Effect of fertilization and planting date on growth yield and quality of cauliflower

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Two separate experiments on cauliflower (Brassica oleracea var. botrytis) were carried out at the Experimental Farm of the Faculty of Agriculture Moshtohor, Zagazig University (Benha Branch) during the winter season of 1991/1992 and 1992/1993. First Experiment: Effect of planting date and cultivargrowth yield and quality of cauliflower:Field experiments were carried out to study the effect of three planting dates (15 Sept., 15 Oct. and 15 Nov.) of cauliflower within three different cultivars namely Snowball, Snowball-y and Amshery. This experiment included 9-treatments which were the combinations of 3- planting dates within the 3-cultivars. A split-plot in a complete randomized block design with four replicates was adopted. The planting date several as main plots and the cultivars several as sub-plots. Agricultural practices were done as commonly followed in the district.The obtained results could be sunrunarized as follows: 1. Vegetative growth : 1.1. Early planting at 15 Sept. resulted the largest vegetative growth expessed as plant height, stem length, number of leaves and freshweight per plant for all tested cultivars.1.2. Amshery possessed the largest vegetative growth as coinpared with cvs. Snowball and Snowball-y with no significant differencesbetween the two latter cultivars.1.3. No significant interactions were detected due to planting dates within cultivars on stem height and total fresh weight per plant. Meanwhile, early planting at 15 Sept. significantly increased number of leavesper plant of cvs. Snowball and Snowbalky as compared with the other treatments. Early yield of curds:2.1. Early planting at 15 Sept. significantly increased weight of curds per faddan at the first or first + second harvest as compared with the other planting dates during both seasons. Meanwhile, the percentage of early yield/total yield ranged from 19.3-34.7% reached the maximum values in plants transplanted at 15 October and the minummn with late planting dates of 15 Nov.2.2. Snowball cultivar significantly surpassed cv. Amshery with respect to early yield production as tons/fed. as well as early yield percentage in both seasons. However, no significant differences were obtained between cv. Snowball and snowball-y in the first season or between cvs. Amshery and Snowball-y in the second one, regarding with early yield as ton/fad.2.3. There was a significant interaction effect due to planting dates within cultivars on early yield of the first + second harvests. Retarding planting date to 15 Nov. greatly depressed early yield production as ton/fad. and its proportion to total yield within the 3-tested cultivars. The highest early yield in tons/fad was obtained when cv. snowball was transplanted early in 15 Sept., whereas, cv. snowball-y produced simillar early yield (ton/fad.) as that of cv. Amshery when they were grown early at 15 sept.. However, delaying planting date from 15 Sept. to 15 Oct. greatly depressed early yield of cv. Amshery but had no significant effect on early yield production(ton/fad.) of cv. snowball-y.3. Marketable and total yield:3.1. Early transplanting in 15 Sept. considerably increased marketable and total yield (ton/fad.). Meanwhile delaying planting date gradually and significantly decreased both marketable and total yield, reached the lower yield in late growing at 15 Nov. 1-lovever, the highest percentage of tnarketable yield/total yield was obtained at the second planting date of 15 Oct.3.2. Amshery cultivar produced significantly higher marketable and total yield (ton/fad.) as compared with the other tested cultivars. whereas, cv. Snowball surpassed cv. Snowball-y with respect to marketable and total yield production (ton/fad.).3.3. The interaction effect cleared that the highest marketable and total yield production (ton/fad.) was obtained when cv. Amshery was transplanted early in 15 Sept. followed by cv. Snowball and

