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YIELD AND ITS ATTRIBUTES OF FABA BEAN *(VICIA FABA,*L) AS INFLUENCED BY PRECEDING CROP, NUMBER OF IRRIGATIONS AND P-LEVELS

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ABSTRACT: Four field experiments were carried out in an adminstration field at Horbait Village, Aboukabiir district, Sharkia Governorate, Egypt during the two winter seasons of 2000/2001 and 2001/2002 to find out the response of faba bean (improved Giza 3 cv.) to number of irrigations (1, 2, 3 and 4) and P-fertilizer levels (0, 15.5 and 31 Kg P_2O_5/fad) when grown after rice or maize.

The obtained results cleared that faba bean plants grown after maize surpassed those grown after rice in no. of bronches/plant, bo. of pods/plant no. of seeds/plant, seed yield/plant, seed yield/fad and harvest index.

Faba bean plants supplied with three irrigations were the tallest, produced the highest no. of pods/plant, as well as, the highest seed and straw yields/fad.

After maize, faba bean seed yield / fad showed a response to application of P-fertilizer. While, there was no response to P-fertilizer after rice.

The highest faba bean seed yield/fad could be secured when plants fertilized with 15.5kg P_2O_5 / fad. irrigated four times or when plants fertilized with 31 Kg P_2O_5 / fad. received three irrigations.

INTRODUCTION

It is stated that non-legumes are prefereable preceding crops for legumes than leguminous ones (Dyke and Prew, 1983). This was attributed partially to the attak of pests and diseases (Krist'an and Cerny, 1972). Fortunately, in the summer season, most of areas in Egyptian rotation are occupied by non-legumes, like maize rice and cotton. In a comparsion study, (Shafshak *et al.* 1984) showed no differences in yield and yield components of faba bean when it

was grown after cotton or maize. Nowadays, with the increase in acreage of rice on expense of cotton, it is of interest to compare between rice and either of the other two crops, as a preceding crops for faba bean in Egyptian rotation.

Though, results of previous studies – generally – indicate that supplying faba bean with three irrigations, is sufficient to maximize its yield in Egypt (El-Zeiny *et al*, 1990; El-Far, 1994 and Teama, 1994), the high content of residual moisture preserved in the soil after paddy rice, may govern number of irrigations needed by faba bean which follow rice.

Also, it is observed that the response of faba bean to P-fertilizer level varied from condition to another (Abo-Salama and Dawood, 1994; Hammam, 1995; Hassanein, 1995; Kortam, 1995 and Zeidan and Abd El-Lateef 2001). Since, submergence of paddy rice fields increase the availability of soil P, it is of interest to study the response of faba bean to P-fertilizer when grown after rice.

Therefore, the present study deals with the effects of preceding crop, number of irrigations and P-levels on faba bean productivity.

MATERIALS AND METHODS

Four field experiments were carried out in an administration field at Horbait Village, Aboukabiir district, Sharkia Governorate, Egypt, during the two successive winter seasons of 2000/2001 and 2001 / 2002 to find out the response of faba bean *(Vicia faba* L) improved Giza 3 cv. to number of irrigations and phosphorus fertilizer levels when grown after either rice or maize i.e. two experiments were performed each season, one of them was after maize and the other one was after rice. The tried number of irrigations were :

1- Irrigation once, at planting.

2- Irrigation twice, at planting and at 30 days after planting (DAP).

3- Irrigation three times, at planting, 30 and 60 DAP.

4- Irrigation four times, at planting, 30, 60 and 120 DAP.

The tested levels of phosphorus were 0.0, 15.5 and 31 kg P_2O_5 / fad.

Each experiment was laid out in split-plot design with four replicates. Where, the four treatments of number of irrigations

Table 1: Mechanical and chemical analysis of the experimental soil.

