

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Response of Growth and Yield of Potato to Spray Different Concentration of Organic Azot Mixed with Poultry Manure in the Soil Sandy.

Djilani GHEMAM AMARA^{1,2,3}, SENOUSI Mohammad Mourad³, ALIA Zeïd¹, and KHERRAZ Khaled¹

¹Biology Department and VTRS laboratory, UniversiteEchahidHammaLakhdar El-Oued, Chott-Teccept Road, 39000, Algeria.

²Registered PhD at the University of Mentouri.

³Laboratory of Biomolecules and Plant Amelioration, LarbiBenmhidi University of Oum El Bouaghi, BP 358, Constantine Road, 04000, Algeria.

ABSTRACT

This study is for knowing the Impact of organic manure with a difference level of nitrogen at growing and productivity of potato plants with the variety spunta – (Number of stem, plants height, tuber weight and production) also starch, ash and protein content in the tuber of potatoes. We are following the experiment is called Randomized Complete Block Design (RCBD). We are making 05 treatments with 04 replications in sandy soil. The results showed an increasing in the number of stems per plants by adding NPK 2 qu/ h and 25 Ton/h of chicken manure. Also it is observed a little increasing of nitrogen content. The tubers weight and plants height were also influenced by fertilizer treatment. increasing amount of nitrogen in the treatment increased all parameters the crop yield of potato tuber Nitrogen supply in the treatment influenced at increasing of all parameters of potato and decreasing in the starch. No significant for the difference of protein content in tuber and increasing ash content

Keywords: Chicken manure , potatoes , starch , yield, nitrogen organic .

**Corresponding author*

INTRODUCTION

Potato plant (*Solanum tuberosum*) belongs to the solanaceae family . It is one of the most important crops in the world. It also is essential in the our food .It has a High nutritive value, it contains proteins, starch, minerals, vitamins, and other substances. Potato plant is sensitive to drought, soil type, environmental conditions, and agricultural operations. One of the major production factors of potato is the organic fertilizers, because that potato require high quantity from it .fertilizer application has important effects on the quality and yield of potatoes [1]. Potato is highly responsive to N fertilization and N is usually the most limiting essential nutrient for potatoes growth, especially on sandy soils [2]. Nitrogen supply also plays an important role in the balance between vegetative growth and reproductive for potato [3,4]. Many previous studies have shown that fertilizer N applications can increase dry matter content, protein content of potato tubers, total yield and marketable tuber [4,5,6,7].Due to the poor soil organic matter content in EL OUED (South of Algeria). Organic fertilizers are indispensable for potato cultivation. therefore, the important of searching for designed to effect of chicken manure with nitrogen on the growth, productivity and nutritional of potato

MATERIALS AND METHODS

The experiment was carried out in town of Hassi khalifa , EL-OUED , located in southern Algeria. It is characterized by sandy soils, at season of autumn (in 2011). In this research we have planted the plant of potatoes - Variety spunta - which it is from AGRICO company. It is one of the most important varieties cultivated in southern Algeria. grown widely in semi-tropical, such as North Africa, and South America [8]. they have a smooth yellow Skinned tubers of large size and elongated shapes . With very shallow eyes and pale yellow flesh , the yield is high, relatively resistant to heat and drought .It is a variety medium of early maturity [9].

The protifer is used as source of N fertilisation. It is a liquid fertilizer quickly and easily absorbable. it is based on amino acids and oligo peptides animal with a high content of organic nitrogen.

Ingredients of Protifer : 50% organic matter, 8.5% general Nitrogen , 8.0% Organic Nitrogen, 50% of the total amino acids, 15% of the free amino acids , 26% organic carbon and pH 5.5 - 7.5.

The experiment was arranged a Design of Complete Type Randomized (R C B D) .we uses five treatment repeated four times. There were five plants on every block which measuring 1.5 x 3m (with a surface of 4.5 m²), with a gap from 1 m between blocks (figure 1).we used the organic manure (poultry chicken and protifert l m w) and inorganic fertilizer N P K (15 15 15). The treatments were include :

T1; no manure use (control)

T2: N P K 2 qu /h + 25 t /h chicken manure(the common fertilization treatment applied by the potato farmers)

T3: 50 t/ h chicken manure + 1kg/h protifert

T4: 50 t/ h chicken manure + 2kg/h protifert

T5: 50 t/ h chicken manure + 3kg/h protifert

There Was a weighing of tubers crashed between 80-100 g, the plantation depth is 10 cm with a 30 cm spacing between plants and the distance enter line is 50 cm.

The parameters of growth and yield are measured for the plants of potatoes (the leaves area, the plants height, the steams number, the tubers weight, the yield and the standard tubers percentage) for five plants in the all treatments in the very blocks. The measures of the protein container are made by Bradford's method, the starch contents (g, kg 1) is by the method Demin and we make the matters dry measure.

