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EFFECT OF BIOFERTILIZER AND COMPOST ON NITRATE STATUS, YIELD AND QUALITY OF POTATO TUBER UNDER NEWLY RECLAIMED SANDY SOIL

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ABSTRACT

This investigation was carried out during the two summer seasons of 2015 and 2016 in sandy soil on potato culitvar "Sante" to study the effect of using 100% compost (15 t/fed.) and 50% compost + nitrogen fixing bacteria (*Azotobacter*, and *Pseudomonas* alone or together) on potato yield and quality as compared to the conventional mineral fertilization (120-75-150 kg/fed. NPK + 5 ton compost/fed.(control)). No significant differences in tubers yield/fed. were detected between mineral fertilization (control) and using 100% compost (15 t/fed).However, control treatment significantly produced a high yield per feddan, more than using 50% compost + any biofertilizer treatment.Using compost treatment at 15 t/fed.execeed all biofertilizer treatments in marketable yield in both seasons, but without significant differences as compared with mineral fertilization (control).No significant differences in tuber dray matter and content of starch in tuber were found between using compost treatment at 15 ton/fed. and mineral fertilization treatment (control)in both seasons. Nevertheless, application of 50% compost+ 4 applications of Azotobacter and Pseudomonas had the highest tuber concentrations of starch and nitrogen with significant differences as compared with the mineral fertilization.Using50% compost + 4 applications of Azotobacter or Pseudomonas or both (Azotobacter + Pseudomonas)and application of 100% compost caused producing potato tubers with the lowest concentration of nitrate with significant differences as compared with the mineral fertilization. No significant differences were detected between mineral and organic fertilizers concerning P and K concentrations in tubers.

Keywords: *potato, compost, Azotobacter, Pseudomonas, biofertilizer.*

INTRODUCTION

Organic farming/products are becoming very necessary in today's world to control ecosystem health and to impart related human health benefits, world over there is growing demand for organic produce. Therefore, renewed interest in organic

farming has resulted in a need for research in sustainable farming practices this interest is in response to environmental and health concerns. In addition, there is a perception that organic farming will help alleviate problems associated with food safety, environmental quality and impact, market concentration, and the survival of rural communities. Over fertilization in agriculture has led to surface water and ground water contamination. Nitrogen fertilizer pollution is responsible for eutrophication, hypoxia, and algal blooms in rivers, marshes, ground water, and runoff, and may be a public health risk (Kramer *et al*., 2006). Organic agriculture is an ecological production management system that promotes and enhances biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. These goals are met, where possible, through the use of cultural, biological, and mechanical methods, as opposed to using synthetic materials to fulfill specific functions within the system (USDA National Organic Standards Board (NOSB) definition, 2001).Egypt has an extended growing season along with an abundance of insect, disease and weed species, both beneficial and pest, making it an ideal region for the extensive study of organic farming. One aspect of organic production that is in need of study is fertilizers and their application rates in organic systems. One of the main problems of organic production is that organic fertilizers are often bulky or are necessary in large quantities. Potato (Solarium tuberosum) It is economically important both in Egypt and worldwide, and it is a world staple crop, able to grow in an array of environments. Up to 85% of potato plant biomass is edible as compared to about 50% of cereals. Potato consumption has increased in the developing world, and over the last decade world, potato production has increased at an annual average rate of 4.5 percent (FAO, 2007). Among other crops, potato is one of the most highly demanded products on the market for organic produce.
The present work aimed to study the effect of using 100% compost and 50% compost + nitrogen fixing bacteria on potato growth and yield as compared to the conventional mineral fertilization.

MATERIALS AND METHODS

This investigation was carried out in Sandy soil farm at Alexandria Desert Rod, Egypt, during the two summer seasons of 2015 and 2016. Investigation material used was potato cultivar Sante, Treatments were arranged in Complete Randomize bloke design with four replicates for each treatment.Potato seeds were cut (approximately 35 g pieces), All potato tuber seeds were treated with the biofungicideBiohealth (containg*Trichoderma sp.* + *Bacillussubtilus*) at a rate of 150 ml/ 100 l. water to avoid infection with soil borne diseases.Potato tubers were mechanically planted by using a four-rows-planter. Each plot was 180 m^2 and included 4 rows.