Season	Crop	Depth (cm)	Sand %	Silt %	Clay %	Texture
1st	Maize	0.0-30	26.96	16.23	56.81	Clay
		30-60	30.86	15.77	53.37	Clay
	Rice	0.0-30	27.32	23.51	49.17	Clay
		30-60	27.55	14.52	57.93	Clay
2nd	Maize	0.0-30	27.77	22.31	49.92	Clay
		30-60	31.077	21.32	46.91	Clay
	Rice	0.0-30	30.62	29.43	39.95	Clay loam
		30-60	34-75	18.18	47.07	Clay

Season	Crop	Depth	Available			Soluble cations and anions mg/100gm								
		cm	N ppm	P ppm	K mg/ 100g	Ca++	Mg^{++}	Na^{+}	K^{+}	Cl^{-}	HCO_3^{-}	$SO4^{-}$	EC ds/m	PH
1st	Maize	0.0-30	32.15	7.41	108	25	12	221.60	98.65	71.00	152.5	133.75	1.56	5.98
		30-60	28.43	5.32	86	35	8	8.80	67.82	23.20	75.50	20.92	1.73	6.23
	Rice	0.0-30	30.52	8.48	108	20	15	86.50	89.47	41.00	17.75	42.22	1.22	6.10
		30-60	25.18	4.83	73	40	30	9.20	54.68	41.21	78.25	14.42	1.31	6.32
2nd	Maize	0.0-30	35.65	7.51	111	20	9	491.90	93.84	44.38	137.25	433.11	1.37	6.33
		30-60	30.32	4.41	89	30	6	10.80	73.14	11.00	62.50	46.44	1.63	6.14
	Rice	0.0-30	33.54	7.97	118	25	16	356.80	105.29	35.50	213.50	254.09	1.26	5.73
		30-60	30.82	4.72	80	50	12	37.80	66.95	43.25	13.50	20.00	1.21	6.09

Table 2: Climatological data during the two season.

	Temperature (c°)			Relative humidity (%)			Soil temperature (c°)									Rain
	Max	Min	Mean	Max	Min	Mean	5 cm			10 Cm			20 Cm			mm
							Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	
							2000/2001									
Nov.	25.5	13.9	19.7	81.3	39.0	60.2	23.6	18.9	21.3	20.0	17.2	18.5	20.6	19..2	19.9	3.0
Dec.	21.2	10.0	15.6	83.0	44.3	63.7	18.3	14.4	16.4	14.9	12.7	13.8	15.8	14.8	15.3	6.0
Jan.	20.9	8.8	14.9	86.0	42.5	62.3	18.5	13.0	15.8	16.0	12.1	14.1	16.8	15.6	16.2	7.0
Feb.	21.4	8.9	15.6	85.7	35.7	60.7	20.3	13.2	16.7	17.4	12.4	14.9	17.2	15.5	16.3	15.0
March	25.9	11.9	18.9	84.3	36.7	60.5	24.9	17.4	21.2	22.3	16.3	19.3	21.4	19.2	20.3	0.0
April	29.2	14.2	21.7	82.7	27.0	54.9	28.2	21.5	24.8	25.2	20.3	22.7	25.3	23.2	24.2	0.0
							2001/2002									
Nov.	25.9	15.2	20.5	80.4	38.2	59.3	25.2	16.7	20.9	22.3	16.8	19.6	22.8	20.8	21.8	0.0
Dec.	22.2	11.4	16.8	78.9	37.1	57.9	20.9	3.2	17.1	17.8	12.8	15.3	18.1	16.3	17.2	5.0
Jan.	20.1	9.0	14.6	82.5	43.5	63.1	17.8	10.6	14.2	14.7	10.0	12.4	14.8	13.3	14.1	7.0
Feb.	22.5	11.8	14.6	80.4	41.3	60.8	22.5	13.4	17.9	18.9	13.1	15.9	17.8	15.9	16.9	14.0
March	26.8	14.4	20.6	83.2	35.0	59.1	22.6	16.5	19.6	20.2	15.4	17.8	19.9	18.3	19.1	0.0
April	27.7	15.3	21.5	77.3	28.1	52.7	27.6	20.3	23.9	22.4	17.9	20.2	23.4	22.0	22.7	0.0

were randomly allocated in the main plots, while, the three levels of phosphorus fertilizer were randomly distributed, in the sub-plots. The sub-plot area was $16m^2$, which included 8 ridges of 4 m length. Mechanical and chemical analysis for soils of the experimental fields are presented in table 1. Meteorological data prevailing during the two seasons are shown in table 2. Sowing was done on November 3rd and 2nd in the two seasons, respectively. Levels of phosphorus fertilizer tested herein were applied before planting in form of calcium superphosphate (15.5 P_2O_5). Also, general dose of 15 kg N/fad. was added at sowing in form of ammonium sulphate (20.6% N). On one side of ridge, faba bean seeds were planted in hills spaced at 15 cm apart. Thinning was made at 25 DAP to leave two plants/ hill. Hand hoeing was done every month before time of irrigation to control weeds. The other cultural practices were applied as recommended in faba bean fields. Harvest was on April 15th and 17th at the two seasons, respectively.

