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Study on Adaptability of Introduced Pear Varieties

Lianjun WANG

Shanghai Chenshan Botanical Garden, Shanghai 201602, China

Abstract [**Objectives**] To study the adaptability of introduced pear. [**Methods**] Five pear varieties, "Aidang" pear, "Taiwan Zaomi" pear, "Cuiguan" pear, "Tianjin Yali" pear and "Zaosheng Xinshui" pear, were introduced. Then, using these five varieties, the phenology of pear trees, various characters of fruit, stress resistance (heat tolerance and cold tolerance) of varieties were studied. [**Results**] The plants of 5 varieties of pear trees grew fast and were robust; in late March, it went into the flowering period; "Aidang" pear fruit had a certain number of stone cells; "Taiwan Zaomi" pear had the highest sweetness; "Cuiguan" pear had the largest fruit; these five varieties of pear trees had good water resistance, heat resistance and cold resistance. [**Conclusions**] This study can provide a reference for the introduction of pear trees, and can also provide a practical basis for the large-scale planting of pear trees.

Key words Pear, Variety, Introduction, Adaptability, Stress resistance

1 Introduction

Pear is a deciduous shrub or small tree in the *Pyrus* genus of Rosaceae family, and is one of the important fruit trees in China. Pear trees are widely distributed in China, including Inner Mongolia, Shaanxi, Shandong, Zhejiang, Shanghai and Nanning. Pear trees have white flowers that appear before the leaves; pear flowers are quite amazing, and pear fruits are fresh and delicious, with high nutritional value, so it is an excellent tree species for watching flowers and eating fruits.

In recent years, there are many studies on pear trees at home and abroad, involving cultivation techniques, flowering regulation, fruit yield and other biotechnology studies[1-2]; there are some reports on the effect of fertilizer on the quality of pear trees[3]; there are also some studies focusing on pear diseases and pests[4-6]. The results of this study can not only provide a reference for the introduction of pear trees, but also provide a practical basis for the large-scale planting of pear trees.

2 Materials and methods

2.1 Overview of experimental site Shanghai Chenshan Botanical Garden Pear Specialized Area, as experimental site, is located in Songjiang District of Shanghai City on the east side of Chenshan Botanical Garden, with an annual average temperature of 15 -16 ℃; the soil fertility is medium, and the soil is clay and alkaline.

2.2 Selection and collection of experimental materials Pear trees planted in the ground were selected as experimental materials, and pear resources were collected in various ways. The introduction place is mainly Shanghai. Specifically, it includes Sheshan Zhongyi Pear Garden Professional Cooperative.

2.3 Experimental design and methods Five groups were set up in the experiment, with each pear variety as one group, and "Aidang" pear tree was used as control. When planting, five pear varieties were randomly arranged without repeated treatment. The ridge width was 200 cm, ditch width was 50 cm, and plant spacing was 250 cm.

Through the observation and research in 2019 -2022, the phenological records, cold resistance, heat resistance, DBH, height and other traits of pear trees were judged by field observation, photo recording and tape measure. The DBH, height and other traits of pear trees were measured by tape measure.

3 Results and analysis

3.1 Phenological records of pear trees As shown in Table 1, it is observed that flowers appeared before the leaves for five pear varieties, "Aidang" pear, "Taiwan Zaomi" pear, "Cuiguan" pear, "Tianjin Yali" pear and "Zaosheng Xinshui" pear, with the initial flowering period in mid-March and the full flowering period from late March to early April. "Taiwan Zaomi" pear matured at the earliest, matured one after another in mid-July, and the other four pear varieties matured one after another in late July. These five varieties of pear finished defoliation in early November.

Table 1 Phenological records of pear varieties

Variety	Full flowering stage	Fruit ripening stage	Leaf fall stage
"Aidang" pear	Late March	Late July	Early November
"Taiwan Zaomi" pear	Late March	Mid-July	Early November
"Cuiguan" pear	Late March	Late July	Early November
"Tianjin Yali" pear	Late March	Late July	Early November
"Zaosheng Xinshui" pear	Late March	Late July	Early November

3.2 Characters of pear varieties As shown in Table 2, the height of "Taiwan Zaomi" pear was 185 cm; the plant height of "Aidang" pear, "Cuiguan" pear, "Tianjin Yali" pear and "Zaosheng Xinshui" pear was 200 -215 cm; in terms of DBH of plants, the DBH of "Taiwan Zaomi" pear was 8 cm; the DBH of other four pear varieties was 11 -15 cm; in terms of pulp color, the pulp color of these five varieties of pear was white; in terms of fruit sweetness, "Taiwan Zaomi" pear had the highest sweetness, and "Cuiguan" pear, "Tianjin Yali" pear and "Zaosheng Xin-

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Lianjun WANG, master, engineer, research fields: fruit treeand vegetable cultivation techniques.

shui" pear had sweet fruits; however, "Aidang" pear contains more stone cells and lower sweetness. In terms of single fruit weight, the weight of "Taiwan Zaomi" pear was 100 g and the weight of "Aidang" was 160 g; the single weight of "Zaosheng Xinshui" pear was 165 g; the weight of Tianjin Yali pear was 150 g; the single weight of Cuiguan pear was 170 g.

