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EFFECT OF DIFFERENT RATES OF PHOSPHORUS AND POTASSIUM FERTILIZATION ON FRUIT PRODUCTION AND QUALITY OF STRAWBERRY CV. CHANDLER.

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ABSTRACT

This study was carried out to elucidate the response of strawberry cv. Chandler to 2 levels of P-Fertilizer (31 and 62Kg P_2O_5/Fed.) and 3 levels of K fertilizer (240 Kg K_2O/Fed. as soil application (SA), 120 Kg K_2O as soil application (SA) + 120 Kg K_2O as foliar spray (FS), and 240 Kg K_2O (SA) + 120 K_2O (FS)/Fed. as well as their combinations.

Obtained results show that P-application had favorable influences on plant growth and early and total yield/Fed. P.supply at 31Kg P_2O_5/Fed increased fruit weight, whereas P- supply at 62Kg P_2O_5/Fed increased fruit firmness and total soluble solids, it also increased K% but did not on N% in fruit.

Results also show that applying K-fertilizer at 240 Kg K_2O (SA) or 120 Kg K_2O(SA) + 120Kg K_2O (FS)/Fed. gave the highest early and total yield/Fed. K supply at 240 Kg K_2O (SA)/Fed increased fruit firmness in March harvesting whereas K application at 120 Kg K_2O (SA) + 120Kg K_2O (FS)/Fed. gave the highest values concerning fruit T.S.S% and total acidity (TA)%. K-fertilization at the rate 240 Kg K_2O (SA)/Fed gave the highest levels of N,P and K contents of fruit comparing with other K levels used.

Obtained data indicated that application of 62 Kg P_2O_5 +240 Kg K_2O as soil application /Fed. gave the highest early and total yield with fruits of high firmness which increase the fruit ability to shipping and marketing. Such result could be recommended.

INTRODUCION

Strawberry cv. Chandler is a new imported variety of US origin. Its planted area in Egypt increased up 30% of the total strawberry cultivated area. SO, this study aimed to recognize the exact P and K fertilization needs of such new variety under the local environmental conditions, through studying its response to different rates of phosphorus and potassium fertilization either they applied alone or combining together in an attempt to achieve high quantity and quality fruit production. Pal and pandey (1986) on strawberry found that application of N,P, and K as urea, potassium dihydrogen orthophosphate and potassium sulphate, respectively each of 0.5% concentration, led to increases in plant spread, and number of leaves, runners and crowns/plant. They also added that NPK application gave the highest increases in strawberry yield (45.3-46.5q /ha) and it enhanced fruit quality as well comparing with NP application.

Potassium nutrient was found to be important to get strawberry fruits at good color and sugar content.However, P nutrient was found to be important for good vegetative growth and runnering (Jookla *et al.*1986;

Haynes and Goh, 1987; Reckruhm and Dluhosch, 1988; Pomares *et al*, 1994, Kopanski, and Kaweck, 1994 on Strawberry).

Becerril and Barrientos, 1982 found fertilization of strawberry plants with phosphorus at 40 and 80 Kg P_2O_5/ha, increased total yield to 1.082 and 1.142 Kg/plant, respectively. They also added that both P and K application increased fruit firmness and soluble solids contents and improved fruit texture as well.

MATERIALS AND METHODS

Two field experiments were carried out at the experimental farm of Barrage Horticultural Research Station, Kaliobia Governorate in two successive seasons of 1997/1998 and 1998/1999. Strawberry *Fragaria X-ananassa*. Variety Chandler was the plant material used in the present investigation. This experiment included 6 treatments which were the combinations of 2 phosphorus levels i.e 31 and 62 Kg P_2O_5/Fed. with 3 levels of potassium as follows :

1- 240 Kg K_2O as soil application (SA) /Fed.
2- 120 Kg K_2O as soil application (SA) +120 Kg K_2O as foliar spray (FS) /Fed.
3- 240 Kg K_2O as soil application (SA)+120 Kg K_2O as foliar spray (FS) /Fed.

