RESULTS AND DISCUSSION

I. Effect of post harvest treatments on physical properties of mangoes during storage :

a) Fruit Firmness:

Table (1) shows the effect of irradiation, some growth regulators, Benlate and "Vapor-Gard " on fruit firmness at different storage periods of " Hindi Be-Sinnara " mangoes in two experimental seasons (1979 and 1980). It is clear that irradiated mangoes with 15 or 30 Krad did not show significant effect on fruit firmness during the different storage periods in the first season (1979), while in the second season (1980), fruit firmness of irradiated mangoes was significantly higher than control after 2 weeks of storage. This result is a general agreement with that mentioned by Dharkar et al.(1966 a) and Hassan (1981).

Regarding the effect of growth regulators on fruit firmness, it is clear that, in the first season, fruits treated by 2,4-D 20 p.p.m. and GA_3 100 p.p.m., fruit firmness was significantly lower than the control after 2 weeks

Table(1): Effect of post-harvest treatments on fruit firmness of "Hindi Be-Sinnara" mangoes during storage

(1979) Treatments	Fruit firmness Kg/cm^2 after storage period (in weeks*)				(1980) Treatments	Fruits firmness Kg/cm^2 after storage period (in weeks)*			
	0	1	2	3		0	1	2	3
	**					**			
Control	3.20 C	1.76 DE	1.23 B	0.60 BD	Control	3.21 B	1.60 C	1.06 C	0.53 C
15 Krad.	3.26 BC	1.60 EF	1.03 BC	0.61 BD	15 Krad.	3.20 B	1.63 C	1.30 B	0.56 BC
30 Krad.	3.36 BC	1.60 EF	1.03 BC	0.53 BD	30 Krad.	3.40 A	1.73 C	1.26 B	0.63 BC
2,4-D 10 p.p.m.	3.30 BC	1.96 CD	1.06 BC	0.70 B	2,4-D 10 p.p.m.	3.36 AB	2.06 B	1.43 B	0.60 BC
2,4-D 20 p.p.m.	3.36 BC	1.93 CD	0.96 C	0.50 BD	GA_3 200 p.p.m.	3.33 AB	2.13 B	1.33 B	0.76 B
GA_3 100 p.p.m.	3.26 BC	1.70 EG	0.60 D	0.50 BD	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	3.36 AB	1.93 B	1.36 B	0.66 B
GA_3 200 p.p.m.	3.23 BC	2.10 BC	1.10 BC	0.65 B	Vapor-Gard 1%	3.43 A	2.40 A	1.86 A	1.20 A
Benlate 1%	3.16 C	1.53 F	0.96 C	0.40 D	Vapor-Gard 1% + 2,4-D 10 p.p.m.	3.46 A	2.46 A	1.70 A	1.30 A
Vapor 2½ %	3.56 A	2.23 AB	1.53 A	1.20 A	Vapor -Gard 1% + GA_3 200 p.p.m.	3.43 A	2.43 A	1.73 A	1.30 A
Vapor 2½ % + benlate 1%	3.50 AB	2.40 A	1.56 A	1.23 A	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	3.46 A	2.33 A	1.83 A	1.20 A

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

of storage. On the other hand, mangoes treated by GA_3 200 p.p.m., showed higher values of fruit firmness after one week of storage. Other growth regulator treatments showed some differences , compared to the control, that were not statistically significant . In the second season, fruit firmness of mangoes treated by GA_3 at 200 p.p.m. and combination of 2,4-D 10 p.p.m. + GA_3 200 p.p.m. was significantly higher than the control after 1,2 and 3 weeks of storage. Also fruit firmness of mangoes treated by 2,4-D 10 p.p.m. was significantly higher after 1 and 2 weeks of storage. These results are in general agreement with those obtained by many investigators ; Abdel-Gawad and Romoni (1967) found that GA diminished fruit softening of apricots. Frankel and Dyck (1973) reported that 2,4-D inhibited softening in Bartlett pears, as well as the results obtained by El-Zeftawi (1971). On the other hand, these results did'nt agree with that obtained by Garg et al.(1978) who reported that 2,4-D accelerated ripening and diminished firmness of guava fruits.

Fruit firmness of mangoes treated by Benlate 1%, in the first season, was significantly lower than control after 1 and 2 weeks of storage, but by the end of storage period the differences were not significant.

Concerning the effect of " Vapor-Gard " on fruit firmness of mangoes, it is obvious that, in the two seasons, all treatments of " Vapor- Gard" exhibited the highest values of fruit firmness all over the different storage periods in comparison with control and other treatments. This effect of " Vapor-Gard " on fruit firmness of " Hindi Be-Sinnara" mangoes, may be due to the retardation of the physiological changes in mangoes during ripening.

From the above results of table(1), it may be concluded that all treatments of " Vapor-Gard " maintained fruit firmness all over the storage periods and retarded softening of fruits.

b) Weight loss :

Data in table (2) shows the effect of gamma irradiation, some growth regulators, Benlate and " Vapor-Gard " on the weight loss percentage of " Hindi Be-Sinnara " mangoes during storage under room conditions in seasons 1979 and 1980, from the results concerning effect of gamma irradiation, it is clear that in both seasons, weight loss of mangoes treated by 15 or 30 Krad was lower than control fruits during the different storage periods, but the differences in 1979 were not large enough to be significant. These results agreed with the findings of Dharkar et al. (1966 b) who found that irradiation (25 Krad) diminished weight loss in mangoes. On the other hand, Farooqi et al. (1974) , working on mangoes, and Kahan et al.(1968) on bananas, reported that weight loss was not affected by irradiation.

Regarding the effect of growth regulators on the fruit weight loss , it is clear that in the first season (1979) the weight loss of fruits treated by 2,4-D 10 and 20 p.p.m. was significantly lower than the control after one

Table(2) Effect of post-harvest treatments on fruit weight loss of " Hindi Be-Sinnara " mangoes during storage.

(1970) Treatments	Weight loss percentage after storage periods in weeks *			(1980) Treatments	Weight loss percentage after storage periods in weeks *		
	1	2	3		1	2	3
Control	17.16 A**	12.06 A	14.66ABC	Control	16.32A**	19.23 A	23.65A
15 Krad.	16.12 AB	10.53 A	13.92ABCD	15 Krad.	13.15 B	17.41 B	21.65B
30 Krad.	15.19 AB	11.90 A	12.74ABCD	30 Krad.	13.27 B	18.19 B	21.70B
2,4-D 10 p.p.m.	14.55 B	10.70 A	14.18ABC	2,4-D 10 p.p.m.	12.17 B	12.66 D	17.31 D
2,4-D 20 p.p.m.	13.88 B	9.91 AB	15.04 AB	GA_3 200 p.p.m.	13.03 B	14.72 C	17.10 D
GA_3 100 p.p.m.	14.42 B	7.98 B	12.03 D	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	12.99 B	13.26 D	19.24 C
GA_3 200 p.p.m.	16.41 AB	9.98 AB	12.39 CD	Vapor-Gard 1%	8.36 C	7.63 A	10.88 A
Benlate 1%	17.07 A	11.73 A	15.73 A	Vapor-Gard 1% + 2,4-D 10 p.p.m.	9.22 C	7.89 E	11.79 A
Vapor 2½ %	5.33 C	24. C	5.06 E	Vapor -Gard 1% + GA_3 200 p.p.m.	9.26 C	7.27 E	10.25 E
Vapor 2½ % + benlate 1%	5.85 C	4.81 C	4.85 A	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	9.78 C	7.15 E	10.40 E

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

week of storage, while the weight loss of mangoes treated by GA_3 100 p.p.m. was significantly lower than the control after 1,2 and 3 weeks of storage. In the second season (1980) the weight loss of all growth regulator treatments was signifidantly lower than control during the different storage periods. These results are in agreement with that mentioned by Garg et al.(1976) as they concluded that weight loss was the least in mangoes treated by 2,4-D . On the contrary, Saha (1971) stated that weight loss percentage of guava fruits treated by 2,4-D was greater than control fruits during storage, also Kohli and Bhambota (1966) found that the weight loss was similar in lime fruits treated by 2,4-D and control.

In both experimental seasons, all treatments of " Vapor-Gard " diminished weight loss percentage signifi-cantly compared with control and other treatments through different storage periods. Thus it may be concluded that treatments of " Vapor-Gard " are more effective in decreas-ing the weight loss percentage of " Hindi Be-Sinnara "

mango fruits during storage. These results are in agreement with Urin et al,(1975) , Alberigo (1977) and Lidster (1981) as they mentioned that, antitranspirant films were found to be beneficial in reducing pre and post-harvest fruit water loss and shriveling.

