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EFFECT OF SOME LEVELS OF PHOSPHORUS FERTILIZATION AND PHOSPHOREIN BIOFERTILIZER ON GROWTH, YIELD AND CHEMICAL COMPOSITION OF SOME SWEET POTATO CULTIVARS

El-Shimi, Amal A.
Vegetable Crop Depts, Hort. Inst. Agric. Res. Center, Giza, Egypt

ABSTRACT

Two field experiments were conducted during 1997 and 1998 seasons at the Hort. Res Farm of Seds, Beniswef Govrenorate. This study was carried out to investigate the response of some levels of phosphorus fertilization and phosphorein biofertilizer on growth, yield and chemical composition of sweet potato. The investigation included 8 treatments which were the combinations between 2 cultivars (Mabrouka and South Africa) and 4 levels of P- fertilization either they applied each alone or together with phosphorein biofertilizer.

The results showed the excellence of Mabrouka cv. in vine length and dry matter contents of leaves, results also show that application of (75% of the recommended P + phosphorein) gave the highest values in this regard. Application of phosphorein combining with the levels used of phosphorus fertilization each alone increased total yield. Application of (75% of the recommended P + phosphorein) gave the highest marketable yield comparing with the control (100% of the recommended P). Data also showed that fertilizing Mabrouka cv. with (25% of the recommended P + phosphorein) or fertilizing South Africa cv. with (100% of the recommended P) gave the highest total dry matter content in tuber roots. South Africa excelled Mabrouka one in nitrogen and protein in leaves. Fertilization with (25% of the recommended P + phosphorein) gave the highest nitrogen and protein contents of leaves. However, application of (75% of the recommended P + phosphorein) gave the highest contents of both P and K in leaves. Fertilizing Mabrouka with (50% of the recommended P + phosphorein) gave the highest nitrogen and protein contents of tuber roots, however, application of (100% of the recommended P) gave the highest P, K and total sugars contents of tuber roots of South Africa cultivar.

INTRODUCTION

Sweet potato (*Ipomoea batatas* L.) is considered one of the most important vegetables for both local consumption and exportation. It is used for human food, animal feed, starch production and in some industrial purposes. It is considered a good source of energy supplying sugars and other carbohydrates, calcium, iron and other minerals as well as vitamins particularly A and C. The main objective of this work was to clarify the effects of partial substitution of inorganic phosphorus (P) fertilizer by the biofertilizer phosphorein on growth, yield and chemical contents of tuberous roots of the two sweet potato cultivars Mabrouka and South Africa.

In spite of the addition of phosphorus to the soil the amount of available for plant from such nutrient still very low, since it is converted into unavailable form by its reaction with the soil Constituents Abdel-Nasser and Makawi (1979) and EL-Dahtory *et al* (1989). This get the farmers to add high amount of P-fertilizer to meet plant requirement from such important nutrient

which do lead to increase the production costs from one hand and causing pollution of the environment from the other hand. Therefor, it is essential to use biofertilizers to improve the soil fertility and save a considerable amount of plant P-requirement as well as lower the environment pollution.

Phosphate solublizing bacteria (PSB) plays a fundamental role in correcting solubility problem in many soils by transforming this insoluble part again soluble (EL-Gibaly *et al*, 1977 and Ali *et al*, 1987). Under the Egyptian soil conditions, EL-Awag *et al*, (1993); Abo EL-Nour *et al* (1996) and EL-Cheekh (1997) mentioned that using phosphorein with or instead of mineral-P apparently increased the available P- concentration in the soil and plants.

EL-Gamal (1996) on potato found that applying 0,15.5,31 or 46,5 Kg P_2O_5/Fed combined with soil inoculation with phosphorein significantly increased foliage dry weight and phosphorus uptake. On other crops, it was found that pea seed inoculation with (PSB) increased plant growth (Srivanstava and Ahlawal, 1995), it was found also soil inoculation with biofertilizer (phosphorein) significantly increased plant height, length and width of 5th leaf than those of plants grown on non-inoculation soil (Abdel - Fattah, 1998) on globe artichoke. Total yield was also increased by seed or soil inoculation with phosphate solublizing bacteria. (Frommel *et al* 1993; Abdel-Ati *et al* 1996; EL-Gamal, 1996; Kamla and Singh, 1999 on potato and Srivastava and Ahlawat, 1995 on pea; Yadav and Shrivastava, 1997 and Jain *et al* 1999 on chick pea).