Table 2 Characters of pear varieties

Variety	Height cm	DBH cm	Pulp color	Pulp flavor	Single fruit weight//g
"Aidang" pear	215	11	White	Average	160
"Taiwan Zaomi" pear	185	8	White	Extremely sweet	100
"Cuiguan" pear	200	14	White	Sweet	170
"Tianjin Yali" pear	200	13	White	Sweet	150
"Zaosheng Xinshui" pear	210	15	White	Sweet	165

3.3 Adaptability of pear varieties As shown in Table 3, it is observed that five pear varieties, "Aidang" pear, "Taiwan Zaomi" pear, "Cuiguan" pear, "Tianjin Yali" pear and "Zaosheng Xinshui" pear, grew well in Shanghai, and the plants grew healthily without freezing damage in winter; it can tolerate the high temperature of 41 ℃ in summer; pear trees grew well in rainy season, and there was no obvious waterlogging.

Table 3 Adaptability of pear varieties

Variety	Growth potential	Heat resistance//℃	Cold tolerance	Water resistance
"Aidang" pear	Good	41	Strong	Strong
"Taiwan Zaomi" pear	Good	41	Strong	Strong
"Cuiguan" pear	Good	41	Strong	Strong
"Tianjin Yali" pear	Good	41	Strong	Strong
"Zaosheng Xinshui" pear	Good	41	Strong	Strong

4 Discussion

There are many factors affecting the fruit yield of pear trees, and it is closely related to cultivation techniques. In terms of fertilization, rational fertilization should be achieved, that is, applying base fertilizer for one time and applying topdressing for two times. After leaves fall in winter, base fertilizer should be applied once. In addition to base fertilizer, topdressing can be applied once before flowering. Flowering needs to consume a lot of energy and nutrition, and topdressing should be applied after flowering. Generally, compound fertilizer can be used, and it has fast fertilizer efficiency and can be used for fruit setting and fruit enlarging quickly. In terms of pruning, pear trees can be pruned once after leaves fall to remove overgrown branches and tillering branches. Overdense branches should be thinned, long branches should be cut short, and the pruned tree shape should be paid attention to at the same time.

In terms of diseases and pests, pear trees have some common diseases and pests, such as aphids, pear rust, oriental fruit moth, *etc.*, which need timely prevention and control. In addition, there is the destruction caused by squirrels and birds. When pears are about to mature, they will be eaten by squirrels and birds, which need to be controlled by bird-proof nets. Otherwise, the fruit will be greatly reduced.

References

[1] WANG YW, WANG S, DU HY, *et al.* Comparative experiment of different cultivation densities of "Huangjin" pear[J]. Northern Horticulture, 2015, (24): 19-21. (in Chinese).
[2] LIANG GT. High-efficiency cultivation techniques of four seasons pear in solar greenhouse in Shouguang, Shandong Province[J]. Practical Techniques and Information of Fruit Trees, 2018, (1): 18-19. (in Chinese).
[3] YAN RR, WEI ZJ, WU RQQG, *et al.* Effect of microbial fertilizer on soil microorganism and enzyme activity in Hulun Buir perforated *Leymus chinensis* meadow grassland[J]. Journal of Ecology and Environment, 2017, 26(4): 597-604. (in Chinese).
[4] ZHOU ZB. Occurrence regularity and control measures of pear scab[J]. Hebei Fruit Tree, 2018, (3): 21. (in Chinese).
[5] WANG M, DENG P, HE N, *et al.* Occurrence and control of pear diseases and pests[J]. Modern Horticulture, 2016, (15). (in Chinese).
[6] XING WC. Misunderstandings and solutions of pear pest control[J]. Modern Horticulture, 2015, (1): 78-79. (in Chinese).

(From page 43)

tion to perfecting the assessment content according to the needs in practice and making dynamic adjustments from time to time. In addition to clarifying the basic responsibilities of undergraduate tutors, we should also introduce assessment conditions such as work effectiveness and student satisfaction evaluation for corresponding scoring. The tutor assessment results are divided into "excellent, good, average and poor", and the assessment results are included in the annual assessment. In addition, the academy can regularly carry out the selection activities of outstanding undergraduate tutors, and give appropriate subsidies to outstanding undergraduate tutors.

Undergraduate tutorial system is an important part of academy system. Tutorial system can effectively promote students' all-round development. However, how to combine with the academy system for collaborative education is a problem that needs to be considered and solved. Through the implementation of collaborative education management, we can give full play to the important role of tutorial system in the practice of educating people in colleges and universities.

References

[1] YAN LL. Exploration and practice of academy system reform mode[J]. Modern Vocational Education, 2023(24): 69-72. (in Chinese).
[2] WANG XP. Research on the problems and countermeasures of implementing this guidance system in colleges and universities in China[D]. Huaibei: Huaibei Normal University, 2017. (in Chinese).
[3] SHANG S, HUANG HF, WANG YR, *et al.* Undergraduate tutorial system under academy mode: Exploration and practice of training top-notch students in Cuiying College of Lanzhou University[J]. Higher Science Education, 2022(4): 51-57. (in Chinese).
[4] ZHANG CM. Exploration on the practical path of perfecting undergraduate tutorial system under the academy mode[J]. Education Observation, 2023, 12(22): 10-13. (in Chinese).