

Influence of Pod Maturity on the Productivity of Okra (*Abelmoschus esculentus* Moenth)

by

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Introduction: Okra or gumbo or *bhindi* (*Abelmoschus esculentus* Moenth) is being extensively cultivated in South India on account of its (i) short duration (ii) heavy yield (iii) easy cultivation and (iv) wide range of adaptability. After the introduction of the *bhindi* variety Pusa Sawani, with long, smooth and slender fruits and tolerance to "mosaic" disease, the cultivation of *bhindi* is becoming more and more popular. To cope up with the increasing demand for seeds, special agencies are functioning in Madras State and elsewhere to produce and supply the required seeds. A study was undertaken to find out the response on the productivity of the *bhindi* crop when grown purely for vegetable or for seed.

Review of literature: Shanmugasundaram (1950) reported that periodic picking of tender fruits in *bhindi* induced the plants to produce more fruits. Madhava Rao (1953) working on *bhindi* (i) as a pure vegetable crop, (ii) partly for consumption of vegetable and partly for seed production and (iii) purely for seed production, found that harvesting tender fruits for consumption after leaving two trusses of fruits for seed was significantly superior to the crop entirely left for seed. He also found that periodical picking of fruits for vegetable stimulated the plants to produce large number of fruits than the treatment in which a portion or the entire crop was diverted for seed purpose. Perkins *et al* (1952) found that harvesting the pods of *bhindi* when they were three or four days old, resulted in a continuous harvest over the entire growing season; but when the pods were allowed to mature, the fruiting was retarded and the plants became stunted. They also found that the plants which were frequently harvested bore continuously while those on which the pods were allowed to mature exhibited alternate bearing as "fruiting waves". Premsekar (1964) has advocated in clusterbeans that harvesting of fruits for vegetable is more remunerative than when left for seed.

Material and Methods: An experiment was laid out with Pusa Sawani variety of *bhindi* with two treatments *viz.* (i) purely as a vegetable crop and (ii) crop allowed entirely for seed. The normal principles of statistical layout of field experiments were followed. The trial was repeated both in summer

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TABLE 1. Mean Number of Pods per Plant

Treatments	Mean number of pods per plant at weekly intervals of							Total	Significant or not P: 0.05
	1	2	3	4	5	6	7		
A. Between Treatments (Mean of two seasons)									
Purely for seed	0.90	1.91	3.26	2.05	1.74	1.39	0.96	12.22	Yes
Purely for vegetable	1.32	2.55	4.67	3.37	2.89	2.59	2.10	19.44	S.E.: 0.25
% increase over seed crop	46.67	33.68	43.27	64.39	66.09	86.33	118.75	59.09	C.D.: 0.74
B. Between Seasons (Mean of Seed and Vegetable crops)									
Monsoon crop	0.90	1.98	3.74	2.55	2.12	1.88	1.48	14.64	No
Summer crop	1.32	2.48	4.19	2.87	2.47	2.12	1.59	17.02	S.E.: 0.25
% of increase over monsoon crop	46.67	25.25	12.03	12.55	16.51	12.56	7.43	16.26	
C. Between Treatment and Seasons									
i) Summer crop									
Purely for seed	1.13	2.13	3.48	2.04	1.81	1.29	0.75	12.63	
Purely for vegetable	1.50	2.83	4.90	3.69	3.13	2.94	2.42	21.41	
% of increase over seed crop	32.74	32.86	40.81	80.88	72.93	127.91	222.67	69.52	Yes
ii) Monsoon crop									
Purely for seed	0.67	1.69	3.04	2.06	1.67	1.50	1.17	11.80	S.E.: 0.36
Purely for vegetable	1.13	2.27	4.44	3.04	2.56	2.25	1.79	17.48	C.D.: 1.05
% of increase over seed crop	68.66	34.32	46.05	47.58	53.29	50.00	53.00	48.14	

TABLE 2. Mean Yield per Plant (g)

