RESULTS AND DISCUSSION

4. RESULTS AND DISCUSSION

4.1. The First Experiment:

The effect of seed sowing date, variety and spacing between plants on plant growth and its chemical constituents as well as yield and quality of green pods of pea plants.

4.1.1 Plant Growth characteristics.

Data presented in Table (2) show the vegetative growth measurments of pea plants as affected by seed sowing date, variety and spacing between plants. It is clear from such data that plant height was significantly decreased with delaying planting date in the first season (1986/1987). These results agree with those obtained by Weiss et al (1950) and Stino (1954) on soybean, Hanafy (1973) and El-Seifi (1991-a) on snap bean .On the other hand, plant height was significantly increased with delaying seed sowing date in the second season (1987/1988). Such results are in agreement with those obtained by stino et al (1967-a) and Khalil (1990-a) on cowpea. These results showing the variable effect of seed sowing date on plant height may be attributed to the important effects of the degrees of temperature, which were not the same during vegetative periods of plant growth from one sowing date to the other.

On the other hand,such, variable trend at both growing seasons is mainly due to the different climatical conditions prevailing at both seasons specially degrees of temperature (Table 1).

It is clear from the same data presented at Table (2) that the number of leaves and branches per plant was significantly increased with delaying sowing date during both growing seasons of this work. These results agree with those of Nelson and Roberts (1961), on soybean regarding effect on number of leaves per plant and Abd El-Salam (1963), and Khalil (1990-a) on cowpea concerning number of branches per plant. However, the results obtained by El Seifi et al (1991-a) on snap bean showed that early sowing increased number of leaves per plant. Concerning the effect of sowing date on both fresh and dry weight per plant, it is clear, from data illustrated at Table (2), that fresh and dry weight per plant was significantly decreased with delaying seed sowing date in the first season. These results agree with those of Gritton and Ebert (1975) on pea regarding fresh weight per plant and as well as El Seifi et al (1991-a) on snap bean and Marcellos and Constable (1986), on faba bean plant regarding dry matter content. In the second season of this work, data in Table (2) showed that early seed sowing decreased both of fresh and dry weight per plant. This result is in agreement with that Obtained by Khalil (1990-a) on cowpea.

Concerning the effect of variety on plant growth characteristics, it is obvious from data at Table (2) that all the studied vegetative growth parameters, i.e. plant height, number of leaves and branches as well as fresh and dry weight per plant were significantly differed between the three tested varieties. In this regard, the maximum values of all previously mentioned growth characteristics were obtained by

Perfection variety followed by Lincoln and mentioned growth parameters may be attributed to genetic archetecture of that variety.

Obtained results are in agreement with those obtained by Abd El-Fattah and Abd El-Salam (1967), Aricha (1982), Abed et al (1988-a) and Khalil (1990-a) and Tsyganok (1991), all working on different pea varieties.

Concerning the effect of plant spacing on plant growth characteristics, the same data at Table (2) show clearly that irrespective of plant height, which significanlty decreased with increasing plant spacing, number of leaves and branches per plant as well as fresh and dry weight of plant were significantly increased as a result of increasing plant spacing from 10 up to 30 cm during both seasons of growth . Such results may be due to that increasing spacing between plants reduced plant competition for water and nutrients and improved plant photosynthesis which in turn enhanced and increased plant vegetative growth. Obtained results are in agreement with those reported by Hanafy (1973) on snap bean, Haq and Hussain (1981) on mung bean and Bakry et al (1984) on pea regrding plant height and Behairy (1965) and El seifi et al (1991-a) concerning number of leaves per plant; Abd El-Salam (1963) and Salem and El-Massri (1986) regarding number of branches per plant; El-Beheidi et al (1984) according to fresh weigth per plant and Behairy (1965), Tayel et al (1967), White et al (1983) and El seifi et al (1991 a) respecting the dry weight per plant all working on different legume crops. However, some investigators reported contra results where

they found that increased number of plants per hill (Goma, 1964 on cowpea) or decreasing plant spacing (Tayel et al, 1967 on snap bean and Brandes et al, 1973 on bean) increased number of leaves per plant. Similary to that, obtained results disagree with those reported by each of Tayel et al (1967) on snap bean; Lenka and Gautam (1972) and Bakry (1984), all working on peas and Saleh (1980) on cowpea who found that number of branches per plant was increased as a result of decreasing plant spacing, increasing plant population or number of rows per ridge.

With regard to the interactional effect of different studied factors on all growth parameters of this work, it may be concluded that plants of the variety Perfection showed the highest values of plant height when seeds were sown on october 15 th at 10 cm apart. However, plants of lincoln variety produced the highest number of leaves and branches but in case of late seed sowing (November 15 th) and at 30 cm apart. Moreover, the variety lincoln showed also the highest values of both fresh and dry weight per plant when seeds were sown at 30 cm apart also, but on October 15 th in first season. However, the variety perfection plants were superior in this respect in the second season. Such variation in the response of the different tested varieties may be due to differences in climatical conditions prevailing during growing seasons. Generally, it could be concluded that perfection cv-plant reflected the highest values in all studied vegetative growth parameter followed by Lincoln and Little Marvel when planted at the widest plant spacing (30 cm between hills).

Table (2): Pea Plant growth characteristics as affected by sowing date, variety and plant spacing.

Season			1986/1987					1987/1988				
Char. Plant. date	Var.	Spac. (cm)	plant height (cm)	No.of leaves/ plant	No.of branch./ plant	Fresh weight(gm)/plant	Dry	Plant height (cm)	No.of leaves/ plant	No.of branch./ plant	Fresh weight(gm)/plant	Dry
Oct.		10	72.9	8.4	1.4	30.8	4.8	73.3	10.7	1.5	33.6	5.3
15th	Little	20	65.2	9.5	1.5	38.0	5.9	67.3	11.9	1.5	43.4	6.6
	Marvel	30	57.2	10.2	2.	44.2	6.8	58.2	14.3	1.7	50.5	7.7
Oct.		10	86.1	10.4	1.5	72.5	10.5	81.0	12.0	1.2	53.7	9.2
15th	Lincoln	20	76.3	12.3	2.6	89.6	13.0	63.3	14.3	1.5	61.7	10.4
		30	65.6	13.2	3.2	132.3	18.8	61.0	16.9	1.9	73.7	12.2
Oct.		10	98.2	11.7	1.5	59.6	8.8	86.5	13.5	1.3	60.7	10.2
15th	Perfe-	20	84.6	13.4	2.4	96.8	14.4	77.2	15.9	1.7	69.4	11.5
	ction	30	76.2	13.8	3.5	124.0	18.3	69.5	19.3	1.8	81.1	13.4
Nov.		10	68.2	10.3	1.4	30.1	4.7	76.4	11.4	1.7	34.2	5.3
15th	Little	20	60.9	12.7	2.3	39.5	6.1	66.4	15.5	2.2	39.4	6.1
	Marvel	30	50.3	15.9	2.8	55.2	8.3	58.5	17.3	2.9	53.1	8.3
Nov.		10	85.3	12.9	1.5	44.4	6.2	86.2	12.2	1.8	56.9	9.6
15th	Lincoln	20	71.0	16.5	2.6	59.8	8.5	78.9	17.0	2.3	64.9	10.9
		30	64.0	20.1	3.5	75.4	10.6	69.1	22.3	3.0	78.0	13.1
Nov.		10	83.5	13.6	1.9	47.5	6.8	79.9	10.5	1.6	61.3	10.1
15th	Perfe-	20	75.3	18.2	3.0	80.8	11.5	76.7	16.4	2.2	69.4	11.4
	ction	30	69.7	24.4	4.6	116.1	17.0	63.4	21.8	2.8	79.0	12.9
L.S.D at 5%			0.14	0.14	0.14	0.32	0.30	0.24	0.11	0.11	0.57	0.24
Oct. 15th			75.8	11.4	2.2	76.4	11.2	70.8	14.3	1.5	58.6	9.6
Nov. 15th			69.8	16.1	2.6	60.9	8.9	72.8	16.0	2.3	59.6	9.7
L.S.D at 5%			0.03	0.05	0.03	0.10	0.17	0.03	0.06	0.02	0.12	N.S
Litt.Mar.			62.4	11.2	1.9	39.6	6.1	66.7	13.5	1.9	42.4	6.6
Linc.			74.7	14.2	2.5	79.0	11.3	73.2	15.8	2.0	64.8	10.9
Perf.			81.2	15.9	2.8	87.4	12.8	75.5	16.2	1.9	70.2	11.6
L.S.D at 5 %			0.03	0.04	0.06	0.06	0.08	0.05	0.05	N.S	0.07	0.11
spac.at.		10cm	82.3	11.2	1.5	47.5	7.0	80.6	11.6	1.5	50.1	8.3
spac.at.		20cm	72.2	13.8	2.4	67.4	9.9	71.6	15.1	1.9	58.0	9.5
spac.at.		30cm	63.8	16.3	3.3	91.2	13.3	63.3	18.6	2.4	69.2	11.3
L.S.D.at 5%			0.06	0.06	0.06	0.13	0.12	0.10	0.05	0.05	0.23	0.10

4.1.2 Chemical composition of plant foliage.

A - Photosynthetic pigments :-

Data presented in Table (3) show the photosynthetic pigments content (determined as mg/100 gm fresh weight) in leaves of pea plant as affected by sowing date, variety and spacing between plants. It is clear from such data that chlorophyll a, b and total chlorophyll as well as carotenoides content was significantly decreased with delaying sowing date in both growing seasons. These results agree with those obtained by Siffel and Sestak (1991) on phaseolus vulgaris. These results may be attributed to the important effect of environmental influences, such as the effect of light and temperature which may be suitable during early sowing date than late one.Contra results were obtined by Khalil (1990-a) on cowpea.

Concerning the effect of variety on photosynthetic pigments leaves content, data illustrated at Table (3) show that chlorophyll a,b and total chlorophyll and also carotenoides were significantly differed in leaves of the three tested varieties during both growing seasons. In this respect, the maximum values of either chlorophyll a,b or total chlorophyll were obtained by lincoln variety followed by perfection and Little marvel. However, the highest values for the carotenoides content was obtained by Little Marvel followed by Lincoln and then Perfection. Such varietial differences were generally in agreement with those obtarned by Petr and Lipavsky (1978); Aricha (1982) and Abed et al (1988-a) on different pea cultivars. Moreover, Abed et al (1988-a) indicated that there was no significant differences regarding to

carotenoides content. Such varietal differences may be due to the nature of branching and leaves number that makes leaves better exposed to light and consequently the formation of photosynthetic pigments may be enhanced.

Regarding the effect of plant spacing on photosynthetic pigments content of pea plant, it is obvious from the same data at Table (3) that chlorophyll a, b and total chlorophyll as well as carotenoides concentrations were significantly increased when spacing between plants increased from 10 to 30 cm apart during both seasons. The obtained results in this concern are in coincidance with those mentioned by Goma (1966) on tomato, El-Beheidi and Mansi (1974) on cucumber and El-Shamma (1980) on pepper.

With respect to the interactional effect of different studied factors on all determined pigments content, it may be concluded that plants of the variety lincoln showed the highest values of chlorophyll a,b and total chlorophyll content when seeds were sown on October 15 th at 30 cm apart followed by perfection and then Little Marvel variety during both growing seasons of this work. Regardimg the carotenoides content, it is noticed that the highest values were obtaimed by Litlle Marvel variety when seeds were sown at 30 cm apart on October 15 th in first season, (1986/1987) and on November 15 th at the second season (1987/1988). Such variation in the response of different tested varieties grown on different sowing date and at different plant spacing may be due to differences in growth

habit of the variety, vegetative growth and also climatical conditions prevailing during growing seasons.

Table (3): Pea Photosynthetic pigments in leaves (mg/100 gm Fresh weight) as affected by sowing date, variety and plant spacing.

Season			1986/1987				1987/1988			
Char.			Chorophyll (a)	Chlorophyll (b)	Total Chlorophyll	Corotenoid.	Chlorophyll (a)	Chlorophyll (b)	Total chlorophyll	Carotenoid.
Plant. date	Var.	Spac. (cm)								
Oct. 15th	Little Marvel	10	71.2	40.3	111.5	73.1	69.5	34.1	103.6	70.6
		20	71.4	40.5	111.9	73.5	69.7	34.3	104.0	70.9
		30	71.8	40.8	112.6	73.9	70.1	34.8	104.9	71.4
Oct. 15th	Lincoln	10	84.2	48.3	132.5	71.3	82.6	45.1	127.7	65.8
		20	84.5	48.6	133.1	71.7	82.8	45.5	128.3	66.3
		30	84.7	49.0	133.7	72.0	83.1	46.1	129.2	66.6
Oct. 15th	Perfe-ction	10	82.1	45.7	127.8	71.1	80.2	43.6	123.8	61.8
		20	82.5	46.1	128.6	71.6	80.3	44.1	124.4	62.5
		30	82.7	46.6	129.3	71.8	80.6	44.5	125.1	62.7
Nov. 15th	Little-Marvel	10	69.4	35.5	104.9	70.4	69.0	33.6	102.6	70.1
		20	69.7	35.8	105.5	70.6	69.4	34.1	103.5	71.7
		30	70.1	36.3	106.4	71.2	69.8	34.5	104.3	72.2
Nov. 15th	Lincoln	10	82.4	45.4	127.8	68.4	81.2	41.6	122.8	67.6
		20	82.7	45.8	128.5	68.9	81.4	42.2	123.6	68.4
		30	83.0	46.2	129.2	69.3	81.5	42.5	124.0	68.4
Nov. 15th	Perfe-ction	10	80.3	44.2	124.5	69.3	79.6	41.1	120.7	60.2
		20	80.6	44.5	125.1	69.8	80.3	41.7	122.0	60.5
		30	80.9	44.7	125.6	70.2	80.5	42.6	123.1	61.4
L.S.D at 5%			N.S	0.18	0.23	N.S	N.S	0.18	0.28	0.23
Oct. 15th			79.4	45.1	124.5	72.2	77.6	41.4	119.0	66.5
Nov. 15th			77.7	42.0	119.7	69.8	77.0	39.3	116.3	66.7
L.S.D at 5%			0.13	0.05	0.08	0.04	0.14	0.05	0.18	0.05
Litt. Mar.			70.6	38.2	108.8	72.1	69.6	34.2	103.8	71.1
Linc.			83.6	47.2	130.8	70.3	82.1	43.8	125.9	67.2
Perf.			81.5	45.3	126.8	70.6	80.1	42.9	123.2	61.5
L.S.D at 5%			0.10	0.06	0.11	0.06	0.05	0.08	0.08	0.13
spac.at. 10cm			78.3	43.2	121.5	70.6	77.0	39.8	116.8	66.0
spac.at 20cm			78.6	43.5	122.1	71.0	77.3	40.3	117.6	66.7
spac.at. 30cm			78.9	43.9	122.8	71.4	77.6	40.8	118.4	67.1
L.S.D.at 5%			0.05	0.07	0.09	0.06	0.08	0.07	0.12	0.09

B - N,P and K content :-

Data concerning total N,P and K content in plant foliage as affected by sowing date, variety and plant spacing were illustrated in Tables (4,5 and 6). From such data, it is evident that early sowing date resulted in significant increments in N,P and K% and uptake of different plant parts (Leaves and stems) and total plant foliage during both seasons of growth. Such obtained resulted are in agreement with those mentioned by Tayel et al (1967) on snap bean. Regarding N content. Moreover, Cervato and Marudelli (1988) reported similar results regarding mineral content of pea plants foliage. However, obtained results disagreed with those of Khalil (1990-a) on cowpea. These increments might be due to the higher uptake of such nutrients from the soil as a results of the prevailing temperature during the early sowing date and also due to the increased vegetative growth and dry matter of plants grown under such conditions.

With regard to the effect of variety on N,P and K content of plant foliage, data presented at Tables (4,5 and 6) clearly show that N,P and K concentration and uptake by plant falioge was significantly differed according to the tested variety. In this respect, the maximum values for all studied macroelements were obtained by Perfection variety followed by lincoln and then Little Marvel cvs, at both growing seasons with the exception that Lincoln var. surpassed perfection concerning K content at the second season. Such results are connected with the difference in vegetative growth rate (Table 2) among the studied varieties.Such varietal differences were generally in agreement with those obtained by Aricha (1982);Abed et al (1988-a)

and Khalil (1990-b) on some pea cvs. and Silveira et al (1991) on cow pea cvs. These results showing the varietal differences are mainly due to the genitical factors and the environmental conditions during growing seasons which affected the variation in nutrient uptake for tested varieties.

Concerning the effect of plant spacing on macroelements content of plant folioge, it is noticed from data at Tables (4,5 and 6) that both of concentrations and plant content of macroelements tended to increase as the plant spacing increased from 10 to 30 cm apart. Obtained results agree with those mentioned by Tayel et al (1967) on snap bean. They found that the amount of N,P and K in plant parts increased with increasing the plant spacing. On the contrary, Behairy (1965) on peas and Tayel et al (1967) on snap bean found that the plant spacing had no statistical significant effect on the N,P and K concentrations. Contra results were also obtained by El-Shamma (1980) on peper who found that narrowing distances between plants inereased N concentrations. Such results, reported in this work showing the good effect of wide spacing, may be attributed to high absorbing efficiency of roots where no competition between plants and abundant available N,P and K nutrients in the soil are found under such conditions and more vegetative growth of such plants as shown by data at Table (2). Generally, it may be concluded that the highest uptake of N,P and K in plant foliage is reported by plants of the perfection variety followed by those of Lincoln and Little Marvel when seeds were sown on October 15 th at 30 cm apart in both growing seasons of this work.

