果 树 学 报 2026,43(2):475-479
Journal of Fruit Science

DOI:10.13925/j.cnki.gsxb.20250465

油梨新品种腾龙的选育

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摘 要:腾龙是从油梨实生苗中选育出的中熟油梨新品种。果实椭圆形,鲜果果皮呈橄榄绿色,果面光滑,肉质细腻,平均单果质量511.9 g,果形指数1.44,可食率78.6%,干物质含量(*w*,后同)19.39%,可溶性固形物含量5.6%,蛋白质含量0.84 g·100 g^{-1},维生素C含量9.23 mg·100 g^{-1},总糖含量1.54 g·100 g^{-1},脂肪含量14.6 g·100 g^{-1}。果实生育期为162~172 d。在广西崇左市龙州县,该品种于9月上旬成熟,属于中熟品种。该品种适应性强,高产、稳产,果实可食率高,种植后第4~5年进入盛果期,适宜在广西崇左地区及相似生态区栽培。

关键词:油梨;新品种;腾龙

中图分类号:S667.9 **文献标志码**:A **文章编号**:1009-9980(2026)02-0475-05

Breeding report of a new avocado cultivar Tenglong

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Abstract: *Persea americana* Mill. is an important tropical and subtropical economic crop with high nutritional value, widely and globally cultivated. At present, avocado cultivation in China is mainly concentrated in Guangdong, Guangxi, Yunnan and other provinces, but the main cultivars are single (mostly Hass), and the cultivation performance varies in different producing areas. The development of the avocado industry is in urgent need of excellent cultivars suitable for local conditions. Thus, domestic scientific research institutions have strengthened avocado breeding, and a number of local-adapted cultivars have been selected. Tenglong, a new avocado cultivar with high yield, stable production and good quality, was bred by Guangxi South Subtropical Agricultural Science Research Institute, which performed excellently in regional trials of avocado producing areas in Guangxi. As early as 1956, Guangxi South Subtropical Agricultural Science Research Institute introduced a batch of Guatemalan race avocado seedlings for trial planting in its research base. After years of observation on the propagation and cultivation of these seedlings through multiple generations, the Tenglong strain was initially screened from the offspring of multi-generational propagated seedlings in 1986. In 2016, the grafted seedlings of Tenglong were planted in the avocado orchard of the institute with a spacing of 5 m×6 m (22 plants per mu), using 5-plant plots with 5 replicates. Through 3 generations of continuous observation on the growth and fruiting habits of the grafted seedlings, Tenglong showed stable economic traits, high-yield perfor-

收稿日期:2025-08-25 **接受日期**:2025-10-14

基金项目:广西农业科学院基本科研业务费专项(桂农科2026YT037、桂农科2026YP074、桂农科2021YT159、桂农科2023YM20);国家现代农业产业技术体系广西创新团队建设(nycytxgxcxtd-2024-17-13);广西农业科学院科技先锋队专项行动(桂农科JZ202008);广西农业科学院科技先锋队“强农富民”“六个一”专项行动(桂农科盟202504)

