

大果龙眼新品种良圆龙眼的选育

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摘要: 良圆龙眼是以大乌圆为母本、储良为父本杂交选育的大果龙眼新品种。果实大小均匀, 单果质量13~18 g; 果皮黄褐色, 果实外观较好; 果肉乳白色, 稍透明, 果肉表面纵纹明显, 表面不流汁, 汁液中多, 肉离核、韧脆化渣, 味甜; 可食率64%~69%, 可溶性固形物含量(w)19%~21%。树势强, 树姿直立, 树冠圆形, 1年生枝条较粗, 优于两亲本。在广州地区成熟期7月底至8月上中旬; 丰产性中等, 高接后第5年平均株产为22.5 kg, 每666.7 m²产量可达724.5 kg; 适宜广东省各产区栽培。

关键词: 龙眼; 新品种; 良圆龙眼; 杂交; 大果

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Breeding report of a new large fruit longan cultivar Liangyuan Longyan

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Abstract: Liangyuan Longyan is a new variety of longan (*Dimocarpus longan* Lour.) selected from a crossing between Dawuyuan (large fruit) and Chuliang (high quality) made in April, 2005 by the Institute of Fruit Tree Research, Guangdong Academy of Agricultural Sciences. The SSR molecular analysis confirmed that it is a hybrid of Dawuyuan and Chuliang. The hybrid seedlings were obtained in 2006, and the hybrid trees started flowering and bearing fruit successively from 2013. One of the hybrid trees exhibited excellent fruit characteristics in 2014. Over seven consecutive years from 2015 to 2021, the fruit quality and fertility of the strain were evaluated in comparison with its male and female parents. It was approved by the Crop Variety Approval Committee of Guangdong Province and named Liangyuan Longan (Yuepingguo 20220006) in March 2023. The tree of Liangyuan Longyan was erect and vigorous with a round canopy. The trunk was gray-brown, with rough bark and moderately pronounced cracks. The leaves were pinnate compound, with opposite leaflets mostly in 4–5 pairs, occasionally 6 pairs. The leaflets were elongated oval in shape, long in length, slightly curled upwards, thick, with wrinkles on the leaf surface, and short wedge-shaped leaf bases, and deep green in color. The burst period of the top buds of Liangyuan Longan was in mid to late January, and the sprouting period of the flower clusters in early February. The initial flowering period was from early to mid-March to early to mid-April, varying significantly in different years. The peak flowering period was from late March to mid-April, and the flower shedding period was in late April. The flowering period of a single tree was approximately 20–30 days, while that of a single spike was 10–20 days. The flowers were in conical

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clusters, large in size, with a yellow-green axis, and moderately deep-cleft stigma heads. The fruits matured from the end of July to mid-August. The fruit clusters were well-formed, with uniformly sized fruits weighing 13–18 g each. The fruit skin was yellowish-brown, presenting a good appearance. The flesh was milky white, slightly translucent, with prominent longitudinal wrinkles on the surface. The fruits did not exude juice, and the juice content was moderate. The flesh was easily separated from the seed, chewy and slightly fibrous, with a sweet taste. The edible rate was 64%–69%, and the soluble solids content was 19%–21%. Compared with the male parent Chuliang, the fruits were larger, and compared with the female parent variety Daguanyuan, the fruit quality was much better. The seeds were flat-round, with medium-sized seed hilums. The ripening period in the Guangzhou region was from late July to mid-August. It had moderate productivity. It would be suitable for cultivation in various production areas in Guangdong Province.

Key words: *Dimocarpus longan*; New cultivar; Liangyuan Longyan; Hybridization; Large fruit

龙眼(*Dimocarpus longan* Lour.)原产于中国,是中国南方名贵的南亚热带水果^[1]。中国具有最大的龙眼种植面积和产量,而广东省龙眼种植面积和产量居全国首位^[2]。目前,广东龙眼主栽品种为石硤和储良,品种较为单一,缺乏差异化品种。石硤单果质量在8.0 g左右,而储良单果质量在12.0 g左右,尚未有更大单果质量的品种。近年来,福建省农业科学院果树研究所选育了一批大果优质的龙眼品种,如福圆^[3]、宝石1号^[4]、翠香^[5]等,但由于地域适应性,需要选育适宜广东地区栽培的大果优质龙眼新品种。因此,广东省农业科学院果树研究所龙眼研发团队以单果质量14.0~18.3 g的大乌圆龙眼为母本,以储良龙眼为父本进行杂交。从杂交后代中筛选出了果大质优良圆龙眼新品种。该品种果实比储良大,品质与储良相近、优于大乌圆,具有较高的食用和经济价值。