Snowball-y when grown early at the same date. Moreover, retarding planting date to 15 Nov. significantly decreased the marketable and total yield of the tested cultivars. 4. Yield components:4.1. Early planting at 15 Sept. increased total fresh weight and average curd weight per plant as coinpared with the late planting date of 15 Nov. whereas, curd weight per plant did not differ significantly for early and mid planting dates of 15 Sept. or 15 Oct. Respecting with the percentage of curd weight/total fresh wt. per plant it was higher in plants grown at 15 Oct. than of the other dates of transplanting.4.2. The tested cultivars varied in curd weight in the first season and total plant fresh weight in both seasons. Amshery cultivar had higher values of curd and plant weight than that of cvs. Snowball and Snowball-y which consequently decreased the percentage of curd weight/total plant weight in cv. Amshery.4.3. No significant interaction between cultivars and planting date were found on yield components; plant fresh weight, average curd weight and percentage of curd weight/total weight per plant 5. Curd Quality : 5.1. Physical characteristics of curds:5.1.1. Most physical characteristics including curd diameter, height and compactiness were improved by early planting at 15 Sept. as compared with the late planting date, however, curd index was not affected.5.1.2. Curd diameter did not differ among the tested cultivars, however, curd height was higher in cv. Amshery than the other cvs. Snowball and Snowball-y which had better curd compactness and whiter colottr than that of cv. Amshery.5.2. Chemical constituents of curds:5.2.1. Early planting at 15 Sept. led to an increase in dry matter, total N, NO3-N, P, K and crude protein percentage as compared with thelater planting dates.5.2.2. The tested cultivars did not differ significantly in NO3-N and 1(`)/0 of curds in both seasons. But dry matter, total-N and crude proteins was higher in cv. Amshery than that of cv. Snowball-y in one season, meanwhile, Snowball cultivar contained more P than Amshery cultivar in both seasons.9 I 5.2.3. No significant interaction were obtained except that of curd content of P in the second season. P °A) was the highest in Snowball cultivar within the early planting date (15 Sept5.2.4. Delaying planting date from 15 sept. to 15 Nov. significantly depressed vitamin-C, reducing sugars and total sugars of curdtissues. 5.2.5 Curds of Snowball contained more vitainin-C than that cvAmshery in the first season only, but Amshery contained more reducing , non reducing and total sugars in both seasons.5.2.6. Concerning the interaction effect between dates within cultivars results showed no significant effects on vitamin-C, reducing, nonreducing and total sugares, except that of the second season, as early growing at 15 Sept. of cv. Amshery led to higher total sugars °/0 as compared with the other treatments.Conclusion : I - To get the highest marketable and total yield (ton/fad.) it is advisable to transplant transplanting cv. Amshery plants early at 15 Sept. To produce the highest early yield with the best quality of curdstransplanting cv. Snowball plants early at 15 Sept. is recommended.3- Delaying transplanting time to 15 Nov. significantly decreased early, marketable and total yield as well as curds quality of the 3-tested cultivars, Amshery, Snowball and snowball-y. Second Experiment: Effect of nitrogen fertilization and boron foliar application on growth, yield, quality and chemicalcomposition of cauliflower:This experiment included 12 treatments which are the combinationof 3-nitrogen fertilizater levels (0, 45 and 90 kg N/fad.) within 4-levels of92)oron foliar application (0, 25, 50 and 100 ppm B). Snowball transplants Nere grown under field conditions at 15 Oct. of both seasons. Treatments Nere arranged in a split plot design, with 4 replicates whereas, nitrogen evels served as main plots and boron levels served as subplots.All treatments received 32 kg P205 and 48 kg K20/fad. Other igriculture practices were done as commonly followed in the district.Dbtained results revealed the following:I. Vegetative growth characteristics:I .1. Increasing levels of nitrogen fertilizer encouraged all plant growth parameters. The highest values of plant height, stem height, number of leaves were found in plants supplied with 45 kg N/fad. whereas, plant fresh weight (kg/plant) was responsed andincreased up to 90 kg N/fad.1.2. Results showed that B foliar application increased plant growth up to 50 ppm B in both seasons except in the second one whereby plant fresh weight was responded up to 100 ppm B.1.3. Concerning the interaction effect of B within N application on plant gowth, no considerable differences were detected except that of number of leaves per plant and stem height in the first season only. In this regared application of 90 kg N/fad. within 50 or 100 ppm B seemed to give the highest plant growth.2. Chlorophyll content of leaves:2.1. Increasing levels of N-fertilizer from 0, 45 up to 90 kg N/fad. significantly increased chlorophyll a, b and total chlorophyllcontent of leaves.2.2. B application at 50