At harvest, 15 guarded plants were taken from the 3rd inner two ridges of each sub-plot to determine plant height, number of branches / plant, number of pods/plant, pods weight /plant, number of seeds/plant and seed weight/plant. Meantime, all plants in the central two ridges of each sub-plot, with an area of 4 m^2, were used to determine yield. Then, 100-seed weight and harvest index was recorded.

Data of each experiment were analyzed according to Snedecor and Cochran (1967). Then, a combined analysis was made for the data of the two experiments in each season, as well as, for the data of both seasons. Duncan multiple range test (Duncan, 1955) was used to compare among means. In interaction tables, capital and small litters were used to compare rows and columns means, respectively.

RESULTS AND DISCUSSION

1- Plant height and number of branches/plant:

As seen in table 3, though, plant height and number of branches/ plant of faba bean were not affected by preceding crop in the 1st season, plants grown after rice were taller but, having less number of branches/plant than those grown after maize in the 2nd season. Results of the combined analysis confirmed those of the 2nd season

Table 3. Plant height at harvest and number of branches / plant of faba bean as influenced by preceding crop, number of irrigations and P-fertilizer levels.

Main effects	Plant height			Number of branches/plant		
	1st	2nd	Comb.	1st	2nd	Comb
1- Preceding crop (c)						
A. Maize	130.98	120.23b	125.61	2.604	2.955a	2.780a
B. Rice	125.37	135.87a	130.62	2.745	2.267b	2.506b
F.test	N.S	**	N.S	N.S	*	**
2- Irrigation (I)						
Once: at planting	116.30c	123.81	120.05c	2.875	2.816	2.845
Twice: at planting and 30 DAP	125.31b	125.48	125.39bc	2.688	2.635	2.661
Trice: at planting, 30 and 60DAP	140.47a	133.05	136.76a	2.521	2.385	2.453
Four times: at planting, 30, 60 and 120 DAP	130.62b	129.86	130.24ab	2.615	2.608	2.611
F. test	**	N.S	**	N.S	N.S	N.S
3- Phosphorus fertilizer levels (KgP_2O_5/fad) (P)						
0.0	127.81	126.14	126.97	2.695	2.715	2.705
15.5	127.50	129.64	128.57	2.609	2.601	2.605
31.0	129.22	128.37	128.80	2.719	2.518	2.618
F. test	N.S	N.S	N.S	N.S	N.S	N.S
4- Interactions						
C x I	N.S	N.S	N.S	N.S	N.S	N.S
C x P	N.S	N.S	N.S	N.S	N.S	N.S
I x P	N.S	*	N.S	N.S	N.S	N.S

N.S. No significant * Significant. ** Highly significant

only in respect with the effect of preceding crop on number of branches/plant.

As evident from results of the 1st season and the combined analysis, faba bean plant height responded to increasing number of irrigations up to three times. However, number of branches/ plant was not affected by number of irrigations. This was true in both seasons and their combined analysis. In respect with the effect of number of irrigations on faba bean plant height, similar results were also recorded by Green *et al.* (1986), Ali and Abd-El-Mottaleb (1997) and El-Far (1999).

Neither plant height nor number of branches / plant of faba bean were affected by the levels of P-fertilizer tested here. This was the same in both seasons and their pooled data.

2- Number of pods and seeds/plant:

Like number of branches/plant and in contrary with plant height (see table, 3), results in the table 4 show the superiority of faba bean plants grown after maize over those grown after rice in number of pods and seeds/plant in the 2nd season. This was confirmed by the pooled data. However, the difference was not significant in the 1st season. These results sustaiined those obtained by Shafshak *et al.*, (1984).

In both seasons, data clear that neither number of pods nor number of seeds/plant were affected by the tried number of irrigations. Nevertheless, the pooled data indicate to the superiority of plants receiving four irrigations than those receiving one irrigation only in number of pods / plant. This means that the increased number of pods due to increasing number of irrigations were without vain in increasing number of seeds i.e. they were empty. Similar results were also recorded by Metwally (1973), El - Moghraby (1980), Shalaby *et al.* (1983), Salih (1985), El-Zeiny *et al.* (1990) and Teama (1994).