1 选育经过

良圆龙眼是广东省农业科学院果树研究所于2005年以大乌圆为母本,储良为父本进行杂交,从20多株杂种后代中选育而成。2005年春季开始杂交,2005年7月采到杂交果实41个,播种后于2006年3月获得小苗22株。2013年开始陆续有植株开花结果,2014年发现其中1株果实性状表现优异,果大质优,暂定名为良圆龙眼(图1)。将初选优株采集接穗进行高接与苗接,系统开展选育工作,包括品种比较试验和多年多点试验。从2015年开始在广东省农业科学院果树研究所果园内,采用高接换种的方式,分别高接第一、第二和第三代进行试验,

开展良圆龙眼的复选工作。2017—2021年期间的试验表明,良圆龙眼的第一、第二和第三代均能保持母树的优良经济性状。通过在广州、台山、东莞进行区域试验和生产试验,树冠在高接后能够快速成型,产量在不同地区能够保持稳定(表1)。2023年3月通过了广东省农作物品种审定委员会评定,定名为良圆龙眼(粤评果20220006)。

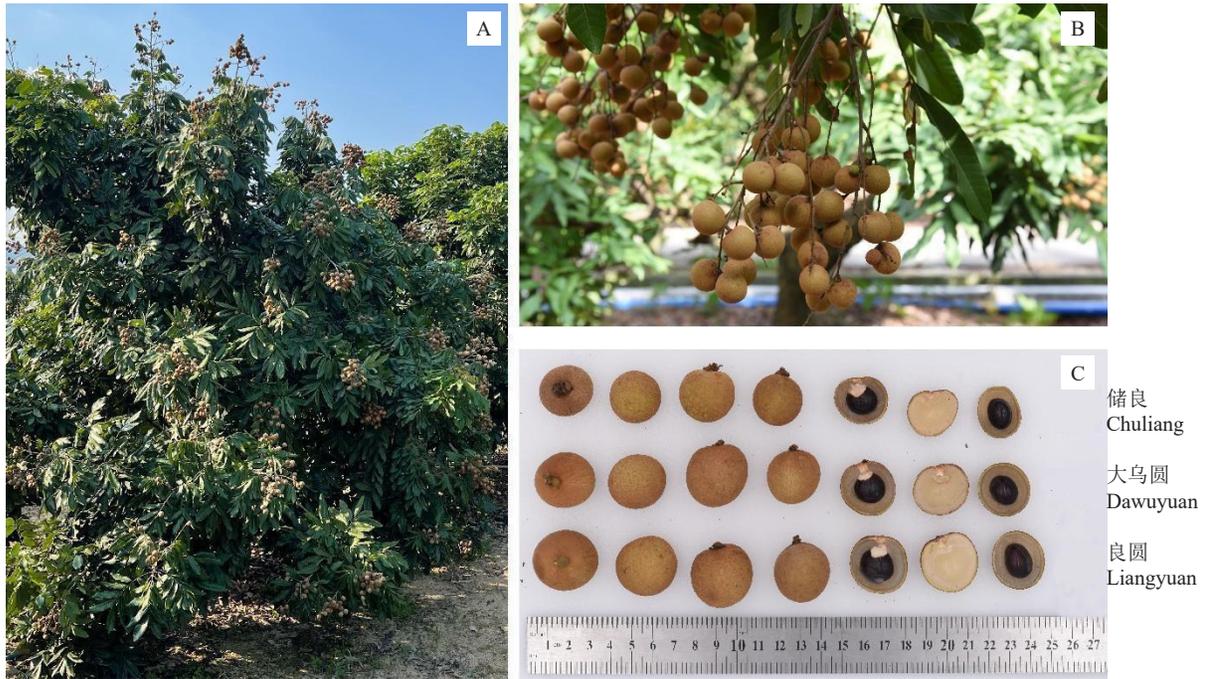
2 主要性状

2.1 植物学特征

良圆龙眼树势强,树姿直立,树冠圆形,1年生枝条较粗(平均1.5 cm);树干灰褐色,树皮较粗糙、裂纹中度明显;叶片为偶数羽状复叶,小叶对生,小叶多为4~5对,偶尔有6对,小叶性状为长椭圆形,长度较长(平均13.7 cm),叶面浅外卷,叶较厚,叶面有皱褶,叶基短楔形,深绿色;圆锥形花序,花序大(平均长30.6 cm),花序轴黄绿色,雌花柱头开裂中等深。

