

优质大果中熟白肉枇杷新品种中白的选育

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摘要: 中白是从早钟6号×贵妃杂交群体中选育的优质大果中熟白肉枇杷新品种。树势中庸偏强, 树冠圆头形, 中心干较明显, 枝梢较长壮。平均单果质量60.1 g, 大小整齐; 果实倒卵形, 果基钝圆少数尖峭, 果顶钝圆微凹; 果皮橙黄色, 厚度中等偏薄, 锈斑少, 果点密度中等, 果点中等大; 萼片平展, 萼孔闭合; 果肉黄白色, 平均厚度10.9 mm, 肉质细嫩、化渣、汁多; 平均可溶性固形物含量13.4%, 味鲜、风味浓郁, 品质优; 平均可食率71.2%, 平均种子4.6粒·果⁻¹。在福建福州地区, 果实4月中下旬成熟, 高接换种后第2年可少量开花, 第3年枝梢抽穗率50%左右, 第4年株产22.8 kg, 折合666.7 m²产709.7 kg, 早结、丰产、稳产。中白是一个优质、大果、丰产稳产、抗性较强的中熟白肉枇杷新品种, 适宜在福建、四川、重庆、云南等枇杷产区应用。

关键词: 枇杷; 新品种; 中白; 中熟; 优质; 大果

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Breeding of Zhongbai: a New High-Taste Quality, Large-Fruit Size, Mid-Ripening, White-Flesh Loquat Cultivar

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Abstract: Zhongbai, a hybrid of Zaozhong 6 (♀, the female parent) and Guifei (♂, the male parent), is a new high-quality cultivar of big-fruit type and mid-ripening loquat. Zaozhong 6 is known for its orange-yellow flesh, extra early-ripening and big-fruit type, while Guifei is white-flesh, late-ripening and big-fruit type. Zhongbai exhibits moderately strong tree vigor and a round-shaped crown with an obvious central stem and long and sturdy shoot. The panicle emergence stage of Zhongbai occurs from mid-October to late-November in Fuzhou, Fujian Province. The initial flowering stage, the full-blooming stage, and the late-blooming stage of Zhongbai are from late-November to early-December, from early-December to mid-December, and from late-December to early-January of the following year, respectively. The fruit of Zhongbai ripens from mid- and late-April. The ripening period of Zhongbai is 10 days later than that of its female parent Zaozhong 6, and about 7 days earlier than that of its male parent Guifei. Zhongbai has many characteristics, for example, the size of fruit is not uniform and the

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average weight of fruit is 60.1 g; the shape of fruit is obovate; the most shape of fruit base is obtuse, while a few is acuminate; the shape of most fruit apex is obtuse with slightly concave. The color of pericarp is yellow with less rust spots; the pericarp has obvious fruit streak; the thickness of pericarp is moderately thin. The density of fruit dots is medium, and the size of fruit dot is medium large; the attitude of sepals is flattened and the calyx cavity of fruit is closed. The color of flesh is yellow white and the average thickness of flesh is 10.9 mm. The average total soluble solids is 13.4% and the taste of flesh is characterized by tenderness, absence of flesh dregs, rich flavor, juiciness and excellent quality. The average edible rate of fruit is 71.2% and the average number of seeds is 4.6. A small amount of flower could be found in the second year after top grafting, and the flowering rate is about 50% in the third year after top grafting. The high yield period of Zhongbai starts from the fourth year. According to the investigation, the yield of a single tree is about 22.8 kg, which is equivalent to 709.7 kg per 667 m². These results indicate that Zhongbai has the characteristics of early fruiting, high and stable yield. Zhongbai has been applied in different areas and ecological environments across China for regional and productive experiments, and it also shows its excellent characteristics in most of the prominent loquat production areas. In summary, Zhongbai is a new cultivar of mid-ripening, big-fruit type and white flesh loquat with high quality, high and stable yield, and strong resistance, and it is suitable to be applied in prominent loquat production areas, such as Fujian, Sichuan, Chongqing and Yunnan.

Key words: loquat; new varieties; Zhongbai; mid-ripening; high quality; big-fruit

枇杷 (*Eriobotrya japonica* Lindl.) 原产于我国, 是未受外来同类果品直接冲击的亚热带特色常绿果树。我国是枇杷主产国, 生产总量占全世界的 2/3 以上, 主产区有四川、福建、浙江、云南、江苏等省区。长期以来, 红肉枇杷品种在生产上占主导地位, 风味品质同质化较严重, 不利于枇杷产业的良性发展。白肉枇杷是我国特有的枇杷资源, 是鲜食枇杷中的极品, 具有“无冕之王”之美誉, 其肉质细嫩、清甜、风味浓郁独特, 深受广大消费者的青睐^[1], 但传统品种因果小、可食率不高、耐贮性不强等原因, 产业规模的扩大一度受限。近二十多年以来, 我国相关科研、教学单位采用实生选种、杂交育种等方式培育了贵妃、新白 8 号^[2]、三月白^[3]、香妃^[4]、迎雪^[5]、粤晖^[6]等系列白肉枇杷新品种, 为枇杷产业对可持续发展提供了品种支撑。福建省农业科学院果树研究所历经 20 多年, 杂交育成优质、大果、中熟的白肉枇杷新品种中白, 已在福建、云南、四川、浙江等产区示范应用, 为进一步优化枇杷品种结构奠定了基础。



