RESULTS AND DISCUSSION

V.1. First Experiment:

Results on the interactive effects of P and K fertilization on growth, chemical composition, flowering, fruit yield and quality of okra; could be discussed under the following topics:

1.1. Plant growth characteristics.

1.2. Chemical composition of plant foliage.

1.3. Flowering characteristics.

1.4. Fruit yield and its components.

1.5. Fruit chemical composition.

1.1. Plant growth characteristics:

Data presented in Table (1) show clearly the effect of P and K fertilizers on okra growth expressed as stem length, stem diameter, number of leaves as well as number of branches per plant and fresh and dry weight per plant. Data indicated that plant growth characteristics except fresh and dry weight were significantly differed due to the climatical changes in both years of this ent. Therefore, a combined analysis of years wi K levels was suggested.

With respect to the main effect plant growth, most studied charac significantly responses to P-nu of phosphorus at its medium

Table (1): Morphological characteristics of okra as affected by P and K fertilization, average of two seasons 1982 and 1983.

Treatments kg/fad.		Stem length (cm)			Stem diameter (cm)			No. of leaves/ plant			No. of branches/plant			Fresh weight/ Plant (gm)			Dry weight/ plant (gm)		
		Year		Mean	Year		Mean	Year		Mean	Year		Mean	Year		Mean	Year		Mean
P_2O_5	K_2O	1982	1983		1982	1983		1982	1983		1982	1983		1982	1983		1982	1983	
0	0	131.8	156.5	144.2	1.9	2.3	2.1	24.0	20.2	22.1	2.8	1.8	2.3	498.0	577.2	537.6	125.3	139.8	132.6
0	24	122.5	163.0	142.8	2.5	2.6	2.6	23.0	17.5	20.3	3.0	2.0	2.5	496.2	575.2	535.7	103.9	144.2	124.1
0	48	132.8	147.0	139.9	2.2	2.8	2.5	24.0	18.2	21.1	4.0	2.0	3.0	509.7	519.2	514.5	126.6	118.2	122.4
Mean		129.0	155.5	142.3	2.2	2.5	2.4	23.6	18.6	21.1	3.2	1.9	2.6	501.3	557.2	529.2	118.6	134.0	126.3
32	0	138.8	165.0	151.9	3.1	3.5	3.3	19.7	17.0	18.4	3.0	1.8	2.4	565.7	560.0	562.9	141.5	142.2	141.9
32	24	126.3	156.8	141.6	2.4	2.7	2.6	27.0	22.0	24.5	3.3	2.5	2.9	641.5	787.5	714.5	156.0	190.1	173.1
32	48	124.3	167.8	146.1	2.4	2.7	2.6	32.2	24.0	28.1	3.5	2.3	2.9	625.5	539.5	582.5	154.7	135.4	145.1
Mean		129.8	163.2	146.5	2.6	2.9	2.8	26.3	21.0	23.6	3.2	2.2	2.7	610.9	629.0	619.9	150.7	155.9	153.3
64	0	128.8	167.8	148.3	2.8	2.5	2.7	20.5	19.0	19.8	4.0	2.3	3.2	581.2	607.7	594.5	141.5	155.9	148.5
64	24	130.3	153.3	141.8	2.5	2.6	2.6	37.5	28.0	32.8	4.5	3.0	3.8	655.7	489.5	572.6	157.9	127.0	142.5
64	48	132.5	140.8	136.7	2.7	2.8	2.8	24.7	15.5	20.1	4.3	2.5	3.4	511.0	466.5	488.8	116.1	93.5	104.8
Mean		130.5	153.9	142.2	2.6	2.6	2.6	27.5	20.8	24.2	4.2	2.6	3.4	582.6	521.2	551.9	138.3	125.4	131.9
Over all mean		129.7	157.5	143.6	2.5	2.7	2.6	25.8	20.1	22.9	3.5	2.2	2.9	564.9	569.1	567.0	135.8	138.4	137.1
K-levels	0	133.1	163.1	148.1	2.6	2.7	2.7	21.4	18.7	20.1	3.2	1.9	2.6	548.3	581.6	565.0	135.9	145.9	141.0
	24	126.3	157.7	142.0	2.4	2.6	2.5	29.1	22.5	25.8	3.6	2.5	3.0	597.8	617.4	607.6	139.2	135.7	146.5
	48	129.8	151.8	140.9	2.4	2.7	2.6	26.9	19.2	23.1	3.9	2.2	3.1	548.7	508.4	528.6	132.4	115.7	124.1