Benlate at 1% did'nt show any significant effect on weight loss percentage during storage periods, where the decrease in fruit weight (as percentage)was similar to the weight loss in control fruits.

C) Decay percentage, quality and shelf-life extension:

Decay in mango fruits stored under room conditions was due to senescence, softness, shrinkage and black spots on the skin (the latter appeared in the irradiated mangoes only). The fruits became weak as a result of senescence and softness, and became susseptible to pathogen attacks. The principal pathogen in " Hindi Be-Sinnara " mangoes during storage was the stem end rot caused by Dipolodia natalensis. P.

Table (3): Effect of post-harvest treatments on decay percentage of "Hindi Be- Sinnara " mangoes during storage.

(1979)				(1980)			
Treatments	% decay after storage period in weeks			Treatments	% decay after storage periods in weeks		
	1	2	3		1	2	3
Control	-	36.36	63.64	Control	-	37.5	66.75
15 Krad.	-	27.30	54.55	15 Krad.	-	31.25	62.5
30 Krad.	-	25.00	41.67	30 Krad.	-	27.20	56.25
2,4-D 10 p.p.m.	-	23.07	46.15	2,4-d 10 p.p.m.	-	18.75	42.85
2,4-D 20 p.p.m.	-	25.0	58.33	GA_3 200 p.p.m.	-	21.42	46.15
GA_3 100 p.p.m.	-	30.76	53.84	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	-	23.52	43.75
GA_3 200 p.p.m.	-	27.27	45.45	"Vapor-Gard" 1 %	-	-	12.50
Benlate 1%	-	15.38	56.25	"Vapor-Gard" 1% + 2,4-D 10 p.p.m.	-	-	16.67
" Vapor-Gard " 2.5%	-	-	14.28	"Vapor-Gard 1% + GA_3 200 p.p.m.	-	-	15.78
"Vapor-Gard " 2.5% + Benlate 1%	-	-	18.75	"Vapor-Gard " 1% + 2,4-D 10 p.p.m. + GA_3 200 p.p.m.	-	-	10.52

Table(3) shows the effect of some post-harvest treatments on decay percentage of " Hindi Be-Sinnara " mangoes. It is clear that, in all cases, the decay percentage increased with the length of storage period,and was higher in control fruits than that of other treatments. Mangoes irradiated with 15 or 30 Krad showed a lower decay percentage than the control after 2 and 3 weeks of storage in both seasons. The decay of fruits treated by 30 Krad was lower than that in mangoes treated by 15 Krad.

Similarly, mangoes treated by growth regulators 2,4-D or GA_3 in both seasons, exhibited lower decay percentage than the control after 2 and 3 weeks of storage. The differences between these treatments were slight.

Benlate 1% as a fungicide was more effective in decreasing the decay percentage after 2 weeks of storage only, where it reached 15.38% compared with control(36.36), but this percentage increased at the end of storage periods (56.25%).

On the other hand, decay percentage of all treatments of " Vapor-Gard " in both experimental seasons was much lower than control and other treatments at the end of storage period, moreover there was no any deterioration in these treatments after 1 and 2 weeks of storage in both seasons. From this result it may be concluded that, treatments of " Vapor-Gard " were more effective in minimizing decay percentage.

Effects of gamma irradiation, growth-regulators, Benlate and " Vapor-Gard " on fruit quality and shelf-life extension of " Hindi Be- Sinnara " mangoes are presented in table (4), Data show that mangoes treated with 30 Krad gamma rays, 10 or 20 p.p. m. 2,4-D and 100 or 200 p.p.m. GA_3 reached the fair quality at 15 days of storage, while control fruits reached the fair quality at 10 days of storage, so the shelf-life was extended by 5 days over that of the control.

On the other side, all treatments of " Vapor-Gard" reached the fair quality at 20 days of storage, so the shelf-life was extended by 10 days over that of the control.

Table (4): Effect of post-harvest treatments on quality and shelf-life extension, of " Hindi Be-Sinnara" mangoes during storage.

(1979) Treatments	quality and shelf -life after storage periods in days.					(1980) Treatments	quality and shelf -life after storage periods in days				
	0	5	10	15	20		0	5	10	15	20
Control	Exc.	G	F.	P.	P.	Control	Exc.	G.	F.	P.	P.
15 Krad	Exc.	G.	F.	P.	P.	15 Krad.	Exc.	G.	F.	P.	P.
30 Krad	Exc.	Exc.	G.	F.	P.	30 Krad.	Exc.	Exc.	G.	F.	P.
2,4-D 10 p.p.m.	Exc.	Exc.	G.	F.	P.	2,4- D 10 p.p.m.	Exc.	Exc.	G.	F.	P.
2,4-D 20 p.p.m.	Exc.	Exc.	G.	F.	P.	GA_3 200 p.p.m.	Exc.	Exc.	G.	F.	P.
GA_3 100 p.p.m.	Exc.	Exc.	G.	F.	P.	2,4-D 10 p.p.m.+GA_3 200ppm	Exc.	Exc.	G.	F.	P.
GA_3 200 p.p.m.	Exc.	Exc.	G.	F.	P.	"Vapor-Gard 1%	Exc.	Exc.	Exc.	G.	F.
Benlate 1%	Exc.	Exc.	F.	P.	P.	"Vapor-Gard 1% +2,4-D 10ppm	Exc.	Exc.	Exc.	G.	F.
"Vapor-Gard 2.5%	Exc.	Exc.	Exc.	G.	F.	"Vapor-Gard 1% + GA_3 200 ppm	Exc.	Exc.	Exc.	G.	F.
"Vapor-Gard 2.5% + Benlate 1%	Exc.	Exc.	Exc.	G.	F.	"Vapor-Gard 1%+ 2,4-D 10 ppm + GA_3 200 ppm.	Exc.	Exc.	Exc.	G.	F.

Exc. = Excellent. , G. = Good. F.= Fair P. = Poor.

On the contrary, fruits treated by 15 Krad gamma rays and Benlate 1% reached the fair quality at the same time as control fruits. Although, treating mangoes with Benlate was very benefical in reducing the decay percentage via prevented pathogen attacks , but it accelerated ripening and senescence after 10 days of storage and led to increased softening. Therefore, Benlate was not used in the second season.

The above results are in agreement with Dharkar, et al.(1966 a) who reported that 25 Krad gamma ray was the optimum dose for extension of storage life of " Alphonso" mangoes, also Dharkar et al.(1966 b) found that , treating mangoes with irradiation (25 krad) alone or combined with skin coating and stored under air or nitrogen increased the storage life. Similarly, the previous results are in line with Ali , et al.(1968) who mentioned that, mangoes irradiated by 30 krad were still acceptable after 2 weeks of storage. Polo et al. (1971) reported that, irradiated mangoes gave the lowest percentage of decay(at 60 Krad).

Also, Ahmed (1972) showed that, ripening in " Dusehri" mangoes was delayed for 7 day when irradiated by 30 Krad.

The results also are in harmony with Farooqi et al. (1974) and Hassan (1981) who stated that mangoes remained in a good condition until 15 day of storage after irradiation with 30 or 25 Krad.

Generally, the results obtained about the effect of growth regulators on decay percentage, quality and shelf-life extension are in harmony with Deol and Bhullar (1972) who reported that , 2,4-D at 60 p.p.m. reduced the wastage percentage in " Sama Balisht " mangoes. Also, Garge et al. (1976) stated that, the rate of ripening and spoilage in mango fruits were low when dipped in 2,4-D at 40 p.p.m.

Similarly, the previous results are in agreement with Kohli and Bhambota (1966) they mentioned that, 2,4-D was more effective in reducing lime fruit rot than control. The results also are in line with those obtained by Saha (1971) who found that treated guava fruits with GA at 100

or 200 p.p.m. caused retarded ripening. Also, Fahmy et al.(1972) reported that, GA prevented decay more effectively than 2,4-D in Balady lime fruits.

On the other side, Awab and Compago(1973) and Awad et al (1975) stated that, treating banana fruits with GA at 50 or 100 p.p.m. delayed ripening by 2-3 days compared with control.

The results concerning " Vapor-Gard " treatments are in harmony with Uriu et al (1975) who reported that, film- forming antitranspirants were found to be beneficial in decreasing fruit shrivel, also Albrigo (1977) mentioned that , antitranspirants sprays on some fruit trees were beneficial in reducing pre-and post-harvest fruit water loss, shriveling and improved post-harvest keeping quality.