Treatments

1- T_1: Recommended control (Mineral NPK at rate of 120-75 -150 kg + 5 ton compost/fed.)

2- T_2: 15 t/ Compost fed. (100%) + Feldspar
3- T_3: 50% Compost + Feldspar + Rock Phosphate +Azotobacter (Applied 0, 6 weeks after planting).
4- T_4: 50% Compost + Feldspar + Rock Phosphate + Azotobacter (Applied 0, 3, 6 and 9 weeks after planting).
5- T_5: 50% Compost + Feldspar + Rock Phosphate + Pseudomonus (Applied 0, 6 weeks after planting).
6- T_6: 50% Compost + Feldspar + Rock Phosphate + Pseudomonus (Applied 0, 3, 6 and 9 weeks after planting).
7- T_7: 50% compost + Feldspar + Rock Phosphate + Azotobacter (0, 6 weeks) + Pseudomonus (0, 6 weeks)
8- T_8: 50% compost + Feldspar + Rock Phosphate + Azotobacter (0, 6 weeks)+ Pseudomonus (0, 3, 6, 9 weeks)
9- T_9: 50% compost + Feldspar +Rock Phosphate+ Azotobacter (0, 3, 6, 9 weeks) + Pseudomonus (0, 6 weeks)
10- T_{10}: 50% compost + Feldspar + Rock Phosphate + Azotobacter (0, 3, 6, 9 weeks) + Pseudomonus (0, 3, 6, 9 weeks)
11-

Data recorded

The experiment was harvested after 105 day after planting, using digger and the following yield data were recorded:1. Total yield (ton/fed).2. Marketable yield (ton/fed).

At harvest, a sample of 100 gram fresh weight of tubers was taken from each plot to determine the percentage of dry matter, nitrates, starch, N, P and K in tubers.

Data of the present study were statistically analyzed using M Stat and the differences between the means of the treatments were considered significantly, when they were more than least significant differences (LSD) at the confidence level of 5%.Sndecor and Cokran, (1967).

RESULTS AND DISCUSSION

Yield and its components: Total Yield

Using mineral fertilization (control treatment) exceeded all biofertilizer treatments in total yield in both seasons (Table1). Meanwhile, there were no significant differences between using compost treatment at 15 ton/fed. and using mineral fertilization (control treatment). No significant differences between application of *Azotobacter* at T3 and *Azotobacter*application atT4 in both season. Applied of *Pseudomonas* T5 and T6 had no significant differences in first season, in contrary in second season T6 recorded higher value of total yield than T5. All combinations between *Azotobacter* and *Pseudomonas* had no significant differences except treatment no. 10, which exceeded all bio fertilizer treatments. This was true in both seasons.

Table 1.Effect of different fertilization, treatments on tuber total yield(ton/fed).

Treatments		Total yield (ton/fed.)		Combined data
		First season	Second season	
1	Mineral NPK(Control)	12.667	15.11	13.89
2	100% Compost(15 ton/fed.)	11.91	13.00	12.46
3	50% Compost + *Azotobacter* 0, 6	5.983	5.750	5.867
4	50% Compost + *Azotobacter* 0, 3, 6, 9	6.350	5.917	6.133
5	50% Compost + *Pseudomonas* 0, 6	8.600	9.517	9.058
6	50% Compost + *Pseudomonas* 0,3, 6, 9	6.533	6.550	6.542
7	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 6.	8.050	8.383	8.217
8	50% Compost + *Azotobacter*0, 6 + *Pseudomonas* 0, 3, 6, 9.	6.917	7.667	7.292
9	50% Compost + *Azotobacter*0, 3, 6, 9 + *Pseudomonas* 0, 6.	8.183	7.667	7.925
10	50% Compost + *Azotobacter*0, 3, 6, 9 + *Pseudomonas* 0, 3, 6, 9.	10.08	10.03	10.058
Mean		8.528	8.959	
LSD $_{0.05}$ for: Season (S) 1.084 Treatments (T) 3.428 S X T 2.424				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks after planting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P_2O_5 and 195 K_2O kg/fed).