L.S.D. at 5% for:	Stem length	Stem diameter	No. of leaves	No. of branches	Fresh weight	Dry weight
Year	8.3	0.13	1.1	0.3	N.S	N.S
P-levels	N.S	0.16	1.3	0.4	28.3	8.1
K-levels	N.S	0.16	1.3	N.S	28.3	8.1
P x K	N.S	0.28	2.3	N.S	49.0	13.9

significantly promoted stem diameter, fresh and dry weight of plant foliage compared with either the highest level (64 Kg P_2O_5/fed.) or the control. Moreover, increasing levels of phosphorus up to 64 kg P_2O_5/fed. had the most favourable effect on number of branches as well leaves per plant. Obtained results concerning the influence of P-fertilization on plant height and side shoots are in harmony with those of Chhonkar and Singh (1963), Randhawa et al. (1977) and Koay and Chua (1978) on okra. However, Chauhan and Gupta (1973) indicated that plant height and number of leaves were not increased by increasing levels of P from 0 up to 22.5 or 45 kg P_2O_5/ha. The increase in number of leaves per plant herein, may be due to the influence of P-fertilizer on number of branches per plant.

The promotive effect of the medium P-fertilizer level on fresh and dry matter content of plant foliage is in accordance with the results obtained by Ahmed and Tulloch-Reid (1968), who emphasized the depressive effect of heavy P-application on fresh and dry weight of okra foliage.

With respect to the main effect of potassium, it was found that it had no significant effect on either stem length or number of branches per plant. However, there were no significant differences with respect to stem diameter, number of leaves, fresh and dry weight of okra plants.

The application of 24 kg K_2O/fed. significantly increased number of leaves, fresh and dry weight per plant compared with either 48 kg K_2O/fed. or the control treatments. Although plant dry weight was promoted by adding the medium level of K (24 kg K_2O/fed.), the variances failed to reach the level of significance compared to the control. The depressive effect of the heavy K-application (48 kg K_2O/fed.) on fresh and dry weight per plant may be referred to the relatively depressive effect on stem length and number of leaves as shown in Table (1). Obtained results concerning the favourable effect of K-fertilizer on number of leaves, branches and fresh weight per plant are in harmony with Chhonkar and Singh (1963) and Koay and Chua (1978) on okra. Moreover, the depressive effect of heavy K-application on plant height and number of leaves was obtained by Chauhan and Gupta (1973) on okra.

With regard to the interactive effect of phosphorus and potassium on plant growth, it is worthy to note that there were no significant differences between the 9 treatments with respect to stem length and number of branches, but the other morphological characteristics showed significant responses. The highest stem length and diameter tended to be obtained when plants were fertilized with 32 kg P_2O_5 + 0 kg K_2O/fed. Furthermore, number of leaves and branches showed good response to the combined effect between 64 kg within 24 kg of both P_2O_5 and K_2O respectively. Meanwhile, application of the medium levels of each of phosphorus and potassium fertilizers (32 and 24 kg P_2O_5 and K_2O respectively) proved to be the best treatment in increasing fresh and dry weight of plant foliage.

1.2. Chemical composition of plant foliage:

Data presented in Table (2) illustrate the effect of P and/or K fertilization on N, P, K and total carbohydrates accumulation in okra plant foliage. From such data, it is clear that chemical constituents of plant foliage except total-N were considerably differed in both years of the experiment. Therefore, a combined analysis of data collected in both years of this experiment was suggested.

