



Sudan University of Science and Technology

College of Agricultural Studies

Department of Agronomy



Graduation Research Project

**Effect of Mono Amonum Phosphate (MAP) on the
Vegetive Growth in Faba bean.**

(Vicia faba L.)

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August 2016

الآية

بسم الله الرحمن الرحيم

يقول سبحانه وتعالى:

وَأَيَّةٌ لَهُمُ الْأَرْضُ الْمَيْتَةُ 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﴾ سُبْحَانَ الَّذِي خَلَقَ الْأَزْوَاجَ كُلَّهَا مِمَّا
تُنْبِتُ الْأَرْضُ وَمِنْ أَنفُسِهِمْ وَمِمَّا لَا يَعْلَمُونَ ﴿٣٦﴾

صدق الله العظيم

سورة يس الآيات (33-36)

DIDCATION

To my dear family , , ,

Father, mother , brothers , and aunts .

To my dear friends and colleges .

ACKNOWLEDGEMEN

My great thanks are first god, who supported me finish this work successfully.

Really, I am greatly in debated to my **Dr. Sami Mohamed Hamid** for this reen , unlimited support , providing valuable thins.

I would like to thanks also the staff of Agronomy Department, college of Agriculture sudan university of science and technology.

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الخلاصة

أجريت التجربة بمزرعة كلية الدراسات الزراعية جامعة السودان للعلوم والتكنولوجيا (شمبات) خلال الموسم 2015-2016 وذلك لمؤفة أثر سماء فوسفات احادي الأمونيم علي نمو محصول الفول المصري.

صمت التجربة العلمية بتصميم القطاعات العشوائية الكاملة وتحتوي علي أربعة معاملات وأربعة مكررات، تم أخذ وزن جاف أول وثاني من نمو النبات لمعرفة الفرق في معدل النمو. أثبتت الدراسة انه توجد فروقات معنوية بين بعض المعاملات.

ABSTRACT

The experiment was carried out at the experimental farm of college of Agricultural – Sudan university of sciences and technology at Shambat, to study the effect of add mono amonum phosphate (MAP) on the vegetive growth in faba bean.

The factorail experiment at randomized complete block design with six reblications was used.

The study showed that there Is some significant differences between some the kreatments.

CHAPTER ONE

INTRODUCTION

Faba bean (*Vicia faba* L.) is a member of the family fabaceae, to which belongs a number of the most important leguminous crops in the world and it is well known as faba beans, filed beans, windsor bean and hours bean, It is originated in the Mediterranean west Asia. Other studies have concluded that faba originated in western Asia, Northern Afric and china. The production in the world is concetration nine majer ago ecological regions. According to the statistical of the food and agricultural organization of the united Nations (200), the total area under faba bean in the world was about 3227 million / hectares, producing total production 3.83 metric tons. It inimportant food legume crops in Sudan, it is concentrated in the north state, north of the latter 16 where environmental conditions are suitable fore its Production better than other parts of the country. In this state, more than 70% of this crops is produced, the Nile state ranks next and produces about 20% small a mounts are produced in khartoum state, central Sudan and Jabal Marra in western Sudan. The dry bans contain about 25.6 % protein, 49 % carbohydrate, 1 % lipid, 6.7 % fiber, 13 % moisture and 3.5 % ash. Faba bean is used as a human food in developing countries as animal food, poultry and pigeons in industrialized countries It can be used as for vegetable green fresh or dried. The soil of the Sudan are deficient in nitrogen, a bout most of the indigenus leguminous crop including faba bean nodulate well the naturally occurring Rhizobium.

Economic Importance cultivated faba bean is used as a human food in developing countries and as animal food. It can use as vegetable, green or dried, fresh or canned. It is common break fast food in the Middle East, Mediterranean region. Chainand Ethiopia (Bond, *et. al* 1985). The most fried contyledon post with some vegetable and spices, Bissara (Cotyledon pastepoured on plant), (Jambunathan, *et al.*, 1994). Salih (1995).

Showed that faba bean is the most important food legume in the sudan. Consumption of faba bean in the creased considerable particularly after the high increasing in meat prices. The wides pread consumption of faba bean may bebecause it is easy to prepare at home , and store, as well as a cceptable tasteflavor. It is popularity is expected to increase (Ali, *et al.*, 1982).

Mono-Ammonium Phosphate (MAP) multi- MAP is a fully water - soluble mono – ammonium phosphate (12-61-0) fertilizer, a highly efficient source of phosphorus and nitrogen for plants.

The objective of this work the objective of this work to study the effect of adds mono ammonum phosphate (MAP) on the vegetive growth in faba bean.

