Comparative Screening Test of Three Peach Varieties In Jiangyou

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Abstract. In this experiment, three peach varieties introduced to jiangyou, Sichuan province were used as materials, and local varieties were used as controls. The multi-dimensional value theory and the combination rule of Reasonableness-Satisfaction degree were adopted to carry out variety comparison and screening, so as to find the most suitable varieties for promotion in this region.

1.Introduction

Peach is a peach subgenus of the genus prunes in the family [1], commonly known as “the first fruit in the world”[2], which is one of the fruit trees with good planting efficiency. Jiangyou city is one of the important peach produced areas in Sichuan. The cultivated area of peach trees was about 633.33 hm², and the area has been put into production was 400 hm², with an annual output of about 5500 t. However, the lack of advantageous peach varieties led to low economy[3]. In China, study on the utilization of peach germplasm resources, the adaptability investigation of superior varieties[4], and the breeding of varieties and cultivation management techniques[5] have been continuously carried out. ‘Chengxiang peach’(CXI) have high yield, bright and beautiful fruit, with yellow flesh and sweet.[6] ‘White peach’(WP) have white flesh, fragrant juice, and good quality. The meat of ‘Chunxue peach’(CXU) is hard and crisp, with large fruit, sour and sweet flavour and relatively resistant to storage[7]. The three introduced varieties were compared with the old local variety‘Hongxinmangzhong peach’(HXM), and the multi-dimensional value theory and the combination rule of Reasonable-Satisfaction were applied to select the promoted varieties with the best comprehensive traits, so as to promoted the sustainable development of the peach industry in Jiangyou city.

2.Materials and methods

2.1Basic information of the pilot park
The pilot park is located in Jiangyou city, Mianyang city, Sichuan province, with an area of 0.26 hm² and 4 plots for peach cultivation.
2.2 Test materials
Eighteen five-year-old CXI, CXU, WP and HXM were randomly selected.

2.3 Test methods

2.3.1 Observation and measurement of test items. In this experiment, 6 plants were randomly selected as one treatment, and the local peach variety HXM was taken as the control. 4 plants were treated with 3 repetitions, and all the plants were labelled. Observe of phenophase, observation of diseases and insect pests, growth character index measurement, determination of yield.

2.3.2 Comprehensive evaluation of all test indicators. The multi-dimension value theory and the comparative analysis and comprehensive evaluation method of Reasonability-Satisfaction combination rule was used to analyze.

3. Results and analysis

3.1 Phenophase phase comparison
It can be seen from table 1 that the four peach varieties in this experiment all belong to early maturing peach varieties, and the budding period of flower was concentrated from the end of February to the beginning of March, among which the bud of CXI was the earliest and that of WP was the latest, with a difference of 4–8 days. The flowering period of CXI and 'Red grain in ear' was 11–13 days, and the shortest flowering period of CXU was 6–8 days. CXI fruit ripens earliest in mid to late June. The fruit of WP ripened at the end of June at the latest, with a difference of 8–14 days between the two varieties.

| Phenophase phase          | CXI       | WP       | CXU       | HXM       |
|---------------------------|-----------|----------|-----------|-----------|
| The buds are budding      | 26/2–28/2 | 4/3–6/3  | 28/2–1/3  | 2/3–4/3   |
| At the beginning of flowering | 13/3–15/3 | 16/3–17/3 | 15/3–17/3 | 15/3–17/3 |
| Full bloom                | 18/3–20/3 | 19/3–21/3 | 18/3–20/3 | 18/3–21/3 |
| At the end of the flowering | 24/3–26/3 | 23/3–25/3 | 21/3–23/3 | 26/3–28/3 |
| Ripening stage            | 15/6–19/6 | 27/6–29/6 | 21/6–23/6 | 22/6–24/6 |

3.2 Diseases and insect pests
According to the observation, 4 peach varieties had no pest occurrence.

3.3 Comparison of growth traits

3.3.1 Calculation of single-factor reasonableness of growth traits and satisfaction. In this experiment, 4 indicators were selected and the results were recorded in table 2.

