

Density Interaction in Determinate and Indeterminate Faba Bean Types

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Abstract : Two field trials were conducted to study the effect of plant densities i.e., 190, 222, 266, 330 and 440 10^3 plants ha^{-1} on morphological characters, physiological and yield attributes of two faba bean types viz. determinate (FLIP-87 -117 strain) and indeterminate (c.v. Giza-461). The results showed that the indeterminate plants significantly surpassed the determinate plants in plant height at 75 and 90 days from sowing, number of leaves at all growth stages and dry matter accumulation at 45 and 90 days from sowing. Determinate plants possessed greater number of side branches than that of the indeterminate plants, but it was only significant at 90 days from sowing. Greater number of flowers were produced by the indeterminate plants than that of the determinate plants at 75 and 90 days from sowing, and although shedding was obvious in both types, it was greater in the determinate plants as compared with the indeterminate one at 90 days from sowing. Increasing plant density resulted in reductions in number of leaves, branches flowers and dry matter accumulation per plant of both faba bean types. However, plant height criteria took a reversible magnitude. Moreover, under all rates of plant densities the indeterminate type plants surpassed the determinate plants in all growth characters studied except for number of branches per plant at 90 days from sowing. The indeterminate plant leaves significantly contained greater concentrations of photosynthetic pigments i.e., chl. a, b and carotenoids than those found in the determinate plant leaves. Also, the data showed significant reduction in photosynthetic pigments concentration as planting density increases. Light extinction coefficient (K) values reached their maximum level at 60 days from sowing, then it declined sharply at 75 days from sowing. The data showed that the illumination inside the determinate faba bean canopies was better than the indeterminate plants. (K) values tended to increase as planting density increases, meanwhile, significant interactions were reported between faba bean type as planting density on (K) at all growth stages. Both of determinate and indeterminate faba bean plant leaves reached their maximum expansion at 75 days from sowing reflecting the highest LAI values, then their declined in the subsequent growth stage. The indeterminate faba bean plants significantly surpassed the determinate plants in LAI up to 75 days from sowing. Growth analysis showed that NAR, RGR and CGR reached their maximum rates at (60-75 days growth stage). Faba bean types did not differ significantly in NAR at the early growth stage. The indeterminate plants were able to grow faster with significant CGR values than the determinate plants. The indeterminate faba bean plants surpassed the determinate ones in number of seeds/pod and per plant, 100-seed weight, seed yield per plant and per hectare at all rates of plant density. Seed yield increased with increasing plant densities of both types. The highest seed yield was attained for both types 440 10^3 plants ha^{-1} .

Keywords : determinate, indeterminate faba bean, Physiological attributes, yield attributes

Conference Title : ICAACS 2017 : International Conference on Agriculture, Agronomy and Crop Sciences

Conference Location : Zurich, Switzerland

Conference Dates : September 15-16, 2017