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早实优质香型杂交龙眼新品种华泰丰的选育

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摘 要:华泰丰龙眼是从石硖×香脆的杂交子代中,通过定向选择优良单株培育而成的早实优质香型新品种,2021年9月通过福建省科技成果鉴定,成果编号9352021Y0075。该品种树势中等,成花易,童期短(2009年杂交授粉,2012年结果)。果穗大,果实扁圆形,大小均匀,单果质量(12.7±1.0)g,显著高于母本石硖龙眼;果肉乳白色,半透明,不流汁,易离核,质地嫩脆,化渣,可溶固形物含量(*w*)(22.7±2.8)%,可食率(70.8±1.6)%,味甜,品质佳,有香气。华泰丰龙眼嫁接次年即可结果,无性子代高接后果实性状遗传稳定。2018—2021年连年结果;与储良、石硖、福眼、蜀冠等国内主栽品种砧穗亲和性好。福州地区成熟期为9月上旬至10月上旬,留树保鲜期长。

关键词:龙眼;新品种;华泰丰;有性杂交;早实;香气

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A new early bearing cross longan cultivar Huataifeng with flavor

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Abstract: Huataifeng (HTF) is an eminent cultivar selected from the crossing of Shixia and Xiangcui created and evaluated at National Longan Germplasm Nursery in Fuzhou, Fujian, China. Shixia is a prominent cultivar with high quality and fertility native to Guangdong, populous among Chinese customers. Xiangcui is a bud-mutation from Biew Khiew (a Thailand cultivar) with large fruit size and abundant fragrance. The hybrid was created in 2009 *via* artificial pollination, 148 seeds were gathered and consequently 112 seedlings were obtained. Line 09-1-70 (ultimately named HTF) was selected from the cross population for its early bearing capacity (fruiting initiated in 2012). Longan production suffered severe yield lose in Fujian province in 2013 due to off-year bearing, while HTF had a high flowering rate and yield as usual. The stable flower formation of this line might give rise to stable fruit production. It was then to top-grafted onto a mature longan tree in 2013. The grafted trees started to bear fruit in 2014, and from 2014 to 2017 all the grafted trees showed stable and consistent characteristic including high flesh recovery, high total soluble sugar content and abundant fragrance. Its fruit weight is 27.8%−48.2% higher than that of Shixia. From 2018 to 2021, HTF was the most consistent bearing line and showed no alternative bearing problem. Consequently, in 2021, HTF was certified in Fujian Province (no. 9352021Y0075). This cultivar has a strong growth vigor and a semi-open tree architecture. The bark is gray-brown and split into narrow rough ridges. Twigs are red-brown and smooth.

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The mature compound leaves are in size of (14.1−26.0) cm × (12.2−25.1) cm, and their 4−5 pairs of leaflets are green, lanceolate, and (12.8−18.7) cm × (3.9−4.7) cm in size. The leaf margins are wavy, and apex narrowly acuminate. The juvenile phase of 3 years of this cultivar is rather short. And it forms inflorescence every year. Its flower cluster is large and scattered. The oblate fruit are uniform in size with a blue-brown pericarp. The fruit base is flat, sometimes with one risen shoulder and the fruit tip is round. The skin segments are obvious. The fruit has an average longitudinal diameter of 2.73−2.81 cm, average transverse diameter of 2.89−2.93 cm, and average lateral diameter of 2.67−2.70 cm. The aril is milky, translucent, fragrant, tender and crisp, and can be easily separated from the seed. Average fruit weight is (12.7±1.0) g. The flesh recovery is (70.8±1.6)%, and TSS (22.7±2.8)%. HTF has an excellent grafting affinity to many main cultivars, such as Shixia and Chuliang (mainly cultivated in Guangdong province, Hainan province and Guangxi Autonomous Region), Fuyan, Songfengben, Lidongben (mainly cultivated in Fujian province), and Shuguan, Lufeng (mainly cultivated in Sichuan province). The productivity of 7-year-old grafted trees can be up to 26.3 tons per ha (density 600). Bud breaking of HTF begins in late February, similar to that of Shixia, and the first leaf matured in late May. Inflorescence morphological differentiation initiates in late February; flowers bloom from late April to early May, and ends in late May. The fruit matures during early September to early October in Fuzhou.

Key words: *Dimocarpns longan*; New cultivar; Huataifeng; Cross breeding; Early-bearing; Aroma

中国作为龙眼(*Dimcarpus longan* Lour.)的起源地，是世界龙眼产业规模最大的国家，2016年栽培面积84.74万hm^2，产量191.40万t[1]。国内石硖龙眼栽培面积超过15万hm^2，在海南、广东、广西、福建、四川、重庆、贵州、云南等产区规模化种植，表现出极强的地区适应性，但生产中果实偏小，一直是国内龙眼品种性状改良的研究热点[2-5]，杂交育种多作为父本材料。笔者以石硖为母本，结合香型龙眼资源的鉴定评价，通过人工授粉以期对母本龙眼品种的果实大小、风味等性状进行改良，为优质石硖二代龙眼新品种持续创新奠定基础。

