

Effect of Formulated Fertilization on Fruit Quality of Early Ripe Peach

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Abstract. Using the early maturing peach variety 'Japan Matsusen' as the test material, nine groups of formula fertilization schemes were set up by orthogonal experiment to study the effects of different fertilization treatments on the quality of peach fruit, in order to obtain the best fertilization formula to improve fruit quality. The results showed that the quality of peach fruit was significantly improved by adding organic fertilizer to the base fertilizer instead of chemical fertilizer. Therefore, by adding organic fertilizer as the base fertilizer, reducing the application amount of chemical fertilizer, and adding other trace element fertilizers can effectively improve the quality of peach fruit.

1 Introduction

Peach (*Amygdalus persica*), Rosaceae, native to China's Shaanxi, Gansu, Tibet Plateau, southern Henan, the Yellow River and the Yangtze River watershed, Yunnan and other places. Peach is one of the most temperate fruit trees in the world. It has a long history of cultivation. It was recognized, utilized and domesticated by humans as early as 4,000 years ago. Now it has been cultivated in more than 70 countries and regions, in various provinces of China. The area has cultivation. According to the US Department of Agriculture (USDA) official website data, the total peach production in the world in 2017 was 21.99 million tons, an increase of about 6% compared with 2016. China, the US and the EU. It is the world's major peach-producing countries and regions, with a total output of 19.173 million tons, accounting for 90.5% of the world's total output. Among them, China's peach cultivation area and output rank first in the world [1].

Scholars at home and abroad have conducted research on formula fertilization on crops such as Korla pear, tomato, grape, sweet cherry and peach [2-3]. The results of Li Jingqia *et al* [4] showed that formula fertilization increased the content of Vc and reducing sugar in Korla pear fruit and improved fruit quality. The results of G. Brunetti *et al* [5] showed that the combination of organic fertilizer and inorganic fertilizer can increase the yield of tomato. Pan Feng *et al.* carried out research on soil testing and formula fertilization on grape and sweet cherry [6]. The results showed that formula fertilization increased the content of various nutrients in fruits. Zhang Liang ying [7] and other research results on 'Peiqitao', 'Feichengtao' and 'Yanfeng No.1' peach showed that formula fertilization can improve soluble solids and soluble in fruits. The content of sugar and Vc increases the quality of the fruit. Therefore, this experiment uses the early-maturing peach variety 'Japan Matsusaka' in Longquanyi District as the

test material, based on soil testing and field experiment, to explore the effects of different fertilizer combinations on the quality of peach fruit, in order to promote and popularize soil testing and fertilization. The peach formula fertilization system provides a reference basis.

2 Materials and Methods

2.1 Material

The test variety is the 5-year-old 'Japan Matsusaka' (approximately 2,000 kg per mu) growing in Dafo Village, Shanquan Town, Longquanyi District, Chengdu City, Sichuan Province, with an altitude of 524 m and a planting density of 750 plants/hm².

The basic physical and chemical properties of the soil in the preliminary investigation were: organic matter content 14.53 g·kg⁻¹, pH 6.46, alkali nitrogen content 76.7 mg·kg⁻¹, available phosphorus content 9.6 mg·kg⁻¹, and available potassium content 97.5 mg·kg⁻¹, water-soluble calcium content 598.25 mg·kg⁻¹, exchangeable magnesium content 140.23 mg·kg⁻¹, effective iron content 29.32 mg·kg⁻¹, effective manganese content 20.34 mg·kg⁻¹.

The experiment started in the winter, according to the results of soil nutrient content determination, the target yield method was used to determine the amount of fertilizer application, and the soil fertility formula balanced fertilization program was formulated. Calculated with a yield of 30,000 kg·hm⁻², germination fertilizer 0.25 kg urea + 0.15 kg borax was applied 2 weeks before germination, and monoammonium phosphate in the strong fruit fertilizer was applied 0.5, 0.8, 1.1 kg per plant, and potassium sulfate was applied at 1.15 per plant. The three levels of 1.15 and 1.75kg were applied during the fruit expansion period. The base fertilizer was applied with

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15kg of organic fertilizer per plant, and combined with 2kg of superphosphate + 0.35kg of urea + potassium sulfate 1.5kg + 0.06kg of magnesium sulfate. 10-15 days of application, using orthogonal test design, a total of 9 treatments, with a single plant as a community, repeated 3 times, a total of 30. The local conventional fertilization was used as the control: budding fertilizer 2.5kg compound fertilizer + 0.5kg urea per plant, strong fruit fertilizer 2kg compound fertilizer per plant, base fertilizer 5kg dry chicken manure + compound fertilizer 3kg + urea 0.5kg. After the peach fruit matures, the fruit is harvested in four directions of the east, south, west and north of the test plant. Five fruits are collected from each tree as samples. After being labeled, they are placed in an ice box and brought back to the laboratory for fruit quality determination.