With regard to the main effect of phosphorus, it is worthy to mention that phosphorus application at its medium level (32 kg P_2O_5/fed.) had a pronounced significant effect in increasing nitrogen, phosphorus and potassium uptake in okra plant foliage as compared with either the heavy P (64 kg P_2O_5/fed.) or the control treatments. Moreover, an increasing trend of total-carbohydrates accumulation in plant foliage was noticed as P-fertilization levels were increased. However, differences in total carbohydrates

Table (2): Effect of phosphorus and potassium fertilization on some nutrients accumulation in okra plant foliage, average of two seasons 1982 and 1983.

Treatments		N/plant (gm)			P/plant (gm)			K/plant (gm)			Total carbohydrates/ plant (gm)		
P_2O_5	K_2O	Year		Mean	Year		Mean	Year		Mean	Year		Mean
(kg/fad.)		1982	1983		1982	1983		1982	1983		1982	1983	
0	0	2.91	4.55	3.78	0.72	0.98	0.85	8.41	12.92	10.67	19.55	19.93	19.74
0	24	2.80	4.45	3.62	0.60	1.45	1.03	7.70	13.30	10.50	14.25	21.63	17.94
0	48	3.36	3.13	3.24	0.80	1.25	1.03	8.31	10.16	9.23	19.93	20.72	20.32
Mean		3.02	4.04	3.53	0.70	1.22	0.97	8.14	12.12	10.13	17.91	20.76	19.33
32	0	3.89	4.34	4.11	0.84	1.52	1.18	9.88	11.77	10.82	27.98	24.65	26.31
32	24	4.64	4.90	4.77	0.81	1.86	1.33	10.07	17.26	13.67	28.68	29.16	28.92
32	48	4.85	4.34	4.60	0.98	1.20	1.09	11.72	12.31	12.02	25.98	22.53	24.25
Mean		4.46	4.52	4.49	0.87	1.52	1.20	10.55	13.78	12.17	27.54	25.44	26.49
64	0	4.96	5.77	5.37	1.10	1.11	1.10	10.01	13.83	11.92	25.65	31.63	28.64
64	24	4.31	3.08	3.70	1.01	1.37	1.19	11.61	12.22	11.91	27.63	35.85	31.74
64	48	3.32	2.41	2.86	0.68	0.94	0.81	9.29	8.52	8.91	19.50	24.47	21.99
Mean		4.19	3.75	3.97	0.93	1.14	1.03	10.30	11.52	10.91	24.26	30.65	27.45
Over all mean		3.89	4.10	4.00	0.83	1.29	1.06	9.66	12.47	11.07	23.24	25.62	24.42
K-levels	0	3.92	4.89	4.40	0.88	1.20	1.04	9.43	12.84	11.13	24.39	25.40	24.89
	24	3.91	4.14	4.04	0.80	1.56	1.18	9.79	14.26	12.02	23.52	28.88	26.20
	48	3.84	3.29	3.56	0.82	1.13	0.97	9.77	10.33	10.05	21.80	22.57	22.18
L.S.D. at 5% for:													
year		N.S.			0.07			0.77			1.73		
P-levels		0.37			0.08			0.94			2.12		
K-levels		0.37			0.08			0.94			2.12		
P x K		0.65			0.14			1.63			3.67		

content between both phosphorus levels (32 and 64 kg P_2O_5/fad.) failed to reach the level of significance (Table 2).

The superiority of the medium level of P-application (32 kg P_2O_5/fed.) on N, P, K may be due to the increase in plant growth (Table 1) especially fresh and dry weight which in turn, increased the removed quantity of such elements. Furthermore, the increase in total carbohydrates by P-application could be a reliable index to plant growth especially number of leaves which affect photosynthesis.