Soil inoculation with phosphorein caused significant increases in soil P- availability and N and P contents and their uptake by potato plants (Abdel-Ati *et al*, 1996) on potato and Abdel-Fattah, 1998 on globe artichoke.

MATERIALS AND METHODS

Two field experiments were adapted at the experimental farm of the Horticulture Research station of Seds, Beniswef Province in summer season of 1997 and 1998 using sweet potato cultivar Mabrouka and South Africa. Cuttings were transplanted on May 14 th and 10 th in 1997 and 1998, respectively. Chemical was determined as shown in Table (1).

Table (1) : Chemical analysis of the experimental soil.

Characteristics	Seasons	
	1997	1998
Available nitrogen (ppm)	16.5	12.1
Available phosphorus (ppm)	10	11
Available potassium (ppm)	350	365
Organic matter %	1.7	2.1
PH	7.7	7.7
EC 25 ^{o}C (mmhos/cm)	0.6	0.7

The experiment included 8 treatments which were the combinations between 2 cultivars (Mabrouka and South Africa) and 4 levels of phosphorus either applied alone or together with phosphorien bio-fertilizer as follow :

1- 100% P- mineral fertilizer : as 46.5 Kg P_2O_5/Fed. (100% P) as control.
2- 75% of the recommended P + phosphorien: as (34.88 Kg P_2O_5 + 10 Kg phosphorien)/Feddan. (75% P + phosphorien).
3- 50% of the recommended P + phosphorien : as 23.28 Kg P_2O_5 + 10 Kg phosphorien)/Feddan. (50% P + phosphorien).
4- 25% of the recommended P + phosphorien : as 11.63 Kg P_2O_5 + 10 Kg Phosphorien)/Feddan. (25% P + phosphorien).

Phosphorus fertilizer was applied in the form of calcium superphosphate (15.5% P_2O_5). However Phosphorien is used as a biofertilizer. It contains live cells of efficient bacteria strain (Bacillus megaterium) as phosphate solubilizing bacteria (PSB). It was supplied by tne General Organization for Agriculture equalization fund (G.O.A.E.F), Minstry of Agriculture, Egypt. Phosphorien bio-fertilizer was applied as soil inoculation at 10 Kg/Feddan mixed with wet soft soil (1:10 ratio) into the root absorption zone of the plant. Both P- fertilizer and phosphorien were applied in two equal portions, 4 and 8 weeks after planting. Treatments were distributed in 4 replicates in a split plot design which cultivars treatments were located in the main plots whereas inorganic phosphorus alone or in combination with phosphorien treatments occupied the sub ones.

The area of the experimental plot was 8.4 m^2. It included 3 rows each of 3.5 m long and 0.8 m width, stem cuttings of 25 cm in length were planted 50 cm in between. All the agricultural practices have been done as commonly followed in sweet potato fields in the district.

Data recorded :

a- Vegetative growth characteristics :

Random samples of 5 plants were taken from each plot, 10 days before harvesting to determine foliage fresh weight, vine length, area of the 5th leaf from the top of the main stem and dry weight % of leaves.

b- Yield and its components :

At harvest time, 6 months after planting, total yield (Kg/plot) and marketable yield % were determined.

c- Tuber root characteristics :

Average weight of individual tuber root (g) was calculated according to the following equation:

$$\frac{\text{Total weight of tuber roots/plot}}{\text{Total number of tuber roots/plot}}$$

Ten tuber roots from each treatment were taken at harvesting time to determine snape index as length (cm)/diameter (cm) at tuber root as well as their dry weight %.

d- Chemical composition :

(1) Chemical constituents of leaves :

Total nitrogen, protein, phosphorus and potassium % were determined in random leaf samples taken from each plot, 10 days before harvesting.