Potassium sulphate 48% K_2O was used as a source of K_2O while calcium superphosphate (15.5 % P_2O_5) was used as a source of P_2O_5. Nitrogen was added to all treatments at rate of 205 Kg N/fed in form of ammonium sulphate.

The experimental design used was a split plot design where phosphorus levels occupied the main plots while potassium levels were established at the sub plots. Treatments were distributed randomly in 3 replicates. The experimental plot included 3 rows, 5 meter length and 0.7 meter width, its area was 10.5 m^2. Transplants of strawberry cv. chandler were planted in Sept. 17 and 16 in 1997 and 1998, respectively. All agricultural practices were carried out as commonly followed in strawberry fields at the district of Barrage. Chemical and physical analysis of soil was determined (Table 1) according to Jackson method (1973).

The amount of fertilizers was added in 10 equal portion starting one month after planting, Three weeks intervals along the plant growth period.

Data recorded :

1-Vegetative Growth Characteristics :

A sample of 5 plants were randomly taken at the beginning of harvesting period to determine plant height (cm), foliage weight (g) and number of leaves.

2-Fruit Yield :

Early yield (ton/Fed) was recorded beginning from 8 and 12 February till the end of March during the two seasons, respectively. Total

fruit yield (ton/Fed) was also recorded for each treatment at the end of each growing season.

3-Fruit Quality :

Ten fruits were randomly taken from each plot to determine the following data, fruit weight (gm), fruit firmness (g/cm^2): Chatillon penetrometer (N.Y.,USA) was used to determine fruit firmness, Total soluble solids (T.S.S) using a hand refractometer .total titratable acidity (T.A) as gram citric acid/100 gram Juice, according to A.O.A.C. (1990) and fruit dry matter % .

Table (1) : The physical and chemical properties of the soil.

Physical properties :	
Clay %	32.5
Silt %	22.5
Fine sand %	41.14
Coarse sand %	1.32
Soil type	Clay loam
Chemical analysis :	
PH	7.60
E.C.	1.58
Organic matter %	2.10
Total N %	0.120
Available N	45.0 ppm
Available P_2O_5	7.4 ppm
Available K	80.0 ppm
Zn	1.3 ppm

Chemical Fruit Constituents :

A sample of 250 g fruits were taken from each plot then dried and grounded to determine the following parameters:

a- Nitrogen % was determined according to Kock and McMeckin (1924).

b- Phosphorus % was determined according to Troug and Meger (1939).

c- Potassium % was determined according to Brown and Lilleland (1946).

The obtained data were statistically analyzed and treatment means were compared at 5% of LSD according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Vegetative Characteristics

Data of Table (2) show clearly that applying phosphorus fertilization at 31 Kg P_2O_5/Fed. seemed to have stimulate effect on plant height as well as *fresh weight and number of leaves/plant comparing with the highest used* level of P fertilizer (62 Kg P_2O_5/Fed). Similar trend of response was found when fertilizing plants with potassium fertilization at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Feddan). Concerning the interaction effect between P and K fertilizers levels, data of the same table revealed

clearly that P supply at 31 Kg P_2O_5/Fed combining with application of K at 120 Kg K_2O/Fed. as soil application + 120 Kg K_2O as foliar spray/Fed. gave the highest values regarding all the morphological parameters records, comparing with the other interaction treatments. Increases found on plant height in the first season due to P and/or K application didn't reach the level of significance.

Table (2): Effect of different rates of phosphorus and potassium fertilizers on vegetative growth of strawberry cv. Chandler.

