

# 紫仁深纹核桃新品种云香1号的选育

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**摘 要:**云香1号(*Juglans sigillata* ‘Yunxiang 1’)是从云南省鲁甸县深纹核桃资源中实生选育而成的紫仁深纹核桃新品种。坚果圆球形, 均匀美观, 三径均值2.84 cm; 种壳刻纹大而浅, 厚度0.87 mm; 单果质量7.32 g, 核仁饱满, 浅紫色, 易取整仁, 仁质量4.93 g, 出仁率高达67.35%, 食味香纯, 无涩味, 口感细腻。核仁含油率65.1%, 蛋白质含量(w)18.5%。在鲁甸地区, 该品种于3月上旬发芽, 9月中旬果实成熟, 其果枝率70.2%, 多为三果和四果, 平均每果枝坐果2.6个, 平均冠幅投影面积干果产量0.36 kg·m<sup>2</sup>。该品种结实早, 产量高, 壳薄, 出仁率高, 核仁浅紫色, 口感佳, 具有较强的抗寒、抗病虫能力, 适宜在鲁甸县海拔1600~2100 m、年均温12~16 °C、年降雨量800~1100 mm、≥10 °C活动积温≥3500 °C区域及周边相似地区种植。

**关键词:**深纹核桃; 新品种; 云香1号; 紫仁; 早实丰产

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## Breeding report of a new small-fruit-type purple kernel variety of *Juglans sigillata* ‘Yunxiang 1’

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**Abstract:** Yunxiang 1 is a new small-fruit-type purple kernel walnut variety selected from seedling resources of *Juglans sigillata* in Ludian County, Yunnan Province. The nut is spherical and uniform, and the shape is beautiful; the average diameter of the nuts is 2.84 cm. The shell features shallow grooves, the shell thickness is 0.87 mm, and the nut weight is 7.32 g. The kernel weighs 4.93 g, exhibits a light purple color, and is plump with an intact extraction rate. The kernel rate is 67.35%. The kernel has a delicate texture and rich aroma without astringency. The walnut kernel has an oil content of 65.1%, and a protein content of 18.5%. The tree vigor is strong, the tree posture is semi-open, and it is naturally open. The 1-year-old dormant branches are purple-brown, with prominent lenticels and sparse density. Mixed bud is triangle with no stalk. There are 9–13 small leaves, and the top leaves are mostly degenerated and spindle-lanceolate. It germinates in early March in Ludian, the male flower disperses in late March, the female flower blooms in early and middle April, the female flower stigma is light red, the flowering habit is protandry, the fruit matures in mid-September, and the leaves fall in late November. The green fruit (husk) is spherical, the fruit surface is covered with yellow fluff, the fruit point is obvious, and the

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fruit top is not prominent. The clone of this variety blossoms and bears fruit in the second year after the top-working of 4–5 years old tree (3–4 years earlier than that of Yangbi Pao walnut), which has obvious early-fruiting trait. The fruiting branches of the mother tree account for 50.3%, and the fruit branch rate is 70.2%. There are three or four more fruits, with an average of 2.6 fruits per fruiting branch. The average crown projection area produces  $0.36 \text{ kg} \cdot \text{m}^{-2}$  of dried nut. This variety has the characteristics of early fruiting, high yield, round nut shape, uniform and beautiful, full and plump kernel, easiness to take out the whole kernel, light purple kernel, high kernel rate, excellent taste and so on. At the same time, it has good cold, disease and insect resistance. It is a rare new variety of small-fruit-type walnut, which can be applied to the development and utilization of walnut food for kernel, tourism and leisure snacks. It has significant potential in improving quality and efficiency and optimizing variety structure in walnut planting base in Yunnan. The popularization and application of this variety is expected to effectively improve the yield and quality of walnut fruit, enhance market competitiveness, and improve the comprehensive benefits of the industry. It is suitable for Ludian County at an altitude of 1600–2100 m, with an average annual temperature of 12–16 °C and an annual rainfall of 800–1100 mm,  $\geq 10$  °C active accumulated temperature  $\geq 3500$  °C area and the surrounding similar conditions of planting.