2.2 物候期

良圆龙眼顶芽萌动期在1月中下旬,2月上旬花穗抽生,2月下旬至3月上旬现蕾,初花期3月上旬至4月上旬,不同年份差异较大,盛花期3月下旬至4月中旬,谢花期4月中下旬;单株树的花期20~30 d,单穗花期10~20 d,一般雌花每年只有一批;第1次生理落果时期为雌花谢后7~10 d,大约在4月下旬,此期落果(落花)最多,约占全部落果数的70%,第2次生理落果是在花的双子房分大小后的幼果开始迅速生长时,大约在雌花谢花后20 d;在雌花谢花后50 d之间,主要是果皮和种皮的迅速增长;谢花后



A. 良圆龙眼结果树;B. 良圆龙眼果穗;C. 良圆龙眼果实与父母本比较。
 A. Liangyuan Longyan fruit tree with mature fruits; B. Fruit clusters of Liangyuan Longyan; C. Comparison of mature longan fruit with parent plants.

图 1 优质大果龙眼新品种良圆龙眼
 Fig. 1 The new longan cultivar Liangyuan Longyan with large fruits and high quality

表 1 不同地区良圆龙眼树冠大小及单株产量

Table 1 Crown size and individual yield of Liangyuan Longan in different regions

地点 Location	树冠大小 Crown size/cm			平均株产 Average individual yield/kg		
	高接后第1年 First year after high grafting	高接后第2年 Second year after high grafting	高接后第3年 Third year after high grafting	高接后第1年 First year after high grafting	高接后第2年 Second year after high grafting	高接后第3年 Third year after high grafting
广州 Guangzhou	165×185	256×285	341×356	2.6	6.8	13.7
台山 Taishan	174×214	330×360	415×426	3.4	4.6	13.5
东莞 Dongguan	152×165	262×272	358×342	2.8	4.4	14.7

50 d左右种胚出现,65 d种胚充满种腔,果皮和种子的质量增加明显,假种皮已开始发育与增长;谢花后84 d到成熟,主要是假种皮的迅速增长,谢花后60 d果肉包满整个种子,86 d后内含物迅速增加;在广州地区成熟期7月底至8月上中旬,丰产性中等,高接后第5年平均株产为22.5 kg,每666.7 m²产量可达724.5 kg(表2)。

2.3 生长结果特性

良圆龙眼果穗成穗性较好(穗坐果数量30~50个),果实大小均匀,单果质量13~18 g;果皮黄褐色,果实外观较好;果肉乳白色,稍透明,果肉表面纵纹

明显,表面不流汁,汁液中多,肉离核、韧脆化渣,味甜;可食率64%~69%,可溶性固形物含量(w)19%~21%(表2);品质中上,与父本储良相比,果实更大,与母本品种大乌圆相比,果实品质更优。种子扁圆形,种脐大小中等。

3 分子标记鉴定

利用简单重复序列(simple sequence repeat, SSR)分子标记对良圆龙眼是否为大乌圆龙眼和储良龙眼的杂交后代进行分子鉴定。使用天根植物基因组DNA提取试剂盒提良圆龙眼、大乌圆以及

表2 良圆龙眼与储良、大乌圆果实品质比较

Table 2 Fruit quality analysis among Liangyuan Longyan, Chuliang and Dawuyuan

品种 Cultivar	成熟期 Ripe period	产量 Yield/ (kg·666.7 m ⁻²)	单果质量 Single fruit mass/g	w(可溶性固形物) Soluble solid content/%	可食率 Edible rate/%	w(维生素C) Vitamin C content/ (mg·100 g ⁻¹)
良圆龙眼 Liangyuan Longyan	7月底至8月上中旬 Late July to Early-mid August	724.5	15.6	20.1	66.2	88.1
储良 Chuliang	8月上中旬 Early-mid August	1 013.2	12.5	20.9	67.1	82.9
大乌圆 Dawuyuan	7月底至8月上中旬 Late July to Early-mid August	763.2	12.8	19.6	66.1	61.8

储良叶片基因组 DNA,利用两对多态性 SSR 引物 LY1 和 LY3^[6]进行荧光 PCR 扩增,在 ABI 3730 xl 测序仪进行毛细管电泳检测。使用峰图分析软件 GeneMarker 2.0 读取荧光 PCR 扩增片段大小,得到

