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# 油柰新品种‘古田早柰’的选育

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**摘 要**：‘古田早柰’是从福建省古田县鹤塘镇西洋村的柰李选种圃中优选出来的油柰(*Prunus salicina* Lindl. var. *cordata*)新品种。早熟性明显，丰产稳产性好，果大质优。果顶凸，平均单果质量103.3 g；果皮浅黄色或绿色透黄，果粉厚，果肉黄色，可食率达97.8%。果实可溶性固形物含量（*w*，后同）为12.41%~13.50%，可滴定酸含量（以苹果酸计）为0.90%~1.06%，总糖含量（以葡萄糖计）为8.4%~9.58%，还原糖含量（以葡萄糖计）为6.3%~7.5%。成熟期在6月底至7月中上旬，比普通油柰早熟20~25 d。适宜在福建省桃、李、柰种植区种植。

**关键词**：油柰；新品种；‘古田早柰’；早熟

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## A new *Prunus salicina* Lindl. var. *cordata* cultivar ‘Gutianzaonai’

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**Abstract:** Nai plum (*Prunus salicina*), a member of the Rosaceae family, originated from China. It is also a famous fruit crop in the Fujian province of China due to its characteristic taste, aroma and flavour. As early as the 1970s and 1980s, it was widely promoted in Gutian county, Pucheng county, Yongtai county, Guangze county, and Fuzhou city in Fujian province. It has become a green industry in the province and a rich industry for farmers. However, there are many problems in production, such as structure onefold, a large number of mid-maturing varieties, concentrated maturity, high-temperature season during harvest, difficult storage of fruits, and extreme lack of early-maturing varieties. Therefore, cultivating new varieties of early maturity is an important issue that needs to be resolved in order to improve the structure of the plum industry variety in Fujian and extend its market supply period. ‘Gutianzaonai’ is a new variety of early ripening ‘Younai’ plums, which is selected from breeding nursery in Xiyang village, Hetang town, Gutian county, Fujian province. It was initially selected in 2000 for its self-fruitful characteristic and very early ripening time (it matures from the end of June to early July and meets the requirements for commercial fruit harvesting). After regional adaptability testing at different sites (including Gutian county, Pingnan county, Jianyang county, Qingliu county, Liancheng county of Fujian province), it was finally selected in 2019. This species is a vigorous tree with evenly distributed branches. The young shoot is green, 2-year branch is light gray-brown, perennial branch is gray-brown. The germinating rate is high, and branching ability is strong. The fruit setting mainly depends on short fruit branches and bouquet-shaped fruit branches. Leaves are long oval, 6.93 cm long and 2.45 cm wide, and obtusely serrated. The flowers are bisexual, white and open before the leaves. Fruits are lager, heart-shaped with a pronounced apex. The average weight of fruit is 103.3 g; skin ripens to yellow with thick cuticle wax; pulp is amber yellow, translucent, tender and juicy; it is half-clingstone; edible rate is 97.8%. The content of soluble solids, titratable acid (as malic acid), total sugar and reducing sugar (as

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glucose) in ‘Gutianzaonai’ fruit juice is about 12.41%-13.50%, 0.90%-1.06%, 8.4%-9.58% and 6.3%-7.5%, respectively. The fruit quality is excellent. The period from anthesis to fruit ripening is about 100-120 d, its time of bud-burst at the middle of February, and full bloom at March, fully mature date in early July in Gutian county, Fujian province. It matures 20-25 d ahead of time compared to younai. It has good stress resistance and environmental adaptability. Suitable cultivation area is peach and plum planting area of Fujian Province. This variety has a large amount of flowers and good yield. The yield of a 3-year tree is 13.5 kg; the yield of a 5-year tree is 68.5 kg, and the yield per 666.7 $m^2$ is 2 541.9 kg (based on 37 plants per acre). Seedlings should be selected from the winter and spring grafted seedlings of the downy peach rootstock. The depth, width, and length of the cave are 0.8 m × 1.2 m × 1.2 m. Top dressing was performed 3 times during growth. While applying fertilizer, it can be watered at the same time. Pruning can be done in winter, including erasing redundant branches, dense branches and poor branches. Prevention of pests and diseases should be taken seriously, especially control of *Monilinia fructicola* and *Xanthomonas pruni*.