The analysis of variations ANOVA was made to determine the signification between the averages, it was compared by the use of LSD with 0.05 probability level.

Effect of organic manure and nitrogen levels in growth parameters

The results of the Table 1 showed a significant deference on the area of leaves in all treatments compared to the control treatment, larger leaves area was observed in the treatment T3, and smaller areas in the T2. Treatment.

The stems number is increased, no significant deference compared to the control treatment, exceptionally in treatment T2 the stems number is increased significantly.

The plant height were significantly increased compared to the control treatment, no significant deference between all treatments. The plant height is the longest in the treatment T3, and it is the smaller in the treatment T2.

The tubers number were significantly increased compared to the control treatment, no significant deference between all treatments. The tubers number is the most in the treatment T2, and it is the fewest in the treatment T5.

Effect of organic manure and nitrogen levels in Nutritional value of tuber potato

The table 2 takes out again that satisfied protein in the potato is weak, the weakest is observed in the treatment (T1) with a rate of 0.76 mg. But the highest rate is noticed in the treatment T4 (1,24 mg). Significant differences were found for treatments T2, T3, T4 and T5 with a comparison of the control treatment. The weakest starch contents were estimated in the t5 with a rate 11,96 % (table 2). T1, t2 and t3 contained respectively 12.45, 12.37 and 12.68 %. For the highest rate is registered in the treatment t4 with 13,18 % (table 2) however, the obtained results did not differ significantly. The results of contents of nitrogen are registered in the table 2. It is resort those not significant differences between treatments. Whereas the highest rate is in the T5 treatment with 0,37 % (table 2). However the weakest rate is in the T4 treatment. The table 2 resort that the highest percentage of ash is registered in T5 with 6,52 %. Also, and comparison with other one treatments, it is significantly different. On the other hand, there was also a significant difference among the rest of treatments.

Effect of organic manure and nitrogen levels on properties yield

The table 3 summarizes analysis the yield results on fresh potatoes tuber. There was a coherent and statistically significant difference ($p < 0.05$) among the treatments of fertilization let us compare by the control treatment. Concerning the production, she did not show significant differences between all the fertilizer treatments. The yield on the highest tuber is 607.01 q / ha was realized by the demand of 50 t/h of fertilizer (chicken + a 3kg / hour protifert), Followed by the treatment N P K 2 that / hour with 25 t/h the fertilizer of chicken, reaching their production is 602.73 q / ha, in more than 574.04 t / ha by the application the treatment (50 t/h the fertilizer of chicken + a 1kg / hour protifert), follows one yield on 507.24 t / ha in the treatment (50 t/h the fertilizer of chicken + a 2kg / hour protifert).

Table 1: Effect of organic manure and nitrogen levels on leaves area, number stem, plants height and The number tubre

Treatment	Properties the growth			
	leaves area cm2	the number stem/plants	plants height (cm)	The number tubre/plants
T1	7.16	1.25.	14.5	1.6
T2	22.02	2.25	51.9	5.38
T3	23.04	1.975	59.05	5.3
T4	19.03	1.95	57.85	5.16
T5	20.05	1.57	57.35	4.98
LSD	3.99	0.8	9.19	1.12

Table 2: Content of protein, Starch, Nitrogen and ash in tuber potatoes cultivars

Treatment	Properties yield			
	Protein (mg/100mg dw)	Starch(%)	Nitrogen (%)	Ash (%)
T1	0.76	12.45	0.35	5.83
T2	1.23	12.37	0.35	6.03
T3	1.14	12.68	0.34	5.97
T4	1.24	13.18	0.32	5.98
T5	1.2	11.92	0.37	6.52
LSD	0.34	1.59	0.21	0.32

Table 3: Effect of organic manure and nitrogen levels on mean tuber weight, production par plant, production and percent of standard tubers

Treatment	Properties yield			
	Production q/h	percent of standard tubers	Production/plant g/plant	tuber weight (g)
T1	80.94	91.44	121.42	72.73
T2	602.73	97.94	904.10	144.91
T3	574.04	97.3	861.07	144.02
T4	507.24	97.75	760.86	141.81
T5	607.01	99.13	910.52	192.03
LSD	220.47		330.71	142.45

The table 3 shown that the increase the tuber weight, the production and the percentage of standard tuber for both treatments comparison by the control treatment. The results reveal that the proportion of the strictest standard of tubers was registered when the treatment of chicken fertilizer with protifert 3 kg / ha is 99.13 %, while the treatments of N P K for 2 that / ha + for 25 t/ha, the fertilizer of chicken, 50 t/ha, the fertilizer of chicken + protifert 1kg / ha and 50 t/h and the fertilizer of chicken + a 2kg / ha are take the values of percentage following (97.94; 97.75, 97.3, 91.44) % respectively

DISCUSSION

The vegetative growth of potato plant improved with different manure treatment incorporated into the soils could be attributed to organic manures supply increase. which are as a source of many essential macro and micronutrients to plants, lower leaching of N due to possible improved soil texture, structure conditioner being rich in organic matter and increase availability and can increase the uptake of nitrogen, phosphorus and potassium[10]. Also fertilizer Nitrogen plays a significant role in the production of stem and axillary branches[11]. This increase has a positive effect on more foliage and leaf area and higher supply of photosynthates and tuber number . The obtained results were in agreement with those reported by Chweya; Gaber and Sarg; Kipkosgei et al.[12,13,14].