(2) Chemical constituents of tuber roots :

Five uniform tuber roots from each treatment were taken during the 2nd season then cleaned, dried and ground to determine N, protein, P,K and total sugars contents as follows :

- Nitrogen was determined according to Koch and Mc. Meckin (1924).
- Protein % was determined according to Pregl (1945).
- Phosphorus % was determined according to Troug and Meyer (1939).
- Potassium mg/100 g dry weight was determined according to Brown and Lilleiand (1946).
- Total sugars % was determined according to Smoggy (1952) and Nelson (1974).

Obtained results were statistically analysed according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Vegetative growth characteristics :

Data of Table (2) show clearly that no signification differences were detected between Mabrouka cultivar and South Africa cv. concerning foliage weight/plant, however Mabrouka cv. excelled South Africa cv. in vine length and leaf dry weight % in both growing seasons. Such promotive influence was also noticed regarding leaf area but in 1998 growing season only.

Concerning the effect of fertilizing treatments data of the same table also show that application of (75% P + phosphorien) gave the highest values concerning weight of foliage/plant and in length in both growing seasons. However, treating plants with (25% P + phosphorien) gave the lowest values in this regard. Other used treatments of fertilization showed intermediate results.

Application of (75% P + phosphorien) or (50% P + phosphorien) gave the highest parameters concerning leaf area and leaf dry weight %, whereas, application of (100% P) gave the lowest value in this regard for the 1st parameter however, Supplying plants with (25% P + phosphorien) gave the lowest value concerning the 2nd parameter. Other treatments of fertilization showed intermediate results in this regard.

Concerning the interaction effect, data presented in Table (2) show clearly that, no significant differences were found between the combinations between cultivars and fertilizing levels used concerning foliage weight/plant. Application of (75% P + phosphorien) to South Africa cv. gave the highest vine length. Fertilizing Mabrouka cultivar with (50% P + phosphorien) gave the highest values concerning leaf dry weight %. The enhancement of growth parameters due to soil inoculation with phosphorien may be due the influence of (PSB) in converting the insoluble phosphorus in the soil into soluble form

available to be absorped by the growing plants (Ibrahim and Abdel-Aziz, 1997). Obtained results are inagreement with those of Srivastava and Ahlawat (1995) on Pea, Abdel-Ati *et al* (1996) and El-Gamal (1996) on potato,, Abdel-Fattah (1998) on globe Artichoke and EL-Awag *et al* 1993 on Soybean.

Table (2) : **Effect of some levels of phosphorus fertilization and phosphorein biofertilizer on some vegetative growth characteristics in Mabrouka and South Africa cultivars during 1997 and 1998 growing seasons.**

Treatments		Vegetative growth characteristics							
		Foliag FWT (Kg)		Vin length (m)		Leaf area (m^2)		Leaf DWT %	
Cultivars	fertilization	1997	1998	1997	1998	1997	1998	1997	1998
Mabrouka	100% P	1.487	1.100	3.025	3.002	20.80	17.30	22.20	21.90
	75% P + phosphorein	1.800	1.525	3.488	3.433	24.30	20.15	24.10	23.60
	50% P + phosphorein	1.225	1.175	3.235	3.272	26.60	22.60	25.35	24.87
	25% P + phosphorein	1.125	1.050	2.536	2.520	22.30	22.90	19.00	18.99
South Africa	100% P	1.575	1.150	2.715	2.688	20.90	17.60	22.27	22.63
	75% P + phosphorein	1.670	1.537	3.573	3.560	25.50	21.30	22.77	22.15
	50% P + phosphorein	1.333	1.050	2.833	2.823	26.60	18.60	24.33	20.87
	25% P + phosphorein	1.188	0.975	2.430	2.410	22.70	16.90	16.67	15.98
L.S.D 5%		N.S.	N.S.	0.208	N.S.	N.S.	0.77	0.54	0.96
Cultivars :									
Mabrouka		1.409	1.213	3.071	3.057	23.50	20.74	22.66	22.34
South Africa		1.441	1.178	2.888	2.870	23.90	18.60	21.51	20.41
L.S.D 5%		N.S.	N.S.	0.104	0.183	N.S.	0.39	0.27	0.48
Fertilization :									
100% P		1.531	1.125	2.870	2.845	20.85	17.45	22.23	22.26
75% P + phosphorein		1.735	1.531	3.530	3.496	24.90	20.73	23.43	22.88
50% P + phosphorein		1.279	1.113	3.034	3.048	26.60	20.60	24.84	22.87
25% P + phosphorein		1.256	1.012	2.483	2.465	22.50	19.9	17.83	17.49
L.S.D 5%		0.132	0.104	0.147	0.259	1.98	0.55	0.38	0.68