Marketable yield

Using compost treatment at 15 ton/fed. exceeded all biofertilizer treatments in marketable yield in both seasons, without no significant differences compared with mineral fertilization (control treatment). Treatment no.4 had the lowest marketable yield value in both seasons. Applied of *Pseudomonas*T5 and T6 had no significant differences in both season. Different combinations between *Azotobacter* and *Pseudomonas* (treatments no. 7, 8, 9 an10) showed no significant differences among them. Treatment no. 7 recorded the highest value of marketable yield in first season, while treatment no. 10 recorded the highest value of marketable yield in the second season. All biofertilizer treatments had no significant differences except treatments no. 7 and 10 at the first season. (Table2).

Tuber quality: Starch concentration

Data in Table 3 revealed that there were no significant differences between using compost at 15 ton/fed. and mineral fertilization in starch concentration in potato tuber. However, compost application showed higher concentration than the mineral application in both seasons. Treatment no.10 surpassed mineral fertilization treatment and had the highest value of tuber starch concentration. The lowest value of tuber starch content was recorded with T9.

Nitrate concentration

Application of compost treatment as well as T4, combination T10,T6 and T8 had the lowest value of NO_3 concentration in tuber. Compost application had significantly lower nitrate concentration in tuber than mineral fertilization. There were no significant differences between using mineral fertilization and T3, T5 and T7 in NO_3 concentration in tuber (Table 4).

Dry matter concentration

No significant differences in tuber dray matter were found between using compost treatment at 15 ton/fed. and mineral fertilization treatment (control). Using T3 had the lowest value with significant differences than all the other biofertilizer treatments except T6, which had no significant differences than T3(Table5). Using both of mineral fertilization and compost treatment had no significant differences with all biofertilizer treatments except T3 and T6 which had the lowest value with significant differences.

Table 2.Effect of different fertilization, treatments on marketable yield(ton/fed).

Treatments		Marketable yield (ton/fed)		Combined data
		First season	Second season	
1	Mineral NPK(Control)	8.45	11.196	12.33
2	100% Compost(15 ton/fed.)	11.231	10.19	13.83
3	50% Compost + *Azotobacter* 0, 6	4.333	4.048	5.167
4	50% Compost + *Azotobacter* 0, 3, 6, 9	2.667	4.508	4.333
5	50% Compost + *Pseudomonas* 0, 6	5.667	6.667	6.167
6	50% Compost + *Pseudomonas* 0, 3, 6, 9	4.333	5.338	5.667
7	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 6.	8.269	6.667	8.000
8	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 3, 6, 9.	5.333	6.632	6.667
9	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 6.	3.667	6.260	6.000
10	50% Compost + *Azotobacter*0, 3, 6, 9 + *Pseudomonas* 0, 3, 6, 9.	8.000	9.000	8 .000
Mean		6.195	7.050	
$LSD_{0.05}$ for:Season 1.084 Treatments (T) 3.428 S X T 4.424				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks afterplanting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P2O5 and 195 K2O kg/fed).

Table 3. Effect of different fertilization, treatments on Starch concentration in potato tuber.

Treatments		Starch %		Combined data
		First season	Second season	
1	Mineral NPK (Control)	75.50	72.54	74.02
2	100% Compost (15 ton/fed.)	78.99	75.61	77.30
3	50% Compost + *Azotobacter* 0, 6	74.77	72.97	73.87
4	50% Compost + *Azotobacter* 0, 3, 6, 9	73.88	79.96	76.92
5	50% Compost + *Pseudomonas* 0, 6	75.14	74.93	75.04
6	50% Compost + *Pseudomonas* 0,3, 6, 9	74.72	79.45	67.94
7	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 6.	74.27	73.42	73.84
8	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 3, 6, 9.	78.13	76.01	77.07
9	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 6.	72.40	72.93	72.67
10	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 3, 6, 9.	75.96	79.21	77.58
Mean		72.54	75.71	
LSD $_{0.05}$ for: Season (S) 1.575 Treatments (T) 4.981 S X T 3.522				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks afterplanting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P2O5 and 195 K2O kg/fed).