Treatments	Mean weight of pods per plant at weekly harvests numbering							Total	Significant or not
	1	2	3	4	5	6	7		
A. Between Treatments (Mean of two seasons)									
Purely for seed	14.90	31.56	52.98	33.86	27.70	22.92	15.23	199.15	Yes
Purely for vegetable	19.17	41.17	79.13	55.73	49.17	42.60	33.39	320.36	S.E.: 4.4
% of increase over seed crop	28.66	30.45	49.36	64.59	77.51	85.86	119.24	60.88	C.D.: 13.05
B. Between Seasons (Mean of Seed and Vegetable crops)									
Monsoon crop	13.86	32.29	58.76	40.94	32.81	30.10	23.44	232.20	No
Summer crop	20.21	40.94	73.34	48.64	44.06	35.42	25.63	288.24	S.E.: 4.47
% of increase over monsoon crop	45.82	26.78	24.81	18.81	34.29	17.67	9.35	22.71	
C. Between Treatment and Seasons									
i) Summer crop									
Purely for seed	19.17	36.04	59.17	34.79	30.83	21.88	12.71	214.59	No
Purely for vegetable	21.25	45.83	87.50	62.50	57.29	48.96	38.54	361.87	S.E.: 6.19
% of increase over seed crop	10.85	24.38	47.88	79.68	85.50	123.77	203.23	68.63	
ii) Monsoon crop									
Purely for seed	10.63	27.08	46.78	32.92	24.58	23.96	18.75	184.70	
Purely for vegetable	17.08	37.50	70.73	48.96	41.04	36.25	28.13	279.69	
% of increase over seed crop	59.74	38.48	51.19	48.72	66.96	51.29	50.03	51.43	

and monsoon seasons. The fruits for vegetables were harvested twice a week as recommended by Chauhan (1965), while the seed pods were gathered once a week. The mean yield of fruits per plant by number and weight were calculated. The earliness rate index according to Bartlett (1937) was computed. The rate of growth of plants were determined at weekly intervals from the commencement of harvest. All the data were interpreted statistically.

Results: The mean yield of fruits per plant in terms of numbers and by weight are furnished in Tables 1 and 2. The results of statistical analysis indicated that significantly more number of pods per plot (19.44) was obtained in vegetable production crop compared to the crop allowed for seed (12.22) showing an increase of 59.09%. Between the two seasons, the production of fruits in summer crop (17.02) was higher than from monsoon crop (14.64) even though this difference failed to attain the level of significance. The differences due to interaction effect between treatments and seasons were significant indicating that the increase in the number of pods per plant in vegetable production crop over seed production crop was marked in summer than in monsoon season. The rate of increase between the means of treatments narrowed down from 69.52% in summer crop to 48.14% in monsoon crop. The rate of weekly increase in the number of fruits per plant in the vegetable crop was markedly higher in summer compared to monsoon season.

A similar trend as in the production of pods was observed in the case of mean yield per plant (by weight) also. The vegetable crop gave significantly more yield to the extent of 60.88% than the seed crop. But the differences due to seasons was only 22.71% and was not statistically significant. However, the yield differences in weekly harvests between treatments were marked in summer season than in monsoon.

The results of earliness rate index based on the weekly harvests of fruits by weight are furnished in Table 3.

TABLE 3. Bartlett's index for earliness

Treatment	Summer	Monsoon	Increase over monsoon crop
Purely for seed	0.44	0.40	+0.04
Purely for vegetable	0.70	0.69	+0.01
Increase over seed crop	+0.26	+0.29	...

Compared to the vegetable crop the seed crop was distinctly late in duration, while between the seasons the crop sown in monsoon was slightly late.

The mean rate of growth of plants at weekly intervals from the time of first harvest was also studied. The vegetable crop attained a mean maximum height of 139.35 cm while the crop left for seed production reached a height of 74.15 cm only. This difference in height was highly significant. But the mean growth between seasons did not show significant difference. The differences in the weekly rate of growth were almost identical in both seasons.

Discussion: The okra crop when harvested for vegetable alone yielded more number of fruits and thereby more yield. This is in agreement with earlier findings of Shanmugasundaram (1950) and Madhava Rao (1953) in *bhindi* crop and of Premsekar (1964) in clusterbeans. Harvesting individual fruits in okra stimulated the plant growth. According to Perkins *et al* (1952), picking of individual fruits stimulated the plant growth, and with increase in plant growth there was continuous fruiting, resulting in continuous harvest during the entire growing season. When the pods were allowed to mature on the plant for seed, the available nutrients were made use of for maturation of pods resulting in retardation of growth and consequently the plants became stunted. When the fruits were picked frequently, the nutrients were conserved and with its availability there was continuous growth, attended to by continuous flowering and fruiting while the pods when allowed to mature on the plant affected its growth and yield.

Perkins *et al* (1952) observed an alternate bearing as "fruiting waves" in crop which was allowed for seed. But in the present study no such "fruiting waves" were observed (vide Figs. 1 and 2). The trend of fruit production was unimodal and almost identical for both vegetable