Table (4): Pea Nitrogen plant foliage content as affected by sowing date, variety and plant spacing.

Season			1986/1987					1987/1988				
Char.			Leaves		Stems		Whole plant	Leaves		Stems		Whole plant
Plant. date	Var.	Spac. (cm)	%	mg	%	mg	mg/plant	%	mg	%	mg	mg/plant
Oct.		10	3.32	105.8	1.73	27.7	133.5	3.26	101.8	1.71	37.0	138.8
15th	Little	20	3.34	123.2	1.75	38.3	161.5	3.32	131.9	1.72	45.5	177.4
	Marvel	30	3.51	153.3	1.78	42.6	195.9	3.65	167.4	1.75	54.9	222.3
Oct.		10	3.31	195.4	1.64	75.5	270.9	3.14	216.1	1.60	36.6	252.7
15th	Lincoln	20	3.32	246.6	1.67	92.8	339.4	3.19	236.4	1.65	49.7	286.1
		30	3.34	384.0	1.68	123.1	507.1	3.22	269.5	1.67	63.6	333.1
Oct.		10	3.02	171.6	1.59	49.6	221.2	2.98	221.6	1.56	43.0	264.6
15th	Perfe-	20	3.24	304.8	1.61	80.7	385.5	3.03	245.4	1.58	53.7	299.1
	ction	30	3.36	363.7	1.63	121.3	485.0	3.07	270.4	1.60	72.9	343.3
Nov.		10	3.16	98.1	1.55	24.6	122.7	3.12	102.0	1.47	30.3	132.3
15th	Litlle-	20	3.17	122.2	1.57	34.8	157.0	3.18	115.8	1.48	36.6	152.4
	Marvel	30	3.22	166.4	1.59	50.4	216.8	3.20	150.4	1.50	54.4	204.8
Nov.		10	3.05	124.7	1.52	31.5	156.2	2.98	214.9	1.41	33.3	248.2
15th	Lincoln	20	3.11	162.9	1.54	49.5	212.4	3.06	232.6	1.44	48.0	280.6
		30	3.17	211.2	1.57	62.4	273.6	3.13	259.7	1.46	69.8	329.5
Nov.		10	2.95	118.0	1.49	42.3	160.3	2.96	230.3	1.37	31.5	261.8
15th	Perfe-	20	2.98	207.5	1.52	69.2	276.7	2.99	244.6	1.40	45.9	290.5
	ction	30	3.04	284.0	1.55	118.9	402.9	3.03	255.9	1.43	66.8	322.7
L.S.D at 5%				14.49		8.64	9.19		N.S		N.S	N.S
Oct. 15th			3.31	227.6	1.67	72.4	300.0	3.20	206.7	1.65	50.8	257.5
Nov. 15th			3.10	166.1	1.54	53.7	219.8	3.07	200.7	1.44	46.3	247.0
L.S.D at 5%				5.69		4.88	3.53		7.49		1.23	8.151
Litt. Mar.			3.29	128.2	1.66	36.4	164.6	3.29	128.2	1.60	43.1	171.3
Linc.			3.22	220.8	1.60	72.5	293.3	3.12	238.2	1.54	50.1	288.3
Perf.			3.10	241.6	1.56	80.3	321.9	3.01	244.7	1.49	52.3	297.0
L.S.D at 5%				5.6		2.61	4.13		4.51		1.87	5.75
spac.at.		10cm	3.13	135.6	1.59	41.9	177.5	3.07	181.1	1.52	35.3	216.4
spac.at.		20cm	3.19	194.5	1.61	60.9	255.4	3.13	201.1	1.54	46.6	247.7
spac.at.		30cm	3.27	260.4	1.63	86.4	346.8	3.22	228.9	1.57	63.7	292.6
L.S.D.at 5%				5.92		3.53	3.75		4.64		1.18	5.33

Table (5): Pea Phosphorus plant foliage content as affected by sowing date, variety and plant spacing.

Season			1986/1987					1987/1988				
Char.			Leaves		Stems		Whole plant	Leaves		Stems		Whole plant
Plant. date	Var.	Spac.	%	mg	%	mg	mg/plant	%	mg	%	mg	mg/plant
Oct.		10	0.291	9.3	0.249	4.0	13.3	0.288	9.0	0.238	5.1	14.1
15th	Little	20	0.295	10.8	0.251	5.5	16.3	0.292	11.6	0.241	6.4	18.1
	Marvel	30	0.301	13.1	0.260	6.2	19.3	0.299	13.7	0.247	7.7	21.4
Oct.		10	0.268	15.9	0.249	11.4	27.3	0.265	18.2	0.234	5.3	23.5
15th	Lincoln	20	0.274	20.3	0.252	14.0	34.3	0.271	20.1	0.260	7.0	27.1
		30	0.281	32.2	0.256	18.7	50.9	0.278	23.3	0.245	9.2	32.5
Oct.		10	0.250	14.2	0.242	7.5	21.7	0.249	18.5	0.232	6.3	24.8
15th	Perfe-	20	0.259	24.3	0.245	12.2	36.5	0.257	20.8	0.261	8.0	28.8
	ction	30	0.265	28.7	0.248	18.4	47.1	0.263	23.1	0.238	10.8	33.9
Nov.		10	0.272	8.4	0.247	3.9	12.3	0.269	8.8	0.230	4.7	13.5
15th	Little	20	0.281	10.8	0.253	5.6	16.4	0.274	10.0	0.236	5.8	15.8
	Marvel	30	0.286	14.7	0.258	8.2	22.9	0.280	13.1	0.242	8.7	21.8
Nov.		10	0.256	10.4	0.247	5.1	15.5	0.253	18.2	0.226	5.3	23.5
15th	Lincoln	20	0.261	13.7	0.249	8.0	21.7	0.259	19.7	0.232	8.5	28.2
		30	0.267	17.7	0.255	10.1	27.8	0.263	21.8	0.238	11.3	33.1
Nov.		10	0.247	9.9	0.241	6.8	16.7	0.244	19.0	0.219	5.0	24.0
15th	Perfe-	20	0.252	17.5	0.247	11.2	28.7	0.250	20.4	0.224	7.3	27.7
	ction	30	0.258	24.1	0.250	19.2	43.3	0.256	21.6	0.231	10.8	32.4
L.S.D at 5%			N.S	1.37	N.S	1.35	4.73	N.S	0.67	N.S	N.S	0.75
Oct.15th			0.276	18.8	0.250	10.9	29.7	0.273	17.6	0.241	7.3	24.9
Nov.15th			0.264	14.1	0.246	8.7	22.8	0.261	16.9	0.231	7.5	24.4
L.S.D at 5%				0.46		0.76	2.38		0.59		N.S	0.57
Litt.Mar.			0.287	11.2	0.253	5.5	16.7	0.283	11.0	0.239	6.4	17.4
Linc.			0.268	18.4	0.251	11.2	29.6	0.265	20.2	0.239	7.8	28.0
Perf.			0.255	19.8	0.245	12.5	32.3	0.253	20.6	0.230	8.0	28.6
L.S.D at 5%				0.51		0.40	2.11		0.29		0.20	0.23
spac.at		10cm	0.264	11.4	0.246	6.4	17.8	0.261	15.3	0.230	5.3	20.6
spac.at		20cm	0.270	16.2	0.249	9.4	25.6	0.267	17.1	0.238	7.2	24.3
spac.at		30cm	0.276	21.8	0.254	13.5	35.3	0.273	19.4	0.240	9.7	29.1
L.S.D.at 5%				0.56		0.55	1.93		0.27		0.26	0.30

Table(6): Pea Potassium plant faliage content as affected by sowing date, variety and plant spacing.

Season		1986/1987					1987/1988				
Char.		Leaves		Stems		Whole plant	Leaves		Stems		Whole plant
Plant. Var. date	Spac. (cm)	%	mg	%	mg	mg/plant	%	mg	%	mg	mg/plant
Oct.	10	3.48	110.8	3.49	55.9	166.7	3.47	108.3	2.78	60.3	168.6
15th Little	20	3.54	130.6	3.50	76.6	207.2	3.59	142.6	2.90	76.9	219.5
Marvel	30	3.63	158.4	3.59	85.8	244.2	3.70	169.5	2.99	93.7	263.2
Oct.	10	3.29	196.1	3.24	149.0	345.1	3.13	214.9	2.76	62.9	277.8
15th Lincoln	20	3.39	251.8	3.29	182.7	434.5	3.27	242.9	2.82	84.8	327.7
	30	3.49	401.9	3.41	249.3	651.2	3.46	290.1	2.96	112.1	402.2
Oct.	10	2.96	168.2	2.88	89.6	257.8	2.87	214.0	2.65	73.0	287.0
15th Perfe-	20	3.10	241.8	2.96	147.8	439.7	3.05	247.2	2.76	93.5	340.7
ction	30	3.25	351.4	3.07	228.4	579.8	3.18	279.8	2.85	129.7	409.5
Nov.	10	4.48	139.2	3.27	51.6	190.8	2.82	92.3	2.91	60.3	152.6
15th Little-	20	4.54	175.1	3.37	74.9	250.0	2.95	107.4	2.86	70.8	178.2
Marvel	30	4.62	238.8	3.44	109.3	348.1	3.10	145.5	2.97	107.8	253.3
Nov.	10	4.30	175.3	2.94	61.0	236.3	2.82	203.3	2.41	56.9	260.2
15th Lincoln	20	4.37	262.2	3.07	98.5	360.7	2.91	221.0	2.47	82.6	303.6
	30	4.49	299.3	3.20	127.2	426.5	3.01	249.5	2.54	121.2	370.7
Nov.	10	3.86	173.6	2.42	68.4	242.0	2.58	201.4	2.32	53.3	254.7
15th Perfe-	20	3.98	277.4	2.66	121.5	398.9	2.69	220.1	2.37	77.7	297.8
ction	30	4.11	383.9	2.79	214.3	518.2	2.78	234.5	2.42	113.5	348.0
L.S.D at 5%			33.03		18.51	29.54		9.10		6.41	8.63
Oct.15th		3.335	229.0	3.27	140.6	369.6	3.30	212.1	2.83	87.4	299.5
Nov.15th		4.31	236.1	3.02	103.0	339.1	2.85	186.1	2.59	82.6	268.7
L.S.D at 5%			N.S		5.19	14.68		9.25		5.80	15.03
Litt. Mar.		4.05	158.8	3.44	75.7	234.5	3.27	127.6	2.90	78.3	205.9
Linc.		3.89	264.4	3.19	144.6	409.0	3.10	236.9	2.66	86.7	323.6
Perf.		3.54	274.4	2.79	145.0	419.4	2.86	232.8	2.56	90.1	322.9
L.S.D at 5%			16.10		6.97	14.90		9.62		5.30	8.87
spac.at	10cm	3.73	160.5	3.04	79.3	239.8	2.95	172.3	2.64	61.1	233.4
spac.at	20cm	3.82	231.5	3.14	117.0	348.5	3.08	196.9	2.70	81.0	277.9
spac.at	30cm	3.93	305.6	3.25	169.1	474.7	3.20	228.1	2.79	113.0	341.1
L.S.D.at 5%			13.49		7.56	12.06		3.71		2.62	3.52

4.1.3 Green pod yield and its components.

Data presented in Table (7) illustrate the total green pod yield and its conponents of some pea varieties as affected by sowing date, variety and plant spacing. It is evident from such data that yield components i.e. number of pods per plant, plant yield (gm) and total yield (Ton/Fed) were significantly increased with delaying sowing date from Oct. 15 th to Nov 15 th during both growing seasons of this work. However, average pod weight (gm) was the unique measurment which was not significantly affected in this concern. Regarding effect of sowing date on average pod weight, contra results were obtained by stino et al (1967-b) on cowpea and Hanafy (1973) and El Seifi et al (1991-b)on snap bean who found that early sowing date produced pods of heavier weight than late sowing. Moreover, obtained results disagree with those reported by Zaki et al (1991-a) on tomato who mentioned that fruit weight of tomatoes was significantly increased with delaying sowing date.

With respect to the effect of sowing date on number of pods per plant, the reported results agree with those obtained by Scarisbrick and Wilkes (1973) working on mung bean (Phaseolus vulgaris),Khalil (1990-a) on cowpea and Martin and Tabley (1981) on pea who showed that the number of pods per plant increased when sowing date was delayed. However, obtained results disagree with those reported by Abd El-Salam (1963) on cowpea and Saharia (1986) on pea who reported that more pods per plant were produced on early sowing than those on late one. Concerning effect of sowing date on green pods yield per plant, obtained results in this work disagree with

those reported by Abd El-Salam (1963) and Stino et al (1967-b) all working on cowpea as well as each of Hanafy (1973) on snap bean and Gill et al (1984), Saharia (1986),Silim et al (1985) and Cervato and Marudelli (1988) all working on peas and El Seifi et al (1990-b) on snap bean who showed that with early sowing date the seed yield was increased as compared with late date. Such disagreement between obtained results of this work and those reported in previous literature could be attributed to the nearly optimum temperature for growth, flowering and yielding ability of plants in comparison with those prevailing during growth season which are varied from one season to the other and also from year to the other. However, obtained results agree with those reported by each of Hussain et al (1978) working on peas who found that total green pods of pea and total yield of cowpea were increased with late of seed sowing.

Regarding the effect of varieties data presented in Table (7) reveal that the tested pea cultivars significanlty differed in their yielding ability. In this regard, the maximum values for the yield and its components were obtained by Little Marvel variety followed by Lincoln and then Perfection cv. during both growing seasons of this work. However, the average pod weight was not signifiently effected in this regard. These results disagree with those of Abed et al (1988-b) and Khalil (1990-b) on peas showing that different varieties varied in this respect. With respect to the effect of variety on number and weight of pods per plant, obtained results agree with those reported by Hanafy (1973) on snap bean as well as Martin and Tabley (1981), Aricha

(1982), Saharia (1986), Abed et al (1988-b) and Khalil (1990-b) all yields. obtained results are in coincidence with those reported by each of Giri and Bhalerao (1984) Abed et al (1988-b), Kock (1988), Ardelen et al (1990) and Khalil (1990-b) all working on pea and Silveira et al (1991) on cowpea. Such varietal differences may be due to the great variations concerning the adaptation ability to the climatical conditions prevailing at the growing season and also to the variations of genitical factors between varieties.

With regard to the effect of plant spacing on yield and its components, it is clear from data at Table (7) that, plant spacing did not reflect any significant effect on average pod weight at both seasons of this work. Regarding the number of pods and yield of green pods per plant, gradually significant increments with increasing plant spacing between plants from 10-30 cm are detected. On the other hand, total yield (ton/fed) was significantly increased with decreasing plant spacing during both growing seasons of this work. Obtained results showing the effect of plant spacing on average pod weight are in accordance with those of Stino et al (1967-b) on cowpea, who showed that no significant effect was reported in this regard, However, Bakry et al (1984) on peas and El-Seifi et al (1991-b) on snap bean reported contra resutls where pod weight increased by increasing plant spacing.

With regard to the effect of plant spacing on number of pods per plant, obtained results agree with those of Lehman and Lambert et al (1967), lenka and Gautam (1972),Cruzat et al (1977), Murphy (1977),

(1960) and Rajput et al (1984) on soybean, Behairy (1965), and Tayel Andreoli and Fontes (1983) and White et al (1983) all working on pea, Stino et al (1967-b) and Herbert and Baggerman (1983) on cowpea, Rojas et al (1977) on bean, Haq and Hussian (1981) on mumg bean, Lisiewski and Kmiecik (1983-b), Fuciman (1987), Graf and Rewland (1987), Miccolis et al (1987) and Salim and El-Massri (1988) on faba bean. Regarding the effect of plant spacing on green pod yield per plant, obtained results of this work agree with those of Abd El-Fattah (1967) on peas, Stino et al (1967-b) and Saleh et al (1980) on cowpea, Haq and Hussain (1981) on mung bean, Lisiewska and Kmiecik (1983b) on broad bean and Rajput et al (1984) on soybean.

With regard to the effect of plant spacing on tatal yield, obtained results agree with those of Abd El-Fattah (1967), Tayel et al (1967) and Bakry et al (1984), all working on pea, Tayel et al (1967) on snap bean, lisiewska and Kumiecik (1983-b) on broad bean, Salem and El-Massri (1988), on faba bean and Saimbhi et al (1991) on pea. On the other hand, white et al (1983) on pea found that seed yield did not respond to changing of plant density.

The improving effect of wide spacing between plants on pods number per plant and plant yield may be attributed to its increasing effect on dry matter and N,P and K contents per plant as shown by data at Tables (2,4,5 and 6) which were the reasons of making plants in suitable physiological and nutritional conditions to be able to produce more pods number/plant and high plant yield. The remarkable good effect of the narrow plant spacing on total yield is mainly due to

the increased number of plants/unit area more than the decrease in yield per plant in such case.

Concerning the interactional effects of different studied factors on number and weight of green pods per plant, it may be concluded that plants of the variety Little Marvel showed the highest values in this respect when seeds were sown on November 15 th at 30 cm apart in the first seasom (1986/1987) and on October 15 th in the second season (1987/1988).