The promotive-effect of P-fertilizer on N uptake was previously reported by Ahmed and Tulloch-Reid (1968) and Asif and Greig (1972) on okra. However, Saimbhi and Padda (1970) on okra indicated that P-application had no considerable effect on chemical constituents. Moreover, obtained results regarding the promotive effect of P-fertilizer on P-content of plant top are in coincidence with those of Asif and Greig (1972), Randhawa _et al_. (1977) on okra and Abdalla _et al_. (1979) on tomato. Meanwhile, Ahmed and Tulloch-Reid (1968) pointed out that P-fertilizer had no pronounced effect on leaf P content at flowering and senescence. The increase in K accumulation in okra plant foliage as a result of P-fertilizer supply is in accordance with that indicated by Asif and Greig (1972) on okra. Results on the favourable effect of P-fertilizer on total-carbohydrates accumulation are not confirmed with those of Chiotan *et al*. (1971) on okra.

Potassium application, generally seemed to promote N, P, K and total carbohydrates accumulation in okra plant foliage (Table 2). Plants received 24 kg K_2O/fed. were superior in this respect. Heavy K application (48 kg K_2O/fad. significantly depressed such studied items.

The favourable effect of K-fertilizer especially at 24 kg K_2O/fed. on N, P, K and total carbohydrates accumulation may be due to the increase in plant growth (Table 1). The increase in N content in plant foliage was reported by Asif and Greig (1972) as a result of potassium fertilization. Meanwhile, Ahmed and Tulloch-Reid (1968) on okra reported that N content was not affected since, it followed the same trend of the control. The promotive effect of K-fertilizer on nutrients accumulation was reported by Asif and Greig (1972) as regard to P-content and Ahmed and Tulloch-Reid (1968) on okra as regard to K-content and Turky (1982) on celery as regard to total carbohydrates.

Concerning the interaction effect on P and K application on chemical constituents of plant foliage, results indicated that the highest content of N was obtained when plants were fertilized with 64 kg P_2O_5 within 0 kg K_2O/fad. followed by the treatment 32 kg P_2O_5 within 24 kg K_2O/fad. The difference between both treatments was insignificant. With regard to P and K contents, it was found that, the best treatment which increased P and K accumulation in plant foliage was 32 kg P_2O_5 combined with 24 kg K_2O/fad. However, the highest increase in total carbohydrates content was found in plants supplied with 64 kg P_2O_5 within 24 kg K_2O/fad.

1.3. Flowering characteristics:

Data presented in Table (3) illustrate the effect of P and/or K fertilizer levels on flowering characteristics expressed as flowering time, number of node, bearing the first flower, number of flowers per plant and fruit setting percentage.

With respect to the main effect of phosphorus it is worthy to mention that phosphorus application significantly accelerated flowering date which consequently depressed the period required from sowing to the first flower anthesis. Plants supplied with either 32 or 64 kg P_2O_5/fad. flowered 3-4 days earlier than those unfertilized. The application of phosphorus at 32 kg P_2O_5/fad. did not exert any effects on lowering the position of the first flower, however, increasing levels of P-application up to 64 kg P_2O_5/fad.

Table (3): Flowering characteristics of okra as affected by P and K fertilization, average of two seasons 1982 and 1983.