Table 4. Effect of different fertilization, treatments on Nitrate concentration.

Treatments		Nitrate conc.		Combined data
		First season	Second season	
1	Mineral NPK(Control)	0.212	0.290	0.251
2	100% Compost	0.112	0.099	0.105
3	50% Compost + Azotobacter 0, 6	0.282	0.137	0.210
4	50% Compost + Azotobacter 0, 3, 6, 9	0.109	0.087	0.098
5	50% Compost + Pseudomonas 0, 6	0.220	0.232	0.226
6	50% Compost + Pseudomonas 0,3, 6, 9	0.117	0.125	0.121
7	50% Compost + Azotobacter 0, 6 + Pseudomonas 0, 6.	0.237	0.177	0.207
8	50% Compost + Azotobacter 0, 6 + Pseudomonas 0, 3, 6, 9.	0.111	0.124	0.118
9	50% Compost + Azotobacter 0, 3, 6, 9 + Pseudomonas 0, 6.	0.190	0.132	0.161
10	50% Compost + Azotobacter 0, 3, 6, 9 + Pseudomonas 0, 3, 6, 9.	0.084	0.084	0.084
Mean		0.167	0.149	
LSD $_{0.05}$ for: Season 0.08966 Treatments (T) 0.06340 S X T 0.06340				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks after planting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P2O5 and 195 K2O kg/fed).

Table 5. Effect of different fertilization, treatments on dry matter concentration in potato tuber.

Treatments		Dry matter %		Combined data
		First season	Second season	
1	Mineral NPK(Control)	19.76	22.44	0.2512
2	100% Compost(15 ton/fed.)	21.78	22.18	0.1059
3	50% Compost + *Azotobacter* 0, 6	17.26	18.40	0.2100
4	50% Compost + *Azotobacter* 0, 3, 6, 9	19.34	21.90	0.09825
5	50% Compost + *Pseudomonas* 0, 6	22.16	22.08	0.2262
6	50% Compost + *Pseudomonas* 0,3, 6, 9	17.76	19.02	0.1213
7	50% Compost + *Azotobacter* 0, 6 +*Pseudomonas* 0, 6.	21.10	22.90	0.2075
8	50% Compost + *Azotobacter* 0, 6 + Pseudomonas 0, 3, 6, 9.	21.18	20.26	0.1180
9	50% Compost + *Azotobacter*0, 3, 6, 9 + Pseudomonas 0, 6.	21.96	23.30	0.1612
10	50% Compost + *Azotobacter*0, 3, 6, 9 +*Pseudomonas* 0, 3, 6, 9.	22.96	21.72	0.0843
Mean		20.52	21.42	
LSD $_{0.05}$ for: Season (S) 0.973 Treatments (T) 3.076 S X T 2.176				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks afterplanting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P2O5 and 195 K2O kg/fed) N-P-K concentration in tuber

Nitrogen concentration in tuber

Data in table 6 indicated that there were no significant differences between using compost at 15 ton/fed. and mineral fertilization in nitrogen concentration in tuber. This was true in both seasons. T8, T9 and T10 had significantly higher nitrogen concentration in tuber than mineral fertilization treatment and compost.

Phosphorus concentration in tuber

Data presented in Table 7 indicated that there were no significant differences between using compost at 15 ton/fed. and mineral fertilization regarding phosphorus concentration in potato tubers in both seasons. Tubers obtained from treatment No. 4 had lower of phosphorus concentration than those got from compost treatment. The same Table indicates no significant differences between mineral fertilization treatment and all biofertlization treatments regarding phosphorus concentration in potato tubers. There were no significant differences between both seasons.

Potassium concentration in tuber

Data in Table 8 showed that there were no significant differences between using compost at 15 ton/fed. and mineral fertilization as well as between these two treatments and all biofertilzation treatments in potassium concentration in tuber. There were no significant differences between both seasons.

Table 6. Effect of different fertilization treatments on Nitrogen concentration in tuber.