As a general conclusion, it is suggested that for obtaining the highest green pods yield (tons/fed), seeds of the variety Little Marvel has to be sown on Nov. 15 th at 10 cm apart. Such results was true at both growing seasons of this work.

Table(7): Pea Green pod yield and its components as affected by sowing date, variety and plant spacing.

Season			1986/1987				1987/1988			
Char. Plant. date	Var.	Spac. (cm)	Pod Weight (gm)	No of pods per plant	Plant yield (gm)	Total yield (ton/Fed)	Pod Weight (gm)	No of pods per plant	plant yield (gm)	Total yield (ton/Fed)
Oct. 15th	Little Marvel	10	4.2	6.3	26.46	3.528	4.3	7.1	30.53	4.071
		20	4.3	10.4	44.72	2.981	4.2	13.0	54.6	3.640
		30	4.4	15.1	66.44	2.953	4.3	13.0	55,9	2.484
Oct. 15th	Lincoln	10	4.5	5.1	22.95	3.060	4.5	4.4	19.8	2.640
		20	4.5	8.4	37.80	2.520	4.5	6.6	29.7	1.980
		30	4.6	12.0	55.20	2.453	4.5	6.9	31.05	1.380
Oct. 15th	Perfe-ction	10	4.3	2.5	10.75	1.433	4.4	3.0	13.2	1.760
		20	4.3	4.4	18.92	1.261	4.3	4.4	18.92	1.261
		30	4.3	6.6	28.38	1.261	4.3	4.9	21.07	0.936
Nov. 15th	Little Marvel	10	4.2	8.6	36.12	4.816	4.2	7.9	33.18	4.424
		20	4.4	11.3	49.72	3.315	4.3	11.4	49.02	3.268
		30	4.3	16.0	68.8	3.058	4.6	12.0	55.2	2.453
Nov. 15th	Lincoln	10	4.5	5.3	23.85	3.180	4.4	5.2	22.88	3.051
		20	4.5	9.0	40.50	2.700	4.5	8.2	36.9	2.460
		30	4.6	12.5	57.50	2.556	4.5	8.7	39.15	1.740
Nov. 15th	Perfe-ction	10	4.3	5.2	22.36	2.981	4.4	4.5	19.8	2.640
		20	4.3	8.9	38.27	2.551	4.3	6.9	29.67	1.978
		30	4.3	13.3	57.19	2.542	4.3	8.8	37.84	1.682
L.S.D at 5%			N.S	0.21	1.32	0.079	0.11	0.20	1.50	0.136
Oct.15th			4.4	7.9	34.60	2.383	4.4	7.0	30.53	2.239
Nov.15th			4.4	10.0	43.80	3.078	4.4	8.2	35.96	2.633
L.S.D at 5%			N.S	0.16	0.64	0.034	N.S	0.14	1.04	0.089
Litt.Mar.			4.3	11.3	48.70	3.442	4.3	10.7	46.40	3.39
Linc.			4.5	8.7	39.60	2.745	4.5	6.7	29.91	2.209
Perf.			4.3	6.8	29.50	2.005	4.3	5.4	23.42	1.710
L.S.D at 5%			N.S	0.07	0.46	0.020	N.S	0.13	0.61	0.044
spac.at		10cm	4.3	5.5	23.70	3.166	4.4	5.3	23.23	3.098
spac.at		20cm	4.4	8.7	38.30	2.555	4.4	8.4	36.47	2.431
spac.at		30cm	4.4	12.6	55.6	2.470	4.4	9.1	40.03	1.779
L.S.D.at 5%			N.S	0.08	0.54	0.032	N.S	0.08	0.62	0.056

4.1.4 Physical pod characteristics.

Data in Table (8) illustrate the physical pod characteristics, i.e. pod length and diameter, number of seeds per pod and netting percentage as affected by planting date, variety and plant spacing between plants. It is clear from such data that planting date had no significant effect on pod length and diameter. However, number of seeds per pod and netting percentage were significantly increased with delaying sowing date from october 15th to November 15th. Obtained results were of the same trend at both growing seasons. Simillar results were recorded by Gill et al (1984) on pea pod length. On the other hand, Abd El-Salam (1963) and Stino et al (1967) all working on cowpea and Hanafy (1973) and El-Seifi et al (1991-b) on snap bean show that each of pod length and diameter were increased with early planting date. Obtained results concerning the number of seeds per pod disagree with those of Gill et al (1984) and Pocsai (1987) who revealed that number of seeds per pea pod was not affected by sowing date. Moreover, Saharia (1986) reported contra results clearing that the number of seeds per pea pod was reduced with late sowing. Respecting effect of sowing date on netting percent, obtained results are in agreement with those reported by El-Moataz and Shawky (1967) on saybean. These results may be attributed to the effect of the suitable mean daily temperatures for pods setting and seed developing in pods.

Concerning the effect of variety on physical pod characters, it is evident from data at Table (8) that all the studied physical pod parameters were significantly differed bewteen the three tested

varieties. In this regared, the maximum values for pod length and number of seeds per pod were obtained by Lincoln variety which has the lowest values for pod diameter and netting percent. However, the maximum values for netting perccent were obtained by the Perfection variety during both growing seasons. Respecting pod diameter, both of little Marvel and Perfection varieties were of nearly similar values but significantly higher than those of Lincoln.

Obtained results agree with those of Abd El-Salam and El-Hakeem (1970) on cowpea; Abed et al (1988b); Chekrygin et al (1988), Kock (1988), Shevchenko (1988-b) and Tsyganok (1991) all working on different pea varieties for pod length, Abd El-Fattah on Abd El-Salam (1967) and both Chekrygin et al (1988) and Abed et al (1988 b) all working on pea for pod diameter. Abd El-Fattah and Abd El-Salam (1967); Nandpuri et al (1974),Aricha (1982) Shevehenko (1987), Abed et al (1988-b), Chekrgyin et al (1988) and Tsyganok (1991) all working on pea varieties for number of seeds per pod and Nandpuri et al (1974) and Abed et al (1988 b) all working on pea for netting percent. Such variation among the studied cultivars may be due to their genitical properties which are considered as the main factor in this respect.

Regarding the effect of plant spacing on physical pod measurments, it is noticed from data at Table (8) that each of pod length and pod diameter, number of seeds per pod and netting percentage were significantly increased with increasing plant spacing from 10 to 20 to 30 cm between plants during both growing seasons of this work. These results are in general agreement with those of

Stino et al (1967-b) on cowpea and disagree with those of Hanafy (1973) on snap bean and Salem and El-Massri (1988) on faba bean for pod length. Obtained results were also coincided with those reported by Hanafy (1973) on snap bean and El seifi et al (1991-b) on cowpea for pod diameter.

Concerning the number of seeds per pod, obtained results from the present work are in confirmety with those of Lehman and Lamber (1960) on soybean and Abd El-Salam (1963) on cowpea. However, contra results were reported by each of Brandes et al (1973) on broad bean, Rojas et al (1977) on bean and Cruzat et al (1977) on pea in this regard. Obtained results of this work, showing that wide spacing between plants increased the number of seeds per pod, are also in agreement with those reported by Murphy (1977) and Bakry (1984) on peas and Fuciman (1987) on bean who found that with high plant population, the number of seeds per pod was decreeased. Regarding the netting percentage, obtained results were in harmony with those of Abd El-Fattah (1967) on pea and Saleh et al (1980) on cowpea. However, contra results of such findings were reported by each of Abd El-Salam (1963) on cowpea and Cutcliffe (1984) on pea who found that shellout percentage was not affected by plant spacing. Such negative relationship between netting percentage and plant spacing is explained by some workers on base that it may be mainly controlled by genitical factors.

Concerning the interactional effect of studied factors on all phyysical pod parameters of this work, it may be concluded that no significancy is found for studied factors on physical pod character. Generally, it may be concluded that green pods of the variety lincoln showed the highest values of pod length and number of seeds per pod when seeds were sown at 30 cm apart on either October 15 th or November 15 th. However, green pods of the variety Perfection showed the highest netting percentage when seeds were sown on either the first or second seed sowing date at 30 cm apart. These results may be attributed to the varietal differences and plant spacing between plants.

Table(8): Pea Physical pod characteristics as affected by sowing date, variety and plant spacing.

Season			1986/1987				1987/1988			
Char. Plant. date	Var.	Spac. (cm)	Pod Length (cm)	Pod diameter (cm)	No of seds per pod	Netting %	Pod length (cm)	Pod diameter (cm)	No of seeds per pod	Netting %
Oct. 15th	Little Marvel	10	7.1	0.87	6.5	34.1	7.8	0.86	7.3	37.7
		20	7.6	0.86	7.3	39.6	7.2	0.89	7.3	40.4
		30	7.8	0.89	7.5	93.0	7.7	0.88	8.0	48.2
Oct. 15th	Lincoln	10	10.1	0.73	8.3	33.8	9.8	0.73	8.8	32.5
		20	10.5	0.76	8.7	35.6	10.3	0.79	9.0	36.8
		30	10.8	0.78	9.1	44.7	10.6	0.81	9.5	39.3
Oct. 15th	Perfe-ction	10	6.7	0.85	7.3	45.9	7.5	0.88	7.0	43.6
		20	7.1	0.87	7.5	46.9	7.6	0.90	7.5	46.2
		30	7.4	0.90	7.6	49.4	7.8	0.89	8.0	49.8
Nov. 15th	Little-Marvel	10	6.9	0.88	7.1	43.1	7.6	0.88	7.5	39.1
		20	7.8	0.87	7.4	47.0	7.7	0.88	7.8	44.1
		30	7.9	0.90	7.8	50.6	7.8	0.87	8.5	53.3
Nov. 15th	Lincoln	10	10.1	0.69	8.3	41.3	10.3	0.80	8.8	38.7
		20	10.4	0.70	9.0	43.6	10.6	0.77	9.3	42.1
		30	10.7	0.71	9.4	46.4	10.7	0.80	9.5	46.0
Nov. 15th	Perfe-ction	10	6.9	0.84	7.3	43.7	7.5	0.90	7.5	43.4
		20	7.6	0.87	7.5	45.2	7.7	0.89	7.8	48.3
		30	7.6	0.90	7.9	45.8	7.9	0.91	7.8	52.0
L.S.D at 5%			N.S	N.S	N.S	-	N.S	N.S	N.S	-
Oct.15th			8.3	0.83	7.7	41.8	8.5	0.85	8.0	41.6
Nov.15th			8.4	0.81	7.9	45.2	5.6	0.85	8.2	45.2
L.S.D at 5%			N.S	N.S	0.13	-	N.S	N.S	0.22	-
Litt. Mar.			7.5	0.88	7.2	42.9	7.6	0.87	7.7	43.8
Linc.			10.4	0.73	8.8	40.9	10.4	0.78	9.1	39.2
Perf.			7.2	0.87	7.5	46.1	7.7	0.89	7.5	47.2
L.S.D at 5%			0.15	0.01	0.12	-	0.20	0.02	0.11	-
spac.at		10cm	8.0	0.81	7.4	40.3	8.4	0.84	7.7	39.1
spac.at		20cm	8.5	0.82	7.9	43.5	8.5	0.85	8.0	42.9
spac.at		30cm	8.7	0.84	8.2	46.6	8.7	0.85	8.5	48.0
L.S.D.at 5%			0.12	0.01	0.09	-	0.16	N.S	0.18	-

4.1.5 Chemical constituents of seeds

Data presented in Table (9) show the chemical constituents of seeds, i.e dry matter percentage and N,P and K contents as affected by seed sowing, variety and plant spacing. It is evident, from such data, that the determinated chemical constituents of seeds were significantly increased with early planting date (October 15th) during both growing seasons. Obtained results were in agreement with those of Cervato and Marudelli (1988) on pea regarding N,P and K seeds content. However, obtained results disagree with those of Hanafy (1973) on snap bean and Strekalova and Kormeichuch (1973) on tomato fruits with regard to the effect of planting date on seed dry matter content. The reported data herein were in harmany with those found by Ali Khan (1977) and Gubbels (1978) working on pea, concerning seeds protein content. The effect of seed sowing date on either dry matter seed content or on the chemical constituents i.e N,P and K of seeds is mainly due to the environmental conditions, specially degrees of temperature, prevailing during growth season. Such increments in the accumulation of N,P and K content of green seeds are due to the increasing plant uptake of studied macro-nutrients during growth season. Such increments in the accumulation of green seeds are due to the increasing plant uptake of studied macro nutrients during early planting date (Tables 4,5 and 6).

Regarding the effect of variety on chemical constituents of seeds, it is clear from data presented in Table (9) that all the studied seeds constituents were significanlty differed between the three tested varieties. In this respect, the maximum values for all such chemical

constituents, i.e N,P and K as well as seeds dry matter perentage were obtained by Little Marvel variety during both growing seasons. These results are in general agreement with those reported by Aricha (1982), Cervato and Marudelli (1985); Shevchenko (1987) and Abed et al (1988-b) on pea cultivars. However, Hanafy (1973) on snap bean varieties reported that no significant differences between varieties were found. These results may be attributed to the effect of genitical factors.

Concerning the effect of plant spacing on seeds chemical constituents, it is shown, from data illustrated at Table (9), that all determined seeds chemical constituents were significantly increased with increasing plant spacing from 10 to 30 cm apart during both growing seasons of this work. Obtained results are in general agreement with those reported by Behairy (1965) and Fordonski et al (1989) all working on pea, El-Bakry (1966), Hanafy (1973) and El seifi et al (1991-b) working on snap bean concerning the effect on seed dry matter content. With regard to the effect of plant spacing on the seeds macro elements content, obtained results are going in the same trend with those renorted by Behairy (1965) on peas concerning N seeds content. Moreover, obtained results, showing superior effect of wide spacing on green seeds N concentration of peas, agree with those reported by Fordonski et al (1989) on pea pods who found that protein pod content increased with decreasing sowing rate. However, Tayel et al (1967) on snap bean and Saleh et al (1980)on cowpea reveald that distance between hills had no effect on concentration of N in pods or protein % seeds respectively. The improving effect of wide spacing

Table(9): Pea Chemical constituents of seeds as affected by sowing date, variety and plant spacing.

Season			1986/1987				1987/1988		
Char.		Dry Matter	N	P	K	Dry Matter	N	P	K
Plant. Var.	Spac.	%	mg/100 gm dry weight			%	mg/100 gm dry weight		
date	(cm)								
Oct.	10	24.4	3345.0	571.3	2760.0	24.3	3347.5	574.5	2740.0
15th Little	20	25.2	3372.5	592.8	2780.0	25.1	3370.0	591.8	2782.5
Marvel	30	26.2	3427.5	605.5	2820.0	26.1	3415.0	604.8	3067.5
Oct.	10	23.8	3290.0	562.5	2740.0	22.8	3310.0	551.3	2735.0
15th Lincoln	20	24.1	3325.0	581.3	2767.5	23.7	3342.5	575.5	2762.5
	30	24.9	3350.0	592.0	2807.5	24.3	3370.0	593.8	2925.0
Oct.	10	24.1	3252.5	556.0	2707.5	23.8	3282.5	543.8	2702.5
15th Perfe-	20	24.6	3307.5	571.3	2737.5	24.8	3312.5	564.5	2745.0
ction	30	25.7	3332.5	586.0	2777.5	25.7	3350.0	581.3	2805.0
Nov.	10	23.7	3242.5	543.8	2670.0	24.2	2782.5	536.0	2640.0
15th Little	20	24.5	3270.0	568.8	2727.5	25.1	3305.0	552.5	2660.0
Marvel	30	25.3	3322.5	581.8	2775.0	26.2	3337.5	574.5	2680.0
Nov.	10	22.8	3222.5	538.3	2657.7	22.4	3257.5	531.8	2610.0
15th Lincoln	20	23.6	3245.0	562.0	2662.5	23.4	3275.0	543.3	2642.5
	30	24.2	3272.5	580.8	2722.5	24.6	3300.0	563.8	2677.5
Nov.	10	23.4	3207.5	530.8	2615.0	23.8	3240.0	526.8	2542.5
15th Perfe-	20	24.2	3232.5	542.8	2662.5	24.8	3257.5	536.0	2580.0
ction	30	24.8	3282.5	563.0	2715.0	25.9	3270.0	499.0	2615.0
L.S.D at 5%			N.S	1.61	N.S		N.S	N.S	38.34
Oct.15th		24.8	3333.6	579.8	2766.4	24.5	3344.4	575.7	2807.2
Nov.15th		24.0	3255.3	556.9	2689.7	24.5	3225.0	540.4	2627.5
L.S.D at 5%			9.19	0.76	14.21		8.36	18.10	17.58
Litt. Mar.		24.9	3330.0	577.3	2755.4	25.1	3259.6	572.3	2761.7
Linc.		23.9	3284.2	569.5	2726.3	23.5	3309.2	559.9	2725.4
Perf.		24.5	3269.2	558.3	2702.5	24.8	3285.4	541.9	2665.0
L.S.D at 5%			7.0	0.85	7.57		N.S	14.64	15.98
spac.at	10cm	23.7	3260.0	550.4	2691.7	23.5	3203.3	544.0	2661.7
spac.at	20cm	24.3	3292.1	569.8	2722.9	24.4	3310.4	560.6	2695.4
spac.at	30cm	25.2	3331.3	584.8	2769.6	25.4	3340.4	569.5	2795.0
L.S.D.at 5%			8.91	0.66	10.30		80.18	13.99	15.65

between plants on chemical constituents of seeds may be attributed to its improving effect on dry matter and N,P and K contents per plant (Tables 2,4,5 and 6) which were the reasons of making plant in suitable physiological and nutritional conditions to be able to produce seeds of high concentration of chemical constituents.

