

枇杷新品种永溪的选育

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摘 要:永溪是从浙江省地方枇杷品系溪上白沙实生后代中选育出来的变异新品种。该品种树冠圆头形, 树形较直立, 中心干明显。叶片披针形, 叶面深绿色。果实高圆或近圆形, 果肉黄白色, 肉质细嫩柔软、汁多、味甜美。平均单果质量 38.1 g, 可溶性固形物含量(w, 后同)14.1%, 可滴定酸含量 0.37%, 维生素 C 含量为 13.5 mg·g⁻¹。种子 2~4 粒, 可食率 72.1%。在浙江省台州市黄岩区(东经 121.26°、北纬 28.65°)5 月下旬成熟。该品种品质佳, 抗裂果、耐低温能力较强, 适合浙江省、江苏省等枇杷主产区种植。

关键词:枇杷; 新品种; 永溪; 抗逆

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Breeding report of a new loquat variety Yongxi

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Abstract: Yongxi is a late-ripening loquat variety characterized by its crack resistance and low-temperature tolerance. The single plant originated from a seedling of the Xishangbaisha, a local variety from Zhejiang Province. In 2005, during an investigation on loquat germplasm resources, a research group discovered an exceptional individual plant with superior quality in Xishang Village, Huangyan, Zhejiang Province. Through years of continuous observation, high-grafting identification experiments, variety comparison experiments, and regional cultivation trials, this single plant demonstrated strong cold resistance, crack resistance, and stable genetic traits. It was officially authorized as a new plant cultivar by the Ministry of Agriculture and Rural Affairs on September 18, 2024, and was named Yongxi, with variety rights number CNA20211001290. Yongxi loquat is a semi-upright tree with a semicircular crown and vigorous growth. Its leaves are medium-sized, lanceolate, dark green, and covered with numerous hairs on the lower epidermis. The leaf blade margin is shallowly serrated, and the base is narrowly wedge-shaped. In central Zhejiang, Yongxi typically produces three shoots annually: spring shoots, summer shoots, and autumn shoots; in some years, late autumn shoots also occur. The flowering period extends from October to early February, with full bloom generally lasting from early November to early January. The inflorescence is conical, averaging 11.4 cm in length and 9.2 cm in width, with an average of 80 to 90 flowers and numerous stamens. The fruit matures in late May, approximately seven days later than its parent Xishangbaisha. The fruit has a nearly round shape, with an average weight of about 38.1 g per fruit. Its surface is orange-yellow, occasionally marked by rust spots. The flesh is yellow-white, tender, free of flesh dregs, juicy, and flavorful, contributing to its excellent quality. The soluble solids content is 14.1%, while the titratable acid content is 0.37%. Additionally, the vitamin C content measures 13.5 mg·g⁻¹, with an average of three seeds per fruit and an edible rate of 72.1%. Yongxi variety demonstrates frost resistance and is less prone to fruit cracking. Compared to the primary culti-

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var, Ruantiaobaisha, Yongxi shows significantly improved cold resistance. When it is exposed to temperatures below $-3\text{ }^{\circ}\text{C}$ for 48 hours, the embryo freezing rate of Yongxi remains below 30%, whereas that of Ruantiaobaisha exceeds 90%. Yongxi loquat can preserve its desirable traits through grafting, with a preference for common loquat as the rootstock. Trees typically begin bearing fruit in the second year after grafting, with a high yield period and a high commercial fruit rate starting in the fourth year. The recommended planting density is approximately 1110 plants per hectare, with a planting spacing of $3.0\text{ m} \times 3.5\text{ m}$. A leader-layered tree structure is advisable, with a height limit of 3 meters. Orchards should be established in flat or mountainous regions with an average annual temperature exceeding $15\text{ }^{\circ}\text{C}$ and a minimum temperature not lower than $-8\text{ }^{\circ}\text{C}$, preferably in sandy soil. Suitable cultivation areas include Zhejiang Province, Jiangsu Province, and adjacent subtropical regions known for loquat production.

Key words: Loquat; New variety; Yongxi; Stress-resistance

枇杷 [*Eriobotrya japonica* (Thunb.) Lindl.] 为产于中国的亚热带常绿果树。果实风味浓郁、营养丰富,具有润肺、止咳、健脾等功效,是一种药食同源的保健水果^[1]。枇杷秋萌冬花,春果夏熟,花和幼果的生长期恰逢一年中最寒冷的季节,花果的低温冻害是威胁枇杷产量和品质的重要因素。此外,传统白肉枇杷易裂果腐烂、耐贮性较差。因此,培育抗逆性强的品种是枇杷育种的重要目标之一。

