

Effect of fertilization with phosphorus and plant density on some faba bean varieties

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Two field experiments were carried out in the farm of Faculty of Agriculture at Moshtohor, Benha University during the two successive growing seasons (2003/2004 and 2004/2005). The aim of this study was to investigate the effect of faba bean varieties, (Misr-1 and Giza 429), hill spacing (20, 25 and 30 cm.), mineral and bio-phosphorus fertilization (0, 15, 30 P2O5/fed, phosphorein®, 15 kg P2O5 + phosphorein® and 30 kg P2O5+ phosphorein®) on growth yield and yield components as well as chemical analysis of faba bean seeds. Soil texture of the experimental site was clay, with pH of 8.0, CaCO₃ 3.50 %, organic matter content 2.0 %. Available N, P and K were 17.0, 11.8 and 265.0 mg/kg. The experimental design was split split plot in randomized complete block design (RCBD) in three replications. Each of the two faba bean varieties were distributed in the main plots, whereas the three plant spacing were assigned in the sub plots and the six phosphorus fertilizer treatments were arranged at random in sub sub plots. The normal cultural practices for growing faba bean were used in the both seasons. The results of the experiments could be summarized as follows:

I- Varietal differences:

- 1- Growth characters and growth analysis- Misr-1 and Giza 429 varieties not differ significantly in number of branches, leaves and leaf area / plant as well as dry weight / plant 80 and 100 day after planting. - Misr-1 variety was superior to Giza 429 in plant height in the 2nd season while Giza 429 variety was superior to Misr-1 in dry weight of leaves at 100 day from planting, CGR and RGR in the 1st season.
- 2- Yield and yield components:- There were no significant differences among Misr-1 and Giza 429 number of pods / plant in both seasons, number of seeds / plant in the 1st season, seeds weight / plant and seed yield / fed in the 2nd season. - Misr-1 significantly recorded the highest seed yield / fed. (1.03 ton/fed) in the season compared with Giza 429 (0.87 ton/fed.).
- 3- Seeds chemical analysis:- Results indicate that there were no significant differences between Misr-1 and Giza 429 on N, P, K, and seed protein.

II- Effect of population density:

- 1- Growth characters and growth analysis on: Plant height after 100 days from sowing was significantly decreased by increasing planting space up to 30 cm between hills. The number of leaves / plant was significantly increasing by increasing plant density (20 cm. between hills) in the two seasons. CGR, RGR and NAR for faba bean plants were not significant effect by plant spacing at period 80 — 100 day after planting in both seasons.
- 2- Yield and yield components: Decreasing hill spacing from 30 to 20 cm/hills significantly decreased number of pods and seeds / plants, seed weight/ plant in both seasons except 100-seed weight in the second season only. Seed, straw and biological yields / fed were significantly increased as planting distance 20 cm which surpassed 25 cm and 30 cm between hills in both seasons (in seed yield / fed by 15.05 and 25.88 in the 1st season, 7.09 and 9.42 % in the 2nd season, respectively).
- 3- Seeds chemical analysis: N, P, K and protein % were significantly increased as a result to the increase of hill spacing up to 25 cm between hills.

III. Effect of phosphorus fertilizers:

- 1- Growth characters and growth analysis: Plant height, number of branches/plant, number of leaves/plant, leaf area/plant, dry weight of leaves and plant at 80 and 100 day after planting, CGR, RGR and NAR were improved by phosphorus fertilization mixed with phosphorein® while the lowest values for forenamed traits were obtained in the unfertilized plots (control).
- 2- Yield and yield components: Phosphorus fertilizer levels mixed with phosphorein® significantly affected in yield and yield components characters. The results showed that adding 30 kg P2O5/fed, mixed with phosphorein® significantly increased number of pods/plant, number of

seeds/plant, seed weight/plant, 100-seed weight as well as seed, straw and biological yields/fed in both seasons as compared with zero phosphorus treatment (control) .The seed yield/fed increased as applied P₂O₅ rate was increased up to the highest level i.e. 30 kg/fed mixed with phosphorein®. The increases were 100 and 38.01% in the 1st and 2nd seasons, respectively, compared with control. 3-Seeds chemical analysis:Nitrogen, phosphorus, potassium and protein% in faba bean seeds significantly affected by phosphorus fertilizers. The increasing P rates up to 30Kg P₂O₅/fed mixed with phosphorein® significantly increased seeds content of N, P, K and protein percentages.

IV. Interaction effects: a. Effect of the first order interaction:1. The results showed that varieties X hill spacing had a significant effect on :-100-seed weight in 2nd season the highest values of 100-seed weight (70.99g) was produced when Misr-1 faba bean variety was planting at 25cm between hills and the lowest seed index was produced when planted Misr-1 variety by 30 cm between hills.