Treatments		Plant height (cm)		Plant fresh wt. (g)		No. leaves/plant.	
P Kg/Fed	K Kg/Fed	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999
31	240 SA	20.16	21.16	30.0	31.5	10.0	10.6
	120 SA +120 FS	20.30	22.0	43.6	45.0	16.0	15.6
	240 SA + 120 FS	18.30	19.16	41.6	42.3	12.6	13.0
62	240 SA	17.3	18.16	37.5	38.5	9.0	9.3
	120 SA +120 FS	18.0	18.5	35.0	36.16	12.0	12.3
	240 SA + 120 FS	19.0	19.16	27.5	30.5	8.33	8.0
L.S.D 5%		N.S.	0.68	2.5	1.00	N.S.	N.S.
31		19.58	20.77	38.4	39.60	12.86	13.06
62		18.1	18.61	33.33	35.05	9.77	9.86
L.S.D 5%		N.S.	0.41	N.S.	N.S.	1.91	2.12
240 SA		18.73	19.66	33.75	35.0	9.5	9.95
120 SA +120 FS		19.15	20.25	39.30	40.58	14.0	13.95
240 SA + 120 FS		18.65	19.16	34.55	36.4	10.46	10.5
L.S.D 5%		N.S.	N.S.	N.S.	2.13	N.S.	1.81

SA = Soil application FS = Foliar spray

Obtained results are in agreement with those mentioned by Martin *et al.* (1981), Haynes and Goh (1987); Recleruhm and Dluhosch, (1988) on strawberry who found that leaf development, crown and root growth and vegetative growth were found to increase with increasing rate of potassium application. Obtained results also in accordance with those reported by khanizadeh *et al.*(1995) on strawberry who found that P supply at all levels used increased total dry and fresh shoot weight, leaf area and number of leaves/plant.

Early and total yield

Data of Table (3) show clearly that increasing P level up to 62 Kg P_2O_5/Fed. led to increases in both early and total yield/Feddan. Such stimulating effect was significant. Data of the same table also show that application of K at (240 Kg K_2O/Fed as soil application) or at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed) gave the highest values concerning early and total yield/Fed. However, application of K at (240 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed) gave the lowest values in this regard.

Table (3): Effect of different rates of phosphorus and potassium fertilizers on early and total yield/Fed of strawberry cv. Chandler.

Treatments		Early yield Ton/Fed.		Total yield Ton/Fed.	
P Kg/Fed.	K Kg/Fed	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999
31	240 SA	0.893	0.93	7.56	8.13
	120 SA +120 FS	1.050	1.08	8.43	8.58
	240 SA + 120 FS	0.980	0.99	7.36	7.68
62	240 SA	1.140	1.22	8.95	8.98
	120 SA +120 FS	1.030	1.03	8.53	8.67
	240 SA + 120 FS	0.780	0.83	8.10	7.82
L.S.D 5%		**0.01**	**0.049**	**0.22**	**N.S.**
31		0.97	0.99	7.78	8.13
62		0.98	1.02	8.52	8.49
L.S.D 5%		**N.S.**	**N.S.**	**0.318**	**N.S.**
240 SA		1.02	1.07	8.25	8.56
120 SA +120 FS		1.04	1.05	8.48	8.63
240 SA + 120 FS		0.88	0.91	7.73	7.75
L.S.D 5%		**0.129**	**0.104**	**0.465**	**0.497**

SA = Soil application FS = Foliar spray

Concerning the interactional influence between P and K fertilizers data of the same table show clearly that application of P at 62 Kg P_2O_5/Fed combining with K supply with 240 Kg K_2O as soil application/Fed gave the highest early and total yield/Fed. in the two growing seasons. Obtained results are in agreement with those found by Becerril and Barrientos (1982), Reckruhm and Dluhosch (1988) and Miner *et al.* (1997) on strawberry.

Fruit Characteristics :

a- Fruit weight :

Data of Table (4) show clearly that application of P at 31 Kg P_2O_5/Fed gave the highest values concerning fruit weight in all harvesting months. No significant differences were detected in this regard between the 2 used levels of P fertilizer with exception of May harvesting period in the 2nd season of 1999. Data of the same table also show that fertilizing plants with P at 31 Kg P_2O_5/Fed Combining with K supply with (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed) gave the highest fruit weight in all harvesting months comparing with the other interactional treatments. Obtained results are in agreement with those mentioned by Jookla *et al.* 1986 on Strawberry.

b. Fruit Firmness:

Data of Table (5) show clearly that fruit firmness significantly increased as P fertilizer level increased up to 62 Kg P_2O_5/Fed in Feb. harvesting period in both growing seasons. However, differences between the two P-levels used in March, April and May harvesting periods did not reach the level of significance in this concern.