实生选种、芽变育种、杂交育种是枇杷传统高效的育种方法。近年来,相关教学、科研单位采用这些

方式培育出一系列白肉枇杷新品种。如白雪早^[2]、三月白^[3]、香妃^[4]、早佳8号^[5]、冬玉^[6]、迎雪^[7]、永路^[8]等。新品种的育成与推广,为进一步优化枇杷品种结构奠定了基础。永溪是浙江省柑橘研究所通过实生选种选育出来的枇杷新品种。该品种适应性强,农艺性状优良稳定,具有晚熟、抗裂果、耐低温等特点(图1)。

1 选育过程

课题组2005年在浙江省台州市黄岩区溪上村

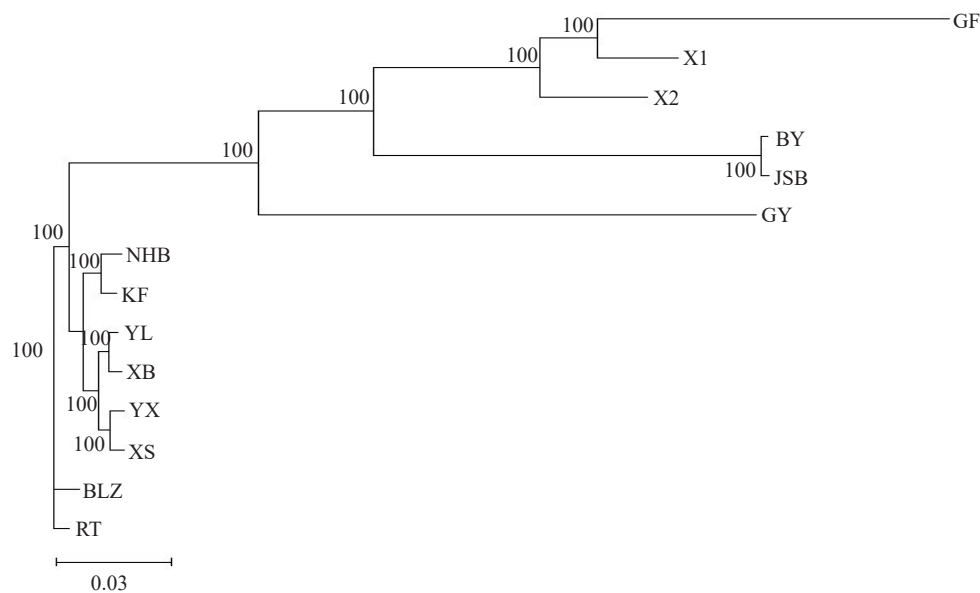


图1 枇杷新品种永溪

Fig. 1 A new loquat variety Yongxi

进行种质资源调查时,发现溪上白沙枇杷(由软条白沙品种分化出的地方品系)实生后代中有一单株的果实、叶片性状异于母本的优良单株,随即进行挂牌标记(标记名XSB)。经过多年连续观察,发现其生物学性状稳定且抗寒性显著强于亲本和当地主栽品种软条白沙。2012年,将其枝条高接至浙江省柑橘研究所枇杷种质资源圃。第2年开始挂

果,后在台州各地陆续种植100多株进行多点区试和品种比较试验。在种质鉴定中为防止同物异名、异物同名以及饰变等现象的出现,采用重测序的方法对其进行遗传关系检测,发现新种质与溪上白沙亲缘关系最近(图2)。该种质于2024年9月获得植物新品种权(品种权号:CNA20211001290),定名为永溪。



GF. 贵妃;BY. 白玉;JSB. 江苏地方品种;GY. 冠玉;NHB. 宁海白;KF. 槐樊枇杷;XB. 湘北白沙;YX. 永溪;XS. 溪上白沙;BLZ. 白荔枝;RT. 软条白沙;YL. 永路;X1,X2. 杂交材料。

GF. Guifei; BY. Baiyu; JSB. Jiangsu local varieties; GY. Guanyu; NHB. Ninghaibai; KF. Kuifan loquat; XB. Xiangbeibaisha; YX. Yongxi; XS. Xishangbaisha; BLZ. Bailizhi; RT. Ruantiaobaisha; YL. Yonglu; X1,X2. Hybrid material.

图 2 永溪与其他枇杷品种的亲缘关系聚类分析

Fig. 2 Genetic relationship between Yongxi and other loquat varieties

2 主要性状

2.1 植物学特征

永溪枇杷树姿半直立,树冠圆头形,生长势较强。叶片着生姿态斜向上,叶片披针形,叶面深绿色,叶背茸毛多。叶尖渐尖,叶缘锯齿浅,基部狭楔形。花序圆锥状,平均长度 11.4 cm,宽 9.2 cm,平均每穗花朵数 85 朵,雄蕊数多。果实中等大小,果肉黄白色,汁液多,风味酸甜可口。