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mance and good fruit quality. Its genetic independence was confirmed by Simple Sequence Repeat (SSR) molecular marker analysis. In 2019, yield measurement was conducted, and the single-plant yield ranged from 22 kg to 38 kg. In 2020, field identification was carried out, with an average single-plant yield of 22.8 kg. In February 2022, an application for new plant variety rights was filed with the name Tenglong. In December 2024, it passed the certification of improved forest tree varieties by the Forest and Grass Variety Certification Committee of Guangxi Zhuang Autonomous Region, with the certification number Guir-SC-PA-022-2024. Tenglong is a mid-maturing avocado cultivar for fresh consumption. It has vigorous tree vigor, a tall tree shape and luxuriant branches and leaves. The leaves are elliptical, with a length to width ratio of 2.5 and a shape factor of 0.528 0. It has type A flowers, and the flowering period is in early March. The fruit development period is 162−172 days, which ensures sufficient nutrient accumulation. The fruits ripen in early September; when ripe, the fruit stalks become yellow and the peel is smooth and green. Grafted seedlings can bloom and bear fruit in the 3rd year after planting, and enter the full fruiting period in the 4th-5th year, with a yield of about 501.6 kg per 666.7 m² during the full fruiting period. The fruits of Tenglong are elliptical, with a fruit shape index of 1.44. The average single fruit weight at maturity is 511.9 g, the peel thickness is 0.81 mm, and the edible rate is 78.6%. The soluble solid content is 5.6%, the dry matter content is 19.39%, the protein content is 0.84 g·100 g^{-1}, the vitamin C content is 9.23 mg·100 g^{-1}, the total sugar content is 1.54 g·100 g^{-1}, and the fat content is 14.6 g·100 g^{-1}. The peel of fresh fruits is medium olive green and smooth, while that of ripe fruits turns yellowish-green. The flesh is delicate and soft. Compared with the control cultivar Guikenda 2, Tenglong has larger fruits, higher edible rate, significantly lower astringency (not obvious in avocado), better taste, more stable yield and better commercial quality. Tenglong has strong adaptability and is easy to cultivate and manage. It is suitable for cultivation in areas with an annual average temperature of 21−23 ℃, a minimum temperature of ≥13.5 ℃ in the coldest month, an extreme low temperature of ≥0 ℃, an annual rainfall of 1000−2000 mm and little typhoon impact. The suitable soil is sandy loam with a depth of more than 1.0 m, a groundwater level below 1.5 m and a pH value of 4.5−6.0. Due to its excellent economic traits, early fruiting, as well as high and stable yield, Tenglong is suitable for promotion and cultivation in Chongzuo area of Guangxi and other ecological areas with similar conditions.

Key words: Avocado; New cultivar; Tenglong

油梨（*Persea americana* Mill.），又称鳄梨、牛油果，富含营养，是热带和亚热带地区广泛种植的经济作物[1]。目前，油梨在中国广东[2]、广西[3]和云南[4]等多个省区种植推广，但品种结构单一，多为哈斯品种，且多产区栽培表现良莠不齐。适宜当地的优良品种是油梨产业发展的支撑，为此，国内各科研单位加强了油梨育种工作，成功选育出一批适宜本地种植的品种，如桂垦大2号、紫金[5]等。腾龙是广西南亚热带农业科学研究所最新选育的油梨品种，该品种高产、稳产、品质好，在广西油梨产区区域试验中表现优异。

1 选育过程

腾龙是广西南亚热带农业科学研究所从危地马拉系实生苗中，经过多代繁育与观测，于1986年筛选出的优良品系。2016年，在研究所的油梨园内定植该品种，安排品种比较试验，种植株行距为5 m×6 m，对应密度为22株/666.7 m²。试验采用5株为一个小区，共设置5个重复。2019年产量测定结果显示，单株产量为22~38 kg；2020年现场鉴定其平均单株产量为22.8 kg。2022年2月申请植物新品种权，并于2024年12月通过广西壮族自治区林木和草品种审定委员会林木良种认定（良种编号：桂R-SC-PA-022-2024），良种名称定为腾龙（图1）。

2 品种分子鉴定

为进一步判定腾龙与现有油梨品种的差异，利

图1　油梨新品种腾龙

Fig. 1　A new avocado cultivar Tenglong

用SSR分子标记技术对腾龙在内的79份油梨种质进行鉴定。结果表明，用5对引物（Pac066、Pac122、Pac131、Pac145和Pac146）可以将腾龙和其余78份油梨种质区分，确定其为独立的种质（图2）。PCR反应程序为96 ℃预变性3 min；96 ℃变性30 s，62~52 ℃梯度退火30 s，72 ℃延伸1 min，30个循环；72 ℃延伸10 min，4 ℃保存。

3　主要性状

3.1　生长结果习性

树势旺盛，树型高大，枝多叶茂，叶片椭圆形。嫁接苗定植后第3年便可开花结果，第4~5年进入盛果期，每666.7 m^2产量约为501.6 kg。花期为3月上旬，A型花，果实生育期为162~172 d，于9月上旬成熟。