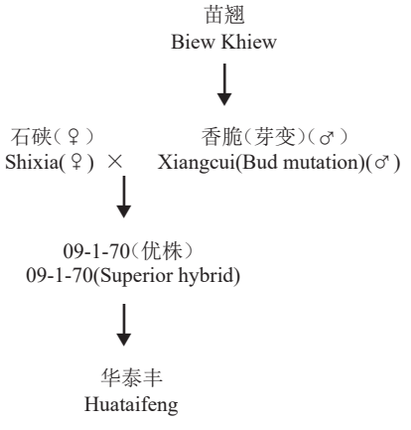

图1 华泰丰龙眼谱系

Fig. 1 The pedigree of Huataifeng

1 选育过程

2009年利用国内种植面积最大的石硖龙眼作为母本、泰国有香气的优异资源香脆龙眼为父本进行人工授粉，对父本花粉进行收集、干燥、保存，在母本花穗雌花始花期进行彻底去雄并套袋隔离，待雌花盛开期授以父本花粉。收获148粒种子，同年获得112株杂交实生苗。2012年从结果后代群体中筛选出09-1-70龙眼优株，童期仅3 a(年)，高接次年即可开花。2013年后陆续开展高接扩繁，利用SSR分子标记技术证实为真杂种[6]，经过2016年复选和2017年决选定名华泰丰(图1)。高接7年生无性子2代，株产43.76 kg，折合26.3 t·hm^{-2}(种植密度600株•hm^{-2})，2018—2021年连年结果，丰产稳产。经3代无性遗传稳定性测定，华泰丰龙眼性状稳定一致，表现为早结果，肉质嫩脆，离核易，不流汁，风味甜，综合品质优(图2)，单果质量超过母本石硖龙眼27.8%~48.2%。2021年9月通过福建省科技成果鉴定(编号：9352021Y0075)。

2 主要性状

2.1 植物学特征

植株树势强，树姿较开张，树干灰褐色，树皮裂纹不明显。枝条分布中等，枝梢粗壮，萌芽力中等，分枝角度大(50°~60°)。1年生枝条红褐色，韧度中等，复叶节间中等长，平均间距4.35 cm，复叶主轴长14.1~26.0 cm，宽12.2~25.1 cm。小叶4~5对，互

图2　华泰丰龙眼丰产状及其果穗

Fig. 2　Heavy looding of tree and single fruit cluster of Huataifeng

生，排列紧密，长12.8~18.7 cm，宽3.9~4.7 cm；叶绿色，叶面稍隆起较光亮，披针形，叶基楔形，叶尖渐尖，叶脉明显，叶缘呈波浪状。花穗易形成，抽穗率高，花穗大，较分散；有雄花、雌花、两性花3种。种子扁圆形，赤褐色，光滑，种顶面观椭圆形，种脐长椭圆形。

2.2　果实特性

果实大小均匀，单果质量（12.7±1.0）g，扁圆形，纵径2.73~2.81 cm，横径2.89~2.93 cm，侧径2.67~2.70 cm，果肩平或微耸，果顶浑圆，龟裂纹明显，乳状突起较明显，果皮青褐色。果肉乳白色，半透明，不流汁，离核易，果肉质地嫩脆，化渣，有香气；可溶性固形物含量（*w*）为（22.7±2.8）%，风味甜；可食率（70.8±1.6）%（表1）。

表1　华泰丰与石硖、香脆果实性状的比较

Table 1　Comparation of fruit characters among Huataifeng, Shixia and Xiangcui

品种 Cultivar	果形 Fruit shape	单果质量 Fruit weight/g	果肉颜色 Aril color	*w*（可溶性固形物） Soluble solid content/%	果肉质地 Texture	可食率 Edible rate/%	香味 Aroma
华泰丰 Huataifeng	扁圆形 Oblate	12.7±1.0 abAB	乳白 Milky	22.7±2.8 aA	嫩脆 Tender and crisp	70.8±1.6 aA	有 Aroma
石硖(♀) Shixia (♀)	不规则形 Irregular	9.4±1.2 bB	乳白 Milky	21.4±3.4 aA	爽脆 Refreshing crisp	69.7±2.0 aA	无 Absent
香脆(♂) Xiangcui（♂）	侧扁圆形 Lateral oblate	13.4±1.8 aA	黄白色 Yellowish white	20.6±2.1 aA	脆 Crisp	70.6±1.3 aA	浓 Strong

注：杂交亲本龙眼分析数据来自国家果树种质福州龙眼圃，华泰丰分析数据来自福州育种园。不同小写字母表示在 $p<0.05$ 差异显著，不同大写字母表示在 $p<0.01$ 差异极显著。

Note: Data of Shixia and Xiangcui from National Longan Germplasm Nursery in Fuzhou, that of Huataifeng from Fuzhou breeding center. Different small letters indicate significant difference at $p<0.05$, different capital letters indicate extremely significant difference at $p<0.01$.

2.3　砧穗亲和性

华泰丰与广东、广西、海南主栽品种储良、石硖，福建主要品种福眼、松风本、乌龙岭、凤梨穗、立冬本，以及四川主栽品种蜀冠、泸丰等国内主栽品种作为中间砧木的砧穗亲和性良好[7]。

2.4　物候期

依据《龙眼种质资源描述规范和数据标准》[8]在福州5年观测，2月下旬春芽开始萌动，5月下旬第一次幼叶老熟，6月中旬夏芽萌动，8—10月秋梢生长，11—翌年1月冬梢生长。2月下旬开始花序形态分化，4月下旬—5月初始花，5月下旬终花。果实成熟期9月上旬—10月上旬，留树保鲜期长。

3　栽培技术要点

宜适度稀植，株行距（5.0~6.0）m×（6~8）m。一般小苗定植和高接换种后第2年均可开花结果，华泰丰龙眼花量大，坐果率高，需要在花期疏除40%~60%的花穗，待坐果后再疏除40%~50%果穗，以利果实发

育。结果树每年施肥3次：第1次在开花前，施肥量占全年的70%，以花生饼等有机肥为主，辅施20%的复合肥；第2次在果实膨大期，施复合肥，施用量占全年的20%；第3次在冬梢停止期，施用复合肥或腐熟土，施用量占全年的10%。

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