2.2 物候期

在浙中和东南部地区,永溪一般每年抽梢 3 次,即春梢、夏梢、秋梢,个别年份有晚秋梢抽生。春梢抽生时间为 3 月上中旬,梢长 8~12 cm。夏梢通常在 5 月初抽生,是主要的结果母枝。秋梢发生在 8 月中下旬至 10 月中旬。花期多在 10 月至翌年 2 月上旬,盛花期通常从 11 月上旬至翌年 1 月上旬。果实成熟

期为 5 月下旬,比亲本溪上白沙晚 7 d 左右。

2.3 果实主要经济性状

永溪平均单果质量 38.1 g,果实卵圆形,果面橙黄色,锈斑少;果肉黄白色,肉质细腻,化渣性强;可溶性固形物含量(w ,后同)14.1%,可滴定酸含量 0.37%,维生素 C 含量 $13.5\text{ mg}\cdot\text{g}^{-1}$;可食率 72.1%;每果含种子数 2~4 粒,种子倒卵圆形,种子大小中等,种皮黄褐色,斑点少,种皮不开裂(表 1)。

2.4 抗逆性

2020—2022 年连续 3 a(年)对永溪裂果率和种胚受冻率进行调查(表 2)。结果表明,与对照品种软条白沙相比,永溪裂果率和种胚受冻率显著降低。2021 年 1 月浙江省遭遇了强寒潮天气,种植地最低温度达到了 $-6\text{ }^{\circ}\text{C}$ 。经过调查,永溪的种胚受冻率为 29.2%,而软条白沙的种胚受冻率达到 91.3%。其他年份永溪种胚受冻率均在 5% 以下,而软条白沙

表 1 永溪与软条白沙果实主要品质性状比较

Table 1 Comparison of main economic traits between Yongxi and Ruantiaobaisha

品种 Variety	单果质量 Single fruit mass/g	w (可溶性固形物) Soluble solids content/%	w (可滴定酸) Titratable acid content/%	w (维生素 C) Vitamin C content/($\text{mg}\cdot\text{g}^{-1}$)	种子数 Seed number	可食率 Edible rate/%
永溪 Yongxi	38.1	14.1	0.37	13.5	2~4	72.1
软条白沙 Ruantiaobaisha	32.7	14.2	0.33	11.3	2~5	69.2

表 2 永溪与软条白沙抗逆性比较

Table 2 Comparison of stress resistance between Yongxi and Ruantiaobaisha

品种 Variety	年份 Year	种胚受冻率 Seed embryo freezing rate/%	裂果率 Cracking rate/%
永溪 Yongxi	2020	1.3	9.2
	2021	29.2	9.8
	2022	4.8	8.7
软条白沙 Ruantiaobaisha	2020	21.2	24.3
	2021	91.3	—
	2022	25.3	21.5

注：“—”表示 2021 年软条白沙受冻率高，果实存活少，无裂果率数值。

Note: The “—” indicates no data available for the fruit cracking rate because of the high freezing rate in 2021.

均在 20%以上。永溪裂果率保持在 10%以下，而软条白沙裂果率高于 20%。

3 栽培技术要点

3.1 繁殖方法

永溪可通过嫁接育苗的方法保持母株的优良性状，砧木宜选用共砧（普通枇杷），嫁接后生长结果良好。嫁接前 15 d 对砧木苗床进行除草、松土并施适量腐熟有机肥。小砧木多用切接或腹接，大砧木多用劈接或切接。在江苏省、浙江省一带，嫁接时期在 2 月下旬至 3 月中旬。

3.2 园地选择

平地建园宜选择地势高、排水良好、土层深而疏松的沙质土壤，山地建园应选择土层深厚、土质疏松、坡度 35°以下的坡地。种植密度应在 1110 株·hm⁻² 左右，株行距 3.0 m × 3.5 m。管理上与其他白肉枇杷的常规栽培技术基本相同。但以规模化、集约化栽培效果最佳。要适当改良酸性土壤，增施石灰为代表的钙素，同时配施钾元素，以改变土壤团粒结构，从而提高可溶性固形物含量。

3.3 整形修剪

在整形修剪中，应重视矮化栽培技术的推广，树高控制在 3 m 以内。利用树体自然特性，培养主干分层形树形。第一层主枝离地面 50~60 cm，在 4~5 个轮生枝中选留位置适当、均匀分布的 3 个作为主枝，其余疏去，共留 3~4 层主枝群。每年注意疏剪多余枝条，避免内部郁闭。

3.4 病虫害防治

主要病虫害有癌肿病、叶斑病、黄毛虫、大蓑蛾、天牛等。提倡以农业防治为主，优先采用生物防治的方法。重视冬季清园工作，消除越冬病虫害源

头。疏果后注意喷施市售耐药性弱、农残率低的杀虫杀菌剂。喷药后 5 d 内完成套袋，可有效防止果实裂果、腐烂，提高果实品质。

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