Also, it is evident from results of both seasons and their pooled data that number of pods and seeds / plant were not affected by the levels of P - fertilizer tried here. These findings are in concurdance with those reported by Moursi *et al.*, (1970), Ahmed (1975) and Salih and Abdalla (1986).

3- Hundred seed weight and seed yield/plant:

As shown in table 5, it can be seen that faba bean plants grown

Table 4. Number of pods / plant and number of seeds/plant of faba bean as influenced by preceding crop, number of irrigations and P- fertilizer levels.

Main Effects	No of pods/plant			No. of seeds / plant (gm)		
	1st	2nd	Comb	1st	2nd	Comb
1- Preceding crop (c)						
A. Maize	11.276	10.872a	11.074a	30.954	31.941	31.448a
B. Rice	11.547	7.587b	9.567b	29.873	21.510	25.692b
F.test	N.S	*	**	N.S	*	**
2- Irrigation (I)						
Once: at planting	10.906	8.456	9.681b	30.335	24.289	27.312
Twice: at planting and 30 DAP	10.917	9.274	10.095ab	28.309	26.774	27.541
Trice: at planting, 30 and 60DAP	11.948	8.247	10.097ab	31.052	24.857	27.955
Four times: at planting, 30, 60 and 120 DAP	11.845	10.940	11.408a	31.958	30.983	31.470
F. test	N.S	N.S	*	N.S	N.S	N.S
3- Phosphorus fertilizer levels (KgP_2O_5/fad) (P)						
0.0	11.695	8.976	10.336	32.075	26.215	29.145
15.5	11.359	9.329	10.344	30.461	26.017	28.239
31.0	11.180	9.382	10.281	28.705	27.945	28.325
F. test	N.S	N.S	N.S	N.S	N.S	N.S
4- Interactions						
C x I	N.S	N.S	N.S	N.S	N.S	N.S
C x P	N.S	N.S	N.S	N.S	N.S	N.S
I x P	N.S	N.S	N.S	N.S	N.S	N.S

N.S. No significant * Significant. ** Highly significant

Table 5. Hundred seed weight (gm) and seed yield / plant of faba bean as influenced preceding crop, number of irrigations and P-fertilizer levels.

Main effects	100-seed weight (gm)			Seed yield / plant		
	1st	2nd	Comb.	1st	2nd	Comb
1- Preceding crop (c)						
A. Maize	77.308a	75.706b	76.507	23.428a	22.190	22.809a
B. Rice	68.649b	82.223a	75.436	20.190b	16.762	18.476b
F.test	**	*	N.S	*	N.S	**
2- Irrigation (I)						
Once: at planting	73.538	77.979	75.758	20.971	18.134	19.552
Twice: at planting and 30 DAP	72.111	80.429	76.270	20.894	19.789	20.341
Trice: at planting, 30 and 60DAP	72.563	79.758	76.161	21.998	19.547	20.772
Four times: at planting, 30, 60 and 120 DAP	73.703	77.692	75.698	23.375	20.436	21.905
F. test	N.S	N.S	N.S	N.S	N.S	N.S
3- Phosphorus fertilizer levels (KgP_2O_5/fad) (P)						
0.0	74.688	80.528	77.608	22.434	19.252	20.843
15.5	72.071	77.844	74.957	21.574	18.966	20.270
31.0	72.178	78.522	75.350	21.420	20.212	20.816
F. test	N.S	N.S	N.S	N.S	N.S	N.S
4- Interactions						
C x I	N.S	*	N.S	N.S	N.S	N.S
C x P	*	N.S	N.S	N.S	N.S	N.S
I x P	*	N.S	N.S	N.S	N.S	N.S

N.S. No significant * Significant. ** Highly significant

after maize produced heavier seeds than those grown after rice in the 1st season. But, the reverse was the case in the 2nd season. Consequently, the pooled data showed no difference between plants grown after rice or maize in seed weight. Here, it is of noticeable that the superiority of plants grown after maize over those grown after rice in number of seeds/plant in the 2nd season (table, 4) was on expense of seed weight. Thereby, seed yield/plant was not affected by the preceding crop in the 2nd season. But, in the 1st season, as well as, the pooled data, plants followed maize surpassed those followed rice in seed yield/plant. These results reflect the role of seed weight in determining faba bean individual plant yielding capacity, as in the 1st season.