Treatments P_2O_5 (kg)	K_2O (kg)	Flowering time (days) Year 1982	1983	Mean	First flower (No.) Year 1982	1983	Mean	Number of flowers /plant Year 1982	1983	Mean	Fruit setting % Year 1982	1983	Mean
0	0	62.0	61.2	61.6	7.1	7.5	7.3	18.5	25.6	22.1	66.8	74.5	70.7
0	24	63.0	61.7	62.4	6.2	6.7	6.5	22.2	23.5	22.9	62.5	88.2	75.4
0	48	61.0	61.2	61.1	6.0	5.8	5.9	17.7	25.1	21.4	73.2	83.9	78.6
Mean		62.0	61.4	61.7	6.4	6.7	6.6	19.5	24.7	22.1	67.5	82.2	74.9
32	0	59.0	60.2	59.6	7.2	5.5	6.4	19.7	24.8	22.3	66.6	84.1	75.4
32	24	60.0	57.2	58.6	7.0	5.2	6.1	17.7	27.8	22.8	63.1	89.2	76.2
32	48	60.0	57.2	58.6	6.9	7.7	7.3	20.0	25.6	22.8	71.3	89.1	80.2
Mean		59.7	58.2	58.9	7.0	6.2	6.6	19.1	26.1	22.6	67.0	87.5	77.3
64	0	57.0	60.2	58.6	6.7	8.2	7.5	16.2	24.6	20.4	72.3	82.9	77.6
64	24	57.0	59.0	58.0	6.5	7.6	7.1	24.0	22.8	23.4	76.3	86.4	81.4
64	48	56.0	56.0	56.0	6.0	8.2	7.1	20.5	24.1	22.3	70.8	89.2	80.0
Mean		56.7	58.4	57.5	6.4	8.0	7.2	20.2	23.8	22.0	73.1	86.2	79.7
Over all mean		59.5	59.3	59.4	6.6	7.0	6.8	19.6	24.9	22.2	69.2	85.3	77.3
K-levels :	0	59.3	60.5	59.9	7.0	7.1	7.05	18.1	25.0	21.6	68.5	80.5	74.5
	24	60.0	59.3	59.6	6.5	6.5	6.5	21.3	24.7	23.0	67.3	87.9	77.6
	48	59.0	58.1	58.5	6.3	7.2	6.75	19.4	24.9	22.1	71.7	87.4	79.6
L.S.D. at 5% for:													
Year		N.S.			N.S.			1.5					
P-levels		1.69			0.48			N.S.					
K-levels		N.S.			N.S.			N.S.					
P x K		N.S.			0.83			N.S.					

Significantly increased number of nodes that bearing the first flower. Data also show that no significant differences could be detected in number of flowers per plant and fruit setting percentage as a result of phosphorus application treatments compared to that of the control. The favourable effect of P-application on reducing the number of days elapsed from sowing to the 1st flower appearance may be due to the role of P-nutrition on accelerating flowering bud initiation and differentiation. Furthermore, the superiority of 32 kg P_2O_5/fad. on flowering characteristics of okra may be due to its superior effect on fresh and dry weight and consequently on N, P, K uptake and total carbohydrates accumulation. Obtained results are in harmony with those of Koay and Chua (1978) on okra. Moreover, Avramescu *et al*. (1961), Abbasova (1971), Jassal *et al*. (1972) and Hewedy (1978) on cucumber as well as Goma (1958) and Eid (1980) on squash came to similar results. However, Saimbhi and Padda (1970) indicated that P-application had no significant effect on flowering characteristics of okra. It is worthy to mention herein, that other research workers manifested the role of P on flowering behaviour throughout its effects on total phenols and indoles concentrations in plant leaves (Farag, 1984) on pepper.

Concerning the main effect of potassium fertilization, results indicated that it positively and slightly affected flowering time, position of the node bearing the first flower, number of flowers per plant and fruit setting percentage. However, differences failed to reach the level of significance. Obtained results regarding the effect of K-fertilizer levels on flowering behaviour are in confirmity with those of Koay and Chua (1978) on okra, who declared that application of potassium in the organic or inorganic form had a slight effect on the number of days to flower intiation. With regard to the combined effect of phosphorus within potassium fertilization on flowering characteristics, it was found that, it did not affect significantly the flowering time, number of flowers per plant and fruit setting percentage. With respect to the first flower node, it showed slight significant effect in this respect. It means that flowering characteristics were mainly affected by increasing levels of P-fertilizer except the position of the first flower which responsed to either K and/or K application. The number of nodes responsible for the appearance of the first flower was reduced in plants supplied with 0 kg P_2O_5 within either 24 or 48 kg K_2O/fad. as well as 32 kg P_2O_5 within either 0 or 24 kg K_2O/fad.

1.4. Fruit yield and its components:

Data illustrated in Table (4) show the effect of phosphorus and potassium on okra fruit yield and its components represented as average fruit weight, number of fruits per plant, fruit yield per plant and early and total fruit yield per feddan. Results clearly show that okra fruit yield and its components were significantly differed according to the climatical changes in both years of this experiment, therefore, a combined analysis was suggested.

