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Determination of the Active Lenticel Numbers in Some Types and Varieties Fruit

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The losses in products like loss of weight in fruit and vegetables, wilting wizening, the structure of the lenticels intensity on the surface of the fruit is important. The more the lenticels and other openings on fruit surface are the faster the metabolic phenomena such as respiration, transpiration, *etc*. Fruit samples belonging to Braeburn, Granny Smith, Starkrimson Delicious, Golden Delicious (apple), Angeleno, Globe Sun, October Sun, TC Sun (plum), Esme (quince) varieties were used in the experiment to determine their active lenticels numbers. The number of lenticels on unit surface, which provide the connection between interior and exterior environments on epidermis, was found to be between 12.96 and 19.96 depending on the types and varieties used in the experiment. When the differences between the numbers of lenticels on the whole surfaces of apple, plum and quince varieties are taken into account, the highest value belongs to the Breaburn (242.9 number/fruit) apple variety whereas the lowest value belongs to TC Sun plum (56.6 number/fruit) variety.

Key Words: Fruit, Active lenticel number.

INTRODUCTION

Garden plants make use of water and nutrients so long as they depend on plants or soil. In this period, they also display resistance to many micro-organisms. However, they lose their resistance and quality for various reasons after harvest[1-3].

Loss of weight in fruit and vegetables cause a decrease in quality in the form of wilting and wizening. Various disease-bearing microorganisms also cause damage in fresh fruit and vegetables[4].

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The nature of fruit, especially density of lenticels on the surface of fruit is effective in cases like this and similar ones that cause losses in products. The more the lenticels and other openings on fruit surface are, the faster the metabolic phenomena such as respiration, transpiration, *etc*[5,6].

Lack of lenticels in tomatoes cause gas giving and taking to take place to a great extent around the stem and in the stem pit. The low number of lenticels in some varieties of cherry cause the water absorption of the fruit and render it to be more resistant to cracking[7].

The number of lenticels that enable the connection between interior and exterior environments on unit surface usually range from 300 to 600 in a cm^2 and vary depending on type and variety. They are higher in number in leafed vegetables than in fruit. There are as many as 480 lenticels/cm^2 in bananas and 1400 lenticels/cm^2 in citrus fruit. They disappear from many fruit with ripening. For example: apples, pears, apricots and plums. However, stomas remain in some. For example, peaches, cherries, citrus fruit and black currants[7].

Generally, lenticels are covered with wax, dust *etc.* and become disfunctional. Tissues with high number of lenticels usually lose water rapidly and become wizened quickly. When this is taken into consideration, it is inferred that lenticel concentration on fruit surface is vital for keeping of fruit[7-9].

The present study intends to determine the number of active lenticels in some types and varieties of fruit and indicate the differences between them.

EXPERIMENTAL

Some varieties of apples, plums and quince obtained from Isparta Egirdir Research Institute for Horticulture were used as material in the experiment. The varieties used are Braeburn, Granny Smith, Starkrimson Delicious, Golden Delicious (apple), Angeleno, Globe Sun, October Sun, TC Sun (plum), Esme (quince).

The experiment was conducted according to the Random Sampling Design and replicated three times. The differences between averages were revealed through an least significant difference (LSD) test[10]. Nine furits were used from each variety in order to determine the number of active lenticels and this procedure was repeated three times in 1 fruit (apple, plum and quince).

Since the air given into both the kernel pad and mesocarp section easily comes out, such lenticels were also considered active in respiration and therefore they were taken to be active lenticels. The method developed by Celik and Fidan[11] was used to determine the number of active lenticels.

An areameter was used to determine the whole area of the fruit surface. First, all fruit were peeled and then areas were measured on the obtained areas by the help of the areameter. All the obtained values were then added and a seperate area measurement was conducted for each fruit.

RESULTS AND DISCUSSION

The number of active lenticels on the whole surface of apples was found to higher in comparison to plum varieties. This difference in the number of lenticels on the total fruit surface is clearly seen in Table-1.

