

## 早熟荔枝新品种‘燎原1号’的选育

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**摘要:** ‘燎原1号’是通过自然实生群体选育而成的早熟荔枝品种。该品种树姿开张, 树势半圆形, 枝条灰白色, 叶片内卷、有光泽且厚, 果实锥形、中等大, 种子细长形或鸡舌形, 平均单果质量23.5 g, 最大单果质量27.2 g。可食率74.4%, 可溶性固形物含量(w, 后同)19.5%, 总糖含量16.5%, 可滴定酸含量1.6%, 维生素C含量567.0 mg·kg<sup>-1</sup>, 焦核率达95%, 品质中上。果实发育期约70 d, 在云南保山成熟期为5月下旬, 与‘褐毛荔’‘大红袍’嫁接亲和性好, 不易裂果, 丰产稳产性好。在云南适宜发展的区域为低纬度低海拔热区。

**关键词:** 荔枝; 新品种; ‘燎原1号’; 早熟

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## Selection of an early-maturing litchi cultivar ‘Liaoyuan No.1’

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**Abstract:** ‘Liaoyuan No. 1’ is an early-maturing litchi variety bred by natural population. In 1994, a litchi superior individual plant was found in the litchi orchard of Liaoyuan team, Lujiang farm, Lujiang town, Longyang district, Baoshan city, Yunnan province. The color of the fruit peel was purple red, the mature period was early, the scorch rate was very high and the yield was stable. After many years regional trials, it was found that the genetic character was stable. In December 2019, it was approved by Yunnan Provincial Tree Species Validation Committee. The species is a tall tree, with tree growth habit spreading and tree vigor semi-circular. The branches are gray. The leaves are narrow, elliptical and involute, with the tips coming gradually sharp. The young leaves are yellow green and the old leaves are dark green as well as shiny. The leaves are 12.6 cm long and 3.4 cm wide. The petioles are 0.6 cm long and 0.3 mm thick. The flowers are large and the receptacle is yellow brown. The fruit is cone-shaped, medium large, with purplish red peel and inconspicuous suture. The average weight of single fruit is 23.5 g and the maximum weight of single fruit is 27.2 g. The longitudinal diameter of fruit is 37.5 mm and the transverse diameter is 33.2 mm. The weight of seed is 2.0 g, measuring 25.4 mm long and 13.3 mm wide. The flesh is waxy white and the testa is dark brown, with a slender or chicken tongue shaped

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appearance. The species is of good quality with 74.4% edible rate 19.5% the content of soluble solids, 16.5% the content of total sugar, 1.6% the content of titratable acid, 567.0 mg·kg<sup>-1</sup> the content of vitamin C as well as 95% the core. The fruit development period is about 70 days, and the mature stage is the end of May in Baoshan, Yunnan province. The mature stage is 10-15 days later than ‘Sanyuehong’ and 10-15 days earlier than ‘Dahongpao’. It has good grafting affinity with ‘Hemaoli’ and ‘Dahongpao’, with is not easy to crack fruit, and has good yield and stability. Taken adult ‘Dahongpao’ as rootstock, the yield per plant is 13.6 kg and 25.7 kg in the third and fourth years after high grafting. Selecting the plot with deep soil layer, high organic matter content and no pollution builds plantations. The row and plant spacing (4-5) m × (5-6) m in flat or gentle slope land and 4m × 4m in steep slope land. Pruning shall be carried out immediately after fruit picking of adult fruiting trees, mainly with short cutting and light thinning, branch pulling including when necessary. The mature period of the last shoot was from late September to early October. The variety is suitable for large-scale development in the hot areas of low latitude and low altitude in Yunnan.

**Key words:** Litchi; New cultivar; ‘Liaoyuan No.1’; Early-maturing

荔枝原产于中国,是典型的亚热带常绿果树,在我国有 2 000 多年的栽培历史,2018 年荔枝种植面积 55.2 万 hm<sup>2</sup>,产量 302.8 万 t<sup>[1-2]</sup>,荔枝是我国重要的水果之一。我国荔枝种质资源丰富,但中晚熟荔枝品种多且上市期集中,市场销售压力过大,而云南早熟区域主栽的荔枝品种‘褐毛荔’‘三月红’‘水东’<sup>[3]</sup>等很难适应市场需求,选育早熟、优质的荔枝品种,是荔枝品种结构调整的重要任务。

## 1 选育过程

‘燎原 1 号’是采用实生选种方法选育出的早熟荔枝新品种,该品种来源于云南省保山市隆阳区潞江镇潞江农场燎原队的 1 株荔枝实生变异单株。1994 年对其生物学特性和果实品质进行调查