**Key words:** *Prunus salicina*; New cultivar; ‘Gutianzaonai ’; Early-ripening

柰李是原产福建省的晚熟优质李，其果桃形李实，皮薄油亮，绿里透黄，香甜适口，营养丰富；食用柰果可清脾润肺，有利于人体健康，深受国内外消费者的喜爱[1]。早在20世纪70—80年代就在福建省古田县、浦城县、永泰县、光泽县和福州市等地大量推广种植，已成为该省的绿色产业、农民的致富产业[2]。但目前生产中李主栽品种相对单一，中熟品种多，成熟期集中，采收期逢高温季节，果实不易贮藏，早熟李品种极度缺乏。因此，培育早熟新品种是改善福建省李产业品种结构，延长其市场供应期亟待解决的重要问题。针对这一产业问题，福建农林大学园艺学院柰李课题组经过多年的不懈努力，成功选出综合性状优良、早熟、果大质优和适应性广的油柰新品种‘古田早柰’。

## 1 选育过程

上世纪90年代初，福建农林大学园艺学院柰李课题组为了充分发掘福建省柰李类品种资源，培育品质优、果形大和成熟期早的柰李新品种，开展了大量柰李品种选育调查和杂交育种研究工作。2000年5月，在古田县鹤塘镇西洋村的柰李选种圃（119°09′39.01″E，26°67′52.02″N，海拔453 m）油柰品种中，发现早熟单株突变体。通过复选阶段鉴定表明果实成熟期早（6月底到7月上旬即成熟，达商品果采收要求），果实生育期为100~120 d，成熟果实色泽鲜艳，果皮浅黄色或黄色带绿，果实表面果粉厚。该品种目前在福建省内区试，推广面积已达246.7 $hm^2$，主要分布在古田、屏南、建阳、清流、连城、长汀等地，年产量9 000多t，有力地促进了该省李类品种结构的调整与栽培经济效益的提高。2019年12月通过福建省林木品种审定委员会良种审定，定名为‘古田早柰’（曾用名‘早熟油柰’‘早柰’，图1），良种编号为闽S-SV-PS-025-2019。

## 2 主要性状

### 2.1 植物学特征

‘古田早柰’品种树势强健，树姿半开张，枝条分布均匀。1 a（年）生枝绿色，阳面有红色，成熟新梢呈浅灰绿色；2 a生枝呈浅灰褐色；多年生枝灰褐色，树干皮灰褐色、平滑，部分存在白色斑点茸毛。萌芽率高，成枝率强，以短果枝和花束状果枝结果为主。叶片长椭圆形，先端渐尖，基部楔形，叶缘细密圆钝锯齿状，长×宽为6.93 cm ×2.45 cm。叶面深绿色，叶背淡绿色，叶两面无毛。浓绿色，叶尖锐尖，叶柄红褐色。叶芽长尖锥形，锐尖，比花芽瘦而小。花为两性花，花瓣5片，单雌蕊，雄蕊20~30枚，花丝长短不等，排成紧密2轮，每个花序1~3朵花，先叶开放，幼叶红褐色，花苞顶部蛋圆，花白色。

### 2.2 果实经济性状

果实呈心形，果顶微凸，油柰特征明显；果实大，平均单果质量103.3 g，果形指数1.05；果皮浅黄色或绿色透黄，果粉厚；果肉淡黄或橘黄色、半透明，质细腻，多汁，纤维少，味酸甜，可食率达96.2%。该品种可溶性固形物含量（*w*，后同）为13.50%，可滴定酸（以苹果酸计）为1.06%，总糖（以葡萄糖计）为8.42%，可食率为96.2%（表1）。


**图1　油柰新品种‘古田早柰’**

**Fig. 1　A new *Prunus salicina* Lindl. var. *cordata* cultivar ‘Gutianzaonai’**

**表1　‘古田早柰’与‘油柰’的性状比较**

**Table 1　Comparison of fruit economic characters between ‘Gutianzaonai’ and ‘Younai’**

| 品种 Cultivar | 成熟期 Muturity | 果形指数 Fruit shape index | 单果质量 Single fruit mass/g | *w*(可溶性固形物) Soluble solids content/% | *w*(可滴定酸) Titratable acid content/% | *w*(总糖) Total sugar content/% | 可食率 Edible rate/% |
|---|---|---|---|---|---|---|---|
| 古田早柰 Gutianzaonai | 6月底至7月上旬 Late June to early July | 1.05±0.04 b | 103.3±16.1 a | 13.5±0.47 a | 1.06±0.08 b | 8.42±0.04 a | 96.2±8.41 a |
| 油柰 Younai | 7月底至8月中旬 Late July to mid-August | 1.18±0.11 a | 110.6±7.2 a | 10.5±0.74 b | 1.46±0.05 a | 7.89±0.02 a | 93.8±5.85 b |

注：不同小写字母表示显著差异($p < 0.05$)。

Note: Different small letters indicate significant difference at $p < 0.05$.