Concerning the main effect of phosphorus, it is worthy to note that phosphorus application had no significant effects on either average fruit weight or number of fruits per plant. The control treatment resulted in significant increased regarding fruit total yield either per plant or per fad. as compared with both phosphorus treatments, (32 and 64 kg P_2O_5/fad.) which showed no significant differences between each other. The highest phosphorus level i.e. 64 kg P_2O_5 led to a significant increase in early yield as compared with the medium level i.e. 32 kg P_2O_5/fad. Moreover, no considerable differences were detected in fruit early yield between plants received 64 kg P_2O_5/fed. or those of the control. The noneffective role of P-fertilizer on increasing average fruit weight and number of fruits per plant may

Table (4): Fruit yield and its components of okra as affected by P and K fertilization, average of two seasons 1982 and 1983.

Treatments P_2O_5 (kg.)	K_2O	Average fruit weight (gm) Year 1982	1983	Mean	No. of fruits/plant Year 1982	1983	Mean	Fruit yield/plant (gm) Year 1982	1983	Mean	Early yield/fed. (kg) Year 1982	1983	Mean	Total yield/fed. (ton) Year 1982	1983	Mean
0	0	6.1	9.4	7.8	15.4	20.7	18.1	94.6	195.1	144.9	78.4	304.2	191.3	1.892	3.904	2.898
0	24	6.6	9.1	7.9	15.6	20.0	17.8	104.1	182.3	143.2	93.8	321.0	207.4	2.082	3.647	2.265
0	48	6.8	9.3	8.1	15.8	20.8	18.3	107.8	195.5	151.7	92.4	410.0	251.2	2.157	3.911	3.034
Mean		6.5	9.2	7.9	15.6	20.5	18.0	102.1	190.9	146.6	88.2	345.0	216.6	2.043	3.820	2.932
32	0	6.3	8.9	7.6	16.9	19.6	18.3	106.4	162.7	134.6	94.2	290.0	192.4	2.130	3.255	2.693
32	24	5.7	8.5	7.1	15.3	21.4	18.4	86.9	181.0	134.0	63.0	310.0	186.5	1.738	3.620	2.679
32	48	7.2	9.4	8.3	14.3	18.8	16.6	103.7	176.9	140.3	99.4	249.7	174.6	2.075	3.539	2.807
Mean		6.4	8.9	7.65	15.5	19.9	17.7	99.0	173.5	136.3	85.5	283.2	184.5	1.981	3.471	2.726
64	0	5.9	9.4	7.7	15.8	18.7	17.3	93.9	177.6	135.8	159.6	227.7	193.7	1.879	3.553	2.716
64	24	6.1	9.2	7.7	15.3	18.3	16.8	93.3	169.2	131.3	117.6	303.0	210.3	1.867	3.386	2.627
64	48	6.5	9.1	7.8	15.8	20.3	18.1	103.8	185.8	144.8	105.7	378.0	241.9	2.077	3.717	2.897
Mean		6.1	9.2	7.7	15.6	19.1	17.4	97.0	177.5	137.3	127.6	302.9	215.3	1.941	3.552	2.746
Over all mean		6.3	9.1	7.7	15.6	19.8	17.7	99.4	180.6	140.1	100.4	310.4	205.5	1.988	3.614	2.801
K-levels	0	6.1	9.2	7.7	16.0	19.7	17.9	98.3	178.5	138.4	110.7	274.0	192.5	1.967	3.571	2.769
	24	6.1	8.9	7.6	15.4	19.9	17.7	94.8	177.5	136.2	91.5	311.0	201.4	1.896	3.551	2.724
	48	6.8	9.3	8.1	15.3	20.0	17.7	105.1	186.1	145.6	99.2	346.0	222.6	2.103	3.722	2.913
L.S.D. at 5% for:																
Year		0.2			0.7			5.4			10.3			0.107		
P-levels		N.S.			N.S.			6.6			12.6			0.132		
K-levels		0.3			N.S.			6.6			12.6			0.132		
P x K		N.S.			N.S.			N.S.			21.9			N.S.		

be due to the negligible influence of P on number of flowers per plant and fruit setting percentage as shown in Table (3).