With regad to the interactional effect of different studied factors on all determined constituents of pea seeds, it may be concluded that seeds of the vareity Little Marvel showed the highest values of dry matter, N,P and K contents when seed sowing took place on October 15 th at 30 cm apart during both growing seasons of this work. Finally, it may be concluded that growing Little Marvel variety on Nov. 15 th and sowing seeds on both sides of ridges 60 cm apart in hills 10 cm in between is advisable to obtain the highest green pod yield (ton/fed), of better physical and chemical characteristics than either other used varieties, sowing date or plant spacing.

4.2. The second experiment.

Effect of pea plants fertilization level on green pods yield and storageability, as well as effect of disinfection and packing treatments and storage period and conditions on keeping quality of pea pods.

4.2.1 Green pod yield

Data presented at Table (10) show that increasing level of fertilization gradually and constantly increased the green pods yield of peas. Moreover, it is evident from such data that the highest used level of commercial fertilizers i.e 200 kg of ammonium sulphate + 400 kg of calcium superphosphate + 100 kg of potassium sulphate/fed showed the highest green pods yield (3.720 and 3.487 tons/fed) at the two growing seasons. Obtained results are going in the same trend with those reported by Oliverira et al (1970); Borcean et al (1979), Aricha (1982), Stan et al (1985) and Khalil (1990-b) all working on peas. They revealed that green pods yield or grain yield of pea plants increased with increasing level of nitrogen fertilization. However, Cebula et al (1988) did not find significant effect for nitrogen fertilizer on total yield of green pea pods. Moreover, Shafshak (1991) working on common bean found similar results regarding P fertilizer application. In addition, results reported by Eid et al (1988) on broad bean and Afifi et al (1989) on cowpea supported findings of this work concerning effect of complete fertilizer. On the other hand, obtained results disagreed with those reported by Bishop et al (1977) regarding effect of N,P and K fertilizers. However, Cebula et al (1988) who found that green pods yield of peas was not affected by nitrogen fertilization at 40 or 80 kg N/ha. Generally, it may be concluded that, under similar conditions of this work, it is advisable to fertilize pea plants variety Little Marvel with a level of 200 kg of amm. sul. + 400 kg of cal. super. Phos. + 100 kg of pot. sul./fed to obtain the highest green pods yield.

Table (10) Effect of fertilization level on green pods yield of peas

Fertilization level (Kg/fed)			1987/1988	1988/1989
amm.sul.	cal.super phos.	pot. sul.		
100	200	50	2.162	1.912
150	300	75	2.900	2.838
200	400	100	3.720	3.487
L.S.D.at 5%			0.290	0.300

4.2.2 Weight loss percentage.

Data presented at Table (11) show the effect of pea plants fertilization levels, pod disinfection and packing treatments as well as storage period and conditions on green pods weight loss % during storage. Such data show that weight loss % of green pea pods was gradually decreased with increasing plant ferlilizer level where the lowest values in this respect are reported for the highest used level of plant fertilitzation (200 kg of ammonium sulphate + 400 kg of calcium super phosphate + 100 kg of potassium sulphate/fed). Obtained results were going in the same trend at both seasons of this work and at the two used storage conditions (cold and normal room storage). These findings are in agreement with those Obtained by Hardh et al (1979) on tomato and El-Sheikh (1988) on tomato and peas regarding potassium fertilizer effect. However, contra results were reported by Shafshak (1961) on tomato and El-Sheikh (1988) on pea in case of nitrogen application. Whileas, Shafshak (1961) found that P had no

effect on weight loss % but K was of slight reducing effect. This decrement in weight loss may be explained on the base of the physiological role of potassium in increasing the osmotic potential in the cell of pod tissues which diminished the water loss in pea pods during storage and consequently reduced the weight loss (Gardener et al 1985).

Concerning the effect of pod disinfection treatments, the same data presented at Table (11) show that soaking pea pods in 1% borax solution significantly decreased the percentage of pods weight loss than either washing with tap water or control treatments (not treated pods)either at cold or normal room storage conditions at both seasons of this work. These results were in agreement with those Obtained by El-Sayed et al (1986) on cucumber and squash and Shanan et al (1978) on cucumber who found that using borax and boric acid solutions gave better results than those untreated ones. On the other hand, El-Beheidi et al (1979) on green bean came to similar conclusion. Whileas, Heikal and El-Mahmoudi (1959) found that washing and drying eggplant fruits before storage had little effect on moisture loss. Obtained results may be attributed to that borax solution may be a source of boron which absorbed in pods and increase the osmotic potential in the cell of pod tissues in additions to the increasing adhesive force of free and bound water of pod cell and concequently reduced the water loss in pea pods during the storage.

With regard to the effect of packing treatments on green pea pods weight loss %, it is evident from data at the same Table (11) that

packing green pea pods in perforated polyethlene packages significantly decreased percentage of weight loss than either perforated craft packages or control treatments (not packed). In this regard using perforated polyethylene packages reflected the lowest values in the percentage of green pods weight loss during both season of storage under both normal and cold storage conditions. These findings are in agreement with those obtained by Hasan and Soehadi (1978); Ben-Yehoshua et al (1980) and Abd El-Rahman (1990) all working on pepper and Heikal et al (1967) working on snap bean and pea as well as El-Beheidi et al (1979) and Atwa et al (1980-c) all working on green bean. The decrease in loss in weight of pea pods during storage by packing is attributed to the decrease in loss of dry weight by respiration and to the decrease in water loss as a result of transpiration. In other words, packing depressed moisture loss through transpiration and evaporation and decreased exchangeable gas which resulted in low rispiration rate. This explanation which attributed to the depressive effect of packing through its bad effect on such physiological processes which minimize weight loss was affered by Weibe (1969) on cucumber. Generally, it could be concluded that using perforated polyethylene packages for packing green pea pods was the best packing treatment under either cold or normal room storage conditions.

Respecting the effect of storage period on the green pea pods weight loss percentage, it is evident from the same data at Table (11) that increasing storage periods from 8 to 32 days under cold storage conditions and from 4 to 16 days under normal room storage

significantly increased the values of pods weight loss %. Obtained results are true at both seasons of this work where the highest values in this repect were obtained after 32 days of cold storage or 16 days of storage at normal room temperature. These results were in coincidence with those obtained by Shanan (1967), El-Beheidi et al (1979); Abu El-Hamd et al (1990) and Shanan et al (1990) all working on some leguminous crops as wells as with those obtained by Khalifa et al (1988); Shafshak et al (1991), Zaki et al (1991-b) all working on tomato, Kojima and Tanaka (1977) on muskmelons and Abd El-Rahman (1990) on pepper concerning the increase in % of weight loss with the prolongation of storage period. This finding may be attributed to the loss in moisture through transpiration and loss in dry matter content through respiration as mentioned by Kojima and Tanaka (1977) on muskmelons.

With respect to the effect of storage conditions on pods weight loss percentage, data recorded in Table (11) show clearly that storage green pea pods under normal room condition increased the percentage of weight loss than under cold conditions. Such results are in agreement with those reported by Abd El-Kader et al (1978); Abd Alla et al (1985); El-Sheikh (1988) and Zaki et al (1991-b) all working on tomatoes, Atwa et al (1980 a) on cucumber, El-Sheikh (1988) on pea and Abu El-Hamd et al (1990) on snap bean. The percentage of loss in weight increased at a more rapid rate with storage in normal room than in cold ones mainly owing to the higher temperature and lower air humidity in normal room than in cold ones. These conditions caused a great moisture loss from pods as reported by Francis and Thomson

(1965) on squash who found that weight loss increased at higher than lower temperature. Generally it may be concluded that each of pea plant fertilization level, pod disinfection and packing treatments as well as storage period and conditions are effective on pod weight loss %. In this respect, higher used level of plant fertilization (200 kg of amm. sul.+ 400 kg of cal. super. phos. + 100 kg of pot. sul./fed) and dipping pods in 1% borax solution for 5 minutes as well as packing pods in perforated polyethylene or craft (1 kg) packages before packing in the exportation carton packages (5 kg) for either 4-8 days when stored at normal room storage or 16-24 days at cold storage, may be recommended to minimize the percentage of weight loss of green pea pods to improve storogeability and to prolong the shelf life of such green pods to a suitable extent.

Table (11) Effect of pea plant fertilization level, pods disinfection and packing treatments as well as storage periods and conditions on green pods weight loss % (1988 season).

Cold storage

Fert. level (Kg/fed)		100 amm. sul.	200 cal.super phos.	50 pot. sul.	150 amm. sul.	300 cal.super phos.	75 pot. sul.	200 amm. sul.	400 cal.Super phos.	100 pot. sul.
Period (Day)		0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32
Dis Nt. Treat.	pack.									
	Nt. pack.	- 7.02 9.43 11.19 14.33	- 6.70 9.13 10.67 13.98	- 6.60 8.91 10.52 13.72						
	perf.craft	- 6.82 9.28 11.11 14.21	- 6.60 8.97 10.57 13.86	- 6.42 8.72 10.40 13.56						
	" polyet.	- 6.68 9.08 10.97 14.04	- 6.45 8.77 10.45 13.72	- 6.23 8.57 10.25 13.41						
Tap Water.	Nt. pack.	- 6.92 9.13 10.90 14.00	- 6.41 8.89 10.30 13.58	- 6.31 8.63 10.22 13.48						
	Perf.craft	- 6.71 8.92 10.74 14.81	- 6.19 8.63 10.11 13.33	- 6.11 8.40 10.00 13.22						
	" polyet.	- 6.50 8.70 10.55 14.63	- 6.00 8.44 9.85 13.10	- 5.89 8.19 9.85 13.00						
Borax 1%	Nt. pack.	- 6.80 8.97 10.63 13.72	- 6.11 8.55 10.00 13.25	- 6.00 8.29 9.91 13.11						
	perf.craft	- 6.65 8.73 10.45 13.50	- 5.93 8.31 9.81 13.00	- 5.81 8.00 9.69 12.88						
	" polyet.	- 6.46 8.55 10.23 13.30	- 5.77 8.10 9.62 12.83	- 5.57 7.98 9.48 12.61						

Fert. 10.12 9.61 9.44 L.S.D. 5% 0.11 Dis. 10.03 9.74 9.39 L.S.D. 5% 0.11
Pack. 9.89 9.73 9.55 L.S.D. 5% 0.11 Per. 6.35 8.67 10.31 13.56 L.S.D. 5% 0.13
Fert. Dis. Pack. Per. L.S.D. 5% N.S

Normal room storage

Period (Day)		0 4 8 12 16	0 4 8 12 16	0 4 8 12 16						
Dis. Nt. Treat.	pack.									
	Nt. pack.	- 9.28 11.85 14.22 16.27	- 9.10 11.46 13.85 15.97	- 8.67 10.78 13.49 15.70						
	perf.craft	- 9.03 11.64 14.21 16.11	- 8.81 11.22 13.72 15.78	- 8.47 10.52 13.33 15.49						
	" .polyet.	- 8.78 11.44 13.88 15.95	- 8.54 10.97 13.61 15.66	- 8.26 10.34 13.23 15.37						
Tap Water.	Nt.pack.	- 8.85 11.55 13.95 15.81	- 8.88 11.18 13.49 15.56	- 8.25 10.48 13.12 15.36						
	perf.craft	- 8.63 11.33 13.69 15.60	- 8.57 10.77 13.29 15.33	- 8.00 10.20 12.75 15.19						
	" polyet.	- 8.41 11.10 13.45 15.35	- 8.33 10.51 13.11 15.18	- 7.75 9.97 12.56 14.92						
Borax 1%	Nt.pack.	- 8.50 11.15 13.48 15.47	- 8.48 10.82 13.22 15.18	- 7.81 10.11 12.81 15.00						
	Perf.craft	- 8.29 10.88 13.25 15.21	- 8.20 10.60 13.00 14.79	- 7.59 9.83 12.57 14.73						
	" polyet.	- 8.00 10.63 13.10 14.95	- 7.95 16.39 12.81 14.60	- 7.35 9.58 12.31 14.55						

Fert. 12.31 12.19 11.56 L.S.D. 5% 0.09 Dis. 12.36 11.95 11.75 L.S.D. 5% 0.09
Pack 12.19 11.96 11.91 L.S.D. 5% 0.09 Pcr. 8.39 11.01 13.31 15.37 L.S.D. 5% 0.11
Fert. Dis. Pack. Per. L.S.D. 5% N.S

Table (11 Cont.) Effect of pea plant fertilization level, pods disinfection and packing treatments as well as storage periods and conditions on green pods weight loss % (1989 season).

Cold storage

Fert.level (Kg/fed)		100 amm. sul.	200 cal.super phos.	50 pot. sul.	150 amm. sul.	300 cal.super phos.	75 pot. sul.	200 amm. sul.	400 cal.Super phos.	100 pot. sul.
Period (Day)		0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32
Dis. pack. Nt. Treat.	Nt.pack.	- 6.69 10.01 14.42 16.02	- 6.26 9.87 14.11 15.59	- 5.82 9.86 13.92 15.27						
	perf.craft	- 6.50 9.87 14.31 15.85	- 6.16 9.71 13.86 15.40	- 5.78 9.48 13.77 15.02						
	" polyet.	- 6.39 9.75 14.22 15.63	- 6.04 9.60 13.65 15.16	- 5.64 9.28 13.58 14.87						
Tap Water.	Nt. pack.	- 6.29 9.66 14.00 15.66	- 5.99 9.48 13.70 15.11	- 5.43 9.46 13.59 14.88						
	Perf.craft	- 6.10 9.45 13.79 15.41	- 5.68 9.26 13.51 15.81	- 5.19 9.27 13.31 14.61						
	" polyet.	- 5.81 9.21 13.55 15.19	- 5.43 9.00 13.29 15.60	- 5.00 9.00 13.00 14.51						
Borax 1%	Nt. pack.	- 6.00 9.25 13.75 15.21	- 5.51 9.15 13.35 14.70	- 5.11 9.15 13.20 14.49						
	perf.craft	- 5.88 9.00 13.51 15.00	- 5.29 8.89 13.19 14.55	- 4.87 8.83 13.00 14.30						
	" polyet.	- 5.59 8.75 13.35 14.80	- 5.11 8.70 13.00 14.36	- 4.66 8.65 12.85 14.10						
Fert.	11.21 10.91 10.61	L.S.D. 5% 0.18	Dis.	11.31 10.92 10.53	L.S.D. 5% 0.18					
Pack	11.11 10.92 10.73	L.S.D. 5% 0.18	Per.	5.71 9.31 13.58 15.07	L.S.D. 5% 0.20					
Fert. Dis. Pack. Per.		L.S.D. N.S								

Normal room storage

Period (Day)		0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16
Dis. pack. Nt. Treat.	Nt.pack.	- 8.19 16.60 22.88 - -	- 7.91 16.30 22.53 - -	- 7.23 15.85 22.09 -						
	perf.craft	- 8.04 16.48 22.76 - -	- 7.47 16.19 22.33 - -	- 7.14 15.64 21.91 -						
	" polyet.	- 7.81 16.34 22.66 - -	- 7.29 15.95 22.12 - -	- 6.87 15.55 21.64 -						
Tap Water.	Nt. pack.	- 7.75 16.21 22.49 - -	- 7.50 16.01 22.20 - -	- 6.88 15.55 21.75 -						
	perf.craft	- 7.51 16.00 22.21 - -	- 7.29 16.83 21.91 - -	- 6.59 15.28 21.51 -						
	" polyet.	- 7.40 15.85 22.00 - -	- 7.12 16.57 21.75 - -	- 6.37 15.00 21.29 -						
Tap Water.	Nt pack.	- 7.36 15.81 22.17 - -	- 7.22 15.72 21.95 - -	- 6.51 15.21 21.40 -						
	Perf.craft	- 7.19 15.59 21.93 - -	- 7.01 15.51 21.82 - -	- 6.40 15.01 21.26 -						
	" .polyet.	- 6.90 15.37 21.78 - -	- 6.71 15.20 21.59 - -	- 6.29 14.88 21.00 -						
Fert.	15.30 15.11 14.52	L.S.D. 5% 0.11	Dis.	15.32 14.99 14.62	L.S.D. 5% 0.11					
Pack	15.15 14.99 14.78	L.S.D. 5% 0.10	Per.	7.18 15.79 21.96	L.S.D. 5% 0.11					
Fert. Dis. Pack. Per.		L.S.D. 5% N.S								

4.2.3 The decay percentage

Data presented at Table (12) show the effect of pea plant fertilization level, disinfection and packing treatments as well as storage period and conditions on green pods decay % through the seasons of 1988 and 1989. Such data show that the decay % of pea pods was gradually decreased with increasing pea plant fertilization level where the lowest values are reported for the highest used level of plant fertilization (200 kg of amm.sul. + 400 kg of cal. super. phos. + 100 kg of pot. Sul./fed). Obtained results were going in the same trend at both seasons of this work and at the two used storge conditions. These findings are in agreement with those obtained by Schafer (1954) and Shafshak (1961), working on tomato concerning effect of phosphorus fertilizers and Shafshak (1961) and Omran (1962) both working on tomato and El-Sheikh (1988) on pea demonstrated that application of potassium fertilizer decreased the percentage of fruit and pods decay during storage. Contra results were reported by Shafshak (1961) and Omran (1962) on tomato and El-Sheikh (1988) on pea concerning N fertilization whileas, Omran (1962) observed that P did not influence the percentage of decayed tomato fruits during storage. The results favourable effect of potassium fertilizers might be attributed to inhibitory effect of potassium sulphate on the development of certain types of organisms, El-Mansi (1968) on pepper came to a similar conclusion to that K encouraged the formation of rapid cell wall and enhanced the thickness of cuticle or peridermis cells.