The above effects of " Vapor-Gard " treatments in reducing decay percentage, keeping quality and shelf-life extension may be due to the retardation of the physiological processes which lead to the ripening.

II. Effect of post-harvest treatments on the chemical porperties of mangoes during storage:

(a) Total soluble solids:

Table (5) shows the effect of irradiation, some growth regulators, Benlate and " Vapor-Gard " on total soluble solids content of "Hindi Be-Sinnara" mango fruits in the two experimental seasons (1979 and 1980). It is obvious that, treatment of mangoes by gamma ray at 15 and 30 Krad did 'nt show significant effects on total soluble solids content in both experimental seasons during different storage periods (1,2 and 3 weeks), except treatment of 30 Krad after 2 weeks of storage in the first season where, total soluble solids was significantly higher than the control mangoes or those treated by 15 Krad. These results are in agreement with Thomas and Janave (1975) as they reported that mangoes irradiated at 25 Krad were not affected. On the contrary, Dennison and Ahmed (1967) found that total soluble solids contents in mango fruits decreased with increasing of gamma rays doses, also Hassan (1981)reported that, total soluble solids content decreased during the

Table(5): Effectof post-harvest treatments on total soluble solids of "Hindi Be-Sinnara" mangoes during storage.

(1979) Treatments	% Total soluble solids after storage periods in weeks * 0	1	2	3	(1980) Treatments	% Total soluble solids after storage periods in weeks * 0	1	2	3
Control	8.96 A	17.0 B	19.20 BC	19.46 A	Control	9.03 A	15.73A	18.53 B	19.93 A
15 Krad.	8.86 A	17.36AB	19.60 BC	20.13 A	15 Krad.	9.10 A	16.33A	19.30 AB	20.20 A
30 Krad.	19.10 A	17.06 B	21.06 A	19.53 A	30 Krad.	9.16 A	16.16 A	18.33 B	20.06 A
2,4-D 10 p.p.m.	9.10 A	16.20 BC	19.33 BC	19.80 A	2,4-D 10 p.p.m.	8.93 A	15.26 A	18.73 B	19.46 A
2,4-D 20 p.p.m.	9.0 A	16.66 BC	18.53 C	20.53 A	GA_3 200 p.p.m.	8.80 A	16.03 A	20.26 A	19.56 A
GA_3 100 p.p.m.	9.10 A	15.53 CD	19.83 B	19.43 A	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	9.8 A	15.93 A	19.10 B	20.36 A
GA_3 200 p.p.m.	9.03 A	16.26 BC	19.13 BC	19.63 A	Vapor-Gard 1%	8.86 A	12.06 B	15.60 C	16.80 B
Benlate 1%	9.0 A	18.33 A	20.26 AB	20.60 A	Vapor-Gard 1% + 2,4-D 10 p.p.m.	8.96 A	12.50 B	15.53 C	17.06 B
Vapor 2½ %	9.20 A	14.60 DE	15.86 D	14.93 B	Vapor -Gard 1% + GA_3 200 p.p.m.	9.06 A	12.83 B	14.93 CD	16.33 B
Vapor 2½ % + benlate 1%	9.30 A	13.60 E	13.93 D	16.46 C	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	8.9 A	13.20 B	14.26 D	17.33 B

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

storage in " Hindi " mangoes irradiated with 25 Krad. In banana fruits, Maxie et al.(1968) and El-Motaium(1980) found that irradiation decreased total soluble solids content with doses of 20-40 Krad.

Similary, treated mangoes by growth regulators 2,4-D or GA_3 in the two seasons, did'nt show significant effect on total soluble solids content in comparison with control fruits after 1, 2 and 3 weeks of storage, except mangoes treated by GA_3 100 p.p.m. in first season where, total soluble solids content were significantly lower than control after one week of storage, also GA_3 200 p.p.m. in the second season gave a higher and significant effect of total soluble solids content after 2 weeks of storage than control. These results are in general agreement with those obtained by Krishnamurthy and Subramanyam (1970) and Garg et al.(1976) as they found that 2,4-D and 2,4,5-T did'nt show any significant changes in total soluble solids content of mango, but Singh et al.(1977) mentioned that GA sprayed on mango trees enhanced total soluble solids content of fruits. On the other hand, the result disagree with Singh (1976) who reported that 2,4-D or 2,4,5-T increased the

total soluble solids content in mangoes. Kohli and Bhambota (1966), in lime fruits, and Srivastava et al. (1971) in apricots, they found that total soluble solids increased in the fruits treated by 2,4-D or 2,4,5-T.

Regarding treatment of Benlate 1% it is clear that the total soluble solids content of mangoes treated by Benlate 1% was higher than control and other treatments after 1 and 3 weeks of storage, the differences were significant after one week only.

Concerning the effect of " Vapor-Gard " on total soluble solids content of " Hindi Be-Sinnara " mangoes, it's obvious that, in both experimental seasons, the total soluble solids of all treatments of " Vapor-Gard " were much lower than control and other treatments all over the storage periods, and the differences were significant. These results are in harmony with Gale and Robert (1966) who mentioned that, antitranspirants reduced total soluble solids content in Cherry and apple fruits.

b) Total acidity :

Table (6) shows the effect of irradiation, some growth regulators, Benlate and " Vapor-Gard " on total acidity at different storage periods of " Hindi Be-Sinnara" mangoes in two experimental seasons (1979 and 1980). It's clear that, irradiated mangoes with 15 and 30 Krad did'nt show significant effect on total acidity content after 2 and 3 weeks of storage in both seasons. The effect after one week in the second season was significantly higher than the control. These results are in line with Dennison and Ahmed (1967), Cuevez - Ruiz et al.(1972) and Thomas and Janve (1975) as they reported that total acidity in mangoes was not affected by irradiation. On the other hand,Beyers et al.(1979) , Thomas and Beyers (1979) and Hassan (1981) found that, total acidity of irradiated mangoes was highly significant than nonirradiated fruits.

Similarly, mangoes treated by growth regulators (2,4-D or GA_3) in the two seasons were not significantly different in total acidity content compared with control after 2 and 3 weeks of storage. Total acidity of mangoes treated by 2,4-D 10 p.p.m. and GA_3 100 p.p.m. was significantly lower after one week of storage in the first season,

Table (6): Effect of post-harvest treatments on total acidity of "Hindi Bē-Sinnara " mangoes during storage

(1979) Treatments	% Total acidity after storage period in weeks *				(1980) Treatments	% Total acidity after storage period in weeks *			
	0	1	2	3		0	1	2	3
Control	1.92 A**	0.46 B	0.15 B	0.14 B	Control	2.01 A**	0.43 C	0.12 A	0.06 A
15 Krad.	1.89 A	0.41 BC	0.14 B	0.11 B	15 Krad.	1.86 A	0.66 B	0.14 A	0.11 A
30 Krad.	1.88 A	0.39 BC	0.17 B	0.13 B	30 Krad.	1.85 A	0.56 B	0.13 A	0.12 A
2,4-D 10 p.p.m.	1.96 A	0.45 B	0.15 B	0.14 B	2,4-D 10 p.p.m.	1.96 A	0.39 C	0.15 A	0.09 A
2,4-D 20 p.p.m.	0.95 A	0.27 C	0.14 B	0.13 B	GA_3 200 p.p.m.	2.01 A	0.61 B	0.15 A	0.10 A
GA_3 100 p.p.m.	1.90 A	0.30 C	0.15 B	0.12 B	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	2.04 A	0.58 B	0.14 A	0.09 A
GA_3 200 p.p.m.	1.81 A	0.38 BC	0.16 B	0.13 B	Vapor-Gard 1%	1.95 A	0.96 A	0.15 A	0.06 A
Benlate 1%	1.86 A	0.28 C	0.14 B	0.11 B	Vapor-Gard 1% + 2,4-D 10 p.p.m.	1.88 A	0.86 A	0.17 A	0.08 A
Vapor 2½ %	1.96 A	1.40 A	0.53 A	0.58 A	Vapor -Gard 1% + GA_3 200 p.p.m.	1.97 A	0.85 A	0.18 A	0.07 A
Vapor 2½ % + benlate 1%	1.91 A	1.28 A	0.39 A	0.46 A	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	1.39 A	0.92 A	0.16 A	0.11 A

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

while in the second season GA_3 200 p.p.m. and 2,4-D 10 p.p.m. + GA_3 200 p.p.m. were significantly higher than control. These results are in harmony with Garg et al.(1976) who stated that, total acidity was not affected by treated mangoes with 2,4-D, also Saha (1971) who found that, treated guava fruits with 2,4-D or GA each at 200 p.p.m. did'nt affect total acidity content. However Singh (1976) and Singh et al.(1977) reported that, spraying mango fruits by 2,4-D or GA reduced total acidity content. Also, Srivastava et al.(1971)in apricots, found that acidity was reduced by spraying the fruits with 2,4-D or GA at the pit hardening stage, Tizio (1950) stated that, in bananas, total acidity content in fruits treated by 2,4-D was higher than control fruits.