This increase has a positive effect on the solar radiation intercepted, the chlorophyll concentration, the photosynthetic rates, metabolic processes of organic compounds in plant, cell elongation and division [15,16,17].

And consequently increases in the dry matter accumulation, and content of protein, total tuber [18,19]. Thus to increases average of tuber weight , standard tubers and tuber weight. These results are in agreement with those obtained by Tsyganovet al, Ferreira and Goncalves[20,21], with observation of Havlin et al.[22].Was presented that fertilizer is one of the most important inputs of increasing the productivity of crops plants. Results were who noticed a decreasing in content of protein and Starch with increasing N application up to 3kg protifert /ha. These findings found support in the work of Anabausi et al.[23] Belanger et al.[4].

CONCLUSION

- The application of 50 t / ha of chicken fertilizer + protifert 1kg / ha realized increased leaves. The results reveal that the increased the number of stalk in the plant, to improve the growth Represented by height of plants as a result of the increased ground the organic fertilizer.
- The number of tuber by plant and the weight of tuber are factors important for a good yield. These components of yield one were also influenced significant by the fertilizer treatments.
- The application of organic fertilizer and the organic nitrogen increased the yield on tuber, the percent of standard tubers and the Production by a plant and the weight of tuber.
- The nutritional value of the tubers of potatoes is augment, as long as the contents of protein. There is no meaning for the contents of starch, nitrogen and ash in tubers.

REFERENCES

- [1] LeytemAB,WestermannDT. Soil Science2005; 401-412.
- [2] ErrebhiM,RosenCJ,GuptaSC,BirongDE.Agron. J1998;90:15.
- [3] AlvaA J. Veg. Crop Prod.2004;10: 97-130..
- [4] BélangerG,WalshJR, RichardsJE,MilburnPH,ZiadiN. Am. J. Pot. Res. 2002;79: 269-279.
- [5] KaraK. 3th National Potato Congress, 23–27 September 2002, İzmir, Turkey, 2002; 347-363.
- [6] ZebarthBJ ,LeclercY , Moreau G , Botha E . Can. J. Plant Sci2004;84: 855-863.
- [7] ZelalemA , TekalignT ,Nigussie .Afr J Plant Sci. 2009;3: 16-24.
- [8] Douches D, Li W, ZarkaK, Coombs J, PettW,GrafiusE ,El-Nasr T. HortScience2002;37:1103–1107.
- [9] Jeff P,Jeremy W .British Potato Council.2006.
- [10] Rao HM, SubramanianTR. J. Pot. Res1991;7(3): 90 – 197.
- [11] Moorby J, Morris DA. Euro. Potato J1967;10:189-205.
- [12] ChweyaJAActahorticulturæ1984;163: 295-301.
- [13] GabrSM,SargSM Alexandria Journal of Agricultural Research,1998;43:33-41.
- [14] KipkosgeiLK,AkundabweniLSM, Hutchinson M.J rift valley African Crop Science Conference Proceedings, 2003;6: 514-518.
- [15] EwaisMA,MahmoudAA, Khalil AA. Alex. J. Agric. Res2010;55: 75-83.
- [16] El-Shatanofy, ManarME M.Sc. Thesis, Fac. of Agric. Alex. Univ2011.
- [17] FatidehMM,AsilM .J. of Horti. Biology and Environment, 2012;3: 145-165.
- [18] SmithJ.L, Papendick R.I, BezdicekD.F ,Lynch J.M 1993; 65-94.
- [19] DinaMS, ShafeekMR, M.AbdallahMF .Annals of Agric. Sci., Cairo Univ2010;55(1): 97-106.
- [20] TsyganovA ,Vildfluhl ,PersikowaT, Masterov AFolia UniversitatisAgric, StetinesisAgric .2000;84: 511-513.
- [21] Ferreira J C,GoncalvesDA . Agricultural water management, 2007;90:45-55.
- [22] HavlinJD, Beaton JD, Tisdal SL, Nelson . Uper Saddle River. New Jersey.2005;515..
- [23] Anabousi O A N,HattarBI ,Suwwan MA. Dirasat-Agriculture-Science,1997;24(2): 242-259.