Table (4): Effect of different rates of phosphorus and potassium fertilizers on Fruit weight of strawberry cv. Chandler.

Treatments		Average Fruit Weight (g)							
		February		March		April		May	
P Kg/Fed	K Kg/Fed	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999
31	240 SA	17.7	18.5	17.0	19.4	22.3	23.3	16.46	17.36
	120 SA +120 FS	18.9	19.8	18.2	20.0	25.0	25.26	16.3	16.66
	240 SA + 120 FS	17.66	18.6	15.9	18.0	20.0	22.16	15.0	15.83
62	240 SA	18.0	19.16	17.8	19.8	17.0	20.0	13.8	14.16
	120 SA +120 FS	16.16	17.3	15.0	17.3	15.3	18.0	15.8	13.5
	240 SA + 120 FS	18.3	19.3	17.6	19.5	16.0	18.8	16.2	13.8
L.S.D 5%		N.S.	0.526	0.872	0.441	N.S.	0.67	0.385	N.S.
31		18.08	18.96	17.03	19.13	22.43	23.57	15.92	16.61
62		17.48	18.58	16.8	18.87	16.1	18.93	15.26	13.82
L.S.D 5%		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	1.16
240 SA		17.85	18.83	17.4	19.6	19.65	21.65	15.13	15.76
120 SA +120 FS		17.53	18.55	16.6	18.65	20.15	21.63	16.05	15.08
240 SA + 120 FS		17.98	18.95	16.75	18.75	18.0	20.48	15.6	14.82
L.S.D 5%		N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.722

SA = Soil application FS = Foliar spray

Table(5): Effect of different rates of phosphorus and potassium fertilizers on Fruit Firmness (g/cm^2) on Strawberry cv. Chandler.

Treatments		Fruit Firmness (g/cm^2)							
		February		March		April		May	
P Kg/Fed	K Kg/Fed	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999
31	240 SA	215	211.6	220	225	236.6	230	133.3	141.6
	120 SA +120 FS	250	240	250	255	250	255	160.3	165
	240 SA + 120 FS	235	226.6	230	235	245	241.6	174.3	176.6
62	240 SA	260	268.3	280	275	235	230	150.0	158.3
	120 SA +120 FS	230	221.6	225	228.3	226.6	220	168.3	170
	240 SA + 120 FS	240	230	200	215	225	215	156.6	160
L.S.D 5%		8.751	4.125	10.346	5.107	N.S.	4.686	N.S.	4.092
31		233.3	226.06	233.3	238.33	245	242.2	155.96	161.06
62		243.3	239.96	235.0	239.43	225	221.66	158.3	162.76
L.S.D 5%		7.171	12.649	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.
240 SA		237.5	239.95	250	250	235.8	230	141.65	149.95
120 SA +120 FS		240.0	230.8	237.5	241.65	238.3	237.5	164.3	167.5
240 SA + 120 FS		237.5	228.3	215	225.0	235	228.3	165.45	168.3
L.S.D 5%		N.S.	8.736	21.910	10.814	N.S.	N.S.	14.695	8.665

SA = Soil application FS = Foliar application (spray)

Potassium application at 240 Kg K_2O as soil application/Fed. was found to give the highest fruit firmness in March harvesting period followed by application of K at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed).

Concerning the interactional effect of P and K nutrients, data of Table (5) show clearly that application of P at 62 Kg P_2O_5/Fed. combining with K supply with (240 Kg/K_2O as soil application) gave the highest fruit firmness in March harvesting period in both growing seasons comparing with other harvesting months. On the other hand, obtained data show also that the application of P at 31 Kg P_2O_5/Fed combining with K level at 240 Kg K_2O as soil application/Fed gave the lowest fruit firmness values in May harvesting period. Other interactional treatments used gave intermediate results in this regard.