TABLE-1
CHANGES OF LENTICEL NUMBER OF EXPERIMENT SOME FRUIT SPECIES [LSD (5 %) VALUE WAS FOUND NOT SIGNIFICANT (ns) IN SOME RESULTS]

Variety	Lenticel number (number/cm^2)	Fruit surface area (adet/cm^2)	Lenticel number of fruit surface area (number/fruit)
Breaburn	13.66	17.73 a	242.9 a
Granny Smith	12.96	12.40 b	159.6 c
Starkrimson Delicious	14.81	13.42 b	197.3 b
Golden Delicious	15.22	13.88 b	209.4 ab
LSD (5 %)	2.456 ns	2.355	36.44
Angeleno	19.96 a	4.658	90.37 a
Globe Sun	15.44 b	3.920	59.46 b
TC Sun	14.77 b	4.118	56.56 b
October Sun	15.33 b	4.479	69.34 b
LSD (5 %)	3.886	1.218 ns	12.93
Inter species			
Breaburn	13.66 b	17.727 a	242.9 a
Granny Smith	12.96 b	12.398 b	159.6 c
Starkrimson Delicious	14.81 b	13.417 b	197.3 b
Golden Delicious	15.22 b	13.876 b	209.4 ab
Angeleno	19.96 a	4.658 d	90.4 d
Globe Sun	15.44 b	3.920 d	59.5 d
TC Sun	14.77 b	4.118 d	56.6 d
October Sun	15.33 b	4.479 d	69.3 d
Esme	14.59 b	9.477 c	140.5 c
LSD (5 %)	3.126	1.840	34.14

Mean separation within columns by least significant difference (LSD) test ($p < 0.05$).

The number of lenticels on the total area of the fruit was higher in the Breaburn apple variety (242.9 number/fruit) than the other varieties studied and it was followed by the Golden Delicious variety (209.4 number/fruit).

The following values were obtained in the other varieties: Starkrimson Delicious (197.3 number/fruit) and Granny Smith (159.6 number/fruit).

In the quince, the number of lenticels on the total fruit surface was 140.5 per fruit. The number of lenticels in the Esme quince variety was lower compared with apple varieties, but it is higher in comparison to plum varieties.

In plums, lenticel concentration on total fruit surface is the highest in the Angeleno variety (90.37 number/fruit) and the lowest in the TC Sun variety (56.56 number/fruit). October Sun (69.34 number/fruit) and Globe Sun (59.46 number/fruit) were obtained in other varieties. In general, the number of lenticels on the total fruit surface of apples and quinces is higher in comparison to plum varieties.

Table-1 shows the change in lenticel concentrations of the fruit used in the experiment in a cm^2 and on the total fruit surface and the differences in the total fruit area.

Although the difference in lenticel concentrations of apple varieities in a cm^2 was not significant, lenticel concentrations per fruit were different due to the difference in total fruit areas. In plums, even though differences in total fruit areas were insignificant, lenticel concentrations in total fruit areas were different because lenticel concentration per cm^2 was different.

Esme, the only variety of quince used in the study, was taken into consideration in inter-variety comparison. All features investigated in this comparison are statistically significant. The highest value of lenticel concentration per cm^2 were obtained in the Angeleno plum variety (19.96 number/cm^2) while the lowest figure was obtained in the Granny Smith apple variety (12.96 number/cm^2). The highest value in total fruit area was obtained in the Breaburn apple (17.73 number/cm^2) and the lowest value was found in the Globe Sun plum variety (3.920 number/cm^2). The Esme quince variety came 7th (14.59 number/cm^2) in lenticel concentration per cm^2 and 5th (9.477 number/cm^2) in total fruit area.

Fig. 1 shows differences in the number of lenticels in total surface areas of apple varieties. The highest value is in the Breaburn variety (242.9 number/fruit) and the lowest one is in the Granny Smith variety (159.6 number/fruit). This difference between apple varieties is statistically significant.