Meantime, neither 100-seed weight nor seed yield/plant were affected by either of number of irrigations or P-fertilizer levels. This was true in both seasons and their pooled data. These results are in agreement with those recorded by Moursi *et al.* (1970), Mohammed (1972), Ahmed (1975), Salih (1979), Krogmen *et al.* (1980), Abdallah *et al.* (1981) Zeidan *et al.* (1986), Nasrallah (1987) and Masood *et al.* (2000).

4- Seed, straw yields/fad and harvest index (HI):

It is evident from results in table 6 that seed, straw yields/fad and HI were not affected by the preceding crop in both seasons. This was also the same in the pooled data for straw yield/fad. While, the pooled data indicate to the superiority of plants grown after maize over those grown after rice in seed yield/fad and consequently HI. This could be attributed to the higher number of seeds / plant after maize than that after rice (table, 4).

Though, seed yield/fad. showed no response to number of irrigations in the two seasons, the pooled data of both seasons exhibit the superiority of plants received three or four irrigations over those received one irrigation in seed yield /fad. Meanwhile, results of the 1st season and confirmed by the pooled data ensure the response of straw yield to increasing number of irrigations up to three times. This was in similarity with the response of plant height to number of irrigations, (table, 3). Nevertheless, HI was not affected by number of irrigations. This was the case in both seasons and their

Table 6. Seed yield (ardab/fad.), straw yield (ton/fad.) and harvest index (HI) of faba bean as influenced preceding crop, number of irrigations and P-fertilizer levels.

Main Effects	Seed yield (Ardab/fad)			Straw yield (ton/fad)			Harvest index (HI)		
	1st	2nd	Comb.	1st	2nd	Comb.	1st	2nd	Comb.
1- Preceding crop (c)									
A. Maize	12.928	9.547	11.237a	2.611	1.722	2.166	0.436	0.457	0.447a
B. Rice	11.910	8.098	10.004b	2.867	1.786	2.327	0.400	0.410	0.405b
F.test	N.S	N.S	*	N.S.	N.S	N.S	N.S	N.S	**
2- Irrigation (I)									
Once: at planting	11.644	7.543	9.593b	2.309b	1.586	1.947c	0.442	0.423	0.432
Twice: at planting and 30 DAP	12.185	8.465	10.325a b	2.655b	1.732	2.193bc	0.418	0.430	0.424
Trice: at planting, 30 and 60DAP	13.495	9.228	11.352a	3.235a	1.804	2.520a	0.399	0.436	0.418
Four times: at planting, 30, 60 and 120 DAP	12.352	10.053	11.203a	2.755b	1.891	2.323ab	0.412	0.447	0.429
F. test	N.S	N.S	*	**	N.S	**	N.S	N.S	N.S
3- Phosphorus fertilizer levels (KgP_2O_5/fad) (P)									
0.0	12.665	8.352	10.508	2.698	1.751	2.225	0.425	0.424	0.424
15.5	12.466	8.993	10.730	2.786	1.745	2.265	0.413	0.438	0.426
31.0	12.126	9.122	10.624	2.732	1.764	2.248	0.415	0.439	0.427
F. test	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
4- Interactions									
C x I	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
C x P	N.S	N.S	*	N.S	N.S	N.S	N.S	N.S	N.S
I x P	N.S	N.S	*	N.S	N.S	N.S	N.S	N.S	N.S

N.S. No significant * Significant. ** Highly significant

pooled data. These results are in good line with those of El-Zeiny *et al.* (1990), El-Far (1994), Teama (1994), Kortam (1995) and El-Far (1999).

Like, all yield attributes studied here, seed, straw yields/fad and HI also were not affected by P-fertilizer levels tested. These results are in agreement with those recorded by Moursi *et al.* (1970), Mohammed (1972) and Salih (1979).

5- Interactions:

Phosphorus fertilizer levels interacted significantly with preceding crop and number of irrigations on faba been seed yield/fad, as shown in tables 6a and 6b, respectively.