**Key words:** *Juglans sigillata*; New variety; Yunxiang 1; Purple kernel; Early fruiting and high yield

深纹核桃(*Juglans sigillata*)又称泡核桃、茶核桃、铁核桃,是中国核桃属植物特有种,主要分布于云南和贵州全境、四川和湖南部分地区、广西西部、西藏南部,以及沿怒江、澜沧江、金沙江、岷江和雅鲁藏布江等流域<sup>[1]</sup>。云南是深纹核桃的起源和分布中心,也是深纹核桃的主要种植区,种植历史悠久<sup>[2-3]</sup>。选育具有显著特色的优良品种,是提升云南核桃产业核心竞争力的关键策略与破局路径。

通过资源收集开展核桃实生选育,是核桃良种选育的有效途径<sup>[4-5]</sup>。鲁甸县地处云南省昭通市西南部的乌蒙山腹地,其复杂的地形地貌(山高谷深)、显著的立体气候特征以及历史上交通不便形成的自然隔离,有效减少了外来种质渗入,使该区域保存并积累了丰富独特的深纹核桃种质资源,为良种选育提供了宝贵的种质基础<sup>[6]</sup>。云香1号选育聚焦鲁甸县特色深纹核桃资源的开发与创新,以培育兼具丰产性、特异性及商品优势的核桃新良种为目标,为云南核桃产业的高质量发展提供核心种质资源支撑。

## 1 选育过程

2010年,云南省林业和草原科学院联合鲁甸县林业和草原局对当地核桃种质资源进行调查,发现存在大量口感好且仁色特异的种质资源。因此,采用选择育种的方式,通过制定优株标准、群众报优、

初选、复选、决选,最终筛选一批仁色特异的核桃优株,并于2012年嫁接于鲁甸县三八林场,进行无性系测定。结果表明,该无性系嫁接后第2年开始挂果,且坚果品质佳,核仁浅紫色,口感优于现有品种。2017年分别在云南省禄劝县、镇雄县开展区域性试验和生产性试验。多年试验观测结果表明,该优系丰产性强、产量高;坚果圆球形,果虽小但均匀美观,出仁率高,核仁浅紫色,口感好。此外,分子标记分析表明,该无性系与云南省主栽品种漾濞泡核桃在分子水平上存在差异(图1)。2024年12月通过云南省林木品种审定委员会认定,命名为云香1号,编号:云R-SC-JS-074-2024。