Obtained results are in agreement with those mentioned by Becerril and Barrientos (1982) who found the both K and P application increased strawberry fruit firmness but disagree with those mentioned by Albregls *et al.*(1996) who found that fruit firmness was not significantly affected by K application.

c. Total soluble solid (T.S.S)%:

Data in Table (6) indicate that increasing P-level up to 62 Kg P_2O_5/Fed significantly increased fruit T.S.S% in March and May harvesting periods, However, it had no remarkable effect in both Feb. and April harvesting period. Application of P at 62 Kg P_2O_5/Fed gave the highest fruit T.S.S% in March harvesting period comparing with other harvesting months.

Table (6): Effect of different rates of P and K fertilizers on Total soluble solid of Strawberry fruits cv. Chandler.

Treatments		Fruit T.S.S %							
P Kg/Fed	K Kg/Fed	February		March		April		May	
		1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999	1997/ 1998	1998/ 1999
	240 SA	9.5	9.8	9.16	9.5	7.0	7.3	6.16	6.8
31	120 SA +120 FS	10.16	10.5	9.5	10.0	8.56	9.0	7.0	7.5
	240 SA + 120 FS	7.33	7.8	8.3	9.0	7.6	8.0	6.9	7.16
	240 SA	8.5	9.3	9.0	9.6	7.2	7.5	6.7	7.0
62	120 SA +120 FS	11.0	12.0	10.5	11.16	8.9	9.6	8.16	8.5
	240 SA + 120 FS	8.3	8.8	9.6	10.16	8.16	8.8	6.7	7.1
	L.S.D 5%	**0.229**	**0.305**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**	**N.S.**
31		8.99	9.36	8.98	9.5	7.72	8.1	6.68	7.15
62		9.26	10.03	9.7	10.30	8.08	8.63	7.18	7.53
L.S.D 5%		**N.S.**	**N.S.**	**0.632**	**0.717**	**N.S.**	**N.S.**	**0.471**	**N.S.**
	240 SA	9.0	9.55	9.08	9.55	7.1	7.4	6.43	6.9
	120 SA +120 FS	10.58	11.25	10.0	10.58	8.73	9.3	7.58	8.0
	240 SA + 120 FS	7.81	8.3	8.95	9.58	7.88	8.4	6.8	7.13
	L.S.D 5%	**0.484**	**0.647**	**N.S.**	**0.815**	**0.791**	**0.733**	**N.S.**	**0.437**

SA = Soil application **FS = Foliar (spray)**

Application of K fertilizer at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed.) gave the highest T.S.S% values in all harvesting months Comparing other K levels used. Fruit harvesting in February seemed to give the highest T.S.S% value in strawberry fruits.

Concerning the interactional effect of K and P levels data of Table (6) also show that application of P at 31 Kg P_2O_5/Fed. combining with K at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed. gave the highest T.S.S% values in fruits.

Obtained results are in coincidence with those recorded by Becerril and Barrientos (1982) and Jookla *et al.*(1986) on strawberry.

d. Titratable acidity (TA) :

Data of Table (7) show clearly that increasing P-level up to 62 Kg P_2O_5/Fed. had no significant influence on titratable acidity content of fruits. Data also show that application K at 120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray/Fed. gave the highest values of TA in strawberry fruits in both growing season. Concerning the interaction effect between P and K nutrients, obtained results show clearly that application of P at 62 Kg P_2O_5 /Fed combining with application of K at 120 Kg K_2O as soil application +120 Kg K_2O as foliar spray/Fed. gave the highest TA values in fruit, however, application of P at 31 Kg P_2O_5 /Fed interacting with K at (240 Kg K_2O as soil application + 120 Kg K_2O as foliar spray) /Fed gave the lowest values in this regard. Obtained results are in accordance with those mention by Jookla *et al.*(1986).

Table (7): Effect of P and K rates of fertilizers on fruit dry matter % and titratable acidity in strawberry cv. Chandler.

