

Effect of Gibberellic Acid Application Times on Earliness and Production of A-106 Artichoke Cultivar in Antalya Ecologic Conditions

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Abstract: Artichoke is one of the important vegetable crops in Mediterranean countries including Turkey. In our country, while artichoke production was undertaken in İzmir, Bursa and Yalova until 10 years ago, its area of production has broadened to include southern cities such as Antalya and Muğla. As early artichoke production, especially in Antalya region, is profitable for farmers, demand for growing this crop has increased. The present study investigated the effect of gibberellic acid application times (0, 1, 2, 3 and 4) on earliness and production of A-106 artichoke cultivar. The plants were grown in West Mediterranean Agricultural Research Institute in 2007-2008. The results show that GA₃ applications are very effective to promote earliness in A-106 cultivar.

Keywords: GA₃ application, time, artichoke, A-106 and earliness.

Introduction

Artichoke is a vegetable whose forebear is thistle and is included in *Cynara* genus in botanical classifying, which belongs to the *Asteraceae* family, and it is perennial, in rosetta shape. It is declared in literature that the home of this vegetable, which can be seen in Mediterranean basin, is middle and west Mediterranean and has firstly been consumed by the Romans in 179 B.C. (Anonymous a 2008; Graifeirberg ve ark. 1995; Lanteri ve ark. 2001; Stamigna 2001; Hill 2001).

In our country artichoke is grown by vegetative propagation and especially in Aegean and Mediterranean regions with our standard types for a long time. However, taking more and early products from unit area has been the main objective, as the other branches of agriculture where the production cost increases day by day. In this context, our region, especially Antalya and neighbours, has many advantages in earliness as in many other kinds of fruit and vegetables. Until a few years ago, it wasn't possible to see other plantations that were established by other types than Sakız and Bayrampaşa. In the last years, the number of plantations that are established with hybrid artichoke cultivars that are produced by seed have increased. Production by seed has an important disadvantage, lateness, besides many important advantages like productivity, resistance to diseases (especially *Verticillium* spp. ve *Fusarium* spp.) and profitability (Macua ve ark. 2000; Gil ve ark. 2003; Calabrese ve ark. 2004; Bianco 2000).

The elimination of lateness has an importance in production by seed if artichoke is going to be grown in Mediterranean region of our country, especially in Antalya where earliness is of importance.

Artichoke needs vernalization 250 hours under 7 C to form a head (although changing from cultivar to cultivar). Foury ve Pecaut 1988; Welbaum 1994; Basnizki ve Goldschmidt 1994; Hill 2001). The effects of GA₃ applications in artichoke on earliness and productivity has been known and applied for a long time. It has been declared in many scientific works that GA₃ applications has taken the place of colding need for head forming in many cultivars (Gerakis ve ark., 1969; Snyder ve ark. 1971; Kocer ve Eser 1999; Miguel ve ark., 1997; Miguel ve ark., 2004; Ercan ve ark. 2004).

The effects of hormone applications on seed propagated artichoke cultivars depend on date of plantation, time of application, number of application, dosage of application, and cultivar. (Welbaum 1994; Schrader, 1992; Elia ve ark., 1994; Mauromicale ve Ierna 1995; Miguel ve ark., 1997; Calabrese ve Bianco 2000; Mauromicale ve Ierna 2000; Goreta ve ark., 2004; Eldin ve ark., 2007).

Mauromicale ve Ierna (2000) has decided that the head characteristics of Orlando and Sicilia artichoke cultivars change by hormone applications.

Calabrese (2000) examined the early productivity of 8 hybrid artichoke types which are produced by seed in Southern Italy. It has been decided that the period between seeding and harvest is 97-120 days. It is declared in the studies of these investigators that productivity changes according to cultivars between 1.75/2.20 ton/ha. These results show that artichoke types that are produced by seed can be grown in October-May like other types which are grown in early classical ways.

Material

In this study A-106 artichoke cultivar, which is included in *Cynara* genus which belongs to Asteraceae family, has been used as plant material. A-106 artichoke cultivar is a type which is early, has a low vernalization need, with much productivity, which form qualified heads, and has many purple bracte leaves.

This study was conducted between the years 2007-2008 in a artichoke plantation situated in West Mediterranean Agricultural Research Institute in Antalya-Turkey (36° 56' N, 30° 51' E).