Fig. 2 shows differences in the number of lenticels in total surface areas of apple varieties. The highest value was obtained in the Angeleno variety (90.37 number/fruit) while the lowest value was obtained in the TC Sun variety (56.56 number/fruit). The difference between plum varieties is statistically significant. But no statistical differences among Globe Sun, TC Sun and October Sun varieties.

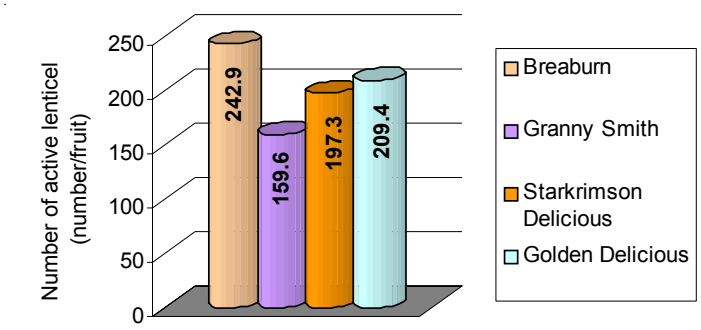

Fig. 1. Lenticel number on the fruit surface area of apple varieties (number/fruit)

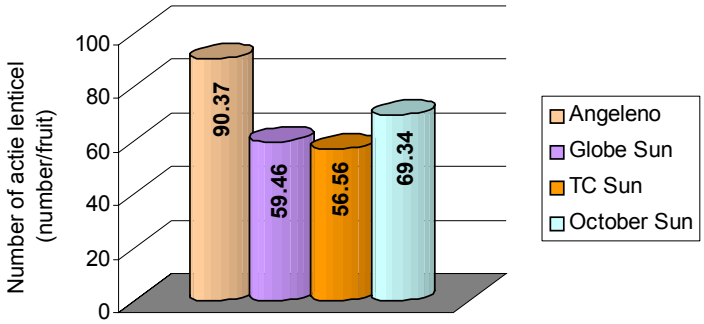

Fig. 2. Lenticel number on the fruit surface area of plum varieties (number/fruit)

Fig. 3 presents differences in the number of lenticels in total surface areas of apple, plum and quince varieties. While the highest value belongs to the Breaburn apple variety (242.9 number/fruit), the lowest value was found in the TC Sun plum variety (56.6 number/fruit). These differences in apple, plum and quince varieties are statistically significant. TC Sun, Angeleno, Globe Sun and October Sun varieties were found the same group.

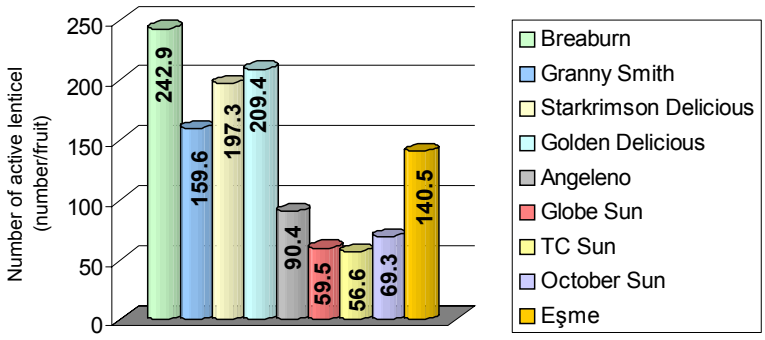

Fig. 3. Lenticel number on the fruit surface area of apple, plum and quince varieties (number/fruit)

The fact that the Angeleno plum variety has a relatively high number of lenticels in comparison to other varieties of plum and apple and the Esme quince variety is an interesting finding. This is clearly visible in high concentrations of water droplets on the fruit surface in Angeleno plum variety and the data in Table-1.

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