并圈枝育苗,调查发现‘燎原 1 号’荔枝母株的果实成熟期较早,果皮颜色紫红,焦核率高,丰产稳产性好。1995 年在云南省保山市隆阳区潞江镇莫卡 1 号云南省农业科学院热带亚热带经济作物研究所建立单点试验园,面积 0.2 hm<sup>2</sup>,株行距 4 m×6 m。2007 年在云南省保山市隆阳区,云南省红河州元阳县、屏边县,云南省玉溪市新平县等分别建立区域性试验园,面积 1 hm<sup>2</sup>,株行距 4 m×6 m。2010 年开展砧穗组合试验,‘燎原 1 号’与‘褐毛荔’‘大红袍’嫁接亲和性好。经过多年的单点试验和区试性试验,‘燎原 1 号’遗传性状稳定。2019 年 12 月通过云南省林木品种审定委员会认定,定名为‘燎原 1 号’荔枝,良种编号:云 R-SC-LC-048-2019(图 1)。



图1 荔枝新品种‘燎原1号’

Fig. 1 A new litchi cultivar ‘Liaoyuan No.1’

## 2 主要性状

### 2.1 植物学特征

‘燎原1号’荔枝树姿开张,树势半圆形。树干光滑,枝条灰白色。小叶2~4对,一般为3对,叶片窄椭圆形、内卷,叶缘微波浪,叶尖渐尖,嫩叶黄绿色,老叶深绿且有光泽,叶片厚;叶片长12.6 cm、宽3.4 cm,叶柄长0.6 cm,叶片厚0.3 mm。花序形状圆锥形,平均长度30.1 cm,宽度17.5 cm。花朵较大,花柱平均长度3.8 mm,柱头2裂。花蕾浅绿色。花托黄褐色。

### 2.2 生物学特性

在云南保山,‘燎原1号’幼年树每年可抽梢5~7次,春梢1次,在3—4月萌发;夏梢2~3次,在5—7月萌发;秋梢1~2次,在8—10月萌发;冬梢1次或无,于11月—翌年1月萌发。成年树每年抽梢2~3次,采果后第一次梢于6月中下旬萌发,第二次

梢于8月中下旬萌发。荔枝结果树11月下旬至12月上旬为露白点期(花序原基),12月下旬至1月下旬抽穗期,2月上旬初花期,2月中下旬盛花期,3月上旬谢花期,3月中旬初始坐果期,3月下旬第一次生理落果期,4月下旬第二次生理落果期,5月中旬果实着色期,5月下旬果实成熟期。

### 2.3 果实性状

‘燎原1号’果实锥形,果肩一平一耸,果顶尖圆,果皮紫红色,龟裂片形状隆起,片锋微尖,缝合线不明显。果实平均单果质量23.5 g,果实纵径37.5 mm,横径33.2 mm;种子质量2.0 g,种子长25.4 mm,种子宽13.3 mm。果肉蜡白色,外种皮暗褐,种子细长形或鸡舌形。焦核率95.2%,可溶性固形物含量19.5%,总糖含量16.5%,可滴定酸含量1.6%,维生素C含量567.0 mg·kg<sup>-1</sup>,可食率74.4%,均比‘三月红’高(表1)。

### 2.4 主要经济性状

表1 ‘燎原1号’与‘三月红’果实性状比较

Table 1 Comparison of fruit economic characters between ‘Liaoyuan No.1’ and ‘Sanyuehong’

品种 Cultivar	果形 Fruit shape	焦核率 Seed abortion percentage/%	单果质量 Single fruit mass/g	w(可溶性固形物) Soluble solids content/%	w(总糖) Total sugar content/%	w(可滴定酸) Titratable acid content/%	w(维生素C) Vitamin C content/ (mg·kg <sup>-1</sup> )	可食率 Edible rate/%
燎原1号 LiaoyuanNo.1	锥形 Cone	95.2	23.5	19.5	16.5	1.6	567.0	74.4
三月红 Sanyuehong	心形 Heart-shaped	74.3	25.6	16.1	13.4	0.6	431.0	70.3

‘燎原1号’属于早熟品种。成熟期为5月下旬,成熟期比‘三月红’晚10~15 d、比‘大红袍’早10~15 d。外观紫红色,不易裂果,焦核率高,肉质较爽脆,不易流汁,香甜可口,品质优于‘三月红’。用成年‘大红袍’高接第3年和第4年的单株产量分别为13.6 kg和25.7 kg,丰产稳产性好。

## 3 分子标记鉴定

笔者团队与广东省农业科学院果树研究所联合开展分子标记鉴定,利用34对EST-SSR标记和21对SNP标记,对‘燎原1号’与其他367份荔枝种质资源进行分子鉴定分析<sup>[4]</sup>。结果(图2)表明,‘燎原1