Total and Marketable yields :

Data of Table (3) show clearly that South Africa sweet potato cultivar gave higher yield than Mabrouka one during the two growing seasons. Difference between the two cvs was only significant in the second growing season. South Africa cv. excelled Mabrouka one by about 7.9 % and 8.4 % in 1997 and 1998 seasons respectively in this regard.

Concerning the influence of fertilizers levels used, data of the same table indicated that soil inoculation with phosphorien interacting with 25 , 50 or 75 % P- fertilizer produced higher or similar total yield comparing with the

control (100% P- fertilizer) in both growing seasons. Application of (25% P-fertilizer + phosphorien) caused the highest yield comparing with most treatments. Increments seemed to be significant in the 2nd season.

Concerning the interaction effect between cvs and fertilizer treatments, data of Table (3) show that in 1997 season fertilizing South Africa cv. with (25% P + phosphorein) gave the highest total yield, however applying (100% P) gave the lowest value in this regard. Other treatments gave intermediate results. In 1998 data show that fertilizing plants of Mabrouka cv. with (25% P + phosphorein) gave the highest yield comparing with other combinations.

Obtained results are in coincidence with those observed by Formmel *et al* (1993) on potato, Srivastava and Ahlawat (1995) on pea and Yadav and Shrivastava (1997) on chickpea.

Table (3) : Effect of some levels of phosphorus fertilization and phosphorein biofertilizer on total and marketable yield of the two sweet potato cultivars Mabrouka and South Africa during the two growing seasons of 1997 and 1998.

Treatments		Total yield Kg / plot		Marketable yield %	
cultivars	fertilization	1997	1998	1997	1998
Mabrouka	100% P	18.23	25.38	85	83.5
	75% P + phosphorein	23.51	26.00	94.87	88.25
	50% P + phosphorein	21.26	23.75	75.0	83.00
	25% P + phosphorein	18.83	31.50	77.5	78.75
South Africa	100% P	20.10	27.5	95.75	92.50
	75% P + phosphorein	21.38	30.13	85.0	86.25
	50% P + phosphorein	21.53	29.5	96.0	94.75
	25% P + phosphorein	25.31	28.5	87.75	85.00
L.S.D 5%		3.28	3.86	4.26	3.67
Cultivars :					
Mabrouka		20.46	26.66	83.09	83.38
South Africa		22.08	28.91	91.13	89.63
L.S.D 5%		N.S.	1.931	2.13	1.84
Fertilization :					
100% P		19.16	26.44	90.38	88.00
75% P + phosphorein		22.44	28.06	89.94	87.25
50% P + phosphorein		21.39	26.63	85.50	88.88
25% P + phosphorein		22.07	30.00	82.63	81.88
L.S.D 5%		2.32	2.73	3.01	2.6

The enhancing effect of the biofertilizer on crop production may be due to the role of (PSB) in increasing the available phosphorus in the soil (Sundara Rao *et al*, 1963). Concerning the marketable yield, data presented in Table (3) show clearly that South Africa cv. gave higher percentage of marketable yield than Mabrouka one during the two growing seasons.

Data also show that applying (75% of the recommended P with soil inoculation with phosphorein) gave similar marketable yield percentages when compared with the control (100% P) during the two growing seasons. The lowest marketable yield % was given by treating plants with (25% P + phosphorein) during the two seasons. Mabrouka cv. show the highest marketable yield % when applying (75% P + phosphorein), whereas, application of (50% of inorganic P + phosphorein) gave marketable yield % similar to that of the control one in Mabrouka cv.