Treatments		Titratable acidity (TA) (g.citrrcacid / 100g. Juice)		Dry matter % of fruit	
P Kg/Fed.	K Kg/Fed	1997/1998	1998/1999	1997/1998	1998/1999
	240 SA	0.85	1.0	9.16	7.97
31	120 SA +120 FS	0.75	0.88	9.8	8.66
	240 SA + 120 FS	0.52	0.61	9.6	8.5
	240 SA	0.85	1.06	9.5	8.4
62	120 SA +120 FS	1.1	1.2	8.9	8.03
	240 SA + 120 FS	0.64	0.83	8.6	7.8
L.S.D 5%		0.031	N.S.	N.S.	N.S.
31		0.71	0.83	9.52	8.37
62		0.86	1.03	9.0	8.07
L.S.D 5%		N.S.	N.S.	N.S.	N.S.
	240 SA	0.85	1.03	9.33	8.16
	120 SA +120 FS	0.92	1.04	9.35	8.34
	240 SA + 120 FS	0.58	0.72	9.1	8.15
L.S.D 5%		0.067	0.134	N.S.	N.S.

SA = Soil application **FS = Foliar spray**

e. Fruit dry matter%:

Data presented in Table (7) show clearly that no significant differences were observed between the effects of P or K nutrients either they applied each alone or in combinations on dry matter % of fruit.

Application of P at 31 Kg P_2O_5/Fed combining with K at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray) /Fed. gave the highest dry matter % of fruit.

Chemical Constituents of fruit :

a. Nitrogen % of fruit:

Data of Table (8) show clearly that increasing P level up to 62 Kg P_2O_5/Fed. had no significant effect on N% of fruit. However, application of K at 240 Kg K_2O/Fed level gave the highest N% in fruit comparing with other K levels uses. Concerning P x K interaction effect on N% of fruit, data of the same table show that application of P at 31 or 62 Kg P_2O_5/Fed combining with K level at 240 Kg K_2O as soil application gave the highest N% of fruit comparing with other treatments of interaction.

Table (8): Effect of different rates of P and k fertilizers on mineral content of fruits in strawberry cv. Chandler.

Treatments		Mineral contents of fruit		
P Kg/Fed.	K Kg/Fed	Nitrogen % 1998/1999	Phosphorus % 1998/1999	Potassium % 1998/1999
31	240 SA	1.53	0.486	4.13
	120 SA +120 FS	0.76	0.275	2.7
	240 SA + 120 FS	1.13	0.339	3.03
62	240 SA	1.43	0.325	3.87
	120 SA +120 FS	0.93	0.347	3.3
	240 SA + 120 FS	1.17	0.381	3.8
L.S.D 5%		0.066	0.006	0.185
31		1.14	0.366	3.29
62		1.18	0.351	3.66
L.S.D 5%		N.S.	0.001	0.313
	240 SA	1.48	0.405	4.0
	120 SA +120 FS	0.845	0.311	3.0
	240 SA + 120 FS	1.15	0.360	3.42
L.S.D 5%		0.046	0.004	0.131

SA = Soil application FS = Foliar spray

b. Phosphorus % of fruit:

Data presented in Table (8) show clearly that P- application at 31 Kg P_2O_5/Fed level gave higher P % in fruit comparing with P- application at 62 Kg P_2O_5/Fed level.

Potassium application level at 240 Kg K_2O as soil supply gave the highest P % in fruit followed by K application level at (240 Kg K_2O as soil application +120 Kg K_2O as foliar spray) /Fed.

Concerning (P x K) interactional effect, data of the same Table show that application of P at 31 Kg P_2O_5 combining with K level at (240 Kg K_2O as soil application) /Fed gave the highest P% in fruit.

c. Potassium % in fruit:

Data of Table (8) show clearly that increasing P. level up to 62 Kg P_2O_5/Fed significantly increased K % of fruit from 3.29 % up to 3.60 %. K-

supply at 240 Kg K_2O/Fed as soil application gave the highest K % value comparing with other used levels of potassium.