Concerning the effect of Benlate on total acidity content of mangoes, the data show clearly that Benlate 1% did'nt show significant effect on total acidity content after 2 and 3 weeks of storage, but the effect was significantly higher after one week of storage.

Data presented in table(6) show also that mangoes treated by "Vapor-Gard " 2.5% or " Vapor-Gard" 2.5% +

Benlate 1% recorded higher values of total acidity content than the control fruits and other treatments all over the storage periods. In the second season treatments of "Vapor-Gard " 1% alone or with growth regulators(2,4-D or GA_3) did not differ significantly than the control after 2 and 3 weeks of storage, but after one week of storage the differences were significantly higher than the control and other treatments.

C) Total carotenoids:

Data presented in table (1) show the effect of some post-harvest treatments on total carotenoids content of " Hindi Be-Sinnara " mangoes during the different storage periods in both experimental seasons (1979 and 1980). It is clear that total carotenoids content of mangoes had increased significantly with increasing the storage periods in both control fruits and other treatments in both seasons. Irradiated mangoes by gamma rays at 15 and 30 Krad did'nt show significant effect on total carotenoids content in comparison with the control fruits after 2 and 3 weeks of storage in both seasons, but after one week of storage

Table (7): Effect of post-harvest treatments on total carotenoids of " Hindi Be- Sinnara mangoes during storage.

(1979) Treatments	Total carotenoids (mg/100 g pulp) contain after storage periods in weeks *				(1980) Treatments	Total carotenoids (mg/100 g pulp)content after storage periods in weeks *			
	0	1	2	3		0	1	2	3
	— **					**			
Control	0.25 A	2.23 C	3.59 BC	5.61 A	Control	0.25 A	2.15 A	3.50 A	5.91 ABC
15 Krad.	0.24 A	2.96 A	3.40 C	5.29 A	15 Krad.	0.27 A	2.11 A	3.51 A	5.65 BC
30 Krad.	0.25 A	2.65 ABC	3.64 BC	5.46 A	30 Krad.	0.26 A	2.26 A	3.28 A	5.88 ABC
2,4-D 10 p.p.m.	0.27 A	2.41 BC	3.27 BC	5.70 A	2,4-D 10 p.p.m.	0.27 A	2.40 A	3.24 A	5.51 C
2,4-D 20 p.p.m.	0.28 A	2.77 AB	4.30 A	5.77 A	GA_3 200 p.p.m.	0.26 A	2.37 A	3.26 A	6.37 A
GA_3 100 p.p.m.	0.25 A	2.75 AB	4.0 A B	5.38 A	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	0.25 A	2.11 A	3.40 A	6.20 AB
GA_3 200 p.p.m.	0.24 A	2.58 ABC	3.32 C	5. 59 A	Vapor-Gard 1%	0.26 A	0.96 B	2.62 B	3.52 D
Benlate 1%	0.26 A	3.05 A	3.98 AB	5.46 A	Vapor-Gard 1% + 2,4-D 10 p.p.m.	0.27 A	0.85 B	2.75 B	3.50 D
Vapor 2½ %	0.25 A	0.43 D	0.65 D	0.50 B	Vapor -Gard 1% + GA_3 200 p.p.m.	0.29 A	0.86 B	3.08 B	3.46 D
Vapor 2½ % + benlate 1%	0.25 A	0.45 D	0.62 D	0.79 B	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	0.24 A	0.93 B	3.02 B	3.68 D

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

treatment of 15 Krad differred significantly than the control in the first season only. These results are in line with those obtained by Cuevez-Ruiz et al.(1972) , Thomas and Janave (1975) , Thomas and Beyers (1979) and Hassan (1981) as they reported that, irradiated mango fruits did'nt show significant differences in it's content of total carotenoids.

Concerning the effect of 2,4-D or GA_3 on total caroteroids of mangoes, data show clearly that , in the first season total carotenoids of mangoes treated by 2,4-D 20 p.p.m. were significantly higher after 1 and 2 weeks of storage, while total carotenoids of mangoes treated by GA_3 100 p.p.m. were significantly higher after one week of storage, other treatments of growth regulators were not different significantly. In the second season the differences between all growth regulator treatment and the control were not statistically significant. These results are in general agreement with Garg et al.(1976) who reported that total carotenoids in mangoes was not affected by

treatment with 2,4-D 40 p.p.m. However in some other fruits, Coggins and Hield (1958) , in organes, Dostal and Leopold (1967), in tomatoes, and Rasmmussen (1973), in ' Valencia ' oranges, they stated that GA delays the carotenoids formation.

Mangoes treated by Benlate 1% gave higher and significant value of total carotenoids content than the control after one week of storage. On the other hand, treatments of " Vapor-Gard " 2.5% in the first season showed a lower and significant values of total carotenoids content in comparison with control and other treatments. The same results has been obtained in the second season for mangoes treated by " Vapor -Gard " 1% alone or " Vapor-Gard" 1% + growth regulator (2,4-D or GA_3) all over the different storage periods. The decrease in total carotenoids formation was higher in the first season than in the second season.

From the results obtained of the treatments of " Vapor-Gard ", it could be concluded that lack of oxygen under the effect of antitranspirants may be responsible of the reduction in carotenoids formation of mango pulp, where the oxygen is very necessary to form this pigment during ripening.

d) Total phenolic compounds:

Total phenolic compounds of " Hindi Be-Sinnara " mango fruits as affected by post-harvest treatments during the storage under room conditions are presented in tables (8) for the two seasons 1979 and 1980.

Data show that a significant increase has been occured in total phenols content as a result of irradiation of mango fruits by gamma rays at 15 and 30 Krad after 2 and 3 weeks of storage in both seasons compared with control and other treatments. These results generally are in agreement with Thomas and Janave (1974), Hassan (1981), in mangoes, Thomas and Nair (1971) , Thomas et al.(1971) and El-Motaium (1980), in bananas, as they reported that irradiated fruits lead to an increase of total phenolic compounds.

On the other hand, mangoes treated by growth regulators 2,4-D or GA_3, in both seasons did not differ significantly than the control fruits in total phenolic content during the different storage periods.

Treated mango fruits by Benlate 1% did'nt show significant effects on total phenols contents all over the storage periods. On the other hand, total phenols of mangoes treated by " Vapor-Gard " 2.5% , after one week of storage,

Table (8) Effect of post-harvest treatments on total phenolic compounds of " Hindi Be-Sinnara " mangoes during storage.

(1979) Treatments	Total phenolic compounds (mg/100 g pulp) of fruits after storage periods in week *				(1980) Treatments	Total phenolic compounds (mg/100g of pulp of fruits after storage period in weeks *			
	0	1	2	3		0	1	2	3
	**					**			
Control	101.67 AB	62.78 CDE	44.46C	39.60 BC	Control	87.88BC	73.33 A	49.01 B	34.33CD
15 Krad.	88.13 C	57.22 E	53.75 AB	48.92 A	15 Krad.	93.16AB	72.08 A	56.58 A	41.30 AB
30 Krad.	91.28 C	67.78 BC	57.22 A	51.05 A	30 Krad.	87.46 C	73.12 A	59.67 A	43.0 A
2,4-D 10 p.p.m.	99.85 AB	65.28CD	48.61 BC	39.89 BC	2,4-D 10 p.p.m.	76.66 D	68.11 A	45.16 BC	39.01ABC
2,4-D 20 p.p.m.	98.72 AB	59.33DE	44.45 C	37.36 C	GA_3 200 p.p.m.	79.6 D	72.55 A	46.25 BC	36.96BC
GA_3 100 p.p.m.	102.63 A	63.64CDE	49.72 BC	43.13 AB	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	95.10A	74.16mA	47.22 B	33.66 CD
GA_3 200 p.p.m.	99.64 AB	63.38CDE	51.23ABC	45.86 AB	Vapor-Gard 1%	87.49 BC	70.0 A	38.89 B	28.69 D
Benlate 1%	78.86 D	68.88BC	47.51 BC	37.81 C	Vapor-Gard 1% + 2,4-D 10 p.p.m.	80.27 D	68.54 A	39.72 D	30.61 D
Vapor 2½ %	94.44 BC	72.85 AB	48.41 BC	37.94 C	Vapor -Gard 1% + GA_3 200 p.p.m.	88.55 BC	73.18 A	39.78 B	28.34 D
Vapor 2½ % + benlate 1%	79.61 D	76.25 A	54.88 AB	38.18 C	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	92.55 ABC	72.22A	40.88 CD	29.66 B

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

and " Vapor-Gard " 2.5% + Benlate 1% after 1 and 2 weeks of storage were significantly higher than the control in the first season. In the second season total phenols of all treatments of " Vapor-Gard" 1% were lower than control and also other treatments after 2 and 3 weeks of storage. The differences were significant after 2 weeks only.

