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The Effect of Different Sowing Times on Development and Efficiency of Some Broccoli Varieties Grown in Corlu Conditions

Funda Eryilmaz Acikgoz
Faculty of Agriculture, Trakya University, Tekirdag, Turkey

Abstract: This research has been conducted in Corlu which has a harder climate than its Province, Tekirdag where a similar research had done before, in order to study the effect of different sowing times on development and efficiency of some broccoli varieties. In the study realized in 2000: 4 varieties V₁ (Shogun F₁), V₂ (Pirate F₁), V₃ (Sultan F₁) and V₄ (Marathon F₁) and 3 sowing times as July, August and September were used. While plant varieties and properties were not being effective, the sowing times were effective in the research. The average primary shoot weights of the varieties changed between 68.21-526.11 g; the average secondary shoot weights were between 8.90-30.82 g and the average secondary shoot was between 2.65-35.50 unit plant⁻¹. The average total plant values of the varieties per plant were determined as; with 68.34-550.17 g of efficiency values V₃ (Sultan F₁), V₁ (Shogun F₁), V₄ (Marathon F₁) and V₂ (Pirate F₁) are the most convenient varieties for Corlu Region respectively and relatively July, August and September are the most appropriate sowing times.

Key words: Broccoli, sowing times, efficiency

INTRODUCTION

Broccoli (*Brassica oleracea* L.Var. Italica) is an eatable vegetable with its immature, green coloured draft flowers and thick meaty flower stems and seems morphologically to cauliflower (Vural *et al.*, 2000).

In broccoli, especially the eatable green shoots are very rich of vitamin C. There is 70 mg of Vitamin C in the fresh weight of 100 g Broccoli shelters selenium in its structure. Selenium includes of Vitamin E which is an antioxidant. It is known that having antioxidant elements in the body decreases the frequency of coroner heart diseases and positively counteracts against cancer (Krauss *et al.*, 1996).

The parts of broccoli which are used as vegetable consist of main head carrying immature draft flowers and side shoots. The diameters of main heads are between 5- 25 cm and their weights are 100-500 g (Esiyok and Donmez, 1998). If the ecological circumstances and growing conditions are suitable, after harvesting the main head; immature draft flowers occur on the edges of side shoots in the armpits of the leaves; thus, more than one harvesting can be done (Acikgoz and Salk, 2000). The diameters of the side shoots coming forth from the armpits of the leaves are smaller than the main head and their weights change between 25-100 g (Esiyok and Donmez, 1998).

A research had been done in order to determine the most convenient variety and sowing time in Tekirdag conditions in between the years 1996 and 1998 (Acikgoz

and Salk, 2000). However, this research was also conducted to determine the suitable variety and sowing time in Corlu County which is far from the seaside and which has a tougher climate condition than its Province: Tekirdag. The result of the research is to be a sample for broccoli production in the inner parts of Trakya Region than its seaside.

MATERIALS AND METHODS

This research was conducted in Corlu County-Tekirdag Province of Turkey in 2000 and in field conditions. The varieties of V₁ (Shogun F₁); V₂ (Pirate F₁); V₃ (Sultan F₁) and V₄ (Marathon F₁) and three different sowing times as: July the 1st (S₁), August the 1st (S₂) and September the 1st (S₃) were used in the experiment. Broccoli seedlings were grown in PE bags which were filled in with peat and those of which the closed dimensions were 15×15 cm and a thickness of 0.15 mm and which were black coloured in order not to be covered with moss; which had bellows in order to stand upward and which had drainage holes for irrigation.

In the experiment, the combinations of variety and sowing were placed in a triple recurrence and according to an experimental design of divided parcels. Treatments in this placement were randomly selected by drawing lots for every block (Duzgunes *et al.*, 1987). Five plants per parcel were used and they were placed at 45×40 cm distances in the rows and on the rows respectively and with border plant on their sides.

Production plan of the experiment

1st Sowing Time : July the 1st
 1st Planting Time : August the 10th
 2nd Sowing Time : August the 1st
 2nd Planting Time : September the 15th
 3rd Sowing Time : September the 1st
 3rd Planting Time : October the 16th

Irrigation was supplied with a filtered bucket in the seedling period by furrow irrigation method in the development period. Nitrogen (N) using in growing increases shoots development by 38-61% (Masson *et al.*, 1991). Therefore, NH₄(NO₃) fertilizing was realized during the growing (Bracy and Bergeron, 1994).

The average temperature was 17.7°C, the average rainfall was 44.3 mm, the average proportional humidity was 68.2% and the average wind speed was 2.1 m s⁻¹ in the months (July-October) when the experiment was conducted.

RESULTS

Plant length: The main sowing effect was found to be important for the plant length after the variance analysis realized. The superior variety was V₄ (Marathon F₁) with 57.60 cm. The taller plants were had in the sowing times of July and August.

Primary shoot diameter: As a conclusion of the variance analysis realized, main sowing effect was found to be important for the primary shoot diameter. The most convenient sowing times were July and August regarding the primary shoot diameter.

Secondary shoot diameter: According to the variance analysis realized, main variety, sowing and interaction effects were found to be important for secondary shoot diameter. Thus, V₁ (Shogun F₁) gave the widest secondary shoot diameters as 8.63 cm in the sowing time of July.

Number of secondary shoot: After the variance analysis conducted, main sowing effect was found to be important for the number of secondary shoot. From the sowing times of July and August a great number of secondary shoots per plant were obtained. The highest number of secondary shoots was given by V₁ (Shogun F₁) as 35 unit plant⁻¹.

Primary shoot weight: According to the variance analysis realized, main sowing effect was found to be important for the primary shoot weight. The highest primary shoot weight was determined as 460.007 g in the sowing time of July (Table 1).