Obtained results regarding the effect of phosphorus on average fruit weight are in accordance with those of Randhawa _et al_. (1977) on okra, who noticed that phosphorus had only a slight favourable effect on okra average fruit weight.

The results concerning number of fruits per palant are in harmony with those of venturi and piazza (1973) on squash. However, Randhawa _et al_. (1977) and Koay and Chua (1978) on okra reported adverse results whereas, number of fruits per plant was increased as a result of P-application. The noticed increase in fruit early and total yield per feddan in the control treatment may be attributed to its favourable effect on number and weight of fruits per plant. The unfavourable effect of P-application on fruit total yield either per plant or per feddan are in harmony with those of Chandrasekharan and George (1970), Saimbhi and Padda (1970), Asif and Greig (1972), Albregts and Howard (1974) and Leela _et al_. (1975) on okra. Adverse results were reported by Sutton (1963), Sutton (1967), Ahmed and Tulloch-Reid (1968), Verma _et al_. (1970), Chiotan _et al_. (1971), Chauhan and Gupta (1973), Singh (1979) and Hooda et al. (1980) on okra. Furthermore, the promotive influence of the highest P-level (64 kg P_2O_5/fed.) on yield earliness completely agreed with Sutton (1963) on okra and may be attributed to the earliness in flowering time.

The low N, P, K and total carbohydrates content in plant foliage of the control treatment (Table 2) may led to the assumption that these nutrients, early translocated to fruits which led to an increase in early yield production.

As regard to the effect of potassium on fruit yield and its components, it was found that potassium at its highest level (48 kg K_2O/fed.) significantly increased average fruit weight, fruit yield per plant and early and total yield per feddan as compared with the control or the other level of potassium. However, no significant difference could be detected in number of fruits per plant as a result of potassium application. Therefore, the application of 48 kg K_2O/fed. may be recommended to increase okra fruit total from 5-7% especially, no interaction effect was detected between P and K. This increment was mainly attributed to the increase in average fruit weight and consequently total fruit yield per plant.

The favourable effect of K-fertilizer especially at the highest level on the fruit weight are in agreement with that obtained by Koay and Chua (1978) on okra.

The favourable effect of K-fertilizer level of 48 kg/fed. on early yield may be due to the relative earliness in flowering time and the relative increase in fruit setting percentage. Whereas, the promotive effect of K-application on total yield may be mostly due to the relative increases in average fruit weight, Obtained results are in confirmity with those reported by Sutton (1967), Ahmed and Tulloch-Reid (1968), Verma *et al*. (1970), Chiotan *et al*. (1971) and Mani and Ramanathan (1980) on okra. However, Sutton (1963), Chandrasekharan and George (1970), Chauhan and Gupta (1973) and Albregts and Howard (1974) on okra indicated that okra fruit yield did not response to K-fertilization.

With regard to the combined effect between P and K, no significant differences between treatments concerning average fruit weight, number of fruits per plant and fruit yield per plant as well as per feddan could be detected.

In this connection plants supplied with 48 kg K_2O/fad. combined with either 0 or 64 kg P_2O_5/fed. Significantly produced higher early yield compared to other treatments. It reflexes the main effect of K-application on fruit yield components.

1.5. Fruit chemical composition:

Data presented in Table (5) show clearly that increasing phosphorus fertilizer levels application led to a gradual decrease in N, P, K and total carbohydrates accumulation in okra fruits, however, variances concerning P and K accumulation were not significant. Obtained results are in agreement with those reported by Chiotan *et al*. (1971), Asif and Greig (1972) and Singh (1979) on okra as regard to N content and Randhawa *et al*. (1977) and Singh (1979) as regard to P content and Singh (1979) as regard to K content of okra fruits. However, other research workers reported that P application had a promotive effect on nutrients accumulation in fruits as reported by Ahmed and Tulloch-Reid (1968) on P and Chiotan *et al*. (1971) on K content of okra fruits.