图 1 优质大果中熟白肉枇杷新品种中白

Fig. 1 A new high-quality, big-fruit type, mid-ripening, white-flesh loquat cultivar--Zhongbai

1 选育经过

2004 年，项目组根据前期研究总结的性状遗传规律^[7-8]，以创制的大果型优质杂交枇杷新品种早钟 6 号^[9]为母本，以发掘的晚熟、优质、大果白肉枇杷新品种贵妃^[3]为父本，开展人工有性杂交育种，次年获得 431 粒种子，播种后获得后代实生苗 376 株，2005 年定植于闽侯科辅枇杷育种示范基地（福建福州）。2009 年后，这批杂交后代树陆续开始开花结果，2010 年从中初选出果实综合性状优于父母本的优质、大果的中熟白肉枇杷新株系 042-272（表 1），初定名白早钟 8 号。经 SSR 分子鉴定，确定了该株系是早钟 6 号和贵妃的杂交后代^[10]。为了加快育种进程，同年开始采用高接方式，对该优株进行两代无性子代的遗传稳定性测定，该株系的优良性状均表现稳定（表 2）。2018 年始，该优系在福建福州、福清、莆田，四川攀枝花，重庆万州、合川，云南屏边，浙江兰溪等不同生态栽培区开展区域试验与生产性试验，均表现优质、大果、丰产等优良性状。2023 年 4 月，通过福建省科技成果评审（闽农科评[2023]4 号），并正式定名为中白。

表 1 中白与父母本主要果实性状

Table 1 Main fruit traits of Zhongbai and its parents

品 种 c u l t i v a r	成 熟 期 Maturing date	单 果 质 量 Mass of fruit/g	果 形 Shape of fruit	果 皮 颜 色 Color of pericarp	果 颜 色 Color of flesh	肉 色 Color of flesh	果 肉 厚 度/mm Thickness of flesh	剥 皮 难 易 Fruit : adheren ce of skin	果 肉 质 地 Texture of flesh	化 渣 程 度 Degree of flesh dregs	汁 液 Juice of flesh	TSS (Total Soluble Solid) /%	可 食 率 Edible rate/%	风 味 Flavor of flesh
中白 Zhongbai	4月中下 Mid- and late- April	60.1	倒卵形 obovate	橙黄 Orange yellow	黄白 Yellowish white		10.9	易 easy	细嫩 Fine tender	化渣 absent	多 much	13.4	71.2	浓甜味 鲜 Strong sweet and Fresh taste 甜酸适 口 Sweet with little acid
早钟6号 Zaozhong 6	4月上 Early April	52.7	倒卵形或洋梨形 Obovate or pyriform	橙红 Orange red	橙红 Orange red		8.9	较易 medium	细 fine	化渣 absent	多 much	11.9	70.8	Sweet with little acid
贵妃 Guifei	4月下 -5月上 From late April to early May	59.2	卵圆形或近圆形 Oval or suborbicular	橙黄 Orange yellow	淡黄白 Light Yellowish white		11.4	易 easy	细嫩 Fine tender	化渣 absent	多 much	13.1	72.8	浓甜 Strong sweet

表 2 中白无性子代遗传稳定性测定

Table 2 Determination of genetic stability of asexual offspring of Zhongbai

类型 type	单果质量 Mass of fruit/g	果形 Shape of fruit	纵径/mm Longitudi nal diameter of fruit	横径/mm Transverse diameter of fruit	侧径/mm Lateral diameter of fruit	果皮 颜色 Color of pericarp	果肉 颜色 Color of flesh	果肉厚 度 Thickne ss of flesh/m m	剥皮难易 Fruit : adherence of skin	果肉质 地 Texture of flesh	化渣 程度 Degree of flesh dregs	汁液 Juice of flesh	TSS (Total Soluble Solid) /%	可食率 Edible rate/%	风味 Flavor of flesh
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母树 mother tree	62.5	倒卵形 Obovate	58.6	48.4	46.2	橙黄-淡橙红 Orange yellow - light orange red	淡黄白 Light Yellowish white	11.9	易 easy	细嫩 Fine tender	化渣 absent	多 much	15.1	71.5	浓甜味 鲜, 风味 佳 Strong sweet and fresh tast, excellent flavor
子一代 F1 generations	64.1	倒卵形 Obovate	60.1	49.3	48.2	橙黄-淡橙红 Orange yellow - light orange red	淡黄白 Light Yellowish white	13.4	易 easy	细嫩 Fine tender	化渣 absent	多 much	14.1	73.1	浓甜味 鲜, 风味 佳 Strong sweet and fresh tast, excellent flavor
子二代 F2 generations	59.4	倒卵形 Obovate	54.5	46.3	44.1	橙黄-淡橙红 Orange yellow - light orange red	淡黄白 Light Yellowish white	10.1	易 easy	细嫩 Fine tender	化渣 absent	多 much	13.3	72.1	浓甜味 鲜, 风味 佳 Strong sweet and fresh tast, excellent flavor