Treatments		N % in tuber		Combined data
		First season	Second season	
1	Mineral NPK(Control)	1.640	2.661	2.151
2	100% Compost (15 ton/fed.)	2.176	2.576	2.376
3	50% Compost + *Azotobacter* 0, 6	1.527	2.721	2.124
4	50% Compost + *Azotobacter* 0, 3, 6, 9	1.960	2.796	2.378
5	50% Compost + *Pseudomonas* 0, 6	1.654	2.642	2.148
6	50% Compost + *Pseudomonas* 0, 3, 6, 9	1.622	2.444	2.033
7	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 6.	1.699	3.285	2.492
8	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 3, 6, 9.	3.466	5.617	4.542
9	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 6.	3.344	5.518	4.431
10	50% Compost + *Azotobacter*0, 3, 6, 9 + *Pseudomonas* 0, 3, 6, 9.	3.862	5.400	4.631
Mean		2.295	3.566	
LSD $_{0.05}$ for:Season (S) 0.2381 Treatments (T) 0.7528 S X T 0.5323				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks after planting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P_2O_5 and 195 K_2O kg/fed).

Table 7. Effect of different fertilization treatments on Phosphorus concentration in tuber.

Treatments		P % in tuber		Combined data
		First season	Second season	
1	Mineral NPK(Control)	0.939	1.072	1.005
2	100% Compost (15 ton/fed.)	1.140	1.264	1.202
3	50% Compost + *Azotobacter* 0, 6	1.009	1.416	1.213
4	50% Compost + *Azotobacter* 0, 3, 6, 9	0.859	0.809	0.834
5	50% Compost + *Pseudomonas* 0, 6	1.014	0.905	0.959
6	50% Compost + *Pseudomonas* 0, 3, 6, 9	1.011	1.283	1.147
7	50% Compost + *Azotobacter*0, 6 + *Pseudomonas* 0, 6.	0.982	0.900	0.941
8	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 3, 6, 9.	1.326	0.989	1.158
9	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 6.	1.316	1.015	1.166
10	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 3, 6, 9.	1.016	1.113	1.064
Mean		1.061	1.077	
LSD $_{0.05}$ for: Season (S) 0.1292 Treatments (T) 0.4084 S X T 0.2888				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks after planting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P2O5 and 195 K2O kg/fed).

Table 8. Effect of different fertilization treatments on Potassium concentration in tuber.

Treatments		K % in tuber		Combined data
		First season	Second season	
1	Mineral NPK(Control)	1.608	1.590	1.599
2	100% Compost (15 ton/fed.)	1.396	2.349	1.873
3	50% Compost + *Azotobacter* 0, 6	1.479	2.377	1.928
4	50% Compost + *Azotobacter* 0, 3, 6, 9	1.682	1.537	1.609
5	50% Compost + *Pseudomonas* 0, 6	1.847	1.973	1.910
6	50% Compost + *Pseudomonas* 0, 3, 6, 9	1.848	1.716	1.782
7	50% Compost + *Azotobacter*0, 6 + *Pseudomonas* 0, 6.	2.343	1.421	1.882
8	50% Compost + *Azotobacter* 0, 6 + *Pseudomonas* 0, 3, 6, 9.	2.454	1.387	1.921
9	50% Compost + *Azotobacter*0, 3, 6, 9 + *Pseudomonas* 0, 6.	1.849	1.355	1.602
10	50% Compost + *Azotobacter* 0, 3, 6, 9 + *Pseudomonas* 0, 3, 6, 9.	1.735	1.307	1.521
Mean		1.824	1.701	
LSD $_{0.05}$ for: Season(S) 0.16 Treatments (T) 0.53 S X T 0.37				

0, 3, 6, and 9 =Azotobacter + Pseudomonas were applied after 0, 3, 6 and 9 weeks after planting. Rock phosphate and feldspar were added to the treatments no. 2 to no.10 to have same levels of P and K added to the control treatment (130 kg/fed P2O5 and 195 K2O kg/fed).