or 100 ppm B significantly increased chlorophyll a and total chlorophyll content of leaves however,chlorophyll-b was less affected.2.3. There was no interaction effect between N and B nutrition onchlorophyll a, b or total chlorophyll content of leaves.3. Early yield:3.1. increasing levels of significantly increased not by number than the 1st + 2nd harvests.N-application up to 45 or 9() 11, fad early yield of curds by weight (ton/fad.) but control calculated as the yield of the first or3.2. Foliar application of 50 or 100 ppm boron significantly produced higher early yield by weight or number than the control calculated for the 1st harvest or lg. +2d.harvests. The percentage of early yield/total yield was 16.2-30.3% reached its highest level by B application.3.3 Adding 90 kg N/fad. + 50 or 100 yield than the other treatments. interaction between N X B significance.B seemed to produce higher early However, variances due to the did not reach the level of 5%4. Marketable and total yield:4.1. Increasing levels of N-application from 0, 45 up to 90 kg N/fad.significantly increased marketable and total yield production by weight (ton/fad.) or number. The highest marketable and total yield was obtained by adding 90 kg N/fad.4.2. Boron application significantly increased marketable and total yield production as ton/fad. whereby spraying plants with 50 or 100 ppm B significantly increased total yield by 17.8-25.8% and marketable yield by 22.2-28.3%, respectively than the control. On the other hand, no significant differences in marketable or total yield by number were detected due to B application except a little improvement in number of marketable curds of plants sprayed with50 or 100 ppm B only in the first season 43 Results showed a significant etTect of the interaction of N X B onmarketable yield production (ton/fad.). The most favourable treatments was 90 kg N + 50 or 100 ppm B with no significant differences between those two levels of B-application. Total yield production (ton/fad) also showed the same trend but variances between treatments were significant only in the first season. Number of marketable and total curds per faddan were not significantly differed between various treatments of N within B.Yield components : 5.1 Increasing levels of N-fertilizer from 0, 45 up to 90 kg N/fad.gradually and significantly increased plant fresh weight and average curd weight per plant. The percentage of curd weight/total fresh weight per plant ranged from 49.3 to 64.9% reached its highest level in plants supplied with 45 or 90 kg N/fad. with no significant differences between those two levels in both seasons.5.2. Boron application significantly increased curd and plant fresh weight. The highest values were obtained by using 100 ppm B. However curd percentage was not significantlty improved by B- application.5.3. No significant differences in yield components (curd or plant fresh weight) were detected between the interactional treatments of Nwithin B.6. Quality of curds; physical and chemical characteristics:. Increasing level of N-application considerably improved diameter. compactness and colour of curds and increased total-N. NO3-N and B content of curd tissue. On the other hand. nitrogen application had no significant effect on curd height, shape index or curd’s content of P and K in the first season only. The best qualit of curds was obtained by adding 45 or 90 kg N/fad. with no significant differences between those two levels. Moreover, reducing, non reducing and total sugars content of curds were significantly and gradually increased by increasing levels of N fertilizer from 0, 45 up to 90 kg N/fad.6.2. Foliar application of B at 50 or 100 ppm B significantly improved quality of curds; diameter, height, compactness NO3-N and boron content of curds. However shap index was not significantly affected by B-application. As for sugars content of curds plants responded up to 100 ppm B.6.3. No significant differences, due to the interaction effect between N within B were obtained in all the studied physical and chemicalquality characteristics of cauliflower curds. Conclusion : As ageneral conculsion, adding 90 kg N/fad. within 3-times of boron application at 50 or 100 ppm B could be recommended as the most favourable treatment for increasing early, total and marketable yield of cauliflower and for improving the most physical and chemical characteristic of curd quality including curd weight and compactness.