Concerning the main effect of potassium, it was found that due to increasing levels a gradual increasing trend in N, P, K and total carbohydrates accumulation in fruits was detected. However with the exception of K content such promotive effect was insignificant. The promotive effect of K-fertilizer especially at its highest level i.e., 48 kg K_2O/fad. may be attributed to the importance of K element on metabolites translocation

Table (5): Effect of phosphorus and potassium fertilization on some nutrients accumulation in fruits of okra plant, average of two seasons 1982 and 1983.

Treatments P_2O_5 (kg)	K_2O	Fruit N/plant (gm) Year 1982	1983	Mean	Fruit P/plant (gm) Year 1982	1983	Mean	Fruit K/plant (gm) Year 1982	1983	Mean	Fruit T. carbo-hydrates/plant (gm) Year 1982	1983	Mean
0	0	0.46	0.75	0.60	0.14	0.14	0.14	1.04	1.30	1.17	2.41	7.18	4.80
0	24	0.61	0.76	0.68	0.17	0.12	0.14	1.25	1.38	1.31	2.50	7.37	4.94
0	48	0.58	0.98	0.78	0.18	0.17	0.17	1.48	1.58	1.53	2.71	8.16	5.43
Mean		0.55	0.83	0.68	0.16	0.14	0.15	1.25	1.42	1.33	2.54	7.57	5.05
32	0	0.64	0.71	0.67	0.18	0.16	0.17	1.31	1.48	1.39	2.70	5.26	3.98
32	24	0.58	0.73	0.65	0.17	0.14	0.16	1.15	1.30	1.23	2.61	6.31	4.46
32	48	0.52	0.63	0.57	0.17	0.15	0.16	1.39	1.30	1.34	2.66	5.82	4.24
Mean		0.58	0.69	0.63	0.17	0.15	0.16	1.28	1.36	1.32	2.65	5.79	4.22
64	0	0.49	0.78	0.64	0.15	0.12	0.13	1.05	1.28	1.16	2.69	5.81	4.25
64	24	0.49	0.69	0.59	0.15	0.12	0.14	1.06	1.10	1.08	2.33	5.16	3.75
64	48	0.56	0.71	0.63	0.17	0.16	0.17	1.29	1.58	1.43	2.87	6.32	4.59
Mean		0.51	0.72	0.62	0.15	0.13	0.14	1.13	1.32	1.22	2.63	5.76	4.19
Over all mean		0.55	0.75	0.64	0.16	0.14	0.15	1.22	1.37	1.29	2.61	6.37	4.49
N-levels:	0	0.53	0.74	0.63	0.15	0.14	0.14	1.13	1.35	1.24	2.60	6.08	4.34
	24	0.56	0.72	0.64	0.16	0.12	0.14	1.15	1.26	1.20	2.48	6.28	4.38
	48	0.55	0.77	0.66	0.17	0.16	0.16	1.38	1.48	1.43	2.74	6.76	4.75
L.S.D. at 5% for:													
Year		N.S.			0.01			0.10			0.33		
P-levels		0.05			N.S.			N.S.			0.41		
K-levels		N.S.			N.S.			0.12			N.S.		
P x K		0.10			N.S.			0.21			N.S.		

from plant foliage to the fruits. Obtained results are in harmony with those of Asif and Greig (1972) with respect to N content and Singh (1979) with regard to K content and Mani and Ramanathan (1981) as regard to total carbohydrates content in okra fruits.

With regard to the combined effect of P within K fertilization it was found that N content of fruits were significantly increased by the use of 0 kg P_2O_5 combined with 48 kg K_2O/fad. as compared with the other treatments. Whereas, the application of 48 kg K_2O/fad. combined with either 0 or 64 kg P_2O_5/fad. significantly increased K-uptake in fruits. On the other hand, no significant differences were detected between treatments concerning P or total-carbohydrates accumulation in fruits.