Physiological studies on the role of some bioregulators in growth, flowering and yield of snap bean

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Two field experiments were carried out during the two successive summer seasons of 2002 and 2003 at the Experimental Farm of the Faculty of Agriculture, Moshtohor, Benha University. First experiment.Effect of sowing date on vegetative growth, chemical composition, flowering behaviour and green pod yield and its components of some snapbean cultivars.This experiment included 12 treatments, which were the combination of 3 sowing dates, i.e., the first of each of March, April and May and four snap bean cultivars namely Paulista, Samantha, Narina and Bronco. A split plot :design with four replicates was adopted where the sowing date treatments were distributed in the main plots and dultivars were located in the sub-plots. The obtained results can be summarized as follows:- 1-Vegetative growth characteristics.-Obtained results refer that vegetative growth aspects, i.e., plant length, number of leaves and branches /plant as well as fresh weight of plant were significantly increased with early sowing on 18 of March, while the dry matter percentage of plant was increased with delaying seed sowing from Marsh 18 to 1a of May.- There were significant differences among the tested cultivars in all the studied growth measurements. In this respect, cv. Bronco reflected the highest values in plant length, number of leaves and branches per plant as well as the fresh weight of plant. On the other hand, cv. Narina exhibited the highest value of dry matter percentage for plant foliage.As for the effect of the interaction between that tested sowing dates and cultivars, sowing cv. Bronco on 18 of March gave the highest values in plant Jength, number of leaves and branches as well as fresh weight per plant. whereas, sowing the seeds in late planting (18 of May) reflected the highest values of dry matter percentage of plant. 2- Chemical composition of plant foliage. a- Photosynthetic pigments.- Early sowing on 18 of Marsh led to significant increases in all assayed photosynthetic pigment (chlorophyll a, b and carotenoids) content in plantleaves.-Significant differences were detected regarding chlorophyll a, b and total chlorophyll as well as carotenoid content in leaves among the tested cultivars, whereby cv. Paulista followed by both cvs. Bronco and Narina showed the highest values compared with cv. Samantha which induced the lowest values of such photosynthetic pigments.-The interaction effect between sowing date and the tested cultivars led to a significant increase in all determined photosynthetic pigments. In this regard, cv. Paulista reflected the highest values followed by cv. Bronco compared with the other used cultivars at all tested sowing dates.b- Mineral constituents.-Early sowing of snap bean seeds on 18 of March led to significant increase in total nitrogen, phosphorus and potassium contents in plant foliage compared with either medium (I of April) or late (0 of May) plantation.Significant differences were found in total nitrogen, phOsphorus and potassium contents among the tested cultivars, whereby cv. Paulista exhibited the highest values in this respect.The interaction effect between sowing date and cultivars indicated that cv. Paulista at the early sowing date showed to the highest N, P and K values.c- Organic constituents-It was found that early sowing on 18 of March led to significant increment in reducing, non-reducing and total sugars in plant foliage as well as nucleic acids (RNA& DNA) in plant leaves comparing with late plantations.-Paulista cultivar reflected the highest values in organic constituents followed in a descending order with cvs. Narina, Bronco and Samantha.-Sowing seeds of v. ’Paulista early on 18

of March produced bean pl nts contained the highest values of the studied orga is constituents as compared with other cultivars an i sowing dates.3- Flowerin beh viour-Early sowing of s ap bean seeds on 18 of March significantly incr ased both number of flowers and pods per plant as well as fruit set percentage. However, late so ing on l of May decreased the number of days el psed from sowing up to anthesis of the first flower.-Significant differen and pods produce percentage betwe-Plants of cv. Bronc f011owed by those Moreover, plants required the least anthesis of the Samantha were th and Narina were i-Early sowing on 18 reflected the highe pods produced b percentage. More flowering.1es were found in number of flowers per plant as well as fruit setting the used cultivars.showed superiority in this respect, of Paulista, Narina and Samantha. f cv. Bronco flowered earlier and umber of days from sowing till the first flower. While those of cv.latest and those of cvs. Paulista between.of March by seeds of cv. Bronco t values for number of flowers andplant as well as fruit setting er, it was the earliest cultivar in4- Total green pods yield.-Results insure that sowing the seeds of snap bean in early planting, (18 of March) significantly increased green pods yield per plant as well as feddan compared with medium and late sowing date.-Results showed significant differences among the used cultivars. In this regard, cv. Bronco produced the highest yield of green pods per plant and feddan, followed by Paulista, Narina, meanwhile cv. Samantha produced the lowest yield.-Earl}, sowing for cv. Bronco on 18 of March exhibited the highest values for average green pods yield per plant and the total yield per feddan followed by cvs. Paulista and Narina. On the contrary, cv. Samantha reflected the lowest values in all studied yield parameters, especially in case of late sowing (18 of May). 5- Pods quality.-Results indicated that early sowing on 18 of March improved all the measured physical and chemical parameters for pods, it also increased average pods length, diameter and weight as well as total carbohydrates and proteins content. In the same time, it decreased the crud fiber contents of green pods compared with the late planting either on first of April or May.-Paulista cv. recorded the highest values in pod length and the highest total carbohydrate and protein content,Summary and conclusion 105while cvs. Bron values for aver without signifi Moreover, cv. S for crude fibers-Regarding the int and the studied planting cv. Pa March) recorded length, total carb pods. However, values for avcra produced the hig cv. Samantha r aforementioned t (18 of May) .o and Narina recorded the highest ge pod diameter and pod weight ant differences between them. mantha recorded the lowest values produced pods.action effect between sowing date cultivars, the results showed that lista on early sowing date (18 of the highest values for average pod hydrate and protein content of green cv. Bronco recorded the highest c pod diameter while, cv. Narina est average pod weight, meanwhile, corded the least values in all aits, especially on late sowing date Conclusion-It could be conclu can be recommen on the early sowi vegetative growt Meanwhile, for b using cv. Paulistaed that under similar conditions it ed to use Bronco snap bean cultivar g (18 of March) to obtain adequatewith higher green pods yield. tter pod quality early sowing and ould be recommended.Second experiments.Effect of sowing date and foliar spray of some bio-regulators on vegetative growth, chemical, composition, flowering behaviour and green pod yield and its components ofsnap bean cv. Bronco.This experiment included 21 treatments, which were the combination of 3 sowing dates i.e., first of each of March, April and May and 7 treatments of bio-regulators, namely puterscine at 50, 100 and 200 mg /1 and benzyladenine at (10, 20 and 40 mg /1) in addition to the control treatments. Plants were sprayed twice with bio-regulators, 30 days from sowing and 10 days later. A split plot design with four replicates was adopted. where the sowing date treatments were distributed in main plots and the bio-regulators treatments were randomly arranged in the sub plots. Obtained results can be summerized as follows:- 1-Vegetative growth characters.-Spraying plants with increasing concentrations of both puterscine (50, 100 or 200 mg /1) or Benzyladenine (10, 20 or 40 mg /1) significantly and gradually increased all the measured growth aspects expressed as plant length, number of leaves and branches as well as fresh weight per plant compared with the check treatment.-The interaction between the tested sowing dates and bio-regulators, i.e., Put. and BA., led to an increase in all values of growth traits. In this respect, medium concentrations for Put. (100 mg / 1) and BA. (20 mg /1) in case of early sowing (18 of March) recorded the highest values, while, the highest concentrations (20 mg/I Put. and 40 mg /1 BA) in case of late sowing (1g of May) reflected the highest values of growth parameters. 2-Chemical composition of plant foliage. a-Photosynthetic