At any level of P-fertilizer, faba bean plants grown after maize outyielded those grown after rice. On the other hand, faba bean plants followed maize responded significantly to the application of 15.5 kg P_2O_5/fad. But, faba bean followed rice did not respond to the added P-fertilizer. The response of faba bean seed yield to P-fertilizer after maize was attributed not only to the low soil P-content after this crop than after rice (see table, 1) but, also to the higher seed yielding capacity of plants followed maize than those followed rice, as observed when faba bean received no P-fertilizer. Such low yielding capacity after rice may be due to the adverse effect of submergence on soil areation and hence the availability of Zn and Cu.

Table 6a: Interaction effect of preceding crop and P - fertilizer levels on seed yield (ardab/fad) of faba bean (combined).

Preceding Crop	P-fertilizer levels P_0	P_1	P_2
Maize	B 10.948a	A 11.404a	A 11.361a
Rice	A 10.069b	A 10.055b	A 9.888b

On one direction, faba bean crop did not respond to P-fertilizer when irrigated once or twice. When number of irrigations increased to three, response was positive and significant to 31.0 kg P_2O_5/fad. But, when irrigation extended to 120 DAP (four irrigations), the response was observed to only 15.5 Kg P_2O_5/fad. On the other direction, without application of P-fertilizer, seed yield/fad of faba bean responded to each additional irrigation up to three times. This was also, the same when plants fertilized with 31 kg P_2O_5/fad. Where, seed yield/fad for plants fertilized with 31 kg P_2O_5/fad. was reduced when provided with the fourth irrigation. However, the response was up to the fourth irrigation when plants

received 15.5 kg P_2O_5/fad. Here, it seems that supplying plants received 31 kg P_2O_5/fad with four irrigations dissolved more P to the extent that caused a somewhat restriction in absorption of Zn and / or Cu, thereby, seed yield/fad was decreased as compared with supplying three irrigations. These results-in turn-indicate that the rain fall allover the season was not enough to dissolve the amount of P-element needed by faba bean received 15.5 kg P_2O_5/fad. . This was also the same for plants received no P or 31 kg P_2O_5/fad but up to Feb. month (see table, 2).

Table 6b: Interaction of number of irrigations and P-fertilizer levels on seed yield (ardab/fed).of faba bean (combined).

Irrigation number	P-fertilizer levels P_0	P_1	P_2
Once: at planting	A 9.513c	A 9.831d	A 9.355d
Twice: at sowing and 30 DAP	A 10.367b	A 10.474c	A 10.126c
Trice: at sowing, 30 and 60DAP	B 11.268a	B 11.095b	A 11.722a
Four times: at sowing, 30, 60 and 120 DAP	B 10.876a	A 11.517a	AB 11.214b

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تأثير المحصول السابق وعدد الريات ومستويات التسميد الفوسفاتى على المحصول ومكوناته فى الفول البلدى

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أقيمت أربع تجارب حقلية خلال الموسمين الشتويين ٢٠٠٠/٢٠٠١، ٢٠٠١/٢٠٠٢ بحقل إرشادى فى قرية هربيط – مركز أبو كبير – محافظة الشرقية -مصر. للوقوف على مدى إستجابة محصول الفول البلدى (صنف جيزة ٣ محسن) لعدد الريات ومستويات التسميد الفوسفاتى عند زراعته عقب الذرة الشامية أو الأرز.

أوضحت النتائج المتحصل عليها تفوق نباتات الفول البلدى المنزرعة عقب الذرة عن تلك المنزرعة عقب الأرز فى عدد الأفرع/النبات، عدد القرون/النبات وعدد البذور / النبات وفى محصول البذور/النبات ومحصول بذور الفدان وفى دليل الحصاد أيضا.

بينت النتائج أن النباتات التى أمدت بثلاث ريات كانت هى الأطول وأنها أنتجت أعلى عدد من القرون / النبات. وأيضا أنتجت تلك النباتات أعلى محصول بذور وقش/ الفدان.

أظهر محصول البذور / الفدان إستجابة للتسميد الفوسفاتى عند زراعة نباتات الفول البلدى عقب الذرة الشامية بينما لم يكن هناك إستجابة للتسميد الفوسفاتى عقب الأرز.

أمكن لنباتات الفول البلدى المسمدة بـ ١٥,٥كجم فو٢أ٥/فدان عند ريها أربع مرات وتلك المسمدة بـ ٣١كجم فو٢أ٥ عند ريها ثلاث مرات تحقيق أعلى محصول بذور/ الفدان