Regarging the effect of disinfection treatments, the same data in Table (12) show that soaking pea pods in borax solution (1%) significantly decreased the decay percentage of pods compared with the control treatments (not treated pods) either at cold or at normal room storage in both years of this work. Moreover, no significnat differences between either 1% borax or washing with tap water treatments may be detected. Obtained results are in agreement with those obtained by Chiang and Others (1963) and Abd El-Latief (1968) who revealed that borax and boric acid were both equally effective in reducing decay of orange fruits. In this regard El-Sayed et al (1986) on squash and cucumber obtained similar results. These findings reported heren may be suggested to the inhibitory effect of borax on the development of certain types of organisms.

With regard to the effect of packing on the green pods decay percentage, the same data illustrated at Table (12) show that packing treatments had no significant effect on decay percentage of green pea pods during storage at normal room conditions only in the first Season (1988). However, packing significantly affected the decay % of green pods under both cold and normal room storage conditions in the second Season (1989). Moreover, it is also evident that no decay was observed during the cold storage in first season. Regardless significancy of decay % values, it is evident that results show,in general that, packing in either craft or polyethylene bags reduced the decay % than control treatments. Obtained results are going in the same trend with those reportd by Kopec (1967) who found that packing in perforated polyethylene bags reduced the spoilage losses in

pepper, lettuce and strawberries fouits as compared to unpacked ones. Similar reuslts were obtained by Abd El-Rahman (1990) on pepper. However, contra results were obserued by Atwa et al (1980-a) working on cuumber who found that polyethylene package reduced the decay %. The low decay % inside the perforated bags may be attributed to the continous ventilation, less moisture condensations, suppresion of off flavour develoment and the formation of the modified atmosphere with low oxygen and high Co_2 which reduce the germs growth (Abd El-Rahman, 1990 on pepper).

With respect to the effect of storage periods on the green pods decay percentage, it is clearly evident from the same data at Table (12) that the decay percentage of green pea pods increased considerably and consistently with the prolongation of storage period. It is also obvious that no decay was observed during the cold storage in first Season (1988) till the end of storage period, but the decay in general occured after 16 days at cold storage in the secord season and after 8 days in normal storage in the two seasons. These results are in agreement with those obtained by many investigators such as Shanan (1967) El-Beheidi et al (1979), Abu El-Hamd et al (1990) and Shanan et al (1990) all working on some leguminous crops and also each of Khalifa et al (1988) and Zaki et al (1991-b) all working on tomatoes and Abd El-Rahman (1990) on pepper who found a consistent and progressive increase in decay percentage with the prolongation of storage period. These results may by attributed to the changes occured in pods during storage periods which caused the increase of moisture condensation on the exterior surface of pods, the decrease of

pod firmness as well as the transformation of complex compounds to simple forms which are of more liability to fungus infection (Shera 1975) on cucumber.

Concerning the effect of storage conditions on the green pods decay percentage, it is clear from data presented at Table (12) that the decay percentage decreased at cold storage conditions (4°C ± 1) than storing at normal room temperature (20°C ± 2). Such improving effect of cold storage conditions than that of storage at room temperature is obvious under differnet treatments and seasons of this work. These results are in agreement with those obtained by Abd El-Kader et al (1978); Abd Alla et al (1985); El-Sheikh (1988); and Zaki et al, (1991-b) all working on tomato, Atwa et al (1980 a); on cucumber, El-Sheikh, (1988); on pea, Abd El-Rahman, (1990) on pepper and Abu El-Hamd et al (1990) on snap bean. The increased values of the decay percentage observed at a more rapid rate with storage in normal room than in cold ones are mainly owing to the higher temperature and lower air humidity in normal room than in cold ones. These conditions of the normal room temperature enhanced the activity of pathogenic organisms which attack the pods and increase the decay % as reported by Smith, (1958) on strawberry and Hall (1961) on tomato who pointed out that both fungal rotting and decay were reduced at low temperature than at higher one. Generally, it may be concluded that each of plant fertilization level, disinfection and packing treatments as well as storage period and conditions are effective on decay % of pea pods. In this regard, higher used level of plant fertilization(200 Kg of amm.sul. + 400 Kg of cal. super. phos. + 100 Kg

of pot. sul. fed) and soaking pods in 1% borax solution or in tap water for 5 minutes. as well as packing pods in either preforated poly ethylene or craft (1kg) backages before packing in the expatation carton packages (5Kg) for either 4-8 days when stored at normal room storage or 24 - 32 days at cold storoge may be recommended to minimize the % of decay of green pea pods, to improve storageability and to prolong the shelf life of such green pods to a suitable extent.

Table (12) Effect of pea plant fertilization level, pods disinfection and packing treatments as well as storage periods and conditions on green pods decay % (1988 season).

Fer.level. (Kg/fed)	100 amm. sul.	200 cal.super phos.	50 pot. sul.	150 amm. sul.	300 cal.super phos.	75 pot. sul.	200 amm. sul.	400 cal.Super phos.	100 pot. sul.
				Cold Storage					
				No Decay					
				Normal room starage					

Period (Day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. Nt. Treat.	pack.															
	Nt.pack.	-	-	6.14	8.59	18.76	-	-	5.19	7.41	17.46	-	-	4.26	7.46	16.14
	perf.craft	-	-	5.97	8.42	18.50	-	-	4.94	7.20	17.39	-	-	4.07	6.96	15.84
	" .polyet.	-	-	5.70	7.96	18.19	-	-	4.66	7.10	16.94	-	-	3.76	6.40	15.34
	Nt. pack.	-	-	5.95	8.28	18.49	-	-	4.80	7.17	17.19	-	-	4.00	7.11	15.85
Tap Water.	perf.craft	-	-	5.81	8.01	18.27	-	-	4.65	6.93	16.81	-	-	3.71	7.00	15.70
	" .polyet.	-	-	5.73	7.89	18.10	-	-	4.41	6.71	16.70	-	-	3.59	6.89	15.50
	Nt.pack.	-	-	5.70	8.00	18.15	-	-	4.55	6.87	16.85	-	-	3.81	6.88	15.51
Tap Water.	Perf.craft	-	-	5.56	7.79	17.81	-	-	4.41	6.60	16.63	-	-	3.60	6.71	15.33
	" polyet.	-	-	5.41	7.63	17.62	-	-	4.26	6.55	16.53	-	-	3.51	6.58	15.20

Fert.	10.68	9.51	8.76	L.S.D. 5%	0.45	Dis.	9.88	9.67	9.40	L.S.D. 5%	0.45
Pack	9.87	9.62	9.44	L.S.D. 5%	N.S	Pcr.	4.74	7.30	16.91	L.S.D. 5%	0.45
Fert. Dis. Pack. Per.				L.S.D. 5%	N.S						

Table (12 Cont.) Effect of pea plant fertilization, pods disinfection and packing treatments as well as storage periods and conditions on green pods decay % (1989 season).

Cold storage

Fert. level. (Kg/fed)		100 amm. sul.		200 cal.super phos.		50 pot. sul.		150 amm. sul.		300 cal.super phos.		75 pot. sul.		200 amm. sul.		400 cal.super phos.		100 pot. sul.
Period (Day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32		
Dis. pack. Nt. Treat.	Nt.pack.	-	-	6.41	17.15	-	-	-	5.36	14.64	-	-	-	3.74	13.45	-		
	perf.craft	-	-	6.16	16.83	-	-	-	5.12	14.43	-	-	-	3.50	13.18	-		
	" polyet.	-	-	5.96	16.46	-	-	-	4.83	14.11	-	-	-	3.15	12.94	-		
Tap Water.	Nt.pack.	-	-	6.15	16.87	-	-	-	5.00	14.33	-	-	-	3.37	13.17	-		
	Perf.craft	-	-	5.88	16.61	-	-	-	4.71	14.12	-	-	-	3.18	12.81	-		
	" .polyet.	-	-	5.70	16.50	-	-	-	4.62	13.98	-	-	-	3.01	12.60	-		
Borax 1%	Nt. pack.	-	-	6.00	16.55	-	-	-	4.71	14.01	-	-	-	3.01	12.91	-		
	perf.craft	-	-	5.79	16.41	-	-	-	4.60	13.81	-	-	-	2.97	12.71	-		
	" polyet.	-	-	5.58	16.20	-	-	-	4.49	13.65	-	-	-	2.75	12.55	-		

Fert.	11.28	9.47	8.06	L.S.D. 5%	0.43	Dis.	9.85	9.58	9.37	L.S.D. 5%	0.43		
Pack	9.82	9.60	9.39	L.S.D. 5%	0.43	Per.	4.66	14.55		L.S.D. 5%	0.35		
Fert. Dis. Pack. Per.				L.S.D. 5%	N.S								

Normal room storage

Period (Day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. pack. Nt. Treat.	Nt.pack.	-	-	8.66	19.14	-	-	-	7.19	17.77	-	-	-	5.72	16.38	-
	perf. craft	-	-	8.36	19.01	-	-	-	6.86	17.51	-	-	-	5.42	16.13	-
	" polyet.	-	-	8.07	18.71	-	-	-	6.26	17.19	-	-	-	5.11	15.61	-
Tap Water.	Nt. pack.	-	-	8.31	18.91	-	-	-	6.80	17.50	-	-	-	5.38	16.11	-
	perf.craft.	-	-	8.15	18.72	-	-	-	6.71	17.36	-	-	-	5.19	15.81	-
	" polyet.	-	-	7.91	18.60	-	-	-	6.52	17.19	-	-	-	5.00	15.73	-
Borax 1 %	Nt.pack.	-	-	8.01	18.63	-	-	-	6.70	17.20	-	-	-	5.21	15.90	-
	Perf.craft	-	-	7.71	18.46	-	-	-	6.57	17.00	-	-	-	5.01	15.72	-
	" polyet.	-	-	7.53	18.25	-	-	-	6.41	16.71	-	-	-	4.88	15.50	-

Fert.	13.39	11.96	10.54	L.S.D. 5%	0.28	Dis.	12.17	11.99	11.74	L.S.D. 5%	0.28		
Pack	12.19	11.98	11.73	L.S.D. 5%	0.28	Per.	6.65	17.28		L.S.D. 5%	0.23		
Fert. Dis. Pack. Per.				L.S.D. 5%	N.S								

4.2.4 Seeds dry matter percentage

It is clear from data presented at Table (13) that increasing level of fertilization gradually and constantly increased the dry matter % of seeds where the highest values are reported for the highest used level of plant fertilization (200 kg of amm.sul. + 400 Kg of cal super.phos. + 100 kg of pot. sul./fed). These resutls are true at both the two seasons of this work. Such findings are in harmony with those obtained by Graman et al (1978) and Omran et al (1979) dealing with beans and Morivedt (1981) working on soybean concerning the nitrogen fertilization effect on this respect. However, Ivanov (1979) on lupin and Mc Ewen et al (1981) on beans reported contra rasnlts where N fertilizer had no effect on dry matter content of seeds. Contra, results were also reported by Zusevies (1981) who pointed out that dry matter content of bean decreased with increasing rates of N fertilizer concerning the effect of phosphorus fertilizers application to grown plants on dry matter content of produced pods. Obtained results of this work are in agreement with those of pais and Hodoss (1976), Stepanov et al (1978), Andrews and Manajuti (1980), Zusevies (1981) and Hassan (1982) all working on peas and beans, Haque et al (1980) on soybean seeds regarding the effect of P pertilization. However, contra resutls regarding P fertilizer were reported by Lovadini et al (1977), Ivanov (1979) and Al thawi et al (1980) all working on lupin. Regarding the effect of potassium fertilizers, the findings of each of Lovadini et al (1977) on soy bean, Zusevies (1981) on bean and El-Sheikh (1988) on pea supported the findings of this work. However, adverse trend in this respect was reported by Ivanov (1979) on lupin

pods dry matter content. It may be suggested that N,P and K fertilization played an important role in keeping quality of pea seeds.

With regard to the effect of pods disinfection treatments on seed dry matter percent, data at Table (13) indicate that soaking pea pods in borax solution 1% just before storage significantly decreased the dry matter % of pea seeds than either washing with tap water or control treatments (not treated pods). These resutls are going in the same trend at both used storage conditions and at the two seasons of this work. Obtained results are in harmony with those reparted by Atwa et al (1980-c) who revealed that washed and untreated green bean pods surpassed those of other treatments regarding the dry matter %. The obtained results of this work could be attributed to that the transpiration process is going in the normal way without any effect from any other cause leading to its reduction and that is why dry matter % increased in such case (Singh et al 1973) on snap bean.

Concerning the effect of packing treatment on dry matter percent of green seeds, it is evident from the same data at Table (13) that dry matter percent in pea seeds, during storage, was lower in case of packing green pea pods in perforated polyethylene packages than those packad in perforated craft and unpacked ones. Obtained results were the same either at the cold or normal storage in the two storage seasons of this work. These results are in agreement with those obtained by Nada and Moursi (1959) on cucumber, Omar (1960) on squash and Atwa et al (1980-a) of cucumber concerning the bad effect of polyethylene bags on dry matter %. These results may be

explained on the base that packing fruits in polyethylene packages keeps the Co_2 resulting in respiration of pods or fruits in the atmosphere around it. Consequently, the respiration rate of fruits or pods, which accounts for the decrease in the relative dry matter (Atwa et al 1980-b on green beans).

Reffering to the effect of storage period on seeds dry mater %, it is clear from data at Table (13) that there was a progressive and consistent increase in the dry matter % of the seeds during their storage at both cold and norml room storage in the two seasons of this work. It reached its peaks at the end of storage period i.e 32 or 24 days in cold storage during 1988 and 1989 seasons, and 16 or 12 days in normal room storage during 1988 and 1989 seasons respectively. These resuts are in harmony with those obtained by Atwa et al (1980-b) on bean and El-Sheikh (1988) on pea with regard to the gradual increment in pods dry matter % with storage period prolongation. These results may be attributed to the superiority in the rate of loss moisture. However, contra results were obtained by Nizharadze et al (1975); El-Sheikh (1988) and Shafshak et al (1991) all working on tomato.

With regard to the effect of storage conditions on seeds dry matter percent, it is confirmed from the same data at Table (13) that the dry matter percent was increased at both cold and normal room storage. The values of dry matter % were higher in normal room than in cold conditions at both storage seasons. These results are in agreement with those obtained by Atwa et al (1980-a) on cucumber

and El-Sheikh (1988) on pea. These results may be explained on the base that the rapid rate of loss of water through transpiration at high temperature might be contributed to this observation. The great loss of dry matter at high temperature as a result of rapid respiration rate did not offset the effect of great loss of water throught transpiration. Consequently, the dry matter % was lower at cold storage conditions as reported by El-Sheikh (1979) on beans and cucumber. Generally, it may be concluded that each of plant fertilization level, green pods disinfection and packing treatments as well as storage period and conditions are effective on dry matter % of pea seeds. In this respect, higher used level of plant fertilization (200 kg of amm.sul. + 400 kg of cal. super. phos. + 100 kg of pot. sul./fed),washing with tap water for 5 minutes and not packing pods in perforated polyethylene or craft sacks (1 kg) before packing in the exportation carton packages (5 kg) for either 12-16 days when stored at normal room storage or 24-32 days at cold storage may be recommended to increase the % of dry matter of pea seeds, to improve the storageability and to prolong the shelf life of green pods.

Table (13) Effect of pea plant fertilization level, pods disinfeion and packing treatments as well as storage periods and conditions on seeds dry matter % (1988 season).