FIGURE 1

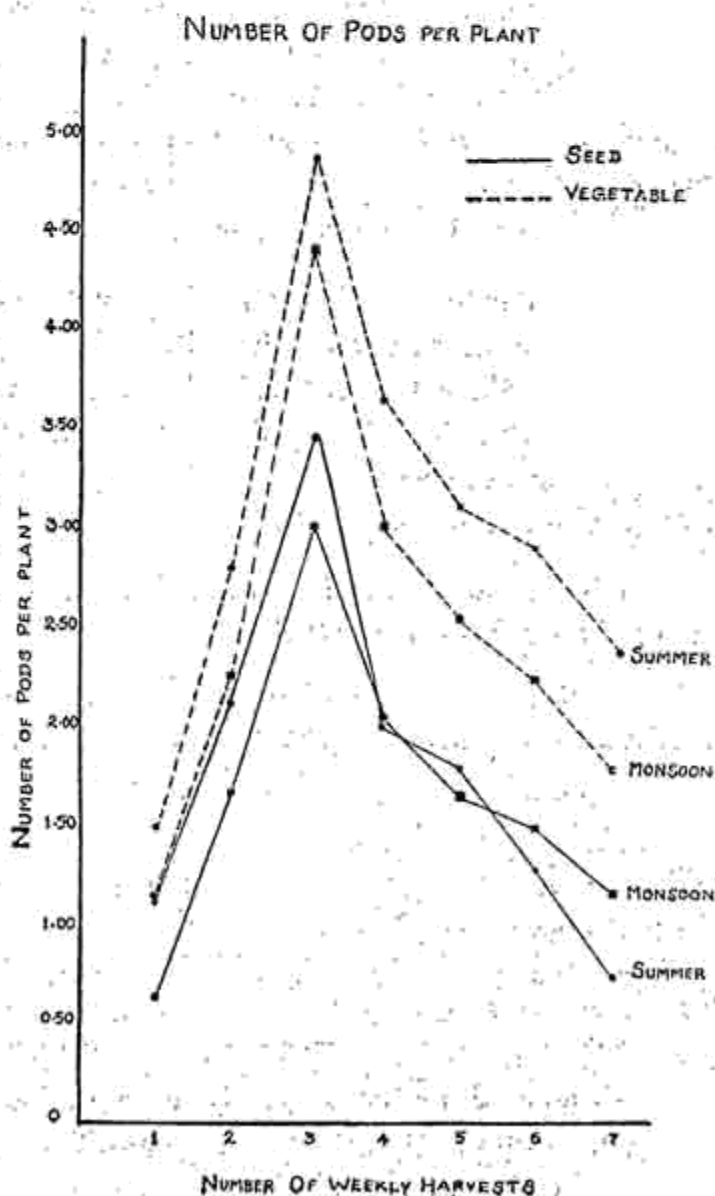


FIGURE-3

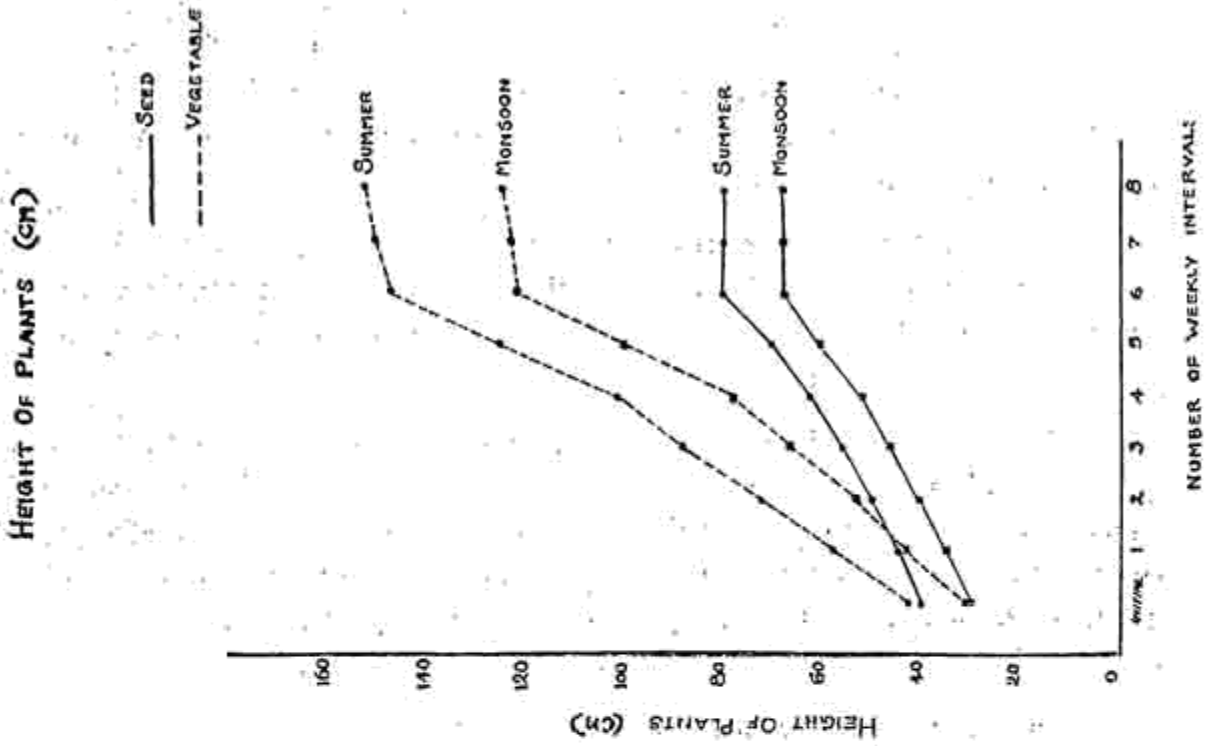
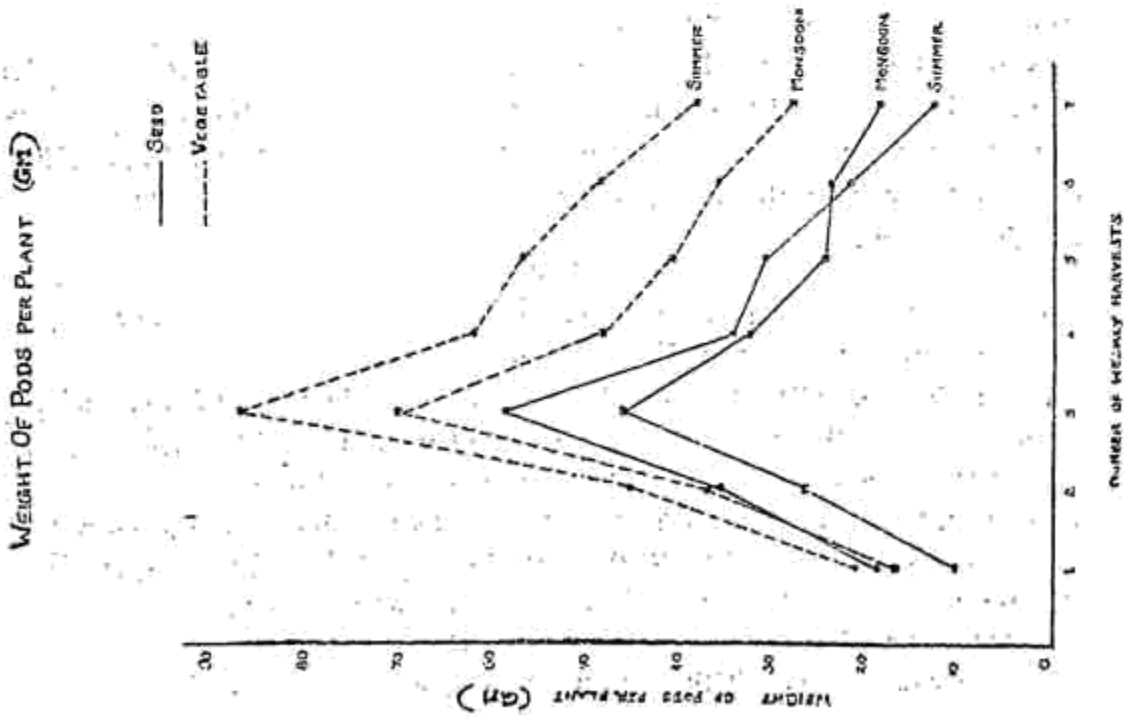


FIGURE-2



and seed crops in both the seasons. There was a steep increase in fruit production upto the third week of harvest after which it declined. The rate of crop growth was almost identical in both the seasons (vide fig. 3). The crop growth continued upto sixth week after commencement of harvest after which the plants ceased to grow. The higher rate of growth in the summer season was due to the prevalence of high temperature as was reported by Thompson and Kelly (1957).

The frequent picking of fruits in the vegetable crop might have resulted in the early exhaustion of the productive capacity of the plants, thereby hastening senility and consequent earliness compared to the seed crop as seen from the earliness rate index.

The study was, in general, in agreement with the previous findings in that (i) okra plants harvested twice a week produced a large number of fruits compared to the crop in which the pods were allowed to mature for seed; (ii) pod maturation for seed caused a severe check in plant growth, (iii) plants which were harvested frequently, bore continuously and (iv) frequent and complete harvesting of fruits was beneficial for consumption.

Summary: An experiment was laid out to study the effect of growing Pusa Sawani variety of okra purely as a vegetable crop and as a seed crop, in two different seasons. The results indicated that when the pods were harvested when they were three or four days old, there was a continuous harvest over the entire growing season; but when the pods were allowed to mature for seed, the fruiting was retarded and the plants became stunted. When okra crop was harvested continuously for vegetable, it yielded more than when left for seed. There was also rapid crop growth. Between the two seasons, the summer crop grew faster and yielded more than the monsoon crop. The study indicated the importance of frequent and complete harvesting of fruits for the market.

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