Generally, from the above results, it may be concluded that total phenolic compounds of all treatments and control showed a marked decrease during the storage periods specially after 2 and 3 weeks of storage, the decrease reached to more than 50% than the beginning of storage and that was true in both seasons(1979 and 1980).

e) Sugars:

Data presented in table (9) show the effect of irradiation, some growth regulators, Benlate and " Vapor-Gard " on reducing sugars content at different storage periods of "Hindi Be-Sinnara " mangoes in two experimental seasons (1979 and 1980). It is clear that irradiated mangoes with 15 and 30 Krad did'nt effect significantly on the reducing sugars content in mango pulp after 2 and 3 weeks of storage

Table(9): Effectof post-harvest treatments on reducing sugars of Hindi Be-Sinnara " mangoes during storage.

(1979) Treatments	Reducing sugars (g/100 g pulp)of fruit after storage in weeks *				(1980) Treatments	Reducing sugars (g/100 g pulp) of fruit after storage in weeks *			
	0	1	2	3		0	1	2	3
	-- **					**			
Control	3.51 A	4.26 B	4.31 B	2.23 D	Control	4.02 AB	44.0D	3.82 CD	2.53 B
15 Krad.	3.61 A	4.20 B	3.81 B	2.60 CD	15 Krad.	4.38 A	40.90C	3.73 CD	2.36 B
30 Krad.	3.38 A	4.70 AB	4.01 B	2.14 D	30 Krad.	4.06 AB	5.66 A	3.85 CD	2.14 B
2,4-D 10 p.p.m.	3.13 A	4.57AB	3.94 B	2.69 CD	2,4-D 10 p.p.m.	3.58 B	5.31 ABC	4.03 BC	2.38 B
2,4-D 20 p.p.m.	3.71 A	3.27 B	4.10 B	2.56 CD	GA_3 200 p.p.m.	4.25 A	5.29ABC	3.46 D	2.24 B
GA_3 100 p.p.m.	3.52 A	4.37 AB	4.17 B	2.43 D	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	4.27 A	5.21 BC	3.81 CD	2.27 B
GA_3 200 p.p.m.	3.16 A	4.69 AB	4.02 B	2.64 CD	Vapor-Gard 1%	4.63 A	4.25 ABC	4.17 ABC	3.23 A
Benlate 1%	3.75 A	4.80 AB	4.47 B	3.09 C	Vapor-Gard 1% + 2,4-D 10 p.p.m.	4.11 AB	5.37 AB	4.46 A	3.12 A
Vapor 2½ %	3.31 A	4.89 A	5.17 A	4.13 A	Vapor -Gard 1% + GA_3 200 p.p.m.	4.34 A	5.12 BC	4.36 AB	3.09 A
Vapor 2½ % + benlate 1%	3.56 A	4.32 AB	4.34 B	4.19 B	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	4.32 A	5.43 AB	3.98 BC	3.26 A

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

in both seasons in comparison with the control fruits. Also, the same trend has been noticed as a result of treated mangoes with growth regulators 2,4-D or GA_3 in both experimental seasons.

On the other hand, reducing sugars content of mangoes treated by " Vapor-Gard " 25% alone or " Vapor-Gard " 2.5% + Benlate 1% and " Vapor-Gard " 1% alone or " Vapor-Gard " 1% combined with growth regulators(2,4-D or GA_3) was significantly higher than the control after 2 and 3 weeks of storage in both seasons. The differences in reducing sugars in response to treatments of " Vapor-Gard " 2.5% + Benlate 1% , in the first season, and " Vapor-Gard " 1% + 2,4-D 10 p.p.m. + GA_3 200 p.p.m., in the second season after 2 weeks of storage were not big enough to be significant.

It is well noticed from the same table that, reducing sugars contents of mangoes of all treatments and control increased throughout the first week of storage followed by a gradual decrease till the end of storage period, this was true in both seasons of study.

Concerning the effect of some post-harvest treatments on total sugars contents in " Hindi Be-Sinnara " mangoes, data in table (10) show that, total sugars content of mangoes irradiated by 15 and 30 Krad gamma rays did not differ significantly compared with the control after 2 and 3 weeks of storage in both seasons, but after one week of storage, both doses were significantly higher than the control in the second season as well as treatment by 30 Krad in the first season.

Regarding , effect of growth regulators on total sugars it is clear that , in the first season mangoes treated by GA_3 100 p.p.m. were significantly higher values than the control after 1 week of storage, while fruits treated by GA_3 200 p.p.m. gave significant and higher values of total sugars content after 3 weeks of storage. In the second season, total sugars content of mangoes treated by GA_3 200 p.p.m. were significantly higher than the control after 1 and 2 week of storage, also treatment of 2,4-D 10 p.p.m. + GA_3 200 p.p.m. was significantly higher than the control after one week of storage. Other treatments of growth regulators, in both season did not differ significantly than the control.

E Table(10): Effec of post-harvest treatments on total sugars of " Hindi Be-Sinaara Mangoes during storage.

(1979) Treatments	Total surgars (g/100 g pulp)of fruits after storage in weeks *				(1980) Treatments	Total sugars (G/100 g pulp) of fruits after storage in weeks *			
	0	1	2	3		0	1	2	3
Control	7.02 A**	8.71 C	9.71 A	8.80 BC	Control	7.64 A**	9.07 B	9.75 BC	9.25 ABC
15 Krad.	7.01 A	9.06 BC	9.76 A	8.84 BC	15 Krad.	7.34 A	9.81 A	10.12 AB	8.63 C
30 Krad.	7.03 A	9.74 AB	10.02 A	7.96 C	30 Krad.	7.29 A	10.03A	9.36 C	8.65 C
2,4-D 10 p.p.m.	6.94 A	8.36 C	9.34 A	8.52 C	2,4-D 10 p.p.m.	7.51 A	9.54AB	9.86 ABC	9.08 BC
2,4-D 20 p.p.m.	7.08 A	8.68 C	9.91 A	9.50 AB	GA_3 200 p.p.m.	7.63 A	9.92 A	10.44 A	9.54 AB
GA_3 100 p.p.m.	7.26 A	9.92 A	10.09 A	9.48 A	2,4-D 10 p.p.m. + GA_3 200 p.p.m.	7.11 A	9.82 A	9.51 BC	9.76 A
GA_3 200 p.p.m.	7.01 A	9.01 BC	9.96 A	9.82 A	Vapor-Gard 1%	7.26 A	7.40 C	6.67 D	5.18 D
Benlate 1%	7.39 A	8.93 BC	9.26 A	8.45 C	Vapor-Gard 1% + 2,4-D 10 p.p.m.	7.08 A	6.63 D	7.03 D	5.40 D
Vapor 2½ %	7.09 A	6.23 D	5.97 B	5.17 D	Vapor -Gard 1% + GA_3 200 p.p.m.	6.98 A	6.71 D	7.06 D	5.09 D
Vapor 2½ % + benlate 1%	7.09 A	6.83 D	5.49 B	4.20 D	Vapor -Gard 1% + 2,4-D 10 p.p.m.+ GA_3 200 p.p. m.	7.30 A	7.02CD	6.55 D	4.79 D

* Fruits were kept in standard carton boxes under room temperature.

** Mean separation by Duncan's multiple range test, 5% level.

On the other hand, a significant decrease in total sugars content has been noticed in " Hindi Be-Sinnara " mango pulp in all treatments of " Vapor-Gard", in both experimental seasons during the different storage periods. Also total sugars content of these treatments were very lower than control and other treatments.

From the above results, it is clear that there was a gradual increase in total sugars content after 1 and 2 weeks of storage for all treatments and control in both seasons followed by a gradual decrease in the 3 rd week.

