Analysis of Sugar Content of Watermelon (*Citrullus lanatus* (Thunb.) Mansf.)

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Sugar content is one of the most important economic parameters for watermelon (*Citrullus lanatus* (Thunb.) Mansf.). This paper provides the research results on the sugar content of different parts of the fruit and different cultivars of watermelon.

Materials and Methods. Seven cultivars (lines) were used in this experiment (Line 129, Line 130, Line 84, Line 85, Line 87, Line 124, and Line 125). Line 129 and Line 130 were tetraploid lines, and the other lines were diploid. All the seeds of these cultivars came from the Gansu Academy of Agricultural Science.

Ten fruits of each cultivar were prepared for the measurement of sugar content. The samples were taken from five sites in the fruit (center part, stem end part, omphalic part, sunlight-side part and ground-side part), and the samples of the four sites other than the center part were taken 1 cm below the skin of the fruit. The sugar content was measured by a Sacharometer WYT produced in Quanzhou, Fujian, and all data of sugar content for each site of each fruit for each cultivar were recorded.

Results. The sugar content of the watermelon varied greatly and was different in different parts of the fruit (Table 1). The average sugar content of the center part was 8.86%, and had the highest sugar content compared to other parts of the fruit. The sugar content of the stem part, omphalic part, sunlight-side part and ground-side part were 7.48%, 7.44%, 7.20%, and 6.99%, respectively. The sugar content of the ground-side part was significantly lower than the sunlight-side part. The sugar content of the stem end part and ground-side part was significantly higher than the sunlight-side part and ground-side part. The percentage of sugar content of the stem part was close to the omphalic part, similar to the results reported by Wang Jian et al. (2001). Wang Jian reported that the sugar content of omphalic part was higher than stem part. Generally, for the diploid cultivars the sugar content of the center part $\geq$ stem part $\geq$ omphalic part $\geq$ sunlight-side part $\geq$ ground-side part. It was very interesting to note that the sugar content of all parts of the fruits of tetraploid cultivars were similar to each other except the center part of the fruit, and that the difference of the sugar content among the stem part, omphalic part, sunlight-side part and ground-side part was not significant (Table 1).

There was a large difference in sugar content between tetraploid cultivars and diploid cultivars, and among the diploid cultivars. Line 129 has the highest sugar content and the Line 84 has the lowest sugar content, with sugar contents of 8.70% and 5.95%, respectively. The difference of the sugar content between the highest cultivar and the lowest cultivar was 2.75%.

It is important to note that the two tetraploid

cultivars had a higher sugar content than any of the diploid cultivars. The sugar content of the tetraploid cultivars was between 8.48% and 8.70%, and the diploid cultivars was between 5.95% and 7.87%.

Discussion and Conclusion. The tetraploid cultivars may have had had higher sugar content than the diploid cultivars because they had fewer seeds. The development of seeds requires much more nutrient materials than the development of the vegetative organs. So, under the same cultivated conditions the diploid cultivars use more of their nutrient materials for seed development, finally leading to the decreased sugar content, whereas the tetraploid cultivars had a lower requirement of nutrient materials for their seed development. This result is consistent with that reported by Tan Suying et al. (2000).

This research showed that the sugar content of the tetraploid cultivars was distributed more uniformly inside of the fruit than the diploid cultivars, and this phenomenon may be due the distribution of the seeds inside the fruit. The tetraploid cultivars not only had fewer seeds, but these seeds were distributed more uniformly, so that the sugar content changed little and accumulated uniformly in the fruits.

For the diploid cultivars, the sugar content of the stem end part and omphalic part was significantly higher than the sunlight-side part and ground-side. This may be the result of the arrangement of seeds inside of the fruit. Generally, watermelon seeds are situated on both sides of the fruit, and these parts have a lower sugar content.

Literature Cited

1. Wang Jian, et al. 2001. China Watermelon and Melon. Chinese Agriculture Press, Beijing.
2. Tan Suying, et al. 2000. Seedless Watermelon Culturing and Breeding, Chinese Agriculture Press, Beijing.

Table 1 The Sugar Content of Different Parts of Fruit of Watermelon

Cultivars (lines)	Sugar content %					
	Center part	Stem end part	Omphalic part	Sunlight-side part	Ground-side part	Average (X)
129(4X)	9.61A	8.23B	8.72B	8.52B	8.42B	8.70A
130(4x)	!0.02A	8.31B	7.92B	7.91B	8.22B	8.48B
124(2X)	8.43A	7.90BC	8.00AB	7.56C	7.41C	7.87C
125(2X)	8.66A	8.01B	7.68B	6.91C	6.75C	7.60D
87(2 X)	8.36A	7.28B	6.72D	7.89B	7.66BC	7.58D
85(2X)	9.51A	6.98B	6.66B	6.15C	5.58D	6.98E
84(2X)	7.41A	5.27C	5.23C	6.08B	5.78B	5.95F
AverageX	8.86A	7.48B	7.44B	7.20C	6.99D	

The different letters in the Table indicate significant differences for each parameter separately at $P \leq 0.01$
(Duncan's Multiple range Test).
Numbers in the Table are average of ten replications.