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Influence of Irrigation, Phosphorus and Row Spacing on Yield and Harvest Index of Pea*

R. P. Yadav**, D. V. S. Chauhan and R. L. Rajput

Regional Agricultural Research Station, Morena (Madhya Pradesh)

ABSTRACT

In the present investigation maximum seed and stover yield was obtained when crop was irrigated at flower initiation with 75 kg P_2O_5/ha at 25 cm row spacing. However, harvest index, was not affected by P_2O_5 levels, irrigation and row spacing. Key word, Pea, Harvest index, Stover, Seed yield.

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INTRODUCTION

Irrigation influence vegetative and reproductive phases and productivity of pea especially at flowering initiation stage (Verma *et al.* 1984). Phosphorus has also been found to increase the production of legume crops (Dubey 1960). Gritton and Eastin (1968) considered row spacing very important for exploring the production potential of pea. Keeping all the above facts in view, the present investigation was taken to study the effect of irrigation timings, phosphorus levels and row spacing on the production of pea crop.

MATERIALS AND METHODS

The experiment was carried out in consecutive *rabi* seasons of 1984-85 and 1985-86 at Regional Agricultural Research Station, Morena of J. N. Krishi Vishwa Vidyalaya to study the effect of irrigation levels, phosphorus levels and row spacing on yield and harvest index of pea. The treatments comprised of four irrigation levels (no irrigation, irrigation at flower initiation stage, pod formation stage and flower initiation plus pod formation stage), four phosphorus levels (0, 25, 50 and 75 kg P_2O_5/ha) and two row spacing (25 and 50 cm). Thus, there were thirty two treatment combinations which were replicated four time in a split plot design keeping irrigations in main plots and combination of phosphorus and row spacing in sub plot. The experiment was sown on 15th and 20th Oct. in 1984 and 1985, respectively. Basal dose of 20 kg N/ha and phosphorus as per treatment was drilled at sowing time. Variety Jawahar Matar-1 was used. The irrigation to a depth of 80 mm was applied as specific time of irrigation. The soil of the experimental field was sandy loam in texture, low in available nitrogen and medium in phosphorus and potash. The total rainfall received during the crop growth period was 22.90 and 69.70 mm in first and second season, respectively.

RESULTS AND DISCUSSION

Irrigation

Yield data given in table 1 clearly showed that production level of grain was improved by

*Part of Ph.D. thesis submitted to Jiwaji University, Gwalior by Sr. author.

**Present address : Jr. Scientist (Agronomy), Regional Agricultural Research Station, Morena (M.P.).

application of irrigation over no irrigation, may be due to more availability of plant nutrients. One irrigation at flower initiation stage resulted in 29.52 and 39.72 per cent higher pea seed yield in the first and second year, respectively when compared to no irrigation. However, this increase was only 17.68 and 8.94 per cent with one irrigations at pod formation stage and 24.82 and 16.58 per cent with two irrigations at flower initiation + pod formation stage over no irrigations in the first and second season, respectively. The significant differences in seed yield were obtained only with irrigation at flower initiation stage over other irrigation treatments in *rabi* 1985-86 only. This might be due to better utilization and translocation of nutrients at the reproductive phase as compared to other stages of crop growth. Singh and Sikka (1954) reported similar results. Hence the utility of the irrigation applied at flower initiation stage was much more than that applied at any other crops growth stages.

The straw production was increased significantly with the application of irrigation over no irrigation. The increase in straw production with irrigation at flower initiation stage, pod formation stage and flower initiation plus pod formation stage over no irrigation was 27.59, 18.54 and 47.12 per cent in first season and 20.66, 12.99 and 37.01 per cent in the second season. The improvement brought by two irrigations was well marked and increased the straw yield significantly over one irrigation at either stages. This was due to more vagetative growth of plants as excess moisture was available with two irrigations. Similar results were also reported by Risk (1979).

Irrigation at flower initiation stage registered maximum harvest index which was 50.41 and 60.79 per cent in first and second season, respectively, however, the differences were not significant.

Phosphorus

The grain and straw porduction was significantly augmented with the application of phosphorus over control in both the seasons except in case of straw production in the second season. The extent of increase was 10.92, 11.55 and 15.09 per cent in seed production and 7.95, 10.47 and 12.06 per cent in straw production with 25, 50 and 75 kg P_2O_5/ha, respectively over control. These results are in conformity with Lenka and Gautam (1972). The magnitude of increase in seed and straw production with every increase in P_2O_5 rates was however, narrow and could not reach to the level of significance except in case of straw production in the first season. In the present case the soil was rated as medium in phosphorus content and hence the response to applied phosphorus through fertilizer was not of a higher order. Similar results were also reported by Yawalkar and Kherde, (1966). Phosphorus application did not affect the harvest index significantly though it was recorded highest (51.26%) with 25 kg P_2O_5/ha rates.

Row spacing

The seed and straw production decreased significantly by increasing the row width from 25 to 50 cm. The extent of reduction in seed and straw yield was 25.21 and 24.55 per cent in the first season and 15.73 and 26.62 per cent in the second season, respectively. This was due to higher plant density in wider row spacing (50 cm), resulting in more comptetion for nutrients, light and mositure as compared to closer row spacing. Similar results were also obtained by Gritton and Eastin (1968). Row spacing of 50 cm significantly increased the harvest index over 25 cm in the second season only. However, 25 cm row spacing registered highest (51.64%) harvest index on the basis of two years average.

TABLE 1

Yield and harvest index as influenced by irrigation, phosphorus and row spacing.

Treatments	Grain yield (q/ha)		Mean	Straw yield (q/ha)		Mean	Harvest index (%)		Mean
	1984-85	1985-86		1984-85	1985-86		1984-85	1985-86	
Irrigation schedules									
1. No irrigation	14.70	16.44	15.57	29.92	31.31	30.61	49.13	52.50	50.81
2. Irrigation at flower initiation stage	19.04	22.97	21.00	37.77	37.78	37.77	50.41	60.79	55.60
3. Irrigation at pod formation stage	17.30	16.78	17.04	35.47	35.38	35.42	48.77	47.42	48.09
4. Irrigation at flower initiation + pod formation stage	18.35	18.07	18.07	44.02	42.90	43.36	41.68	42.12	41.90
S. Em. ±	1.36	0.57	—	2.27	1.11	—	0.79	1.76	—
C. D. at 5%	4.10	1.81	—	7.66	3.54	—	NS	NS	—
P_2O_5 kg/ha									
0	16.16	17.74	16.95	32.62	35.27	33.94	49.54	50.29	49.91
25	18.89	18.63	18.76	36.36	36.84	36.60	51.94	50.57	51.26
50	18.92	18.81	18.86	37.91	36.94	37.42	49.90	50.52	50.21
75	19.44	19.08	19.25	38.27	37.97	37.97	50.69	50.65	50.67
S. Em. ±	0.76	0.31	—	0.28	0.82	—	0.49	0.39	—
C. D. at 5%	1.19	0.19	—	0.83	NS	—	NS	NS	—
Row spacing (cm)									
25	20.41	20.15	20.28	40.27	41.46	40.86	50.68	48.60	49.64
50	16.30	16.98	16.59	32.33	32.33	32.28	50.41	52.68	51.54
S. Em. ±	0.45	0.48	—	1.12	0.57	—	0.67	0.80	—
C. D. at 5%	1.29	1.36	—	3.17	1.61	—	NS	2.28	—

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