### 2.3　生长结果习性

‘古田早柰’树体根系发达，对土壤适应性强。树体成枝力强，短截后一般能抽出2~3条枝，新梢在1.2 m以上。3 a生树树高2.1 m，干高73.0 cm，干周6.2 cm，冠幅3.05 m ×2.62 m；12 a生树树高4.5~5.7m，干周47.8 cm，冠幅4.25 m ×3.48 m。幼树以短果枝结果为主，成年树以花束状果枝和短果枝为主。自花能实，花量大，丰产性好，3 a生树单株产量为13.5 kg；5 a生树株产68.5 kg，每666.7 $m^2$产量达2 541.9 kg（以每666.7 $m^2$ 37株计）；徒长枝当年可成花芽，第二年结果。

### 2.4　物候期

‘古田早柰’在古田、连城、屏南等地种植。2月中下旬至3月初萌芽；2月底至3月中旬始花，3月中下旬盛花，花期半个月左右，边开花边展叶；4月上中旬第一次生理落果；果实4月下旬硬核；4月底至5月初第二次生理落果，5月中下旬迅速膨大，6月上中空腔形成，6月底至7月上旬成熟；成熟后，果实挂树时间达15 d；落叶期12月下旬至1月上旬。果实生育期为100~120 d，比普通油柰早熟20~25 d。

## 3　遗传鉴定

参考本实验室Wu等[3]的研究结果，利用ISSR分子标记技术对对福建省栽培的33个李品种进行遗传多样性和群体结构分析。从加拿大英国哥伦比亚大学公布的100个引物中，筛选条带清晰，多态性明显的14对适合李类资源的ISSR引物，对33个李品种进行PCR扩增，聚丙烯酰胺凝胶电泳检测和分析。结果发现，‘油柰’和‘古田早柰’存在着明显的分支，说明‘古田早柰’在DNA水平上存在差异，具备成为新品种的遗传基础。

## 4　栽培技术要点

### 4.1　园地选择

‘古田早柰’对环境条件要求不严格，通常不低于-4 ℃的气温均可种植。pH值5.3~6.5。宜在背风

向阳洼地和东南坡土层深厚，坡度25~35°的壤土或沙壤土均可建园，如在黄壤、红黄壤上建园应注意增施有机肥、绿肥、石灰，调节土壤酸碱性，挡风地方应种植杉树、桉树作防风林带，园地应排水良好，交通方便。

### 4.2 建园定植

苗木应选择毛桃砧木的冬春嫁接苗，杆粗0.6 cm，高70 cm，山地建园最好用小挖机等高水平建园，株距4 m×4 m或4 m×5 m，每666.7 $m^2$栽42~33株。穴深0.8 m×宽1.2 m×长1.2 m。每株基肥50~75 kg，石灰1.5 kg（适于老果园改造），宜梅花形栽植。栽后及时浇透水以利成活。以自然开心形定干，干高40~60 cm。

### 4.3 整形修剪

采用自然开心形。幼树应长放轻剪为主，疏除过密枝。为促进结果早、丰产的树冠形成，通常多在3个主枝基础上保留5~7个骨干枝，以吊、拉枝形式，促发斜生枝、短果枝，提早结果。结果后以疏剪方式为主，培养立体结果树势，避免短枝修剪平面结果、球面结果的低产树形；成年结果树以长放轻剪为原则。进入盛果期后，长放的一、二、三级骨干枝，确保侧枝上结果量的稳定性效应，减少主、侧枝中上部营养枝萌发，可大量促进枝梢中下部形成大量的短果枝，花束状果枝。

### 4.4 肥水管理

生长期间进行3次追肥。第一次在4月下旬—5月上旬，每株施复合肥1.0~1.5 kg，硼锌肥250 g，硝酸钙250 g；第二次在6月上中旬施复合肥1.5 kg，增施硫酸钾0.5 kg；第三次在7月上中旬采果前后施复合肥1.0 kg，加尿素0.25~0.5 kg。采果后于10—11月，以有机肥为主，每株有机肥25~30 kg，增施钙镁磷肥2.5~5.0 kg，有条件的亦可以火烧土每株25~50 kg，深埋绿肥15~25 kg。在干旱半干旱年份，在花前、花后、幼果、果实膨大期应灌水3~4次，每次以灌透1 m深左右，或树盘覆草，保持田间持水量为65%。

### 4.5 病虫害防治

‘古田早柰’主要病害有红点病、细菌性穿孔病、焦叶病、白粉病、烟煤病、褐腐病；主要虫害为桔心食蝇、蚜虫、红蜘蛛、桑白蚧、梨小食心虫、吸果夜蛾、蝽蟓等。芽期注意防治焦叶病、炭疽病和蚜虫等；果实生长发育期易受褐腐病、穿孔病、红点病和介壳虫危害，应及时喷药防治，药剂可选用70%甲基托布津800倍和65%代森锌600倍等。

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