The results concerning effect of irradiation on reducing and total sugars content are in harmony with Cueves-Ruiz et al.(1972) who stated that, irradiation did'nt effect on the carbohydrate content in mangoes , also Thomas and Beyers (1979) found that , no difference in total sugars content between irradiated and nonirradiated mango fruits as well as obtained by Hassan (1981) who found that, irradiated mangoes with 25 Krad did'nt give significant effects an reducing and total sugars content. These results did not agree with Dharkar et al.(1966 a) as they reported that reducing sugars were more in the

irradiated mangoes.

On the other hand, results obtained by growth regulators treatments are in harmony with Garg et al. (1976) as they reported that , treatment mangoes with 2,4-D did'nt show any significant effects in sugars contents, also the results are in line with those obtained by Singh et al.(1977) as they found that sugars content in mangoes were enhanced when sprayed with GA . Moreover, the results are in agreement with Kohli and Bhambota (1965) in sweet oranges, Saha (1971) in guava fruits and Srivastava et al (1971) in apricots, they reported that treatment the fruits with 2,4-D did 'nt affect reducing and total sugars content, On the other hand, Tizio (1950) in bananas and Garg and Ram (1976) in guava fruits found that 2,4-D caused an increase in total sugars content, as well as the results obtained by Assi (1978) who reported that 2,4-D and GA_3 increased significantly the total sugars content in Amoun oranges.

III. Respiration Rate :

Data concerning the respiration activity of "Hindi Be-Sinnara " mangoes as affected by gamma radiation , some growth regulators, Benlate , " Vapor-Gard " and

storage period under room condition after harvest through the two experimental seasons(1979 and 1980) are presented in tables (11 and 12) , these results were divided into three parts as follows:

a) Radiation studies:

Respiration rates of irradiated mangoes and the control are illustrated in Fig.(1) for both seasons (1979 and 1980) . The unirradiated control mangoes reached a climacteric peek (126 mg CO_2 / Kg / hour) in ten days in the first season starting from 10 mg CO_2 on the second day of storage and with the rate rising steeply with ripening from 7 th day at the first season while, in the second season control mangoes reached a climacteric peak (135.5 mg CO_2 / Kg/ hour) in 11 days (Fig.2), and with the rate rising steeply with ripening from 8 th day.

On the other hand, the irradiated mangoes at 15 Krad reached a climacteric peak (118 and 124 mg CO_2/Kg/hour) on the 12 th day in both experimental seasons, respectively (1979 and 1980).

In mangoes irradiated at 30 Krad the climacteric peak was reached on the 14 and 15 th day (120 and 123 mg CO_2/ Kg/ hour) in both seasons, respectively. In the first season , there was steady increase in respiration

Table(11): Respiration rates (as mg Co_2 / Kg / hour) in " Hindi Be-Sinnara " mango fruits after harvest as affected by (gamma irradiation, Growth regulators, Benlate, "Vapor-Gard)" and storage under room conditions (1979).

days after harvest.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Temperature °C	28	27	29	30	29	28	28	30	29	28	28	28	29	28	29	29	28	29
Treatments.																		
Control	-	10	18	27	31	35	40	62	95	127	102							
15 Krad	-	15	18	23	29	40	53	74	89	100	112	118	102					
30 Krad	-	12	17	24	30	38	46	55	68	84	91	102	114	121	110	93		
2,4-D 10 p.p.m.	-	12	19.5	22.5	32	34	42	56	64	71	80	87	101	108	119	97		
2,4-D 20 p.p.m.	-	13	18	22	30	38	34	49	54	59	67	76	94	123	101			
GA_3 100 p.p.m.	-	18	23	30	36	45	55	60	85	94	128	111	93					
GA_3 200 p.p.m.	-	23	36	40	45	51	62	66	70	75	82	90	108	114	98			
Benlate 1%	-	18	22	26	37	52	66	78	91	118	110	80						
"Vapor-Gard " 2½%	-	18	17	17	17	18	20	26	34	26	14	13	13	13	32	10		
"Vapor-Gard " 2.5% + Benlate 1%	-	5	10	11	11	12	13	13	18	21	25	30	34	23	13	3		

(-) did'nt calculate

Table(12): Respiration rates(mg CO_2 / Kg / hour) in " Hindi- Be- Sinnara " mango fruits after harvest as affect by Gamma irradiation, Growth regulators, Vapor gard and storage periods under room conditions (1980).

Days after harvest.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Temperature	29	28	28	29	29	28	30	29	28	28	28	29.5	29.0	30.0	29.0	29.0	29.0	29.0
Treatments																		
Control	-	-	-	7	11.2	26.8	36.8	59	76	104	135.5	130	97.8	26.0	31.6			
15 Kr d	-	-	-	6.5	30	46	53	64	75	87	119	124	114	89				
30 Krad	-	-	-	16.3	20	24.5	28	32	35	46	51.6	62.6	87	119	124	118	102	
2,4-D,10 p.p.m.	-	-	-	20	26	42	51	71	83.5	87	94	104	113	122.1	126	121	86	
GA_3 200 p.p.m.	-	-	-	9.4	16.4	22	27	34	53.2	73	82	92.6	113	124.5	128	126	113	87
2,4-D 10 p.p.m. + GA_3 200 p.p.m.	-	-	-	11.8	16	23	40	40	46.3	57	60	63	74	84	105	109.6	103	75
Vapor-Gard 1%	-	-	-	6.8	16.2	29.5	32	36	41	47	55	60.2	67.2	74.3	86	106	102.5	71
Vapor-Gard 1% + + 2,4- 10 p.p.m.	-	-	-	13	26.6	42	52	59	65	73	78	85	85	102	109	120	110	94
Vapor -Gard 1% + GA_3 200 p.p.m.	-	-	-	9	12	28	36	42	48	56	66	76	78	96	105	115	122	110
Vapor -Gard 1% + 2,4-D 10 p.p.m. + GA_3 200 p.p.m.	-	-	-	4	9	13	18	25	34	40	49	56	73	87	98.2	107	116	103

(-) did'nt calculate.