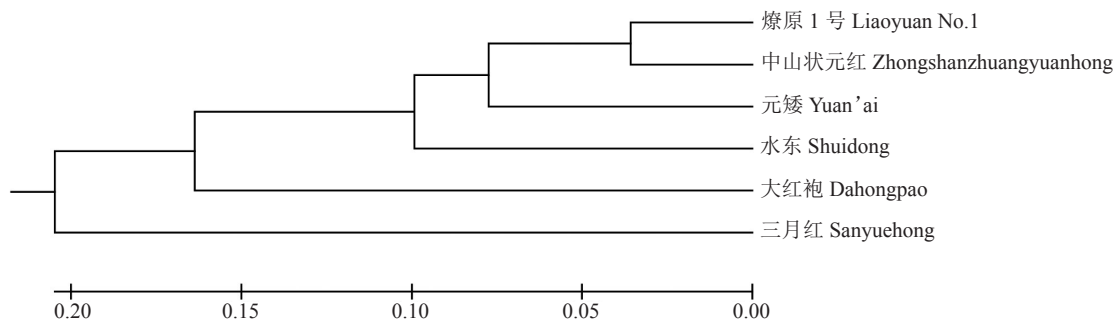


图2 基于21个SNP位点获得的367份荔枝种质资源的部分聚类分析

Fig. 2 A part of UPGMA dendrogram of the 367 germplasm based on 21 SNP markers

号’为‘褐毛荔’矮化品系‘元矮’与‘大红袍’或‘中山状元红’的自然杂交种,是一份新的荔枝种质资源。

## 4 栽培技术要点

### 4.1 建园技术

选择土层深厚、有机质含量高、无污染的地块建园。坡度 15°~35°的园地必须做梯面,梯面宽度不小于 3 m,外高内低,内埂做排水沟。坡度大于 35°地块不建议建园。平地或缓坡地株行距(4~5)m×(5~6)m,陡坡地株行距 4 m×4 m。

### 4.2 培养健壮结果母枝

成年结果树采果后立即进行修剪,以短截、轻疏剪为主,必要时进行拉枝。修剪后及时进行施肥,每株施入 20 kg 有机肥+1.5 kg 复合肥(15:15:15)+0.5 kg 尿素+0.5 kg 磷酸二氢钙,施肥后进行灌溉。第一次梢抽梢时间调控在 6 月中下旬;二次梢在 8 月中下旬萌发,9 月下旬至 10 月上旬枝梢老熟。

### 4.3 控梢促花

末次梢枝梢老熟后,对主枝螺旋环剥 1.2~2.0 圈(视粗度而定),环剥宽度为 0.2~0.3 cm,深达木质部。此后若萌发新梢,可在新梢长约 10 cm 时,用“杀梢素”1 500 倍液喷雾树冠杀梢。在 11 月下旬未见白点,可用 0.1%核苷酸+0.1%细胞分裂素喷雾树冠促白点。

### 4.4 保花保果

在花穗抽出至 20 cm 时,施入 10 kg 有机肥+0.5 kg 复合肥(15:15:15)+0.5 kg 氯化钾+0.2 kg 钙镁磷肥并结合灌溉。花期需要放蜂,雌花柱头开放呈“羊角”状至谢花,喷雾 2,4-D 保果。

## 4.5 病虫害防控

梢期注意预防小绿象甲、尺蠖、卷叶蛾、蓟马等,花果期注意预防荔枝蒂蛀虫、荔枝椿象,荔枝霜疫霉病、荔枝炭疽病。在生产管理过程中,应以农业防治、生物防治为主,化学防治为辅的综合防控方法。

## 参考文献 References:

- [1] 李建国. 荔枝学[M]. 北京:中国农业出版社,2008:50-103.  
LI Jianguo. The litchi[M]. Beijing: China Agriculture Press, 2008:50-103.
- [2] 陈厚彬,欧良喜,李建国,苏钻贤,杨胜男,吴振先,胡卓炎. 新中国果树科学研究 70 年:荔枝[J]. 果树学报,2019,36(10):1399-1413.  
CHEN Houbin, OU Liangxi, LI Jianguo, SU Zuanxian, YANG Shengnan, WU Zhenxian, HU Zhuoyan. Fruit scientific research in New China in the past 70 years:Litchi[J]. Journal of Fruit Science,2019,36(10):1399-1413.
- [3] 张惠云,高贤玉,王跃全,宋云连,张翠仙,左艳秀,张发明,罗心平. 云南荔枝龙眼产业发展思考[J]. 热带农业科学,2019,39(3):115-119.  
ZHANG Huiyun, GAO Xianyu, WANG Yuequan, SONG Yunlian, ZHANG Cuixian, ZUO Yanxiu, ZHANG Faming, LUO Xinping. Commercial development of lychee and longan in Yunnan province [J]. Chinese Journal of Tropical Agriculture, 2019, 39(3):115-119.
- [4] 刘伟,罗心平,张惠云,蒋依辉,肖志丹,袁沛元,邱艳萍,凡超,杨晓燕,高贤玉,左艳秀,向旭. 荔枝新种质‘燎原’的分子标记鉴定[J]. 分子植物育种,2016,14(1):1-9.  
LIU Wei, LUO Xinping, ZHANG Huiyun, JIANG Nonghui, XIAO Zhidan, YUAN Peiyuan, QIU Yanping, FAN Chao, YANG Xiaoyan, GAO Xianyu, ZUO Yanxiu, XIANG Xu. Identification of a novel litchi germplasm ‘Liaoyuan’ by molecular markers[J]. Molecular Plant Breeding,2016,14(1):1-9.