Method

In this research it is aimed to determine the most suitable GA₃ application time for A-106 artichoke for earliness. In this research 4th, 6th and 8th weeks after transferring to soil was selected as the first application time for vegetable development regulatory. 25 ppm GA₃ applications were made to the plants by spraying. Only water was sprayed to the plants that have been selected as the control group. In this study following criteria have been examined:

1. Number of days from transfer to soil until harvest (earliness)

Number of days from transferring the vegetables to soil until harvest is an important criteria in determining the effectiveness of the applications on earliness.

2. Head weight (g)

Differences among the applications are determined by weighing the heads at time of harvest.

3. Head length (mm)

Differences among the applications are determined by measuring the length of heads at time of harvest.

4. Head diameter (mm)

Differences among the application are determined by measuring the diameter of heads at time of harvest.

5. Productivity (kg/da)

Productivity in da is calculated in kg by the productivity per vegetable.

All application groups were laid out with four replications and 10 plants in each replicants in the randomised block experimental design. Data were subject to analysis of variance by SAS statistical program (SAS Institute, Version 7) and means were compared by LSD's (Least Significant Differences) test at 0.05 significance levels.

Results and Discussion

In this research, where the affects of GA₃ application times on A-106 artichoke cultivar on earliness, yield and head quality is examined, it was determined that hormone applications have important affects on all criteria that have been examined, compared to the control vegetables with no applications.

Although depending on the application time of hormone, average 1,5 months of earliness was provided at the vegetables with applications. The earliest harvest at the GA₃ application made at the 4th week happened at the 98. day after transferring to soil. The latest harvest happened at 140. day at the control group with the plants with no hormone application. At other application times these periods were very close, between 100-110 days.

The effects of hormon application times on productivity was shown at Figure 1. As it can be seen in Figure 1, the effects of the applications were found statistically significant. The effects of application times on yield changed between 1.12-1.88 t/da; the highest yield was determined at the GA₃ application on the 4. week as 1.88 t/da, and it was followed by the application at 6. week and the control application at the 8. week. The effects of applications on yield was found to be more succesful in all applications than control. Our trial results are in accordance with many other investigators. In many studies where the effects of hormone application times on artichoke was examined, it is reported that hormone application times increase productivity significantly. (Esteva ve Ayala, 2004; Ercan ve ark. 2004; Gil ve ark. 1998; Goreta ve ark. 2004)

Besides, the effects of hormone application times on head quality (head weight, head width and length) are examined and the results are presented in Figure 2. The effects of the applications on the head quality were

different. As a result of the statistical evaluations it is determined that the all hormone application times have important effects on all quality criteria that are examined, compared to the control group. Furthermore, the effects of hormone application times on head quality (head weight, head width and length) were examined in this study and the results are presented at Figure 2. The effects of the applications made on head quality were different. For example, the highest head weight was found to be 423 g at the 4th week, the lowest head weight was 410 g at the heads at the control group. Head weight values determined at other hormone application times took place in the same group statistically with the 4th week applications. The highest value of head width was found in the heads with hormone applications on 4th week. The highest head height was found at the vegetables with hormon applications on 8th week. The effect of GA3 applications on head length can be explained by the fostering of the GA's to the cells for growing.

In this study, where the effects of GA3 application times on earliness, yield and head quality of A-106 artichoke cultivar were examined, considering all the criteria investigated it can be said that the optimum GA3 application time is the 4th week after transferring the vegetables to soil.

Table 1. Effect of GA3 Application Times on Yield (tonnes/da) of A-106 Artichoke Cultivar

Application Time	Yield(tonnes/da)
Control	1.12 C
4.th	1.88 A
6. th	1.64 B
8. th	1.58 B
LSD _{5%}	0.18

Table 2. Effect of GA3 Application Times on Head Quality of A-106 Artichoke Cultivar

Application Time	Head Weight (g)	Head Diameter (mm)	Head Lenght mm)
Control	382 B	98.98 C	89.48 C
4.th	423 A	130.28 A	98.74 B
6. th	418 A	122.48 B	112.46 B
8. th	420 A	120.22 B	118.34 A
LSD _{5%}	22	8.42	6.32

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