Regarding the (P x K) interaction effect, obtained results indicated that applying P at 31 Kg P_2O_5/Fed. combining with K at 240 Kg K_2O/Fed as soil application gave the highest K % in fruit. However, applying P at 31 Kg P_2O_5/Fed combining with K at (120 Kg K_2O as soil application + 120 Kg K_2O as foliar spray) /Fed. produced the lowest K % in fruit. Other used (P x K) combinations gave intermediate results.

CONCLUSION

Accordingly, Obtained results indicate that applying 62 Kg P_2O_5 + 240 Kg K_2O as soil application /Fed gave the highest early and total yield with fruits of high firmness which lead to increasing fruit ability for shipping and marketing. Such result could be recommended.

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تأثير بعض المعدلات السمادية من الفوسفور والبوتاسيوم على إنتاج وجودة ثمـــار الفراولة صنف شاندلر

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أجريت تجربتان فى الموسم الشتوى ١٩٩٨/٩٧، ١٩٩٩/٩٨ بمحطـــة بحـــوث البســاتين بالقناطر الخيرية لدراسة تأثير مستويان من التسميد الفوسفاتى (٣١،٦٢كجم فو٢أ٥ /فـدان) ، ٣ مستويات من التسميد البوتاسى (٢٤٠كجم بو٢ أ إضافة أرضية) ، (١٢٠كجم بو٢ أ إضافة أرضية + ١٢٠ كجم بو٢ أ رشا على المجموع الخضرى) ، (٢٤٠كجم بو٢ أ إضافة أرضية+١٢٠كجم بو٢ أ رشا على المجموع الخضرى) /فدان وكذلك التفاعل بينهما على إنتاج وجودة محصول الفراولـــة صنف شاندلر.

أظهرت النتائج الأتـــــــى :

- التسميد الفوسفاتى شجع النمو الخضرى للنبات كما زاد من المحصول المبكر والكلى/فـدان . زيادة التسميد الفوسفاتى حتى ٦٢ كجم فو٢ أ٥ /فدان زاد من نسبة صلابة الثمـــار ونســبة المادة الجافة بها خلال شهر مارس ومايو فى حين لم يكن للتسميد الفوسفاتى تـــأثير يذكـــر على الحموضة الكلية ونسبة المادة الجافة بالثمرة . وتشـــير النتـــائج أن زيـــادة التســميد الفوسفاتى حتى ٦٢كجم فو٢ أ٥/فدان لم يؤثر على نسبة النتروجين بالثمرة بينما زاد من نسبة البوتاسيوم بهـــا .
- أشارت النتائج أيضا إلى أن التسميد البوتاسى بمعدل(١٢٠كجم بو٢ أ٥ أرضيا+١٢٠كجم بو٢ أ رشا)/فدان شجع النمو الخضرى للنبات بينما أدى التسميد بمعدل ٢٤٠كجم بـــو٢ أ/فـــدان أرضيا الى زيادة صلابة الثمار فى حصاد مارس . إضافة البوتاسيوم بمعدل (١٢٠كجـــم بو٢ أ أرضيا + ١٢٠كجـم بو٢ أ رشا)/فدان زاد من نسبة المواد الصلبة الكلية والحموضة الكلية بالثمرة فى حين لم تتأثر نسبة المادة الجافة بالثمرة بإضافة السماد البوتاسى .وتشـــير النتائج أيضا إلى أن إضافة البوتاسيوم بمعـــدل ٢٤٠كجم بو٢ أ/فدان أرضيا أعطى أعلـــى القيم لنسب النتروجين والفوسفور والبوتاسيوم بالثمـــرة مقارنة بمستويات التسميد البوتاســـى المستخدمة .
- أظهرت النتائج أن التسميد بمعدل (٦٢كجم فو٢ أ٥ + ٢٤٠كجم بو٢ أ كأضافة أرضية)/فدان أعطى أعلى محصول مبكر وكلى/فدان وإتصفت الثمار الناتجة بالصلابة العالية . والدراسة توصى بإستخدام المعدل السمادى المذكور للحصول على أعلى محصول مبكر وكلـــى مـــع صلابة للثمار عاليه مما يسهم فى زيادة قدرة الثمار الناتجة على تحمل الشحن والتسويق .