| Varieties | Crown height | Crown diameter | Trunk girth | The amount of shoot growth in that year |
|-----------|--------------|----------------|-------------|----------------------------------------|
|           | Value of number/cm | Value of number/cm | Value of number/cm | Value of number/cm |
|           | Single factor Reasonableness-Satisfaction | Single factor Reasonableness-Satisfaction | Single factor Reasonableness-Satisfaction | Single factor Reasonableness-Satisfaction |
| CXI       | 286.4        | 1.00           | 265.4       | 0.55                                   | 32.2     | 0.27       | 110.5   | 1.00             |
| WP        | 247.3        | 0.52           | 285.7       | 1.00                                   | 38.3     | 1.00       | 103.2   | 0.53             |
### 3.3.2 Reasonable synthesis of growth traits - calculation of Satisfaction
As can be seen from table 3, among the four peach varieties, WP has the best performance in jiangyou, Sichuan, followed by CXI, HXM and CXU.

| Varieties | CXI  | WP  | CXU  | HXM  |
|-----------|------|-----|------|------|
| Synthesis Reasonableness - Satisfaction | 0.69 | 0.77 | 0.21 | 0.24 |

### 3.4 Comparison of high yield
Since the yield was a single factor screening factor, only the single factor reasoning-satisfaction was calculated. It can be seen from table 4 that in the test area, the average yield per plant of CXI was significantly higher than that of the other three varieties. The second was WP; However, the yield per plant of Chunxue snow peach was the lowest, and its average yield per plant was lower than that of the control variety ‘red heart grain in ear peach’, which ranked third.

| Varieties | Average yield per plant /kg | Single factor Reasonableness - Satisfaction |
|-----------|-----------------------------|---------------------------------------------|
| CXI       | 36.36                       | 1.00                                        |
| WP        | 27.64                       | 0.36                                        |
| CXU       | 22.63                       | 0.00                                        |
| HXM       | 26.22                       | 0.26                                        |

### 3.5 Composite evaluation
The table 5 showed that CXI and WP composite reasonable - satisfaction for didn’t of 0.85 and 0.56, and CXU compound reasonable - satisfaction of only 0.10, hearts grain in ear peach composite reasonable - satisfaction was 0.25, that from the point of growth traits and high yielding, CXI in local optimum performance, WP was the second, HXM third, CXU was the worst.

| Varieties | Growth traits | High yielding | Compound Rationality - Satisfaction |
|-----------|---------------|---------------|--------------------------------------|
| CXI       | 0.69          | 1.00          | 0.85                                 |
| WP        | 0.77          | 0.36          | 0.56                                 |
| CXU       | 0.21          | 0.00          | 0.10                                 |
| HXM       | 0.24          | 0.26          | 0.25                                 |

### 4. Discussion and conclusion
Compared with variance analysis, the method adopted in this experiment could make up for the deficiency of single index analysis, but further research can be done on the classification of breed grades by composite Reasonable-Satisfaction value. Since there were no obvious diseases and insect pests in the four peach varieties during the period of this experiment, a comprehensive analysis could be made from three aspects: phenophase period, growth character and yield. The variety of CXI was the most precocious, and the compound Reasoning-Satisfaction value of its growth character and yield was 0.85, with the best comprehensive performance, which can be used as the main variety of Sichuan Jiangyou. WP had the best growth rate. The compound and Reasonable-Satisfaction value was 0.56, but the maturity stage was the last. The WP comprehensive performance was general. It can be...
developed in the local right amount. HXM and CXU had close fruit maturity period, and the overall performance was not good. It was not recommended to promote as a local variety.

**Acknowledgments**

The writing of this paper has been completed. I would like to express my special thanks to professor wangzhihui, my tutor. This research paper was completed under the careful guidance of my tutor from topic selection, experimental design to paper writing. The teacher’s profound professional knowledge had let me have a strong interest in the fruit tree. And in the teacher’s earnest instruction, I have learned a lot of basic knowledge about the fruit tree. Sincerely to the teacher to express high respect and heartfelt thanks!

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