Cold storage

Fert. level (Kg/fed)		100 amm. sul.		200 cal.super phos.		50 pot. sul.		150 amm. sul.		300 cal.super phos.		75 pot. sul.	200 amm. sul.			400 cal.super phos.	100 pot. sul.
Period (Day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32	
Dis. pack. Nt. Treat.	Nt.pack.	20.9	22.3	24.5	25.6	27.2	21.3	22.4	24.7	25.8	27.3	21.7	22.8	25.0	26.1	27.7	
	perf.craft	20.9	22.1	24.3	25.3	26.7	21.3	22.2	24.4	25.4	26.8	21.7	22.6	24.8	25.8	27.2	
	" polyet.	20.9	21.6	24.0	25.0	26.2	21.3	21.8	24.2	25.2	26.4	21.7	22.1	24.5	25.4	26.8	
Tap Water.	Nt. pack.	20.9	22.4	24.5	25.7	27.3	21.3	22.4	24.6	25.7	27.1	21.7	22.7	25.0	26.1	27.6	
	Perf.craft	20.9	22.2	24.4	25.5	26.6	21.3	22.3	24.2	25.3	26.7	21.7	22.5	24.7	25.7	27.0	
	" polyet.	20.9	21.7	24.1	25.1	26.3	21.3	21.7	24.1	25.0	26.3	21.7	22.1	24.3	25.3	26.8	
Borax 1%	Nt. pack.	20.9	22.5	24.6	25.7	27.3	21.3	22.3	24.5	25.6	27.1	21.7	22.5	24.8	26.0	27.5	
	perf.craft	20.9	22.3	24.5	25.5	26.5	21.3	22.1	24.2	25.3	26.6	21.7	22.4	24.7	25.6	27.0	
	" polyet.	20.9	21.9	24.2	25.0	26.2	21.3	21.5	24.1	25.1	26.2	21.7	22.0	24.1	25.4	26.7	

Fert.	23.88	23.96	24.32	L.S.D.	5%	0.02		Dis.	24.08	24.06	24.02			L.S.D.	5%	0.02	
Pack.	24.31	24.06	23.78	L.S.D.	5%	0.02		Per.	21.30	22.20	24.44	25.48	26.85	L.S.D.	5%	0.03	
Fert. Dis. Pack. Per.				L.S.D.	5%	N.S											

Normal room storage

Period (Day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16	
Dis. pack. Nt. Treat.	Nt.pack.	20.9	22.7	24.9	26.0	27.6	21.3	23.0	25.2	26.3	27.9	21.7	23.5	25.7	26.8	28.4	
	perf.craft	20.9	22.5	24.7	25.7	27.1	21.3	22.8	25.0	26.0	27.4	21.7	23.3	25.5	26.4	27.9	
	" polyet.	20.9	22.0	24.4	25.4	26.6	21.3	22.3	24.7	25.8	27.0	21.7	22.8	25.1	26.2	27.4	
Tap Water.	Nt.pack.	20.9	22.6	24.8	26.0	27.5	21.3	23.0	25.1	26.2	27.8	21.7	23.4	25.7	26.6	28.4	
	perf.craft	20.9	22.3	24.6	25.6	27.1	21.3	22.7	25.0	26.0	27.3	21.7	23.3	25.4	26.4	27.7	
	" polyet.	20.9	22.0	24.4	25.3	26.5	21.3	22.2	24.6	25.7	27.0	21.7	22.7	25.0	26.1	27.2	
Borex 1%	Nt pack.	20.9	22.6	24.8	25.8	27.5	21.3	22.8	25.1	26.2	27.8	21.7	23.4	25.6	26.6	28.3	
	Perf.craft	20.9	22.2	24.5	25.6	27.0	21.3	22.6	24.9	25.8	27.2	21.7	23.2	25.3	26.3	27.8	
	" polyet.	20.9	21.9	24.3	25.2	26.4	21.3	22.2	24.6	25.5	26.9	21.7	22.7	25.0	26.0	27.3	

Fert.	24.09	24.41	24.88	L.S.D.	5%	0.04		Dis.	24.52	24.46	24.40			L.S.D.	5%	0.04	
Pack.	24.74	24.48	24.16	L.S.D.	5%	0.04		Per.	21.30	22.70	24.94	25.98	27.40	L.S.D.	5%	0.05	
Fert. Dis. Pack. Per.				L.S.D.	5%	N.S											

Table (13 Cont.) Effect of pea plant fertilization level, pods disinfection and packing treatments as well as storage periods and conditions on seeds dry matter % (1989 season).

Cold storage

Fert.level (Kg/fed)		100 amm. sul.		200 cal.super phos.		50 pot. sul.	150 amm. sul.		300 cal.super phos.		75 pot. sul.	200 amm. sul.		400 cal.super phos.		100 pot. sul.
Period (Day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32
Dis. Nt. Treat.	pack. Nt.pack.	22.8	26.3	29.5	29.7	-	23.9	26.6	29.8	30.1	-	25.3	27.2	30.2	30.4	-
	perf.craft	22.8	25.9	28.4	29.3	-	23.9	26.1	28.7	29.7	-	25.3	26.4	29.2	30.1	-
	" polyet.	22.8	25.5	28.1	28.5	-	23.9	25.8	28.4	29.0	-	25.3	26.2	28.8	29.3	-
	Nt. pack.	22.8	26.2	29.4	29.7	-	23.9	26.5	29.8	29.9	-	25.3	27.1	30.1	30.3	-
Tap Water.	Perf.craft.	22.8	25.9	28.3	29.2	-	23.9	26.0	28.6	29.7	-	25.3	26.3	29.2	30.1	-
	" polyet.	22.8	25.4	28.1	28.4	-	23.9	25.8	28.3	29.0	-	25.3	26.1	28.7	29.2	-
	Nt.pack.	22.8	26.2	29.4	29.6	-	23.9	26.5	29.7	30.0	-	25.3	27.1	30.1	30.4	-
Borax 1%	perf.craft	22.8	25.8	28.3	29.2	-	23.9	26.1	28.6	29.6	-	25.3	26.2	29.1	30.0	-
	" polyet.	22.8	25.4	28.0	28.4	-	23.9	25.7	28.4	29.1	-	25.3	26.0	28.7	29.1	-

Fert. 26.59 27.12 27.75 L.S.D. 5% 0.02 Dis. 27.20 27.14 27.13 L.S.D. 5% 0.02
Pack. 27.60 27.11 26.76 L.S.D. 5% 0.02 Per. 24.00 26.15 28.95 29.51 L.S.D. 5% 0.03
Fert. Dis. Pak. Per. L.S.D. N.S

Normal room starage

Period (Day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. Nt. Treat.	pack. Nt.pack.	22.8	27.6	30.8	31.0	-	23.9	28.2	31.4	31.7	-	25.3	28.8	31.8	32.0	-
	perf.craft	22.8	27.1	29.7	30.5	-	23.9	27.8	30.3	31.2	-	25.3	28.1	30.6	31.6	-
	" polyet.	22.8	26.7	29.3	30.0	-	23.9	27.3	29.9	30.5	-	25.3	27.8	30.3	31.0	-
	Nt. pack.	22.8	27.4	30.7	31.0	-	23.9	28.1	31.3	31.6	-	25.3	28.6	31.8	31.8	-
Tap Water.	perf.craft	22.8	27.1	29.6	30.3	-	23.9	27.7	30.2	31.0	-	25.3	28.0	30.5	31.4	-
	" polyet.	22.8	26.5	29.2	30.0	-	23.9	27.2	29.9	30.3	-	25.3	27.7	30.2	31.0	-
	Nt.pack.	22.8	27.4	30.8	29.8	-	23.9	28.0	31.3	31.6	-	25.3	28.6	31.7	31.9	-
Borax 1%	Perf.craft	22.8	27.0	29.6	30.4	-	23.9	27.7	30.3	31.1	-	25.3	28.1	30.5	31.3	-
	" polyet.	22.8	27.6	29.3	30.1	-	23.9	27.2	29.7	30.2	-	25.3	27.8	30.2	30.9	-

Fert. 27.54 28.27 28.93 L.S.D. 5% 0.04 Dis. 28.30 28.22 28.22 L.S.D. 5% 0.04
Pack 28.68 28.18 27.88 L.S.D. 5% 0.04 Per. 24.00 27.67 30.40 30.93 L.S.D. 5% 0.05
Fert. Dis. Pack. Per. L.S.D. 5% N.S

4.2.5 Total soluble solids percentage.

Data presented at Table (14) show the effect of pea plants fertilization level, green pod disinfection and packing treatments as well as storage period and conditions on seeds total soluble solids %. The same data show that T.S.S % of pea seeds was gradually increased with increasing plant fertilization levels where the highest T.S.S values are reported for the highest used level of plant fertilization (200 kg of amm. sul. + 400 kg og cal. saper.phos. + 100 kg of pot. sul./fed). Obtained results were going in the same trend at both seasons of this work and at the two used storage conditions (cold and normal room storage). These findings are in coincidence with those obtained by Santos et al (1972) on tomato regarding the improving effect of K ferlilizer on T.S.S fruit content. Similar results were also obtained by El-Sheikh (1988) regarding effect of potassium sulphate 3% foliar spray on pea plants and its effect on percentage of T.S.S in pods. However, contra results were obtained by Aricha (1982) concerning effect of N fertilization on T.S.S % of pea seeds, Mallick and Muthukrishnan (1980) regarding the effect of P fertilization on T.S.S % of tomato fruits and Amable and Sinnadurai (1977) studying the effect of K ferlilizer on T.S.S % of tomato fruits.

Concerning the effect of green pods disinfection treatments on T.S.S %,the same data shown at Table (14) indicate that the green pods disinfection treatments had no significant effect on the percentage of T.S.S of pea seeds. These results are true at cold and normal room storage in the two successive seasons of this work.In this respect similar results were obtained by Abu El-Hamd et al (1990) on

snap bean pods treated with some disinfection solutions. However, obtained results disagreed with those reparted by Abd El-Latief (1968) on mandarine who found that the highest values of T.S.S % were obtained from fruits treated with mixture of boric acid and borax before storage.

With regard to the effect of packing on T.S.S %, it is confirmed from data at the same Table (14) that packing green pea pods in perforated polyethylene packages significantly decreased the percentage of T.S.S of pea seeds than either perforated craft packages or cortrol treatments (not packed). These results are true at either cold or normal room storage in the two successive seaons of this work. These findings are in agreement with those obtained by Atwa et al (1980-a) on cucumber regarding the effect of packing treatments for storage under normal room and by the same investigator under cold storage conditions. Meanwhile, Abd El-Rahman (1990) on pepper did not find any effect for packing treatments in this respect. These results may be attributed to reduced dry matter through its consumption by respiration during storage at this relatively high temperature as mentioned by Omar (1960) on squash.

Concerning the effect of storage period on green seeds T.S.S %, it is clear from the same data at Table (14) that extending periods of storage from 8 to 32 days of cold storage and from 4 to 16 days of storage at normal room conditions significantly decreased the values of T.S.S % of pea seeds. Obtained results are true at both seasons of this work where the lowest values in this respect were obtained after

32 days of cold storge at both the two seasons and at 16 days at the second season for the normal room storage. These results are in agreement with those obtained by Kabeel (1959), Winsor et al (1962), Abd El-Ghaffar (1973), El-Sheikh (1988) and Zaki et al (1991-b) all working on tamato, Atwa et al (1980 a) on cucumber and El-Sheikh (1988) on pea concerning effect of storage period on T.S.S % in fruits of green pods. On the other hand, Abu El-Hamd et al (1990) and Shanan et al (1990) working on snap bean reported that contra results where they revealed T.S.S % stabilized during storge period.

Regarding the effect of storage conditions on green pea seeds T.S.S %, it is shown from the same data at Table (14) that T.S.S % increased at cold storage conditions ($4^{o}C \pm 1$) than storing at normal room conditions ($20^{o}C \pm 2$). Such improving effect of cold storage than that of storage at normal room conditions is obvious under different treatments and seasons of this work. This finding is in agreement with those obbtained by Abd El-Kader et al (1978), El-Sheikh (1988) and Zaki et al (1991-b)all working on tomato, Atwa et al (1980-a) on cucumber and El-Sheikh (1988) on pea concerning the improving effect of cold storage conditions on the pods or fruits T.S.S% than that of normal room storage conditions.Such reduction of seeds T.S.S% under storage conditions of normal room temperature more than that of the cold storage conditions is mainly due to the higher consumption of soluble constituents of seeds through respiration process under higher temperature of normal room than that of cold one as reported by Omar (1960) on squash. Generally, it may be concluded that each of pea plants fertilization level, pod disinfection

and packing treatments as well as storage period and conditions are effective on T.S.S.% of pea seeds. In this respect, higher used level of plants fertilization (200 kg of amm.sul. + 400 kg of cal.super.phos. + 100 kg of pot.sul./fed), washing with tap water for 5 minutes or without washing, packing in perforated craft bags or not before packing in the exportation carton packages (5 kg) for either 4-8 days when stored at normal room storage or 16 days at cold storage may be recommended to increase the percentage of T.S.S of pea seeds for improving storageability and to prolong the shelf life of green pea pods to suitable extent.

Table (14) Effect of pea plant fertilization level, pods disinfection and packing treatments as well as storage periods and conditions on seeds total soluble solids % (1988 season).

Cold storage

Fert. level (kg/Fed)		100 amm. sul.		200 cal.super phos.		50 pot. sul.		150 amm. sul.		300 col.super phos.		75 pot. sul.		200 amm. sul.		400 cal.super phos.		100 pot. sul.	
Period (Day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32			
Dis. pack. Nt. Treat.	Nt. pack.	13.5	16.5	14.3	12.1	13.5	14.1	17.0	14.7	12.9	11.8	14.7	18.0	15.8	13.7	12.7			
	Perf. craft	13.5	16.3	13.8	11.9	13.3	14.1	16.8	14.3	12.7	11.7	14.7	17.9	15.5	13.4	12.5			
	,, polyet.	13.5	16.2	13.2	11.5	13.0	14.1	16.4	14.1	12.3	11.3	14.7	17.6	15.1	13.1	12.1			
Tap Water.	Nt. pack.	13.5	16.4	14.3	12.0	13.5	14.1	16.8	14.6	12.8	11.7	14.7	18.0	15.6	13.6	12.6			
	Perf. craft	13.5	16.2	13.7	11.8	13.1	14.1	16.8	14.4	12.6	11.7	14.7	17.8	15.6	13.3	12.4			
	,, polyet.	13.5	16.2	13.1	11.4	13.0	14.1	16.3	14.2	12.2	11.4	14.7	17.5	15.2	13.0	12.0			
Borax 1%	Nt. pack.	13.5	16.4	14.2	12.0	13.3	14.1	16.9	14.7	12.9	11.7	14.7	17.8	15.7	13.6	12.5			
	perf.craft	13.5	16.3	13.7	11.9	13.0	14.1	16.7	14.2	12.6	11.5	14.7	17.8	15.5	13.2	12.5			
	,, polyet.	13.5	16.2	13.0	11.3	13.0	14.1	16.5	14.1	12.3	11.5	14.7	17.5	15.1	13.0	12.1			
Fert.	13.69	13.86	14.72		L.S.D. 5%	0.16	Dis.	14.13	14.08	14.06					L.S.D. 5%	N.S			
Pack	14.30	14.11	13.86		L.S.D. 5%	0.16	Per.	14.10	16.91	14.50	12.57	17.38			L.S.D. 5%	0.21			
Fert . Pis . Pack . Per					L.S.D. 5%	N.S													

Normal room storage

Period (Day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. pack. Nt. Treat.	Nt.pack	13.5	12.7	10.5	8.8	7.6	14.1	13.1	11.2	8.9	7.7	14.7	13.7	11.8	9.6	8.9
	perf. craft	13.5	12.6	10.3	8.5	7.3	14.1	13.0	10.8	8.8	7.5	14.7	13.5	11.6	9.4	8.5
	,, polyet.	13.5	12.3	10.1	8.2	7.1	14.1	12.7	10.5	8.5	7.3	14.7	13.3	11.1	9.1	8.2
Tap Water.	Nt pack.	13.5	12.7	10.4	8.7	7.6	14.1	13.0	11.0	8.8	7.6	14.7	13.7	11.6	9.5	8.7
	perf.craft	13.5	12.5	10.2	8.4	7.1	14.1	13.0	10.7	8.8	7.4	14.7	13.4	11.6	9.5	8.5
	,, polyet.	13.5	12.3	10.1	8.2	7.1	14.1	12.7	10.4	8.5	7.3	14.7	13.4	11.0	9.2	8.2
Borax 1%.	Nt pack.	13.5	12.6	10.5	8.8	7.5	14.1	13.0	11.1	8.7	7.6	14.7	13.6	11.7	9.4	8.9
	Perf. craft	13.5	12.5	10.4	8.4	7.2	14.1	12.8	10.6	8.7	7.5	14.7	13.5	11.5	9.5	8.5
	,, polyet.	13.5	12.4	10.2	8.0	7.2	14.1	12.5	10.5	8.6	7.4	14.7	13.3	11.1	9.1	8.1
Fert.	10.41	10.78	11.50		L.S.D. 5%	0.19	Dis.	10.92	10.88	10.88					L.S.D. 5%	N.S			
Pack	10.06	10.90	10.71		L.S.D. 5%	0.19	Per.	14.10	12.95	10.83	8.83	7.75			L.S.D. 5%	0.25			
Fert . Dis . Pack . Per.					L.S.D. 5%	N.S													

Table (14 Cont.) Effect of pea plant fertilization level, pods disinfection and packing treatments as well as storage periods and conditions on seeds total soluble solids % (1989 season).