2.2 Methods

The fruit firmness was measured by GY-3 fruit hardness tester, and the longitudinal and transverse diameters of the fruit were measured by cursor calipers and the fruit shape index was calculated. The fruit shape index = vertical diameter/transverse diameter; the solubility was measured by a handheld TD-45 portable sugar meter. The content of

solids was determined by fluorenone colorimetric method; the titratable acid content was determined by NaOH titration; the Vc content was determined by molybdenum blue colorimetric method [8].

3 Results and Discussion

3.1 Effect of Formulated Fertilization on Fruit Quality of 'Japan Matsusaka' Peach

It can be seen from the table that the fruit quality can be improved on a certain basis by increasing the application amount of organic fertilizer on the original basis and assisting the rational fertilizer application scheme. In terms of fruit appearance quality, the single fruit weight of 'Japan Matsusaka' had different degrees of improvement after treatment, and the weight of single fruit treated with 3, 6, 7, 8, and 9 was significantly higher than that of the control, and the other groups were not significantly different; fruit hardness The control group was the highest, followed by treatment 3, which was 3.43 kg/cm². The two treatments were significantly higher than the other treatments, and the difference between the other treatments was not significant; the difference between the fruit shape index of the fruit was not significant.

Table 1. Effect of Different Treatments on Fruit Quality of 'Japan Matsusaka'.

Treatments	Single fruit weight	Fruit shape index	TTS (%)	Hardness (kg·cm ⁻²)	Total sugar (%)	Acid value (%)	Vc (mg·kg ⁻¹)	Solid acid ratio
1	168.63d	0.882a	12.67c	2.85b	8.14c	0.46a	18.50a	27.54c
2	159.92d	0.841a	12.23c	2.63b	8.22c	0.45a	18.36a	27.18c
3	195.14a	0.858a	12.13c	3.43a	8.12c	0.42a	18.59a	28.88c
4	168.29d	0.831a	12.28c	2.81b	8.16c	0.46a	18.27a	26.70c
5	165.43d	0.854a	13.57b	2.98b	9.14b	0.38b	18.87a	35.71b
6	173.17c	0.851a	13.67b	2.80b	9.23b	0.37b	18.12a	36.95b
7	174.27c	0.852a	12.17c	2.91b	8.38c	0.43a	18.12a	28.30c
8	183.21b	0.849a	14.27a	3.01b	10.17a	0.32c	18.44a	44.59a
9	182.62b	0.851a	14.17a	3.03b	10.32a	0.31c	18.25a	45.71a
CK	160.11d	0.862a	11.73d	3.72a	7.73d	0.42a	18.18a	26.93d

Note: The lowercase letters in the table indicate the difference in the same column data at the 0.05 level, the same below.

In terms of fruit inclusions, the content of soluble solids in peach fruit treated with formula fertilization was significantly higher than that in the control. The soluble solids content of treatment 8 and treatment 9 was the highest, reaching 14.27% and 14.17%, respectively, which was significantly higher than other treatments and controls. The lowest soluble solids content was 12.13%; the total sugar content of the fruit was higher than the control, the highest was 9 for treatment, 10.32%, and the second was treatment for 10.17%, which was significantly higher than other treatments and control groups; The total acid content was significantly lower than that of the control group. Treatments 5, 6, 8, and 9 were significantly lower than other treatments and controls. The total acid content of treatment 9 and treatment 8 was the lowest, 0.31% and 0.32%, respectively. The total sugar content was

significantly higher than the control, in which the content of treatment 9 was the highest at 10.32%; the ratio of solid acid in treatment 8 was 45.71%, which was significantly higher than other treatments and control groups; the effect of formula fertilization on Vc content of fruits was not significant. There was no significant difference in the Vc content between the fruits of the treatment and the control group.

4 Conclusions

According to the characteristics of peach growth and fertilizer, the scientific soil testing and formula fertilization should be carried out according to local conditions, and the current application of nitrogen fertilizer and organic fertilizer should be changed.

Fertilization by soil testing formula, adding 750kg of organic fertilizer per mu, reducing fertilizer application by 79.6kg, reducing the application rate of fertilizer by 30.52%, but the quality of peach fruit is significantly improved, indicating that the application amount of fertilizer can be increased by adding organic fertilizer. The effect of reducing fertilizer and increasing efficiency.

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