Obtained results are in agreement with those mentioned by Frommel *et al* (1993) on potato since they found that plant inoculation with *Pseudomonas* sp. strain increased yield of commercial size tuber comparing with the non-bacterized one. Similar results are also found by EL-Gamal (1996) who gained improved potato tuber quality by application of 46.5 Kg P_2O_2/Fed to (PSB) inoculated potato plots.

Tuber root characteristics :

Data of Table (4) show clearly that Mabrouka cv. significantly excelled South Africa cultivar in tuber fresh weight in 1997 growing season. Data also show that application of (50% of recommended phosphorus + phosphorein) gave the highest values concerning tuber fresh weight followed by (75% P + phosphorein). Application of (100% P) gave the lowest value in this regard.

Concerning the interaction effect on tuber fresh weight, data of Table (4) show that application of (50% P + phosphorein) to Mabrouka cv. gave the highest tuber fresh weight in 1997 growing season comparing with other combinations. Differences between the combination treatments seemed to be non significant.

Mabrouka shape index seemed to be higher than that of South Africa cv. in 1998 season. No significant differences were noted between fertilizing treatments used. No significant differences were also found between the combinations used between the fertilizer levels and cultivars.

Data of Table (4) also show that no significant differences were detected between Mabrouka and South Africa cvs regarding tuber dry weight % in both growing seasons.

Concerning the effect of fertilizing treatments, it was observed that application of (50% of the recommended phosphorus + phosphorein) gave the highest values concerning tuber dry weight % in both seasons, however application of (25% of P + phosphorein) gave the lowest values in this regard. Other fertilizing treatments gave intermediate results. Concerning the interaction effect, it was found that application of (25% P + phosphorein) to Mabrouka cv. or (100% P) to South Africa cv. gave the highest tuber dry weight % in 1997 season, differences between the combination treatments seemed to be non-significant in 1998 season.

Obtained results are in agreement with those of Kamla and Singh, 2000 on potato, Sundara Rao *et al* 1963, EL-Dahtory *et al* 1989 and EL-Gamal 1996.

Table (4): Effect of some levels of phosphorus fertilization and phosphorein biofertilizer on Tuber roots characteristics of the two sweet potato cultivars Mabrouka and South Africa during the two growing seasons of 1997 and 1998.

Treatments		Tuber roots characteristics					
		Weight (g)		Shap Index		Dry matter %	
Cultivars	fertilization	1997	1998	1997	1998	1997	1998
Mabrouka	100% P	221.25	263.75	2.82	3.41	28.96	30.48
	75% P + phosphorein	341.25	293.75	3.81	3.04	30.66	31.48
	50% P + phosphorein	416.25	316.50	2.89	3.12	29.80	32.08
	25% P + phosphorein	300.00	282.50	3.60	3.32	31.45	27.53
South Africa	100% P	221.25	267.25	3.52	3.22	32.55	29.25
	75% P + phosphorein	258.75	298.75	3.52	2.69	29.28	31.08
	50% P + phosphorein	335.63	320.00	2.84	2.55	30.70	31.83
	25% P + phosphorein	250.31	288.75	3.27	2.79	26.88	28.63
L.S.D 5%		29.74	N.S.	N.S.	N.S.	1.52	N.S.
Cultivars :							
Mabrouka		319.69	289.06	3.28	3.22	30.21	30.39
South Africa		266.48	293.68	3.29	2.81	29.85	30.19
L.S.D 5%		14.87	N.S.	N.S.	0.27	N.S.	N.S.
Fertilization :							
100% P		221.25	265.5	3.17	3.32	30.76	29.86
75% P + phosphorein		300.00	296.25	3.66	2.87	29.97	31.28
50% P + phosphorein		375.94	318.13	2.87	2.84	30.25	31.95
25% P + phosphorein		275.16	285.63	3.44	3.05	29.16	28.08
L.S.D 5%		21.03	12.56	N.S.	N.S.	1.07	0.90

Chemical constituents of leaves :

Data of Table (5) show clearly that South Africa cv. significantly surpassed Mabrouka in nitrogen and protein but was lower in phosphorus content of leaves. However, no significant difference was obtained between the two cultivars in K content of leaves.