CHAPTER TWO

LITERATURE REVIEW

2-1 Botany:

Vicia faba L. is an annual herb with course and right stem un branched 0.3- 2 m tall, with one or more hollow stem from the base (Bond, *et al*, 1985; heath, *et al.*, 1994). The leaves are consist of 2-6 leaves each up to 8cm long. Flowers are large with dark purple marking, born on short in clusters of 1-4 pods develop from each flower cluster, and growth is indeterminate though determinate mutants are available. About 30% of the plants in a population are cross – fertilized and the main insect pollination is It bears a robust tap root with profusely branched secondary root (Bond, *et al.*, 1985). Based on seed size, two sub species were recognized, The latter was sub divided var. minor with small rounded seeds (1 cm long), var. equine with medium sized seeds (105 cm) and var. major with large broad flat seeds (205 cm long) (kay, 1979; bond, *et al.*, 1985). Cuber (1974) suggested four sub species, namely : minor, major and . Taxonomically the crop belongs section faba of the Genus *Vicia* (Bond, *et al.*, 1985; smart 1990).

2-2 Economic Importance:

Cultivated faba bean is used as a human food in developing countries and as a nimal food. It can use as vegetable, green or dried, fresh or canned It is common breakfast food in the Middle East, Mediterranean region. Chain and Ethiopia (Bond, *et.*, al 1985). The most fried cotyledon post with some

vegetable and spices, Bissara (Cotyledon paste poured on plant), (Jambunathan, *et al.*, 1994). Salih (1995) showed that faba bean is the most important food legume in the Sudan. Consumption of faba bean has increased considerably particularly after the high increasing in meat prices. The widespread consumption of faba bean may be because it is easy to prepare at home, and store, as well as acceptable taste flavor. Its popularity is expected to increase (Ali, *et al.*, 1982).

2-3 Ecology:

Faba bean requires a cool temperature for good development. The optimum temperature ranged from 7°C to 27 (56 – 85 F) (Duke, 1981). Rainfall of 560 – 1000 mm per annum with an even distribution was reported as ideal. Kay (1979) showed that the maturity period ranges 90- 220 days depending upon the cultivars and the prevailing climate condition.

2-4 Fertilization:

Soils of the Sudan are deficient in nitrogen, but indigenous leguminous crops including faba bean nodulated well with the naturally occurring *Rhizobium*, and do not respond to fertilizer nitrogen. Babik, (1997) and Salih (1987) did not find significant response to nitrogen addition in faba bean grown at various locations in the northern parts of Sudan.

2-5 Rhizobium inoculation:

Salih and Ageeb (1987) found no grain yield response to the level and method of phosphorus application in Shambat. In

the contrast, Elkarouri (1979) obtained apposite response to phosphorus when it was placed in holes with the seed. The clay soils of the sudan are known to be rich in potassium and the therefore, faba bean did not respond to the application of potassium fertilizer (Babik, 1975).

Rhizobium leguminosarum is nearly all faba bean growing areas of the world. However the crops are being introduced for the first time inoculation may be needed. In other areas where faba bean is grown in sudan the amount of natural nodulation, which occurs has been related to the since previous cropping with faba or legume (Musa, 1982) Hamdi (1982) reported that inoculation gave a significant positive response in seed yield at three out of ten locations in Egypt Phosphorus is an essential element for plant nutrition.

It has to be added to the soil as a fertilizer because of its deficiency and low solubility.

Phosphorus is found in an insoluble form in soil And hence it is unavailable for plants. However, many microorganisms play a great role in solubilizing the inorganic insoluble phosphates into a soluble form through excretion of various organic acids and also by mineralizing the locked up organic phosphorus through excretion of various enzymes in agricultural soils and making readily available forms for plants.

In Sudan, with the possible exception of nitrogen, no other element has been as critical in crop production as phosphorus (*Adv. Environ. Biol.*, 86-94, 2010 87).

CHAPTER THREE

MATERIAS AND METHODS

3-1 Experimental site:

The experiment was carried out in the season (2015 – 2016) in the experiment Farm of college of Agricultural studies, Sudan University of science and Technology at (Shambat). It is located 32 : 32"E and latitude 15.40"N and 380 meters above the sea level, within the semi- desert region (Adam, 2002). The soil of the site is described by Abdgadir (2010) as lam clay it is characterized by deep cracking, moderately alkaline clays, and low nitrogen content and PH (7.5-8) and high exchangeable Sodium percentage (ESP) , in subsoil. The soil relative humidity ranged between 14-27% during season and 31- 51% during with low relative humidity, The annual rainfall is about 151.8 mm (Oliver, 1965).

3-2 Layout of the experiment and land preparation:

- The experiment was arranged in a randomized complete block design (RCBD) with six replications was used to layout, with the 4 plots.
- Conducted the experiment in plastic bags to see the effect of fertilizer Mono ammonium phosphide (MAP) on the vegetative growth of the crop of faba bean.
- Bags were packed with soil from the agricultural field at a rate of 5/kg /bag agriculture and has a rate of 4 seed in each bag (4 plants per bag) It was that on date 6/12/2015. were irrigation immediately after planting and then rolled

irrigations as needed. And the percentage of germination excellent 85% and has been feeding operation after two weeks from the date of Agriculture.

3-3 Fertilization:

The treatments were as follows:

- 1- Control
- 2- Dose 520 mg/pot.
- 3- Dose 700 mg/pot.
- 4- Dose 350 mg/pot.