The present study revealed that mineral fertilizer exceeded the compost at 15 ton/fed regarding total tuber and marketable yield. However, the differences between the two treatments were significant only regarding total tuber yield. These results reflected the effect of these treatments on plant productivity. Although several investigations indicated that the yields between conventional and organic are comparable (Delate *et al*., 2003; Lang, 2005;Powon*et al*., 2005; Abou-Zeid and Bakry 2011 andMandic*et al*., 2011), the present results revealed the superiority of conventional fertilization over the organic ones. Since the soil, where the present experiment was virgin, it is logic to get lower yield from the organic fertilization. These results are in line with others proved that organic production is generally lower than the conventional one in the first years of organic production. An increase in potato tuber yield due to using conventional fertilization was also recorded by various previous researchers. Also, the effect of organic fertilizer on yield depended also on potato cultivar. Regarding effect of different fertilization treatments on the concentrations of N, P and K in potato tubers, the present study revealed that there were no significant differences between using compost at 15 ton/fed. and mineral fertilization regarding the concentrations of these three elements in potato tubers in both seasons.Similar results were recorded by some researchers under similar conditions. In the same connection, Mourão *et al*., (2008) found that The differences between the composted organic pig manure at rates of 0, 15, 30 and 45 ton ha^{-1} and conventional mineral N fertilizer (120 kg N ha^{-1}) regarding the concentrations of N, K, Ca and Mgtubers were not significant.The present study clearly indicated that using a combination of nitrogen fixing bacteria (as in the T 8, 9 and 10) led to a significant increase in nitrogen concentration in potato tubers. Also, it was clear that potassium and phosphorus release micro-organisms that used in the present study were similar in their effect on P and K concentrations in tubers to the mineral fertilization. The most previous research revealed increase in the concentrations of N, P and K in potato tubers due to biofertilization, as compared to mineral fertilization.Conventional fertilization significantly contained higher nitrate than all other treatments, except T3, T5 and T7 which had similar effect to the conventional fertilization. The previous studies also revealed the effectively of biofertilizers in increasing potato quality by reducing nitrate content. El-Banna and Tolba, 2000, usingNitrobien (a biofertilzer contains *Azospirillum* sp., *Azotobacter* sp. and phosphate dissolving bacteria, namely, *Bacillus* sp.) in plots received 75% of recommended N and P, Abdel-Salam and Shams 2012, adding a Biofertilizer consisting of a combined mixture of N-free fixing bacteria (*Azotobacter*and *Azospirillium*) + P-dissolving bacteria (*Bacillus megaterium*) + silicate dissolving bacteria (SDB) (*Bacillus circulans)* to feldspar . Respecting effect of different treatments on dry matter and starch percentages in tubers, it was clear that compost fertilization caused production of higher percentages of starch and dry matter than conventional one, but without significant differences between them. The previous studies revealed either increase in starch percentage in potato tuber due to using organic fertilizers (Merzlaya*et al*., 2008; Baniuniene and Zekaite, 2008; Järvan and Edesi, 2009 and Abou -Zeid and Bakry, 2011). Concerning effect of biofertlization, T10 significantly exceeded mineral fertilization in starch percentage in tubers, whereas T3 and 6 had lower dry matter % than the mineral fertilization. No significant differences were detected between mineral and biofertlization regarding these two traits. Meanwhile compost at 15 ton/fed resulted in significant increase in starch percentage than T9 and significant increase in the percentage of tuber dry matter than the T3, and T6. Abdel-Salam and Shams (2012) found under clay soil conditions, that adding a biofertilizer consisting of a combined mixture of N-free fixing bacteria (*Azotobacter*and *Azospirillium*) + P-dissolving bacteria (*Bacillus megaterium*) + silicate dissolving bacteria (SDB) (*Bacillus circulans)* to feldspar had no effect on starch concentration in tubers as compared to using feldspar alone without inoculation.

CONCLUSION

The present study proved that we can produce organic potato in sandy soil by using100% compost without any significant differences in tubers yield per fed. as comparing to the conventional fertilization. Using compost treatment at 15 ton/fed. exceeded all biofertilizer treatments in marketable yield in both seasons, without significant differences compared with mineral fertilization. There were no significant differences between using compost at 15 ton/fed. and mineral fertilization in nitrogen, phosphorus, Potassium, starch and dray matter concentration in tuber. Compost application had significantly lower nitrate concentration in tuber than mineral fertilization

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