Table (5): Effect of some levels of phosphorus fertilization and phosphorein biofertilizer on Chemical composition of leaves of the two sweet potato cultivars Mabrouka and South Africa during the two growing seasons of 1997 and 1998.

Treatments		Chemical composition of leaves			
cultivars	fertilization	N %	Protein %	P %	K %
Mabrouka	100% P	3.309	20.68	0.543	4.70
	75% P + phosphorein	4.039	25.24	1.002	4.63
	50% P + phosphorein	3.767	23.55	0.935	4.53
	25% P + phosphorein	4.508	28.18	0.517	4.93
South Africa	100% P	4.550	28.44	0.822	4.23
	75% P + phosphorein	4.869	30.43	1.038	5.13
	50% P + phosphorein	4.541	28.38	0.574	4.53
	25% P + phosphorein	5.407	33.79	0.420	4.73
L.S.D 5%		0.039	0.24	0.017	0.11
Cultivars :					
Mabrouka		3.906	24.41	0.749	4.69
South Africa		4.842	30.26	0.714	4.65
L.S.D 5%		0.02	0.12	0.008	N.S.
Fertilization :					
100% P		3.930	24.56	0.683	4.46
75% P + phosphorein		4.454	27.84	1.020	4.88
50% P + phosphorein		4.154	25.96	0.754	4.53
25% P + phosphorein		4.958	30.98	0.468	4.83
L.S.D 5%		0.028	0.18	0.012	0.08

Data also show that application of 75 , 50 or 25% of the recommended inorganic phosphorus combining with phosphorein gave higher values of nitrogen and protein contents of leaves comparing with the control (100% P).

Application of (75% P + phosphorein) showed higher contents of both phosphorus and potassium of leaves in 1998 growing season.

Concerning the interaction effect between varieties and different levels of fertilizers used, data of Table (5) reveal that fertilizing South Africa sweet potato cultivar with (25% P + phosphorein) gave the highest contents of both nitrogen and protein of leaves, however, application of (75% P + phosphorein) showed highest contents of both P and K of leaves

Obtained results are in agreement with those of EL-Gamal (1996) on potato regarding nitrogen and phosphorus contents.

Chemical constituents of tuber roots :

Data presented in Table (6) show clearly that Mabrouka cv. significantly surpassed South Africa cv. in both tuber roots nitrogen, protein and potassium contents. However, no significant differences were noticed between the two cvs in both phosphorus and total sugars contents of tuber roots.

Concerning the influence of fertilizer treatments, application of 50 or 75 % P combining with phosphorein increased both N and protein contents of tuber roots comparing with the control (100% P). Phosphorus and total sugars of tuber roots seemed to be not affected by any of the used levels of fertilizers comparing with the control (100% P).

Table (6): Effect of some levels of phosphorus fertilization and phosphorein biofertilizer on Chemical composition of tuber roots of the two sweet potato cultivars Mabrouka and South Africa during the two growing seasons of 1997 and 1998.

Treatments		Chemical composition of tuber roots				
cultivars	fertilization	N %	Protein %	P %	K %	Total sugars %
Mabrouka	100% P	1.685	10.53	0.626	2.75	3.050
	75% P + phosphorein	1.841	11.50	0.520	2.83	3.325
	50% P + phosphorein	1.941	12.13	0.479	2.75	3.975
	25% P + phosphorein	1.526	9.54	0.436	2.92	3.575
South Africa	100% P	0.883	5.52	0.806	2.95	4.300
	75% P + phosphorein	1.079	6.74	0.542	2.62	3.650
	50% P + phosphorein	1.227	7.67	0.502	2.75	3.125
	25% P + phosphorein	0.952	5.95	0.392	2.60	2.588
L.S.D 5%		0.101	0.63	0.304	0.158	0.609
Cultivars :						
Mabrouka		1.748	10.93	0.515	2.812	3.481
South Africa		1.035	6.47	0.565	2.729	3.416
L.S.D 5%		0.050	0.31	N.S.	0.079	N.S.
Fertilization :						
100% P		1.283	8.02	0.725	2.850	3.675
75% P + phosphorein		1.459	9.12	0.531	2.725	3.488
50% P + phosphorein		1.585	9.91	0.491	2.750	3.550
25% P + phosphorein		1.239	7.74	0.413	2.758	3.081
L.S.D 5%		0.071	0.44	N.S.	0.112	N.S.