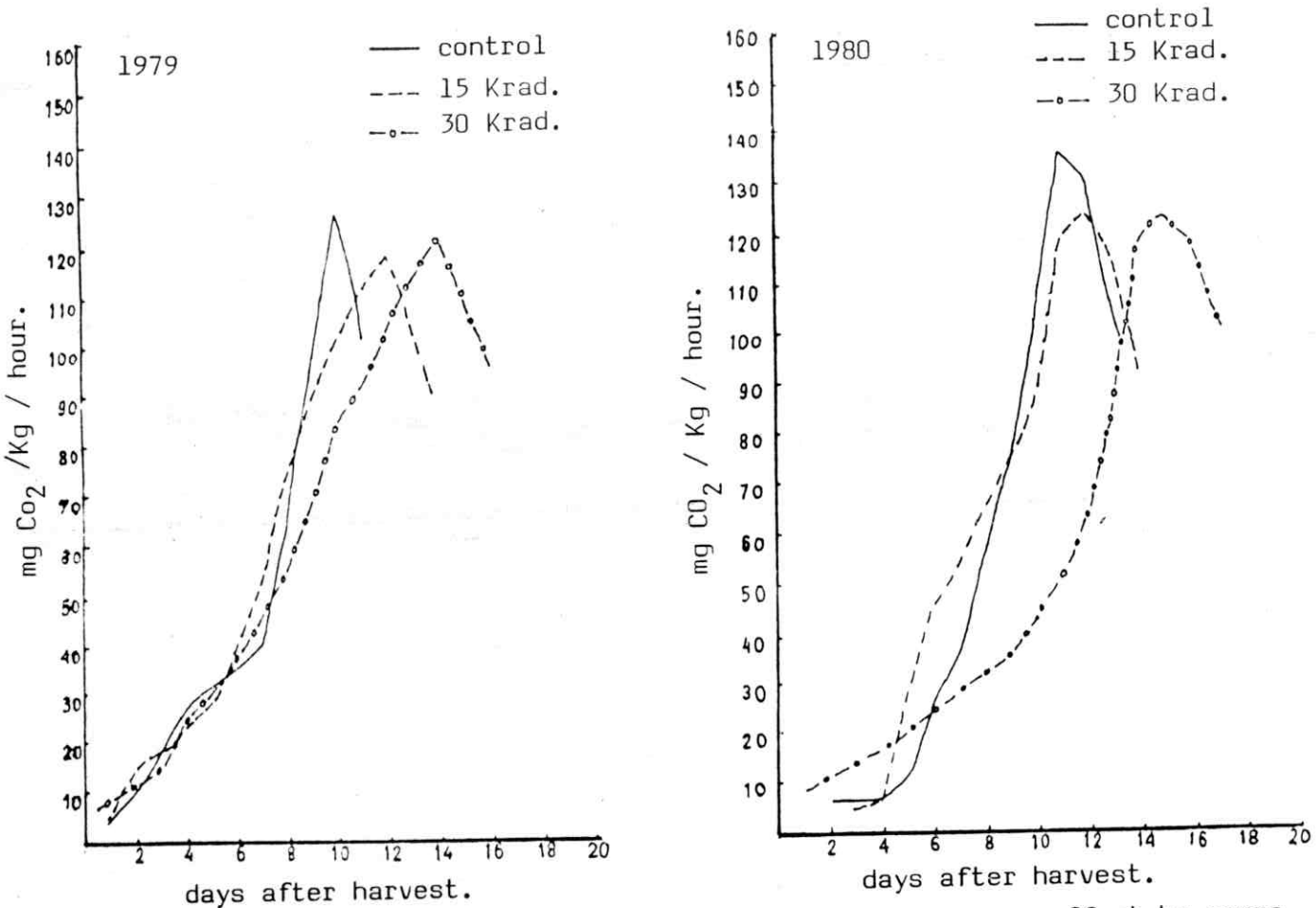


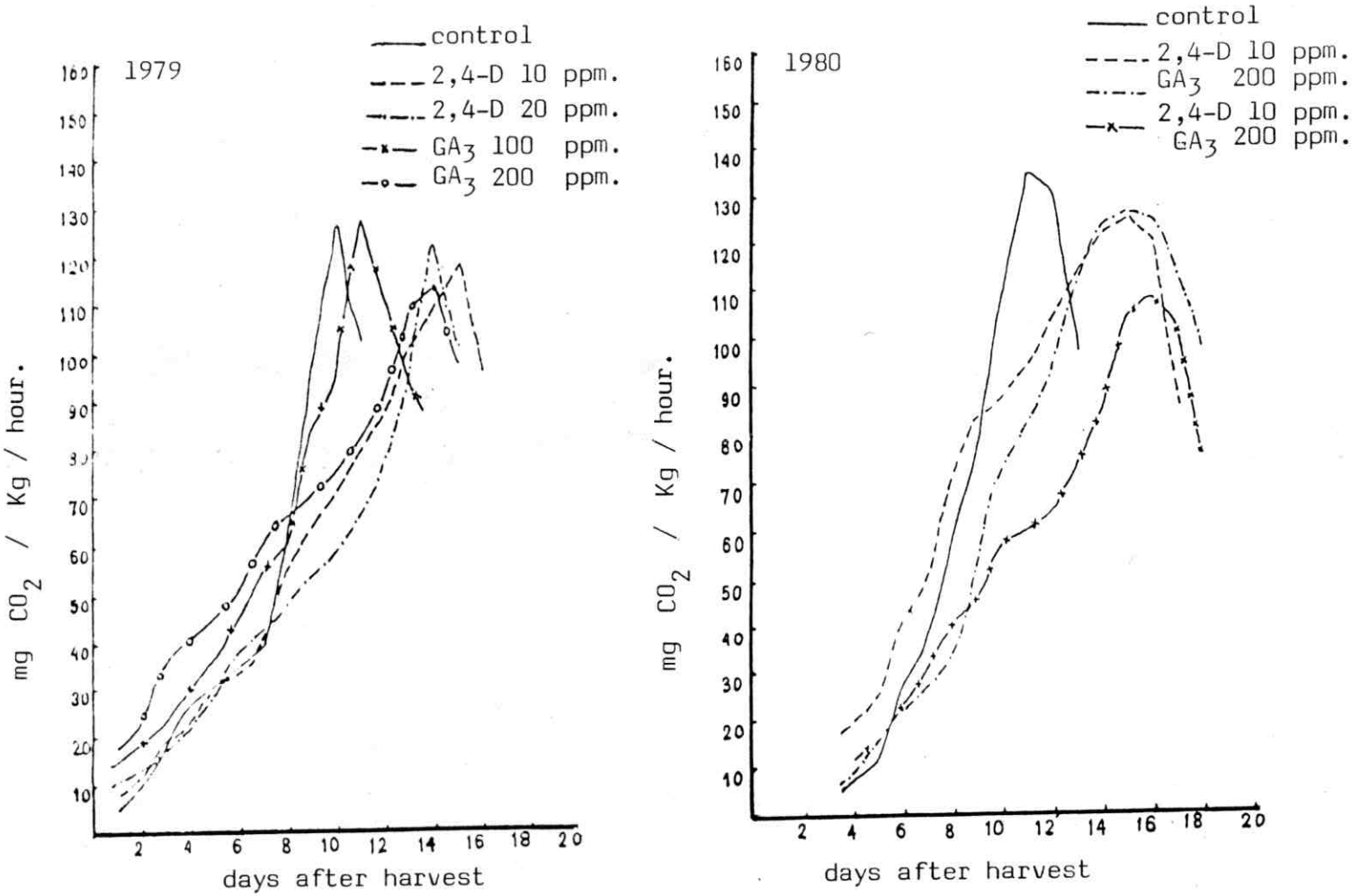
Fig.(1) Rate of Co_2 out put of " Hindi Be- Sinara " mangoes as affect by gamma irradiation and storage periods under room conditions after harvest (1979 & 1980).

rate of mangoes irradiated by 30 Krad up to 84 mg CO_2 after the 10 th day of storage, but in second season a slightly increasing in respiration rate was observed until the 12 th day(62.6 mg CO_2) from the start of storage.

b) Growth regulators studies:

The pattern of respiration with " Hindi Be-Sinnara" mango fruits treated by 2,4-D or GA_3 are shown in Fig.(2). For the both seasons (1979 and 1980). In the first season, fruits treated with 2,4-D 10 and 20 p.p.m. reached the climacteric peak (119 and 123 mg CO_2/ Kg/ hour) in 15 th and 14 th days, respectively. The rate of respiration was slow and steady until the 12 th and 10 th day of storage respectively where the fruits reached the ripening stage compared with the control fruits which reached in the 7 th day. In the second season, fruits treated with 2,4- D 10 p.p.m. reached the climactric peak (125. Mg CO_2/ Kg/ hour) in the 15 th day starting from 20 mg CO_2 on the second day of storage and with sharp increase until the 9 th days (83.5 mg CO_2), then respiration increased with steady rate up to the end of the peak.

On the other side, respiration rates of "Hindi Be-Sinnara " mangoes treated by GA_3 at 100 and 200 p.p.m. in the first season (1979) are shown in Fig. 2 , where



Fig(2): Rate of CO out put of " Hindi Be- Sinnara " mangoes as affect by growth regulators and storage periods under room condition after harvest. (1979 and 1980).

Climacteric peaks were reached on the 11 and 14 th day (128 and 114 mg CO_2 / Kg / hour respectively).

The pattern of respiration of mangoes treated with GA_3 100 p.p.m. did'nt differ much with the control mangoes.

In the second season (1980) respiration rates of mango fruits treated by 2,4-D 10 p.p.m. and GA_3 200 p.p.m. are shown in Fig. (2) , it could be noticed that, a sharp rise in respiration rate of mangoes treated with 2,4-D 10 p.p.m. until the 9 th day reaching 83 mg CO_2/ kg/ hour. afterwards, there was a steady increase up to 127 mg CO_2/ Kg/ hour on the 15 th day. While in case of GA_3 200 p.p.m. respiration rate was slow until the 10 th day of storage following a gradual increase reaching a maximum value at the climacteric peak (127.7 mg CO_2/ Kg / hour) in the 15 th day. It is clear also that , in Fig.(2), in the second season, climacteric peak of mangoes treated by 2,4-D 10 p.p.m. + GA_3 200 p.p.m. was reached on the 16 th day, starting from 11.8 mg CO_2 on the 4 th day of storage and with the rate rising steeply with ripening from 12 th day.

C) Benlate and " Vapor-Gard " studies:

The pattern of carbon dioxide release during the climacteric phase of mango fruits treated by Benlate 1% is given in Fig.(3) in the first season only (1979).