Treatment was repeated four times, 2 plants were taken from each bag in a row to take (one dry weight) and the introduction of plants in an electric oven at a temperature of 70 for 48 hour and that on 12/1/2015 This step was repeated on 24/12/2016 to take (two dry weight,) In order to calculate the rate of growth in the first and second dry weight, Other plants were harvested on 15/3/2016.

3-4 Statistical analysis:

The collected data were subjected to standard statistical analysis. Analysis of variance was performed for each character in order to determine variability among treatments undertaken in this study, The data were analyzed by using the (statisix) program.

CHAPTER FOUR

RESULTS

4-1 Mean relative growth rate:

Table (1) showed that there was no significant difference between the control at (520) dose and (350) dose showed no significant between them . However, there is a significant difference in the between (700) dose, (350) dose the control, (520) dose .

Table 1. Relative growth rate:

Doses	Treatment	mean
control	1	1.1 ^a
520	2	1.1 ^a
700	3	0.50 ^b
350	4	0.50 ^b

The figure presented by the same letters there is no significant between them according to Duncan Multiple Test.

Cv :16.38

4-2- Production :

Analysis of variance showed no significant difference treatment in the yield high mean obtained by treatment (700 ml), (Mono A monum Phosphate) , (2.25) table (2) .

Table 2. Production:

Doses	Treatment	Mean
Control	1	2.5 ^a
520	2	1.87 ^a
700	3	2.52 ^a
350	4	1.82 ^a

The figure presented by the same letters there is no significant between them according to Duncan Multiple Test.

CV:34.6

4-3-Number of pod per plant:

Analysis of variance showed no significant difference between in the Number of pods.

High mean obtained by treatment control (MAP). Table (3)

Table 3. Number of pods:

Doses	Treatment	Mean
Control	1	2.75 ^a
520	2	2.50 ^a
700	3	2.50 ^a
350	4	2.25 ^a

The figure presented by the same letters there is no significant between them according to Duncan Multiple Test.

Cv: CV 24.9

4-4 Number of seeds per plant:

Analysis of variance showed no significant difference between in the Number of seed

High mean obtained by treatment 700 ml (MAP), (5.52) Table (4)

Table 4. Number of seeds:

Doses	Treatment	Mean
Control	1	4.50 ^a
520	2	5.0 ^a
700	3	5.50 ^a
350	4	3.0 ^a

The figure presented by the same letters there is no significant between them according to Duncan Multiple Test.

Cv: 38.13

4-5-100% seed weight (g):

Analysis of variance showed no significant difference between treatment for seed weight (g).

The high mean record was by dose (350) (73.7) table (5).

Table 5. 100% seed weight (g):

Doses	Treatment	Mean
Control	1	56.7a
520	2	41.2a
700	3	51.7a
350	4	73.7a

The figure presented by the same letters there is no significant between them according to Duncan Multiple Test.

cv.50.38

CHAPTER FIVE

DISCUSSION

Phosphorous plays a vital role in plant physiology . Because it stimulates early root formation (Govil and Prasad, 1993 ; patel *et. Al.* ; 2007) . It also improves the biomass a accumulation. The significant of phosphorus for legume was reported by El sheikh (1993) who showed that its importance for all step of nodule formation , and symbiotic N₂ - fixation as source of energy in the form of ATP. Dawelbeit *et. Al* (2007) reported the soil of the Central clay plain of the sudan are very poor phosphorus , that available P < 10 ppm . They added that the relatively high CEC and base salutation% , make these soil to respond well to adding phosphorus fertilizers .

However , addition of phosphorus as triple supper phosphorus proved not to improve the growth and yield of several crops. This was attributed to the poor availability of phosphorus in such alkaline calcareous clay soil (*Cumaa , 1999 ; Rathod et . el .al.2002*). In this experiment the mono ammonium phosphate , which is a newly inhoused P – fertilizer , was used instead of the triple super phosphate . However , the results was not that encouraging . This might be result to the soil nature mentioned above .

CHAPTER SIX

SUMMARY AND CONCLUSION

6-1- summary :

The experiment was carried out at the experimental farm of college of Agricultural – Sudan university of sciences and technology at Shambat, to study the effect of add mono amonum phosphate (MAP) on the vegetive growth in faba bean.

The factorail experiment at randomized complete block design with six reblications was used.

The study showed that there Is some significant differences between some the kreatments.

6-2- conclusion :

Treatment did not show a clear effect on increasing growth rates and holds faba bean by intensive research on the field level of the use of fertilizer mono amonum phosphate unilateral on faba bean crop. You may come with positive results .

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APPENDICES

Appendices 1: The semi – desert climate:

Sun – shine duration	3650 hour/year
Solar radiation	22.7MJ/m ² /day
Maximum temperature	42c (May)
Minimum temperature	12c(January)
Temperature range	32c
Rain full	100-250mm/annum
Evaporation	2400mm/annum

Appendix 2 : chemical and physical properties of the field soil :

PH	8.2
ECC ds/m	0.5
SAR	4.5
Soluble cation (meg)	
Ca + Mg	0.9
Na	
K	3.0
Cl meg/L	10.3
Na%	0.04
Pp.p.m	3.1
CaCo ₃ %	2.00
Sand%	15
Silt%	23
Clay%	62