Cold storage

Fert.level (kg/Fed)		100 amm. sul.		200 cal.super phos.		50 pot. sul.		150 amm. sul.		300 cal.super phos.		75 pot. sul.		200 amm. sul.		400 cal.super phos.		100 pot. sul.	
Period (Day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32			
Dis. pack. Nt. Treat.	Nt.pack.	12.8	15.1	12.8	11.1	8.7	13.2	15.7	12.9	11.5	9.9	13.5	17.0	14.6	12.8	11.2			
	perf. craft	12.8	14.9	12.6	10.8	8.6	13.2	15.5	12.5	11.3	9.6	13.5	16.8	14.4	12.7	10.9			
	,, polyet.	12.8	14.5	12.6	10.6	8.5	13.2	15.2	12.4	11.2	9.4	13.5	16.5	14.2	12.3	10.7			
Tap Water.	Nt. pack.	12.8	15.2	12.7	11.0	8.6	13.2	15.5	12.8	11.4	9.7	13.5	16.8	14.5	12.7	11.1			
	Perf. craft	12.8	14.8	12.4	10.7	8.5	13.2	15.5	12.4	11.2	9.5	13.5	16.8	14.3	12.7	10.8			
	,, polyet.	12.8	14.5	12.6	10.5	8.4	13.2	15.2	12.3	11.0	9.3	13.5	16.5	14.2	12.2	10.6			
Borax 1%	Nt. pack.	12.8	15.0	12.8	11.0	8.6	13.2	15.6	12.8	11.4	9.7	13.5	16.9	14.6	12.6	11.0			
	perf. craft	12.8	14.7	12.5	10.6	8.6	13.2	15.4	12.5	11.2	9.6	13.5	16.7	14.3	12.5	10.8			
	,, polyet.	12.8	14.3	12.5	10.5	8.4	13.2	15.2	12.3	11.0	9.3	13.5	16.6	14.1	12.1	10.5			

Fert.	11.89	12.39	13.58	L.S.D.	5%	0.21	Dis.	12.67	12.60	12.59			L.S.D.	5%	N.S				
Pack.	12.79	12.62	12.46	L.S.D.	5%	0.21	Per.	13.16	15.64	13.17	11.50	9.645	L.S.D.	5%	0.27				
Fert. Dis. Pack. Per				L.S.D.	5%	N.S													

Normal room storage

Period (Day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. pack. Nt. Treat.	Nt.pack.	12.8	12.1	9.8	8.8	-	13.2	12.2	10.2	9.1	-	13.5	13.5	12.0	10.2	-
	perf.craft	12.8	11.8	9.6	8.4	-	13.2	12.1	10.0	8.9	-	13.5	13.1	11.8	10.0	-
	,, polyet	12.8	11.6	9.5	8.1	-	13.2	11.9	9.8	8.6	-	13.5	12.9	11.7	10.0	-
Tap Water.	Nt. pack.	12.8	12.0	9.7	8.7	-	13.2	12.0	10.1	9.0	-	13.5	13.4	11.8	10.0	-
	perf.craft	12.8	11.7	9.5	8.4	-	13.2	12.1	9.9	8.8	-	13.5	13.0	11.8	10.0	-
	,, polyet.	12.8	11.5	9.4	8.0	-	13.2	11.8	9.7	8.5	-	13.5	12.8	11.7	9.8	-
Borax 1%	Nt. pack.	12.8	12.1	9.6	8.6	-	13.2	12.1	10.0	9.0	-	13.5	13.5	11.9	10.1	-
	Perf. craft	12.8	11.6	9.5	8.3	-	13.2	12.1	9.9	8.8	-	13.5	13.0	11.8	10.1	-
	,, polyet.	12.8	11.5	9.3	8.1	-	13.2	11.8	9.8	8.7	-	13.5	12.7	11.7	9.9	-

Fert.	10.62	10.99	12.10	L.S.D.	5%	0.25	Dis.	11.28	11.21	11.22			L.S.D.	5%	N.S				
Pack	11.38	11.23	11.09	L.S.D.	5%	0.25	Per.	13.16	12.29	10.42	9.07		L.S.D.	5%	0.25				
Fert . Dis . Pack . Per.				L.S.D.	5%	0.52													

4.2.6 The sugars percentage.

Data presented at Tables (15,16 and 17) show the effect of pea plants fertilization level and green pods disinfection and packing treatments as well as storage period and conditions on seeds reducing, non-reducing and total sugars %. It is evident from such data that the sugars % (reducing, non-reducing and total sugars) increased with increasing fertilization levels up to the highest used one (200 kg of amm-sul 400 kg of cal-super, phos + 100 kg of pot. sul./fed). These results are true at both cold and normal room storage conditions in both storage seasons of this work. Obtained results are in agreement with those reported by Khalil (1990-a) on cowpea and Kumar (1981) on soybean who found that nitrogen fertilizers application in first case and P fertilizer in the second case increased reducing and total sugars %. In this respect, El-Bakry et al (1980) on snap bean and Midan et al (1982) on green pea pods obtained similar results. In addition Omran (1962) on tomato and El-Sheikh (1988) on pea and tomato found that K application increased the % of sugars fraction in fruits and pods of such crops. On the other hand, Ciszewsra and Szynai (1981) and Aricha (1982) on pea reported that N on P fertilization had no effect on estimated sugars.

Regarding the effect of green pods disinfection on the sugats %, it is clear from data at Tables (15,16 and 17) also that soaking pea pods in 1% borax solution had no effect on the % of sugars (reducing, non-reducing and total sugars) of pea seeds than either washing with tap water or control treatments which were not varied at all either at cold or normal room storage at both seasons of this work. Moreover, it

is obvious that the lowest values in all pod determined sugars fractions were connected with dipping in borax solution followed by washing with tap water and the control treatment. These resutls are in agreement with those obtained by Abd El-Rahman (1990) on pepper and Abu El-Hamd et al (1990) on snap bean who found that total sugars content of fruits or pods were not affected materially by the application of various preservatives before storage. However, Shera (1975) on cucumber and El-Beheidi et al (1979) on snap bean reported differenent results and hence they disagreed with the obtained findings of this work where they indicated that such preservative substances impeded gas exchange and decreased respiration rate. It is generally concluded that either washing green pea pods with tap water or not before storage is preferable than any other treatment of disinfection for keeping sugars pods content.

Concerning the effect of green pods packing treatment on the sugars %, it is evident from the same data presented at Tables (15,16 and 17) that packing green pea pods in perforated polyethylene packages generally decreased % of reducing, non reducing and total sugars than either perforated craft packages or control treatment. This trend was true at either cold or normal room storage in both the two seasons of this trail. In this regard, contra results were reported by Moustafa (1969) on artichoke and El-Beheidi (1979) on green bean pods who found that packing in polyethylene packages lowered the loss in reducing and total sugars of artichoke or total sugar and total carbohydrates of green bean pods as compared with those unpacked ones. These results may be attributed to that the gases exchange is

decreased by packing and this in turn decreased the rate of respiration since sugars serve as a substrate for this metabolic activity (El-Sheikh, 1979 on bean and cucumber).

With regard to the effect of storage period on sugars % in green pea seeds, it is clear from the same data at Table (15,16 and 17) that increasing periods of storage from 8 to 32 days under cold storage conditions at both seasons, as well as from 4 to 16 days or 4 to 12 days at the first and second seasons respectively under normal room storage condtitions significantly decreased the percentage of sugars of seeds. These results are in coincidence with those obtained by El-Beheidi et al (1979) on snap bean; El-Sheikh (1988) on tomato and peas as well as Abu El-Hamd et al (1990) and shanan et al (1990) on snap bean.

Concerning the effect of storage conditions on sugars percentage, it is observed from the same data presented at Tables (15,16 and 17) that the % of reducing, non-reducing and total sugars increased at cold storage ($4^{o}C \pm 1$) than at normal room storage ($20^{o}C \pm 2$). Such improving effect of cold storage than that of storage at normal room is obvious under differnt treatments and seasons of this work. This finding is in agreement with those obtained by Manzano et al (1984), Abd Alla et al (1985) and El-Sheikh (1988) on tomato, Heatherbell et al (1966) on peas and Atwa et al (1980-b) on bean. These results may be attributed to higher temperature and lower humidity in normal rooms than in cold ones. Generally, it may be concluded that each of pea plants fertilization level, pods disinfection and packing treatments

as well as storage period and conditions on keeping quality are effective on sugar %. In this respect, higher used level of plants fertilization (200 kg od amm. sul. + 400 kg of cal. super. phos. + 100 kg of pot. sul./fed), soaking pods in tap water or 1% borax solution for 5 minutes and packing pods in perforated craft (1 kg) backages or not before packing in the exportation carton packages (5 kg) for either 8-12 days when stored at normal storage for 16-24 days at cold storage may be recommended to decrease the loss of sugars of pea seeds.

Finaly, it may be concluded that pea plant fertilization with the higher level of complete fertilization (200 kg of amm.sul. + 400 kg of cal.super. phos. + 100 kg of pot. sul./fed), dipping green pea pods either in 1% borax solution or tap water for 5 minutes before packing in perforated polyethylene bags for 4-8 days under normal room temperature ($20^{o}C \pm 2$) or for 12-16 days under cold storage conditions ($4^{o}C \pm 1$) may be recommended for prolonging the shelf life and keeping quality of green pea pods.

Table (15) Effect of pea plant Fertilization level, pods disinfection and packing treatmuents as well as storage periods and conditions on Seeds reducing Sugars% (1988 Season)

Cold Storage

Fert.level (Kg/Fed)		100 amm. sul.	200 cal-super phos.	50 pot sul	150 amm. sul	300 cal.super phos.	75 pot. sul.	200 amm. sul	400 cal.super phos.	100 pot. sul.
Period (day)		0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32
Dis. Nt. Treat.	pack. Nt.pack.	3.55 3.73 3.53 3.26 2.95	3.78 3.90 3.64 3.34 3.04	3.97 3.97 3.72 3.47 3.16						
	perf.craft.	3.55 3.67 3.44 3.16 2.85	3.78 3.77 3.53 3.24 2.96	3.97 3.84 3.63 3.32 3.05						
	,, polyet.	3.55 3.58 3.35 3.05 2.76	3.78 3.68 3.48 3.18 2.88	3.97 3.76 3.55 3.24 2.86						
Tap Water	Nt.pack.	3.55 3.70 3.51 3.23 2.93	3.78 3.88 3.62 3.31 2.95	3.97 3.95 3.71 3.45 3.15						
	perf.craft	3.55 3.64 3.42 3.13 2.82	3.78 3.75 3.51 3.21 2.94	3.97 3.82 3.62 3.31 2.95						
	,, polyet	3.55 3.55 3.33 2.96 2.74	3.78 3.66 3.46 3.17 2.86	3.97 3.73 3.52 3.21 2.85						
Borax 1%	Nt.pack	3.55 3.69 3.48 3.21 2.91	3.78 3.88 3.60 3.30 2.93	3.97 3.94 3.69 3.44 3.00						
	perf.craft	3.55 3.62 3.42 3.10 2.81	3.78 3.74 3.50 3.18 2.93	3.97 3.80 3.61 3.31 2.93						
	,, polyet.	3.55 3.53 3.31 2.95 2.70	3.78 3.65 3.45 3.16 2.84	3.97 3.71 3.51 3.20 2.83						
Fert	3.31 3.44 3.54	L.S.D. 5% 0.03	Dis	3.45 3.43 3.41	L.S.D. 5% N.S					
Pack	3.51 3.43 3.35	L.S.D. 5% 0.02	Per	3.76 3.74 3.52 3.22 2.91	L.S.D. 5% 0.04					
Fert. Dis. Pack. Per.		L.S.D. 5% N.S								

Normal room storage

Period (day)		0 4 8 12 16	0 4 8 12 16	0 4 8 12 16						
Dis. Nt. Treat.	pack. Nt.pack	3.55 3.44 3.22 2.95 2.65	3.78 3.61 3.35 3.05 2.75	3.97 3.68 3.43 3.17 2.87						
	perf.craft	3.55 3.38 3.14 2.84 2.55	3.78 3.48 3.23 2.95 2.66	3.97 3.54 3.34 3.02 2.75						
	,, polyet	3.55 3.28 3.05 2.75 2.45	3.78 3.38 3.17 2.88 2.59	3.97 3.46 3.26 2.95 2.64						
Tap Water	Nt.pack	3.55 3.42 3.20 2.93 2.63	3.78 3.59 3.33 2.97 2.73	3.97 3.66 3.41 3.15 2.85						
	perf.craft	3.55 3.36 3.12 2.81 2.52	3.78 3.45 3.20 2.94 2.64	3.97 3.53 3.31 2.95 2.71						
	,, polyet	3.55 3.26 2.98 2.73 2.43	3.78 3.35 3.15 2.86 2.57	3.97 3.45 3.24 2.94 2.62						
Borax 1%	Nt.pack	3.55 3.42 3.18 2.91 2.63	3.78 3.58 3.32 2.95 2.71	3.97 3.66 3.40 3.15 2.83						
	perf.craft	3.55 3.33 3.10 2.81 2.51	3.78 3.45 3.17 2.93 2.64	3.97 3.52 3.30 2.93 2.70						
	,, polyet	3.55 3.25 2.96 2.71 2.41	3.78 3.34 3.15 2.85 2.56	3.97 3.44 3.24 2.93 2.60						
Fert.	3.07 3.21 3.31	L.S.D. 5% 0.02	Dis.	3.21 3.19	L.S.D. 5% N.S					
Pack.	3.28 3.19 3.12	L.S.D. 5% 0.02	Per.	3.76 3.45 3.22 2.92 2.63	L.S.D. 5% 0.03					
Fert. Dis. Pack. Per		L.S.D. 5% N.S								

Table (15 Cont.) Effect of pea plant Fertilization level,pods disinfection and packing treatmuents as well as storage periods and conditions on Seeds reducing Sugars % (1989 Season)

Cold storaage

Fert.level (Kg/Fed)		100 amm. Sul.		200 cal-super phos.		50 pot Sul	150 amm. Sul		300 cat.super phos.		75 pot. sul.	200 amm. sul		400 cal.super phos.		100 pot sul.
Period (day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32
Dis. Nt. Treat.	Pack. Nt.pack	3.33	3.48	3.29	3.04	2.70	3.56	3.65	3.39	3.09	2.79	3.73	3.72	3.48	3.22	2.91
	perf.craft	3.33	3.42	3.20	2.92	2.59	3.56	3.52	3.29	2.99	2.70	3.73	3.59	3.35	3.07	2.80
	,, polyet	3.33	3.33	3.10	2.82	2.51	3.56	3.38	3.22	2.93	2.66	3.73	3.52	3.31	2.99	2.71
Tap Water.	Nt.pack.	3.33	3.45	3.25	2.95	2.68	3.56	3.63	3.36	2.98	2.77	3.73	3.70	3.46	3.20	2.87
	perf.craft	3.33	3.40	3.18	2.90	2.55	3.56	3.50	3.26	2.97	2.67	3.73	3.56	3.32	2.96	2.77
	,, polyet	3.33	3.31	3.00	2.81	2.50	3.56	3.36	3.20	2.90	2.64	3.73	3.50	3.30	2.96	2.68
Borax 1%	Nt.pack	3.33	3.43	3.23	2.93	2.66	3.56	3.61	3.35	2.96	2.77	3.73	3.70	3.44	3.17	2.86
	perf.craft	3.33	3.40	3.18	2.87	2.55	3.56	3.50	3.27	2.95	2.65	3.73	3.55	3.30	2.95	2.75
	,, polyet.	3.33	3.30	2.98	2.80	2.49	3.56	3.35	3.19	2.88	2.63	3.73	3.48	3.30	2.94	2.65

Fert	3.07	3.20	3.30	L.S.D. 5%	0.03	Dis	3.21	3.18	3.17			L.S.D. 5%	N.S		
Pack	3.26	3.18	3.12	L.S.D. 5%	0.04	Per	3.54	3.49	3.26	3.96	2.68	L.S.D. 5%	0.04		
Fert. Dis. Pack. Per.				L.S.D. 5%	N.S										

Normal room storage

Period (day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. Nt. Treat.	Pack. Nt.pack.	3.33	3.21	2.97	2.26	-	3.56	3.36	3.10	2.65	-	3.73	3.43	3.18	2.77	-
	perf.craft	3.33	3.15	2.89	2.45	-	3.56	3.23	2.98	2.55	-	3.73	3.29	3.08	2.68	-
	,, polyet	3.33	3.04	2.80	2.35	-	3.56	3.13	2.92	2.51	-	3.73	3.21	3.02	2.53	-
Tap Water.	Nt.pack.	3.33	3.18	2.95	2.53	-	3.56	3.35	3.00	2.63	-	3.73	3.40	3.15	2.75	-
	perf.craft	3.33	3.13	2.86	2.43	-	3.56	3.20	2.96	2.53	-	3.73	3.27	2.95	2.66	-
	,, polyet	3.33	2.98	2.78	2.32	-	3.56	3.10	2.90	2.50	-	3.73	3.20	2.90	2.50	-
Borax 1%	Nt.pack	3.33	3.18	2.94	2.53	-	3.56	3.35	3.00	2.61	-	3.73	3.40	3.00	2.73	-
	perf. craft	3.33	3.12	2.85	2.41	-	3.56	3.18	2.95	2.52	-	3.73	3.25	2.95	2.64	-
	,, polyet.	3.33	2.96	2.77	2.30	-	3.56	3.09	2.90	2.49	-	3.73	3.18	2.88	2.49	-

Fert	2.93	3.07	3.16	L.S.D. 5%	0.05	Dis	3.08	3.05	3.04			L.S.D. 5%	N.S		
Pack	3.13	3.05	2.98	L.S.D. 5%	0.05	Per.	3.54	3.20	2.94	2.54		L.S.D. 5%	0.05		
Fert. Dis. Pack. Per.				L.S.D. 5%	N.S										

Table (16) Effect of pea plant Fertilization level,pods disinfection and packing treatments as well as storage periods and conditions on Seeds non-reducing Sugars % (1988 Season).