2 主要性状

2.1 植物学特性

中白枇杷的树势中庸偏强，树冠圆头形，中心干较明显，灰白色。分枝力较强，新梢茸毛多，成熟枝梢棕褐色，茸毛中等多，1年生枝梢长度19.0~44.0cm、粗度0.96~1.29cm、叶片19~39片。叶片倒卵形，叶尖渐尖，基部狭楔形；叶缘微波浪形，锯齿起始点在中下部，锯齿浅且间距中等，锯齿形状锐尖；叶片深绿色，较光亮，叶脉明显，叶片质地中等，叶背茸毛多；叶长16.0~22.2cm、宽5.2~6.8cm，叶脉13~18对。花穗中等大小，支轴姿态平伸，花量多^[11]。

2.2 果实性状

中白枇杷平均单果质量60.1g，大小整齐；果实倒卵形，纵径54.5~60.1mm，横径46.3~49.3mm，侧径44.1~48.2mm，果基钝圆少数尖峭，果顶钝圆微凹；果皮橙黄色，厚度中等偏薄，锈斑少，果点密度中等，果点中等大；萼片平展，萼孔闭合；果肉黄白色，平均厚10.9mm，肉质细嫩、化渣、汁多；平均可溶性固形物含量13.4%，味鲜、风味浓郁；平均可食率71.2%；平均种子4.6粒·果⁻¹，种子三角体形，种皮黄褐色，斑点多且大，种皮不开裂。

2.3 主要物候期

中白枇杷在福州春梢发生期1月下旬至3月上旬，第一次夏梢5月上至7月下旬，第二次夏梢6月上中至7月下旬，秋梢8月上旬至9月上旬，晚秋梢10月底至11月中旬。初花期11月下旬至12月上旬，盛花期12月上旬至中旬，终花期12月下旬至翌年1月上旬。在福州果实成熟期4月中下旬，比母本早钟6号迟熟10d以上，比父本贵妃早熟7d左右。

2.4 生长结果习性

中白的枝梢长势较壮，低位多头高接换种后第二年枝梢总数16枝·株⁻¹，平均枝梢长度63.7cm、粗度12.8mm、叶片数34片、枝梢抽穗率27.4%；第三年枝梢总数154枝·株⁻¹，平均枝梢长度54.3cm、粗度12.2mm、叶片数27片、枝梢抽穗率54.5%；第四年株产22.8kg，折合666.7m²产709.7kg（666.7m²植31株计）。

2.5 适应性和抗病性

经福建福州、莆田，四川攀枝花，重庆万州、合川，云南屏边，浙江兰溪，广东深圳等地多年多点观察鉴定，中白枇杷均表现早结、丰产、优质、大果等优良性状，适应性较强。

3 栽培技术要点

3.1 中白的枝梢成枝率较高、长势较壮，幼龄树宜在新梢长至20~30cm摘心促发分枝，并选留1~3个长势较好、不同方位的新梢，利于树冠快速形成；幼龄结果树根据树势和结

果量，夏梢抽生期，每个枝梢选留 1~3 个新梢，以降低树体生长势，花芽生理分化期控水控肥，提高枝梢抽穗率。

3.2 中白为大果白肉枇杷新品种，坐果率较高，果实大小均匀，宜根据树势和枝梢数选留 50%~80%的枝梢结果；疏果时根据枝梢长势选留分布均匀、大小一致的幼果 3~8 粒·穗⁻¹，留果负载量以成熟果实单果质量 > 50 g 且穗质量 > 250 g 为宜。

3.3 中白为中熟枇杷品种，在福州的成熟期 4 月中下旬，部分年份气温回升较早，在果实成熟期间须关注气温变化，注意监测橘小食蝇的发生，及早做好橘小食蝇的防控。

3.4 中白枇杷果实的裂果、锈斑等病害的抗性较强，套袋栽培时，宜在幼果横径 > 2 cm 至果实转色前套袋，套袋以原浆牛皮纸袋为佳。

3.5 施肥以有机肥为主，每年花芽形态分化期或幼果期采用沟施方式施入畜禽粪或商品有机肥，配施磷钾肥及中微量元素，施肥量约占全年总施肥量的 50%左右，有水肥一体化设施的果园也可以在此期间分批次施用配方水溶肥。

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