3.2　果实经济性状

果实椭圆形，果形指数1.44，成熟期平均单果质量511.9 g，果皮厚度0.81 mm，可食率78.6%；干物质含量（w，后同）19.39%，蛋白质含量0.84 g·100 g^{-1}，维生素C含量9.23 mg·100 g^{-1}，总糖含量1.54 g·100 g^{-1}，脂肪含量14.6 g·100 g^{-1}，可溶性固形物含量5.6%（表1）。果皮光滑，鲜果中等橄榄绿色，后熟果实黄绿色，肉质细腻。与对照品种相比，腾龙果肉质地绵软，可食率高，果实性状、大小也存在明显差异，果实商品性好，且高产稳产，比对照品种桂垦大2号增产20.2%~117.3%（表2）。

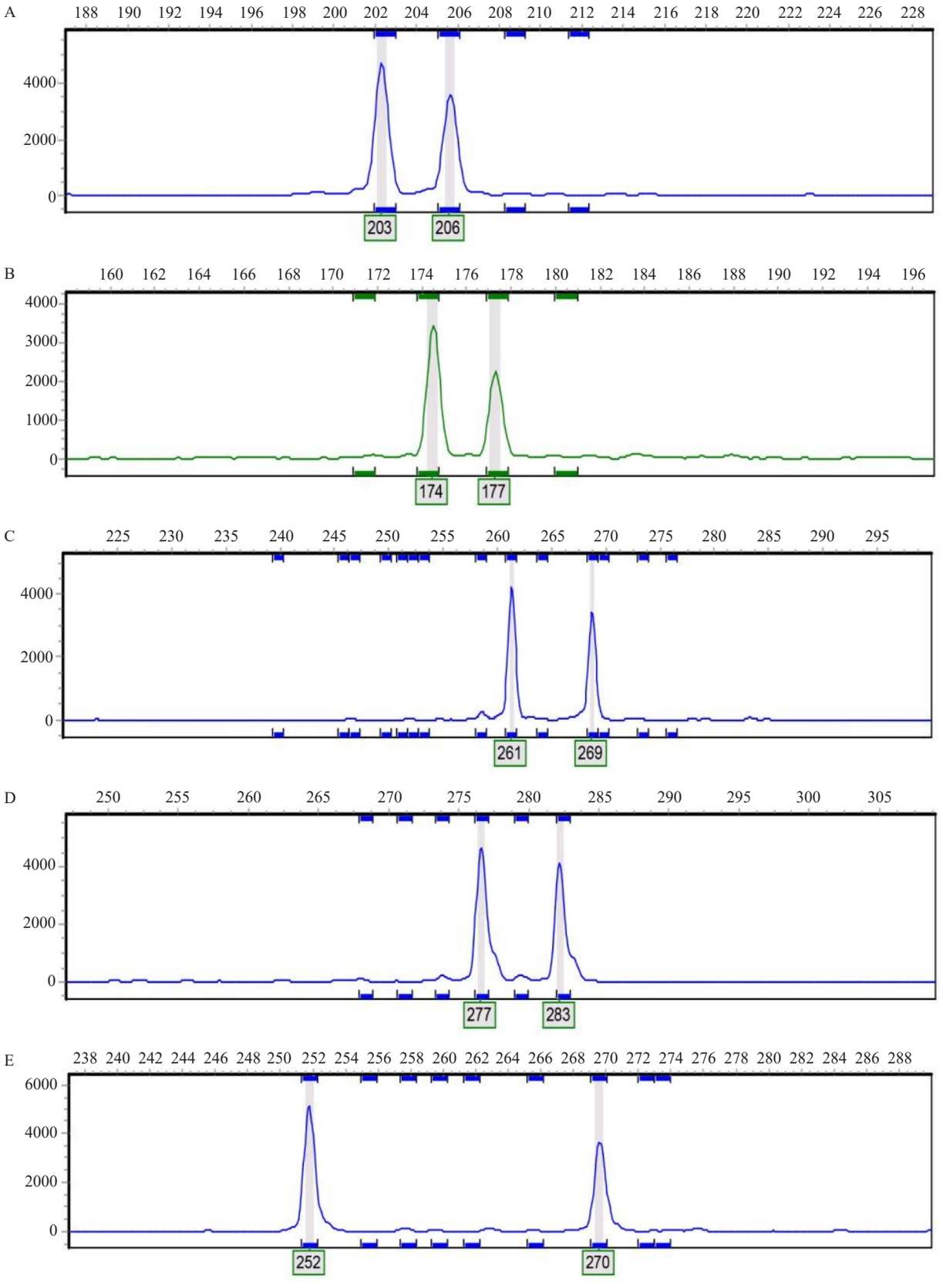
4　栽培技术要点

4.1　种植及建园技术

株行距以5 m×7 m为宜，平地种植密度为17~22株•666.7 m^{-2}，具体种植密度可根据地势、土壤肥力及栽培管理水平进行调整。平地建议起垄种植，授粉品种可搭配花期相遇的B型花品种，如Lisa等。

4.2　水肥管理

施肥时避免使用含氯复合肥，宜采用撒施、淋施或浅沟施肥等方法，浅沟深度不宜超过10 cm。



A.Pac006 引物；B. Pac122 引物；C. Pac131 引物；D. Pac145 引物；E. Pac146 引物。

A.Pac006 primer; B. Pac122 primer; C. Pac131 primer; D. Pac145 primer; E. Pac146 primer.

图 2 腾龙引物标准峰值图

Fig. 2 Tenglong primers standard chromatogram

表 1　腾龙与对照品种果实特性比较

Table 1　Comparison of fruit characteristics between Tenglong and the control cultivar

品种 Cultivar	单果质量 Single fruit mass/g	纵径 Longitudinal diameter/mm	横径 Transverse diameter/mm	果形指数 Fruit shape index	种子质量 Seed mass/g	可食率 Fruit edible rate/%	w（干物质） Dry matter content/%	w（可溶性固形物） Soluble solids content/%