Concerning the interaction effect between cultivars and different levels of fertilizers, data of the same table show clearly that fertilizing Mabrouka sweet potato cv. with (50% of the recommended phosphorus combining with phosphorein) gave the highest values regarding nitrogen and protein contents of tuber roots, however, inorganic phosphorus fertilization (100% P) gave the highest contents of P , K and total sugars in tuber roots of South Africa cv.

Obtained results are in coincidence with those of Abdel-Ati *et al* (1996) on potato and Abdel-Fattah (1998) on globe artichoke regarding N,P and total sugars contents.

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تأثير التسميد بمستويات مختلفة من الفوسفور والمخصب الحيوى فوسفورين على النمو والمحصول والتركيب الكيماوى لبعض أصناف البطاطا

أمال أنور الشيمى
بحوث الخضر – معهد بحوث البساتين – مركز البحوث الزراعية

أجريت تجربتان حقليتان فى الموسم الصيفى لعامى ١٩٩٧ ، ١٩٩٨ بمزرعة محطة بحوث البساتين بسدس لدراسة تأثير التسميد بمستويات مختلفة من الفوسفور والمخصب الحيوى فوسفورين على النمو والمحصول والتركيب الكيماوى فى البطاطا صنفى مبروكة وساوس أفريقا وشملت التجربة ٨ معاملات ناتجة من التفاعل بين صنفين (مبروكة وساوس أفريقا) وأربعة مستويات من التسميد الفوسفاتى سواء أضيف منفردا أو مع المخصب الحيوى فوسفورين .

وأوضحت النتائج تفوق الصنف مبروكة من حيث طول النبات ومحتوى الأوراق من المادة الجافة وقد أعطى التسميد الفوسفاتى بمعدل ٧٥% من الكمية الموصى بها + الفوسفورين إلى الحصول على أعلى القيم من حيث النمو الخضرى .

أستخدام الفوسفورين + مستويات مختلفة من التسميد الفوسفاتى كل على حده أدى إلى زيادة المحصول الكلى فى حين أن إضافة الفوسفورين + التسميد الفوسفاتى بمعدل ٧٥% من الكمية الموصى بها أعطى أعلى محصول قابل للتسويق وذلك مقارنة بالكنترول (١٠٠% تسميد فوسفاتى) . وتضيف النتائج إلى أن تسميد الصنف مبروكة بالمعاملة (٢٥% من الكمية الموصى بها من التسميد الفوسفاتى + الفوسفورين) أو التسميد الفوسفاتى فقط للصنف ساوس أفريقا أعطى أعلى محتوى من المادة الجافة بالجذور الدرنية .

أشارت النتائج أيضا إلى تفوق الصنف ساوس أفريقا على الصنف مبروكة من حيث المحتوى النتروجينى والبروتينى بالأوراق فى حين الصنف مبروكة من حيث المحتوى الفوسفورى بالأوراق . أعطى التسميد بمعدل ٢٥% من الكمية الموصى بها من التسميد الفوسفاتى + الفوسفورين للصنف ساوس أفريقا أعلى القيم من حيث محتوى الأوراق من النتروجين والبروتين بينما إضافة ٧٥% من الكمية الموصى بها من التسميد الفوسفاتى + الفوسفورين أعطت أعلى محتوى من الفوسفور والبوتاسيوم بالأوراق .

وتضيف النتائج أن تسميد الصنف مبروكة بـ ٥٠% من الكمية الموصى بها من التسميد الفوسفاتى + الفوسفورين أظهر أعلى القيم من حيث محتوى الجذور الدرنية من النتروجين والبروتين بينما أعطى التسميد الفوسفاتى (١٠٠% من الكمية الموصى بها) أعلى محتوى من الفوسفور والبوتاسيوم والسكريات الكلية بالجذور الدرنية فى الصنف ساوس أفريقا .