Table 1: Average primary shoot weight (g) related to the varieties and sowing times

Varieties	Sowing times			Main variety effect
	S ₁	S ₂	S ₃	
V ₁	462.94	140.50	80.71	228.05
V ₂	387.81	147.16	76.40	203.79
V ₃	526.11	127.50	68.21	240.60
V ₄	463.17	109.46	70.37	241.33
Main sowing effect	460.00 A	131.15 B	73.92 C	221.69

Main sowing effect: 5%, LSD: 46.10, Capital letter within row are significantly different

Table 2: Total Shoot Weight per Plant (g) Related to the Varieties and Sowing Times

Varieties	Sowing times			Main variety effect
	S ₁	S ₂	S ₃	
V ₁	492.16	160.37	83.62	245.38
V ₂	392.81	164.14	77.31	211.42
V ₃	550.17	148.24	72.44	256.95
V ₄	464.12	120.70	68.34	227.72
Main sowing effect	482.31 A	148.36 B	75.42 C	235.36

Main sowing effect: 5%, LSD: 1.15, Capital letter within row are significantly different

Table 3: Average secondary shoot weight (g) related to the varieties and sowing times

Varieties	Sowing times			Main variety effect
	S ₁	S ₂	S ₃	
V ₁	29.22	20.83	8.931	9.66
V ₂	21.12	16.84	8.901	5.62
V ₃	24.10	20.74	9.121	7.98
V ₄	30.82	25.42	9.242	1.82
Main sowing effect	26.31 A	20.95 B	9.04 C	18.76

Main sowing effect: 5%, LSD: 0.60, Capital letter within row are significantly different

Total shoot weight per plant: As a conclusion of the variance analysis realized, main sowing effect was found to be important for the total shoot weight per plant. Thus, the sowing time of July gave the highest value of total shoot weight per plant as 482.31 g (Table 2).

Secondary shoot weight: After the variance analysis realized, main sowing effect was found to be important for the secondary shoot weight. Thus, with 26.31 g the sowing time of July gave the plants which had the greatest secondary shoot weight (Table 3).

DISCUSSION

As a conclusion of the research; while the analysed criteria (plant length, primary shoot diameter, secondary shoot diameter, secondary shoot weight, number of secondary shoots, primary shoot weight and total shoot weight per plant) were found to be unimportant related with the main variety effect, they were found to be important in accordance with the main sowing effect.

The research brought similarities to the results of another research conducted by Acikgoz and Salk (2000) in Tekirdag. Some results of that research are: Main sowing effect had been found to be important for the primary shoot weight and the primary shoot weight had changed between 66.98-464.22 g in the sowing time of July; main sowing effect had been found important for the secondary shoot weight and it had changed between 8.67-27.80 g in the sowing time of July; main sowing effect had been found to be important for the number of secondary shoots and changed between 2.66-38 unit plant⁻¹ in the sowing time of June and finally main sowing effect had also been found to be important for the total shoot weight or efficiency per plant and changed between 48.69-539.83 g in the sowing time of July.

The significant results of the research which was executed in Corlu County were given below:

The average primary shoot weights of the varieties are changed between 68.21-526.11 g; the average secondary shoot weights are between 8.90-30.82 g and the average secondary shoot is between 2.65-35.50 unit plant⁻¹.

The average total plant values of the varieties per plant were determined as; with 68.34-550.17 g of efficiency values V₃ (Sultan F₁), V₁ (Shogun F₁), V₄ (Marathon F₁) and V₂ (Pirate F₁) are the most convenient varieties relatively for Corlu Region and respectively July, August and September are the most appropriate sowing times.

In this research which was conducted in Corlu County which is far from the seaside and which has a tougher climate condition than its Province: Tekirdag, used variety was found to be unimportant, however; July was determined to be the most convenient sowing time in broccoli growing. The result of the research is to be a sample for broccoli production in the inner parts of Trakya Region where Corlu County is located.

Furthermore, another significant result of the research is that the main sowing effect saves its importance on

development and efficiency whether the climate conditions change in the location where broccoli growing is being realized.

REFERENCES

- Acikgoz, F. and A. Salk, 2000. The effect of different sowing times on development and efficiency of some broccoli varieties grown in tekirdag conditions. 3rd Symposium of Vegetable Agriculture: 11-13 September 2000, Isparta, Turkey, pp: 356-360.
- Bracy, R.P. and P.E. Bergeron, 1994. Side dress n application methods for broccoli production. Hammond Research Station, Louisiana Agriculture Experiment Station, Louisiana State University Agricultural Centre, 21549 Old Covington Highway, Hammond, la 70403. *J. Vegetable Crop Prod.*, 1: 63-71.
- Duzgunes, O., T. Kesici, O. Kavuncu and F. Gurbuz, 1987. Research and Testing Methods (Statistical Methods-2) Ankara University, Faculty of Agriculture Publications; 1021: 381, Ankara, Turkey.
- Esiyok, D. and A.I. Donmez, 1998. The effects of sowing time, plant frequency and top pruning on efficiency in broccoli growing. 2nd Symposium of Vegetable Agriculture: 28-30 September 1998, Tokat, Turkey, pp: 285-289.
- Krauss, R.M., R.J. Deckelbaum and N. Ernst, 1996. Dietary guidelines for healthy american adults, a statement for health professionals from the nutrition committees american heart association, *circulation*, 94: 1795-1800.
- Masson, J., N. Tremblay and A. Gosselin, 1991. Effects of nitrogen fertilization and HPS supplementary lighting on vegetable transplants production. *J. Am. Hortic. Sci.*, 116: 594-598.
- Vural, H., D. Esiyok and I. Duman, 2000. Culture Vegetables (Vegetables Growing), Ege University Prints, Bornova, Izmir, Turkey.