pigments.-Treating the plants with increasing concentrations of bio-regulators either Put. or BA. gradually increased all the determined photosynthetic pigments, i.e., chlorophyll a and b as well as carotenoids. In this respect, 200 mg /1. Put. and 40 mg /1. BA. recorded the highest values.- The interaction effect between sowing date and bio-regulators indicated that the highest values were recorded in case of using the higher concentration of both bio-regulators on early sowing time (18 ofrch). b- Mineral constituents.-There was gradual increase in total nitrogen, phosphorus and potassium content of plant foliage due to treating plants with increasing concentration of Put. or BA. the highest N P K content was obtained due tousing the highest concentrations of Put. (200 mg /1)and BA. (40 mg /1).-The interaction between sowing date and tested bio-reOlators showed that early sowing date on 18 of March and spray the plants with the medium concentrations for Put. (100 mg3) or BA. (20 mg /1) reflected the highest values in NPK content.c- Organic constituents.-Treating the plants with Put. at 100 mg /1 or BA. at 40mg /1 increased total sugars content in plant foliage,while using the highest used concentration for bothPut. (200 mg /1) and BA. (40 mg /1) increased nucleicacrid content of plant leaves.-Spraying plants of the early sowing date (1s1 of March) with medium concentration of Put. (100 mg /1) or BA. (20 mg /1) showed superiority regarding all sugar fractions. While as using the highest concentration for both bio-regulators, especially in case of late sowing date (18 of May) recorded the highest values for sugars as well as nucleic acid content in bean plants.3- Flowering behaviour.-Treating plants with bio-regulators resulted insignificant increases in number of flowers, number ofpods per plant and fruit setting percentage. However,not significant effects were noticed in number of dayselapsed from sowing to the first flower anthesis ascompared with check treatment.- Spraying bean p1 nts with the highest level of Put. (200 mg/1) or BA. (0 mg/1) was able to ameliorate the depressive effec s of delayed sowing dates, especially on 18 of May re arding flowering behaviour of plants.4- Yield of reen ods.-Results insured tha using both bio-regulators at medium or higher rates si:i ificantly increased the produced yield either for plant or per fed. in comparison with the check treatment and th lower tested concentration with a limited preference to wards puterscine.-The interaction of ct for both sowing date and bio-regulators significantly increased all recorded yield parameters. In cas sowing bean seeds early on 18 of March it proved t. be enough use the medium levels of the tested bio-regu ators. However, it is advisable to use the highest concen ations of Put. (200 mg/1) or BA. (40 mg/I) in order to a eliorate the despressing effect of late sowing date (18 of I ay) on yield productivity).5- Po(.Lginiah•- Using bio-regulators led to an increase length, diameter an (total carbohydrate hand, it decreased t pods. In this respect, the best one-Early sowing com medium concentratio BA. (20 mg / 1) recorat different studied concentrations in physical pods parameters (pod weight) and chemical constituents nd proteins contents). On the other e crude fibers content of produced the highest used concentration wasfined with treating plants with for both Put. (100 mg / 1) and ed the best results. Moreover, bio-regulators at the highest used concentration (200 mg /1 Put. and 40 mg /1) BA. recorded the best results under late sowing conditions. ConclusionIt could be concluded that under such conditions of the experiment early sowing on 1g of March and treating the plants of cv. Bronco twice with 100 mg / I Put. or 20 mg /I BA. were recommended for sowing snap bean cv. Bronco and obtaining good vegetative growth with higher green pods yield and best quality. However, it is advisable to use the highest concentration of Put. (200 mg/1) or BA.(40 mg /I) in order to ameliorate the depressing influence of late sowing date (1g of May) on yield productivity under such conditions.