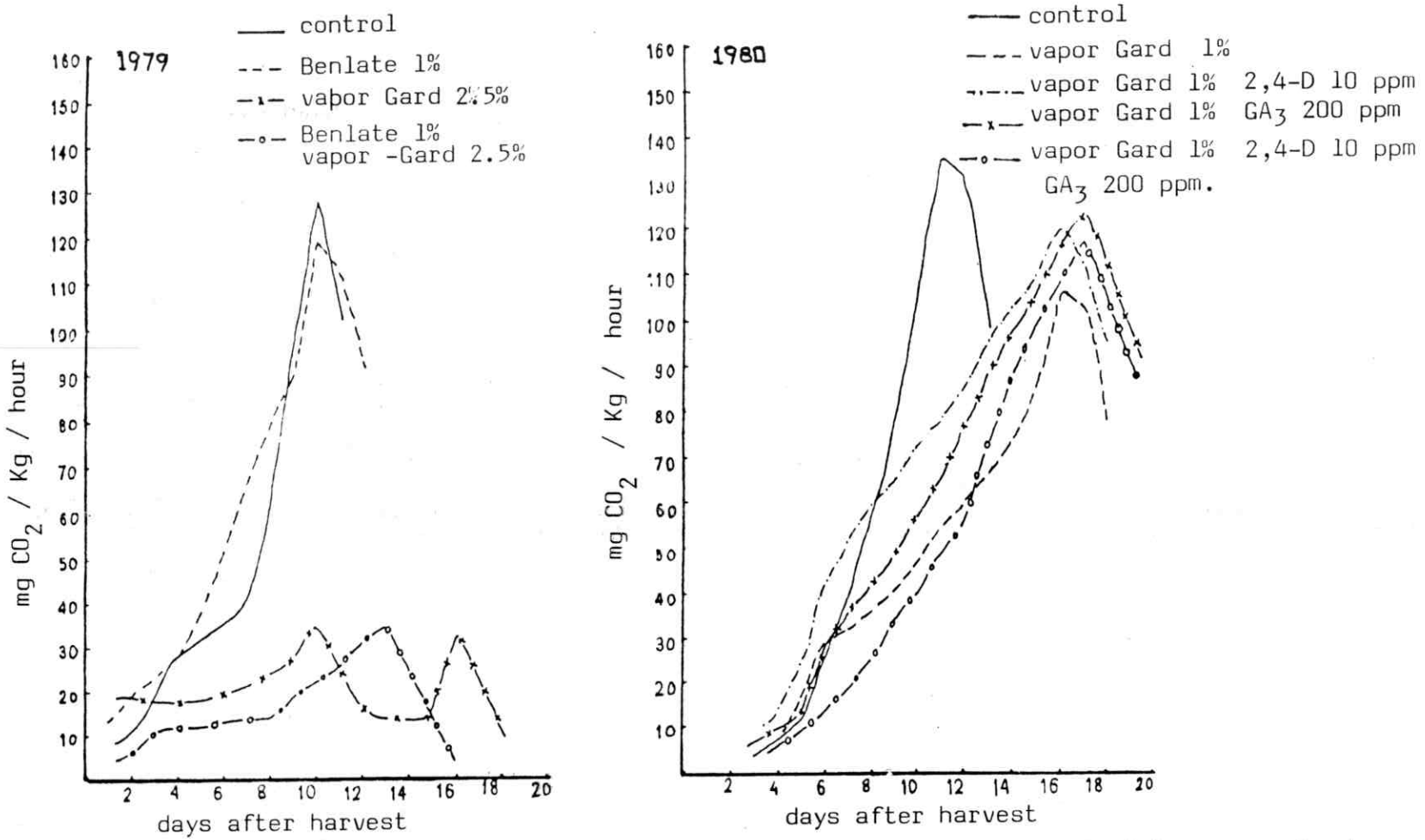


Fig.(3): Rate of CO out put of " Hindi Be- Sinnara " mangoes as affected by Benlate, vapor-Gard alone or combined with Benlate or growth regulators and storage under room condition after harvest (1979 & 1980).

The climacteric peak in this treatment was reachedd around the 10 th day (118 mg CO_2 / Kg/ hour). Also , from Fig.(3) it could be observed that, skin coated fruits by " Vapor-Gard " at 2.5% V/V alone or "Vapor-Gard 2.5% + Benlate 1% , didn't show any rise in respiration above 32 mg CO_2/ Kg/ hour. Several fluctuations were seen in respiration peak in this case.

In the other side, respiration rates of the fruits treated by " Vapor-Gard " at 1% V/V alone or Vapor-Gard 1% with 2,4-D 10 p.p.m. , GA_3 200 p.p.m. and the combination of 2,4 -D, 10 p.p.m. + GA_3 200 p.p.m. in the second season (1980) were shown in Fig. (3). Climacteric peak of mangoes dipped in " Vapor-Gard" 1% alone was reached on the 16 th day (106.1 mg CO_2/ Kg/ hour) , starting from 6.5 mg CO_2 on the 4 th day of storage and with the rate rising slowly until the 14 th day.

Similary, mangoes treated by " Vapor-Gard " 1% combained with 2,4-D 10 p.p.m. or GA_3 200 p.p.m. and 2,4-D 10 p.p.m. + GA_3 200 p.p.m. reached climacteric peaks in 16,17 th day respectively with the same trend and with Rate of CO_2 out-put reached maximum 120, 122 and 116(mg CO_2 / kg / hour) respectively.

The above results concerning the respiration rate of control fruits are in agreement with Dharkar et al . (1966 b), Krishnamurthy and Subramanyam (1970) and Krishnamurthy et al (1971) as they concluded that, mango fruits reached the climacteric peak on the 9 th day ± 1 of storage under room conditions ambient storage of 26 ± 2°C, while Lakshiminarayana (1973) reported that climacteric rise in " Alphonso " mangoes occured after the 10 th day when fruits were picked at the optimal mature stage.

Regarding, mangoes treated by gamma rays, The above results disagree with Dharkar et al (1966 b) they found that , climacteric peak of irradiated mangoes at 25 Krad was reached on the same day as for unirradiated fruits (9 days).

14. Fruit dipping in " Vapar-Gard 1% + 10 p.p.m. 2,4-D + 200 p.p.m. GA_3.

Fruits of all treatments were subjected to the determination of various physical and chemical properties directly after treatment, then at regular intervals during storage every 7 days. Determination of quality and extension of shelf-life were tested were tested every 5 days.

The results obtained could be summerized as follows:

1. All treatments of " Vapor-Gard " exhibited the highest values of fruit firmness and retarded softening of fruits at the different storage periods.

2. Generally irradiation and growth regulators treatments as well as " Vapor-Gard " diminished the weight loss percentage of fruits during the different storage periods in both experimental seasons, while the treatments of Benlate at 1% did'nt show any significant effect on weight loss percentage of fruits.
3. In all cases, the percentage of decay of fruits was increased with the length of storage period and was higher in control fruits than that of other treatments. On the other hand, treatment of " Vapor-Gard " were more effective in minimizing decay percentage of fruits.

4. Fruits treated by 30 Krad gamma rays or growth regulators, reached the fair quality after 15 days of storage while the control fruits reached the fair quality after 10 days, so the shelf -life was extended by 5 days over that of the control, while the shelf-life of the fruits treated by " Vapor-Gard " alone or with growth regulators was extended by 10 days over that of the control.

5. Total soluble solids content of mangoes treated by " Vapor-Gard " was much lower than control and other treatments.

6. Total acidity of mangoes treated by " Vapor-Gard " 2.5% alone or combined with Benlate 1% was significantly increased through the different storage periods over that of the control and other treatments.

7. Total carotenoids content of mangoes had increased significantly during the storage periods in all treatments and control. Mangoes treated by Benlate 1% gave higher value , while treatments of " Vapor-Gard " gave lower values of total carotenoids.

8. Total phenolic compounds of fruits in all treatments and control showed a marked decrease during the storage periods, the decrease reached about 50% than of the values of the

at the beginning of storage .

9. Reducing sugars content of mangoes of all treatments and control increased throughout the first week of storage followed by a gradual decrease till the end of storage period . Treatments of " Vapor-Gard " exhibited the highest values of reducing sugars content of mangoes.

10. Generally, there was a gradual increase in total sugars content after 1 and 2 weeks of storage for all treatments and control followed by a gradual decrease in the 3 rd week. On the other hand, total sugars content of mangoes in treatment of " Vapour - Gard " were significantly lower than the control and other treatments during the different storage periods.

11. Climactric peaks of respiration for control fruits after 10 ± 1 days of storage, while fruits treated by " Vapor-Gard" at 1% either alone or combined with growth regulators (2,4-D or GA_3) reached climactric peaks after 16 or 17 days of storage. Mangoes treated by 30 Krad, 10 or 20 p.p.m. 2,4-D and 200 p.p.m. GA_3 reached climactric peaks after 15 days of storage.