等位基因分型表及分型峰图(图2)。结果发现良圆龙眼具有母本大乌圆 132 位点、父本储良 184 位点的峰,说明良圆龙眼是大乌圆和储良的杂交后代。

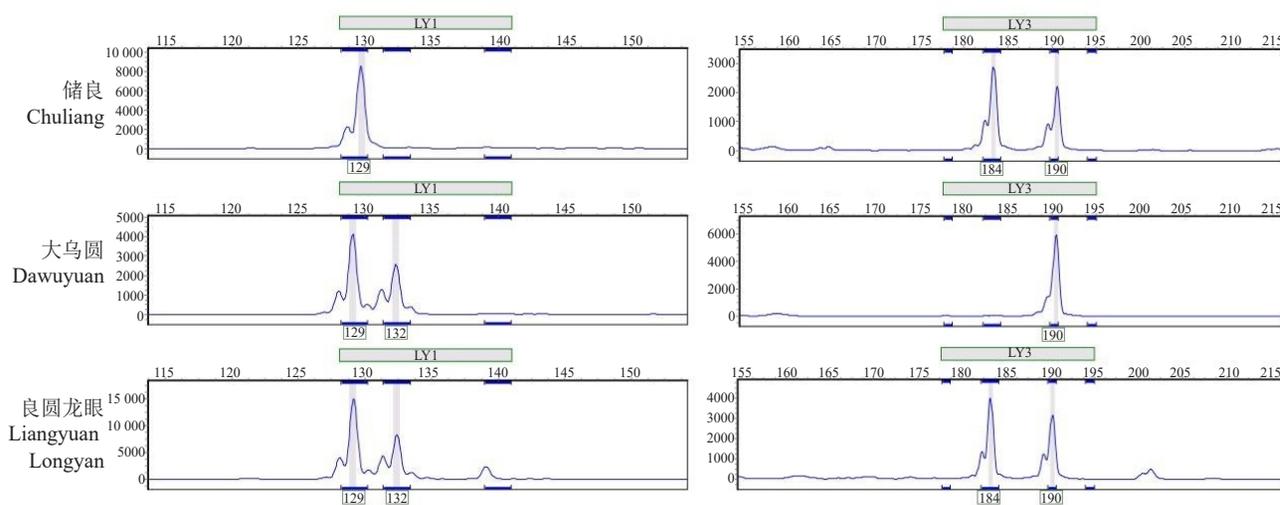


图2 利用毛细管电泳对良圆龙眼进行 SSR 杂种鉴定

Fig. 2 SSR hybrid identification of Liangyuan Longyan using capillary electrophoresis

4 栽培技术要点

4.1 栽培适应性

在广东年均气温 21 °C 以上的地区为龙眼适栽区,冬季最低温度下降到 -3 °C 以下,就会引起严重冻害,应避免在有严重霜冻的地区栽培龙眼。良圆龙眼除在珠三角开展区域试验外,还在茂名、东莞、汕尾、潮州等开展试验推广,在各地均表现正常,适应广东省的各大龙眼主产区栽培,由于自然条件植株成花稍难,可以施用氯酸钾催花,提高其成花率。

高接换种采用低位大枝嫁接,嫁接后能较快形成树冠,第2年即可少量开花结果,嫁接3年后可正

常投产。嫁接苗在春季定植最佳,定植后加强管理,当年可抽生新梢3~4次,定植第3年后可正常投产。

4.2 肥水管理

龙眼的花果生长发育需要大量的营养供给,在花果期必须加强肥水管理以满足果实生长发育的需要,按花果的发育期可分为壮花肥和壮果肥。壮花肥在2月上中旬花穗抽生初期施用,施肥以速效的完全肥料为好,不宜偏施氮肥,以防止花穗徒长;树冠5~6 m的植株每株施腐熟花生麸水50~100 kg(折合干麸1~1.5 kg)加氯化钾0.3 kg,或氮磷钾配比15:15:15的复合肥1~1.5 kg。树势壮旺,秋冬季施肥水平较高的果园,一般不在抽花穗期施肥,以免花量过大而影响坐果。第一次壮果肥在3月下旬至4月上

旬龙眼开花前后,与壮花肥施用相同;第二次壮果肥在 5 月底至 6 月初疏果后,每株施麸水 50~100 kg (折合干麸 1~1.5 kg),或复合肥 1~2 kg 加尿素 0.5~1.0 kg。具体用量需根据实际挂果量、树势等综合考虑。

4.3 疏花疏果

疏花在花穗发育完成至开花前(3月中旬左右)进行。花果多或树势弱的植株疏花疏果量较大,反之少疏;花量大,以疏花为主,疏去 30% 以上的花穗,对叶片少、树势弱的植株可疏去 70% 的花穗,短截花穗至 20~25 cm。疏果在小果黄豆大时(5月上中旬)进行,先疏去坐果稀少、病枝、残枝的果穗,再疏去过多的果穗,保留坐果较好、果粒较紧凑、果量适中的果穗;对保留的大果穗应短截或疏去一些小穗,使挂果量适中;结果母枝粗度为 0.6~0.8 cm 的果穗,保留果实 40 粒左右。

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