Cold Storage

Fert. level (Kg/Fed)		100 amm. Sul.	200 cal-super phos.	50 pot. sul.	150 amm. sul	300 cat.super phos.	75 pot. sul.	200 amm. sul	400 cal.super phos.	100 pot sul.
Period (day)		0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32	0 8 16 24 32
Dis. Pack.										
Nt. Treat.	Nt.pack.	5.22 6.27 5.15 4.30 3.37	5.32 6.39 5.35 4.53 3.60	5.44 6.61 5.59 4.72 3.80						
	perf.craft	5.22 6.25 5.15 4.28 3.39	5.32 6.43 5.36 4.53 3.60	5.44 6.71 5.56 4.72 3.83						
	,, polyet.	5.22 6.17 5.19 4.23 3.31	5.32 6.39 5.37 4.41 3.53	5.44 6.60 5.59 4.72 3.87						
Tap Water	Nt.pack.	5.22 6.25 5.13 4.30 3.39	5.32 6.37 5.34 4.54 3.67	5.44 6.60 5.58 4.70 3.79						
	perf.craft	5.22 6.26 5.13 4.27 3.38	5.32 6.35 5.34 4.52 3.61	5.44 6.71 5.55 4.69 3.90						
	,, polyet	5.22 6.18 5.18 4.29 3.26	5.32 6.34 5.37 4.38 3.54	5.44 6.61 5.59 4.73 3.86						
Borax 1%	Nt.pack.	5.22 6.25 5.19 4.31 3.39	5.32 6.37 5.35 4.55 3.68	5.44 6.59 5.59 4.69 3.93						
	perf.craft	5.22 6.26 5.11 4.28 3.36	5.32 6.26 5.33 4.52 3.60	5.44 6.71 5.54 4.69 3.89						
	,, polyet.	5.22 6.18 5.19 4.28 3.30	5.32 6.35 5.35 4.37 3.55	5.44 6.62 5.59 4.75 3.88						
Fert.		4.84 5.02 5.24	L.S.D. 5% 0.02	Dis.	5.04 5.03 5.03	L.S.D. 5%	N.S			
Pack.		5.04 5.04 5.02	L.S.D. 5% N.S	Per.	5.32 6.41 5.36 4.49	L.S.D. 5%	0.03			
Fert. Dis. Pack. Per.			L.S.D. 5% N.S							

Normal room storage

Period (day)		0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16	0 4 8 12 16
Dis. pack.										
Nt. Treat.	Nt.pack	5.22 4.47 3.59 2.70 1.86	5.32 4.70 3.68 2.80 2.09	5.44 4.82 4.13 3.10 2.54						
	perf.craft	5.22 4.46 3.53 2.71 1.83	5.32 4.76 3.66 2.79 2.06	5.44 4.90 4.12 3.13 2.53						
	,, polyet.	5.22 4.44 3.47 2.59 1.85	5.32 4.62 3.67 2.77 2.02	5.44 4.89 4.10 2.98 2.23						
Tap Water	Nt.pack	5.22 4.45 3.58 2.68 1.85	5.32 4.69 3.63 2.86 2.09	5.44 4.82 4.12 3.09 2.53						
	perf.craft	5.22 4.45 3.51 2.71 1.83	5.32 4.77 3.65 2.78 2.06	5.44 4.88 4.13 3.17 2.54						
	,, polyet.	5.22 4.46 3.52 2.59 1.85	5.32 4.60 3.66 2.75 2.01	5.44 4.86 4.11 2.99 2.23						
Borax 1%	Nt.pack.	5.22 4.43 3.57 2.69 1.82	5.32 4.67 3.63 2.88 2.11	5.44 4.80 4.11 3.05 2.51						
	perf.craft	5.22 4.47 3.50 2.70 1.82	5.32 4.75 3.66 2.78 2.05	5.44 4.88 4.14 3.17 2.53						
	,, polyet.	5.22 4.45 3.52 2.60 1.85	5.32 4.59 3.66 2.75 2.01	5.44 4.86 4.09 2.97 2.21						
Fert.		3.54 3.70 3.98	L.S.D. 5% 0.09	Dis	3.74 3.74 3.73	L.S.D. 5%	N.S			
Pack.		3.75 3.76 3.70	L.S.D. 5% N.S	Per.	5.32 4.66 3.76 2.84 2.10	L.S.D. 5%	0.11			
Fert. Dis. Pack. Per.			L.S.D. 5% N.S							

Table (16 Cont.) Effect of pea plant Fertilization level,pods disinfection and packing treatmuents as well as storage periods and conditions on Seeds non-reducing Sugars % (1989 Season).

Cold storaage

Fert.level (Kg/Fed)		100 amm. sul.		200 cal-super phos.		50 pot. sul.		150 amm. sul.		300 cal.super phos.		75 pot. sul.		200 amm. sul		400 cal.super phos.		100 pot. sul.	
Period (day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32			
Dis. Nt. Treat.	Pack. Nt.pack.	6.18	6.92	5.80	4.94	4.96	6.24	7.04	6.48	5.17	4.28	6.28	7.28	6.22	5.36	4.44			
	perf.craft	6.18	6.89	5.79	4.89	4.04	6.24	7.07	6.21	5.17	4.27	6.28	7.32	6.24	5.39	4.48			
	,, polyet	6.18	6.89	5.83	4.85	3.98	6.24	7.05	6.01	5.09	4.14	6.28	7.26	6.24	5.29	4.43			
Tap Water	Nt.pack	6.18	6.86	5.73	5.01	4.07	6.24	7.04	6.49	5.26	4.23	6.28	7.30	6.19	5.35	4.43			
	perf.craft	6.18	6.80	5.79	4.89	4.05	6.24	7.05	6.29	5.16	4.24	6.28	7.32	6.23	5.45	4.47			
	,, polyet	6.18	6.89	5.90	4.84	3.97	6.24	7.04	6.00	5.10	4.08	6.28	7.25	6.23	5.29	4.43			
Borax 1%	Nt.pack	6.18	6.99	5.71	5.03	4.08	6.24	7.06	6.48	5.28	4.23	6.28	7.18	6.30	5.36	4.41			
	perf.craft	6.18	6.93	5.63	4.91	4.05	6.24	7.01	6.29	5.16	4.23	6.28	7.33	6.24	5.46	4.47			
	,, polyet	6.18	6.94	5.83	4.81	3.96	6.24	7.05	6.02	5.12	4.08	6.28	7.27	6.24	5.29	4.45			
Fert	5.57	5.78	5.92		L.S.D. 5%	0.03	Dis	5.77	5.75	5.75				L.S.D. 5%	N.S				
Pack	5.80	5.76	5.71		L.S.D. 5%	0.03	Per	6.23	7.07	6.08	5.14	4.22		L.S.D. 5%	0.04				
Fert. Dis. Pack. Per.					L.S.D. 5%	N.S													

Normal room storage

Period (day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. Nt. Treat.	Pack. Nt.pack	6.18	6.19	5.35	3.41	-	6.24	6.42	5.40	3.66	-	6.28	6.55	5.83	4.04	-
	perf.craft	6.18	6.16	5.23	3.45	-	6.24	6.44	5.44	3.65	-	6.28	6.63	5.87	4.08	-
	,, polyet	6.18	6.22	5.26	3.52	-	6.24	6.47	5.43	3.64	-	6.28	6.68	5.90	4.02	-
Tap Water	Nt.pack.	6.18	6.17	5.35	3.41	-	6.24	6.40	5.46	3.66	-	6.28	6.54	5.83	4.02	-
	perf.craft	6.18	6.16	5.23	3.42	-	6.24	6.43	5.44	3.65	-	6.28	6.61	5.98	4.06	-
	,, polyet	6.18	6.25	5.25	3.53	-	6.24	6.46	5.45	3.61	-	6.28	6.65	6.00	4.01	-
Borax 1%	Nt.pack.	6.18	6.17	5.35	3.40	-	6.24	6.38	5.44	3.64	-	6.28	6.52	5.93	4.01	-
	perf.craft	6.18	6.13	5.25	3.43	-	6.24	6.44	5.45	3.63	-	6.28	6.60	5.96	4.08	-
	,, polyet.	6.18	6.27	5.23	5.51	-	6.24	6.46	5.43	3.61	-	6.28	6.67	6.02	3.99	-
Fert.	5.27	5.43	5.71		L.S.D. 5%	0.06	Dis.	5.47	5.47	5.47				L.S.D. 5%	N.S	
Pack.	5.46	5.47	5.49		L.S.D. 5%	N.S	Per.	6.23	6.41	5.54	3.70			L.S.D. 5%	0.07	
Fert. Dis. Pack. Per.					L.S.D. 5%	N.S										

Table (17) Effect of pea plant Fertilization level,pods disinfection and packing treatmuents as well as storage periods and conditions on Seeds Total Sugars % (1989 Season).

Cold storaage

Fert.level (Kg/Fed)		100 amm. sul.		200 cal-super phos.		50 pot. sul.	150 amm. sul		300 cal.super phos.		75 pot. sul.	200 amm. sul		400 cal.super phos.		100 pot. sul.
Period (day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32
Dis. Nt. Treat.	Pack. Nt.pack	8.77	10.00	8.68	7.56	6.32	9.10	10.29	8.99	7.87	6.64	9.41	10.58	9.31	8.19	6.96
	perf.craft	8.77	9.92	8.59	7.44	6.24	9.10	10.20	8.89	7.77	6.56	9.41	10.55	9.19	8.04	6.88
	,, polyet	8.77	9.75	8.54	7.28	6.07	9.10	10.07	8.85	7.59	6.41	9.41	10.36	9.14	7.96	6.73
Tap Water	Nt.pack.	8.77	9.95	8.64	7.53	6.32	9.10	10.25	8.96	7.85	6.62	9.41	10.55	9.29	8.15	6.94
	perf.craft	8.77	9.90	8.55	7.40	6.20	9.10	10.10	8.85	7.73	6.55	9.41	10.53	9.17	8.00	6.85
	,, polyet.	8.77	9.73	8.51	7.25	6.00	9.10	10.00	8.83	7.55	6.40	9.41	10.34	9.11	7.94	6.71
Borax 1%	Nt.packed	8.77	9.94	8.61	7.52	6.30	9.10	10.25	8.95	7.85	6.61	9.41	10.53	9.28	8.13	6.93
	perf.craft	8.77	9.88	8.53	7.38	6.17	9.10	10.00	8.83	7.70	6.53	9.41	10.51	9.15	8.00	6.82
	,, polyet.	8.77	9.71	8.50	7.23	6.00	9.10	10.00	8.80	7.53	6.39	9.41	10.33	9.10	7.95	6.71

Fert.	8.15	8.47	8.79	L.S.D. 5%	0.03	Dis.	8.49	8.46	8.45			L.S.D. 5%	N.S
Pack.	8.55	8.47	8.38	L.S.D. 5%	0.03	Per.	9.09	10.15	8.88	7.71	6.51	L.S.D. 5%	0.04
Fert. Dis. Pack. Per.				L.S.D.	N.S								

Normal room storage

Period (day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis. Nt. Treat.	Pack. Nt.pack	8.77	7.91	6.81	5.65	4.51	9.10	8.31	7.03	5.85	4.84	9.41	8.50	7.56	6.27	5.41
	perf.craft	8.77	7.84	6.67	5.55	4.38	9.10	8.24	6.89	5.74	4.72	9.41	8.44	7.46	6.15	5.28
	,, polyet	8.77	7.72	6.52	5.34	4.30	9.10	8.00	6.84	5.65	4.61	9.41	8.35	7.36	5.93	4.87
Tap Water	Nt.pack	8.77	7.87	6.78	5.61	4.48	9.10	8.28	6.96	5.83	4.82	9.41	8.48	7.53	6.24	5.38
	perf.craft	8.77	7.81	6.63	5.52	4.35	9.10	8.22	6.85	5.72	4.70	9.41	8.41	7.44	6.12	5.25
	,, polyet	8.77	7.72	6.50	5.32	4.28	9.10	7.95	6.81	5.61	4.58	9.41	8.31	7.35	5.93	4.85
Borax 1%	Nt.pack.	8.77	7.85	6.75	5.60	4.45	9.10	8.25	6.95	5.83	4.82	9.41	8.46	7.51	6.20	5.34
	perf.craft	8.77	7.80	6.60	5.51	4.33	9.10	8.20	6.83	5.71	4.69	9.41	8.40	7.44	6.10	5.23
	,, polyet.	8.77	7.70	6.48	5.31	4.26	9.10	7.93	6.81	5.60	4.57	9.41	8.30	7.33	5.90	4.81

Fert.	6.61	6.91	7.30	L.S.D. 5%	0.02	Dis.	6.96	6.91	6.92			L.S.D. 5%	N.S
Pack.	7.03	6.95	6.83	L.S.D. 5%	0.02	Per.	9.09	8.12	6.98	5.80	4.74	L.S.D. 5%	0.03
Fert. Dis. Pack. Per.				L.S.D. 5%	0.08								

Table (17 cont.) Effect of pea plant Fertilization level,pods disinfection and packing treatments as well as storage periods and conditions on Seeds Total Sugars % (1989 Season).

Cold storaage

Fert.level (Kg/Fed)		100 amm. sul.	200 cal-super phos.		50 pot. sul.		150 amm. sul.	300 cal.super phos.		75 pot. sul.		200 amm. sul.	400 cal.super phos.		100 pot. sul.	
Period (day)		0	8	16	24	32	0	8	16	24	32	0	8	16	24	32
Dis.	Pack.															
Nt. Treat	Nt.pack.	9.51	10.40	9.09	7.98	6.77	9.80	10.69	9.87	8.26	7.07	10.01	11.00	9.70	8.58	7.35
	perf.craft	9.51	10.31	8.99	7.81	6.63	9.80	10.59	9.50	8.16	6.97	10.01	10.91	9.59	8.46	7.28
	,, polyet	9.51	10.22	8.93	7.67	6.49	9.80	10.43	9.23	8.02	6.80	10.01	10.78	9.55	8.28	7.14
Tap Water	Nt.pack.	9.51	10.31	8.98	7.96	6.75	9.80	10.67	9.85	8.24	7.00	10.01	11.00	9.65	8.55	7.30
	perf.craft	9.51	10.20	8.97	7.79	6.60	9.80	10.55	9.55	8.13	6.91	10.01	10.88	9.55	8.41	7.24
	,, polyet	9.51	10.20	8.90	7.65	6.47	9.80	10.40	9.20	8.00	6.72	10.01	10.75	9.53	8.25	7.11
Borax 1%	Nt.pack.	9.51	10.42	8.94	7.96	6.74	9.80	10.67	9.83	8.24	7.00	10.01	10.88	9.64	8.53	7.27
	perf.craft	9.51	10.33	8.81	7.78	6.60	9.80	10.51	9.56	8.11	6.88	10.01	10.88	9.54	8.41	7.22
	,, polyet.	9.51	10.24	8.81	7.61	6.45	9.80	10.40	9.21	8.00	6.71	10.01	10.75	9.54	8.23	7.10

Fert.	8.63	8.98	9.22	L.S.D. 5%	0.02	Dis.	8.96	8.93	8.92			L.S.D. 5%	N.S		
Pack.	9.04	8.94	8.83	L.S.D. 5%	0.02	Per.	9.77	10.56	9.35	8.11	6.91	L.S.D. 5%	0.02		
Fert. Dis. Pack. Per.				L.S.D.	N.S										

Normal room storage

Period (day)		0	4	8	12	16	0	4	8	12	16	0	4	8	12	16
Dis.	Pack.															
Nt. Treat.	Nt.pack.	9.51	9.40	8.32	5.97	-	9.80	9.78	8.50	6.31	-	10.01	9.98	9.01	6.81	-
	perf.craft.	9.51	9.31	8.12	5.90	-	9.80	9.67	8.42	6.20	-	10.01	9.92	8.95	6.76	-
	,, polyet.	9.51	9.26	8.06	5.87	-	9.80	9.60	8.35	6.15	-	10.01	9.89	8.92	6.55	-
Tap Water	Nt.pack	9.51	9.35	8.30	5.94	-	9.80	9.75	8.46	6.29	-	10.01	9.94	8.95	6.77	-
	perf. craft	9.51	9.29	8.09	5.85	-	9.80	9.63	8.40	6.18	-	10.01	9.88	8.93	6.72	-
	,, polyet.	9.51	9.23	8.03	5.85	-	9.80	9.56	8.35	6.11	-	10.01	9.85	8.90	6.51	-
Borax 1%	Nt.pack	9.51	9.35	8.29	5.93	-	9.80	9.73	8.44	6.25	-	10.01	9.92	8.93	6.74	-
	perf.craft	9.51	9.25	8.10	5.84	-	9.80	9.62	8.40	6.15	-	10.01	9.85	8.91	6.72	-
	,, polyet.	9.51	9.23	8.00	5.81	-	9.80	9.55	8.33	6.10	-	10.01	9.85	8.90	6.48	-

Fert.	8.20	8.51	8.87	L.S.D. 5%	0.02	Dis.	8.55	8.52	8.51			L.S.D. 5%	N.S		
Pack.	8.59	8.52	8.47	L.S.D. 5%	0.01	Per.	9.77	9.61	8.49	6.25	4.74	L.S.D. 5%	0.02		
Fert.	Dis.	Pack.	Per.	L.S.D. 5%	0.06										

SUMMARY AND CONCLUSION