

Observations per Mean 3
Standard Error of a Mean 0.3496
Std Error (Diff of 2 Means) 0.4944

Randomized Complete Block AOV Table for S

Source	DF	SS	MS	F	P
REP	2	2.03333	1.01667		
TREAT	4	1.00267	0.25067	1.90	0.2033
Error	8	1.05333	0.13167		
Total	14	4.08933			

Grand Mean 3.5933 CV 10.10

Tukey's 1 Degree of Freedom Test for Nonadditivity

Source	DF	SS	MS	F	P
Nonadditivity	1	0.22504	0.22504	1.90	0.2103
Remainder	7	0.82830	0.11833		

Relative Efficiency, RCB 1.90

Means of S for TREAT

TREAT	Mean
1	3.5333
2	3.3333
3	3.7667
4	4.0000
5	3.3333

Observations per Mean 3
Standard Error of a Mean 0.2095

Std Error (Diff of 2 Means) 0.2963

Randomized Complete Block AOV Table for F

Source	DF	SS	MS	F	P
REP	2	36.9213	18.4607		
TREAT	4	10.7307	2.6827	1.71	0.2394
Error	8	12.5253	1.5657		
Total	14	60.1773			

Grand Mean 9.7133   CV 12.88

Tukey's 1 Degree of Freedom Test for Nonadditivity

Source	DF	SS	MS	F	P
Nonadditivity	1	0.9741	0.97415	0.59	0.4674
Remainder	7	11.5512	1.65017		

Relative Efficiency, RCB 2.46

Means of F for TREAT

TREAT	Mean
1	9.967
2	9.867
3	8.600
4	9.067
5	11.067

Observations per Mean 3
Standard Error of a Mean 0.7224
Std Error (Diff of 2 Means) 1.0217

Randomized Complete Block AOV Table for D

Source	DF	SS	MS	F	P
REP	2	14.6440	7.32200		
TREAT	4	6.0827	1.52067	1.54	0.2787
Error	8	7.8893	0.98617		
Total	14	28.6160			

Grand Mean 5.6600   CV 17.55

Tukey's 1 Degree of Freedom Test for Nonadditivity

Source	DF	SS	MS	F	P
Nonadditivity	1	5.09560	5.09560	12.77	0.0091
Remainder	7	2.79373	0.39910		

Relative Efficiency, RCB 1.85

Means of D for TREAT

TREAT	Mean
1	5.5333
2	5.3333
3	4.9333
4	5.6667
5	6.8333

Observations per Mean	3
Standard Error of a Mean	0.5733
Std Error (Diff of 2 Means)	0.8108

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LSD All-Pairwise Comparisons Test of P for TREAT

TREAT	Mean	Homogeneous Groups
5	52.333	A
3	51.000	A
2	49.333	A
1	48.000	A
4	48.000	A

Alpha 0.05 Standard Error for Comparison 1.9833
Critical T Value 2.306 Critical Value for Comparison 4.5734
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
5	11.333	A
4	10.333	AB
2	9.333	B
3	9.333	B
1	8.000	C

Alpha 0.05 Standard Error for Comparison 0.4944
Critical T Value 2.306 Critical Value for Comparison 1.1401
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
4	4.0000	A
3	3.7667	A
1	3.5333	A
2	3.3333	A
5	3.3333	A

Alpha 0.05 Standard Error for Comparison 0.2963
Critical T Value 2.306 Critical Value for Comparison 0.6832
Error term used: REP*TREAT, 8 DF
There are no significant pairwise differences among the means.

LSD All-Pairwise Comparisons Test of F for TREAT

TREAT	Mean	Homogeneous Groups
5	11.067	A
1	9.967	AB
2	9.867	AB
4	9.067	AB
3	8.600	B

Alpha 0.05 Standard Error for Comparison 1.0217
Critical T Value 2.306 Critical Value for Comparison 2.3559
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 D for TREAT

TREAT	Mean	Homogeneous Groups
5	6.8333	A
4	5.6667	AB
1	5.5333	AB
2	5.3333	AB
3	4.9333	B

Alpha 0.05 Standard Error for Comparison 0.8108
Critical T Value 2.306 Critical Value for Comparison 1.8698
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.