腾龙 Tenglong	511.9	131.19	91.27	1.44	80.04	78.59	19.30	5.6
桂垦大2号 Guikenda 2	429.0	94.97	86.14	1.10	93.81	68.01	22.47	11.7

表 2　腾龙与对照品种产量比较

Table 2　Comparison of yields between Tenglong and the control cultivar

品种 Cultivar	树龄 Tree age/a	株产 Yield per plant/kg	比对照增产 Yield increase compared with control/%
腾龙 Tenglong	3	22.07	62.6
桂垦大2号 Guikenda 2		13.57	–
腾龙 Tenglong	4	36.30	117.3
桂垦大2号 Guikenda 2		16.70	–
腾龙 Tenglong	5	39.50	38.1
桂垦大2号 Guikenda 2		28.60	–
腾龙 Tenglong	6	46.50	42.8
桂垦大2号 Guikenda 2		32.56	–
腾龙 Tenglong	7	35.60	20.2
桂垦大2号 Guikenda 2		29.60	–

结果树建议每年施肥4次：每年2月前施用花前肥（有机肥20~25 kg•株$^{-1}$，复合肥1 kg•株$^{-1}$）；第二次生理落果前施用稳果肥（复合肥1.5 kg•株$^{-1}$）；在6月下旬施用果实膨大肥（复合肥1.5 kg•株$^{-1}$）；在10—11月施用采后肥（复合肥2~3 kg•株$^{-1}$，增加N肥比例）。此外，在挂小果后15~20 d喷施一次磷酸二氢钾。

4.3　病虫害防治

重点防治炭疽病、茎溃疡病、轮枝孢萎蔫病、疮痂病、小穴壳果腐病、蒂腐病等病害，以及果实蝇、潜叶蛾、蚜虫、蓟马、蝽象等虫害，及时清除果园内病死枝梢、枯枝落叶、落地烂果。应采取综合防治，使用松脂酸铜、百菌清、乙磷铝、杀螟松、毒死蜱、吡虫啉、敌百虫等中低毒化学药剂。第二次生理落果后，可采用白色纸袋进行果实套袋。

5　应用前景

腾龙是中熟油梨品种，果实经济性状优良。在崇左市龙州县、扶绥县和南宁市宾阳县等3个县开展的区域品比试验结果表明，该品种栽培表现出色，适应性强，早结、丰产、稳产，适宜在相似生态区推广种植。

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