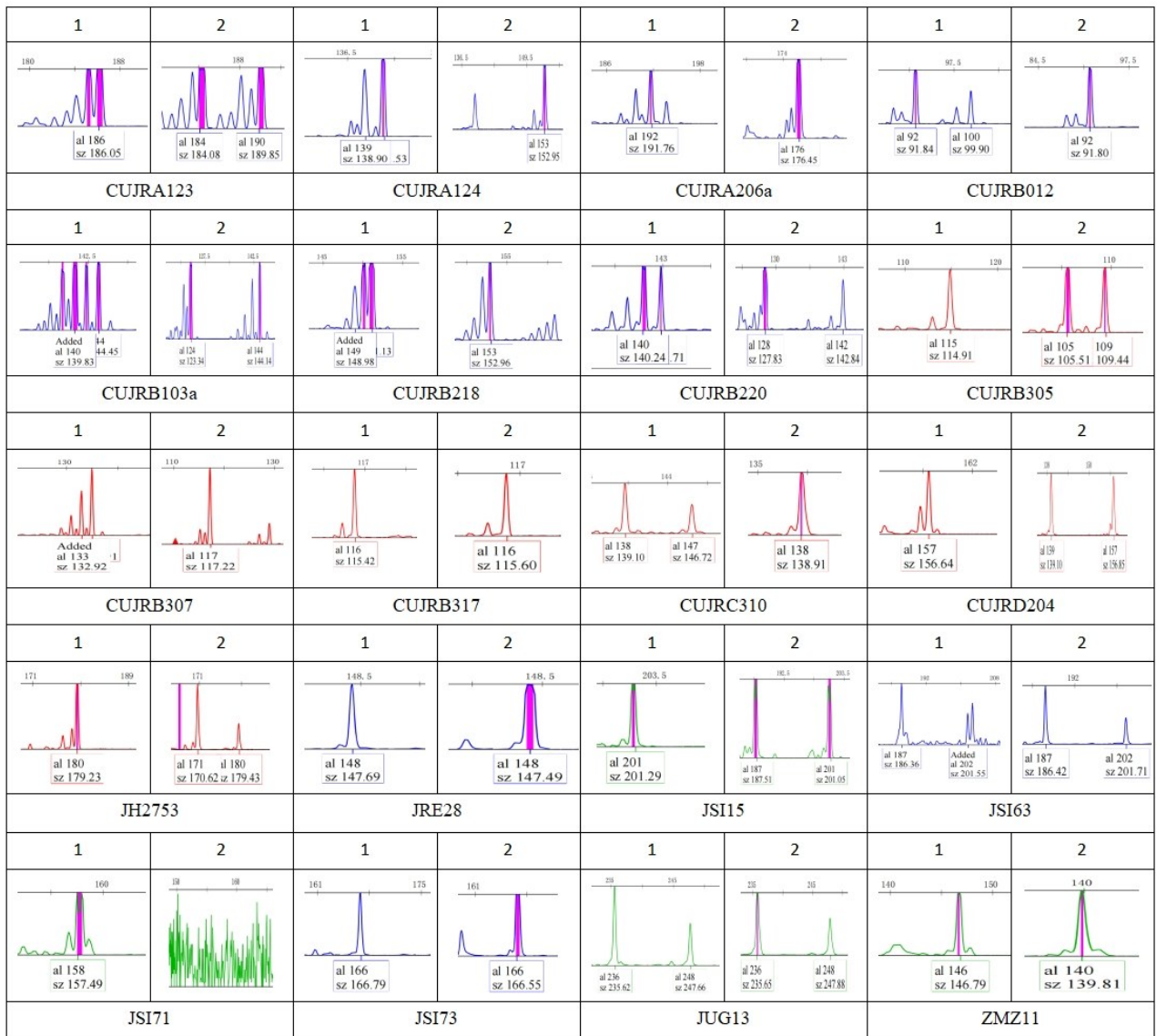
## 2 主要性状

### 2.1 植物学特征

云香1号无性系母树树龄90 a(年),生长海拔为1850 m。树势强,树姿半开张,自然开心形。1年生休眠枝紫褐色,皮孔突出且稀疏。混合芽呈三角形,无芽柄。小叶9~13枚,顶叶多退化,呈纺锤披针形。雌花柱头淡红色;青果圆球形,果面密被黄色茸毛,果点明显,果顶不突出(图2)。

### 2.2 物候期

在鲁甸地区,云香1号无性系于3月上旬发芽,3月下旬雄花散粉,4月上中旬雌花盛开,开花习性为雄先型,9月中旬果实成熟,11月下旬落叶(表1)。



1. 云香1号;2. 漾漈泡核桃。

1. Yunxiang 1; 2. Yangbipao.

图1 云香1号与漾漈泡核桃的20个SSR位点的毛细管电泳检测结果

Fig. 1 Capillary electrophoresis detection results of 20 SSR loci in Yunxiang 1 and Yangbi pao walnut



图2 云香1号结果习性及丰产性

Fig. 2 Fruiting character and high-yielding capacity of Yunxiang 1

表 1 云香 1 号与对照品种漾濞泡核桃物候期观察

Table 1 Phenological observation of Yunxiang 1 and the control variety Yangbipao

品种 Variety	萌芽期 Bud break period	雄花花期 Male flowering period	雌花花期 Female flowering period	开花习性 Flowering habit	落叶期 Leaf fall period
云香 1 号 Yunxiang 1	3月7日—3月10日 Mar. 7 to Mar. 10	3月27日—4月2日 Mar. 27 to Apr. 2	4月6日—4月13日 Apr. 6 to Apr. 13	雄先型 Male first type	11月下旬 Late Nov.
漾濞泡 Yangbipao	2月28日—3月3日 Feb. 28 to Mar. 3	3月22日—3月31日 Mar. 22 to Mar. 31	4月7日—4月13日 Apr. 7 to Apr. 13	雄先型 Male first type	11月上旬 Early Nov.

### 2.3 结果习性与丰产性

云香 1 号无性系高枝换接于 4~5 年生树, 第 2 年便可开花结果(结果时间比漾濞泡核桃提前 3~4 a), 具有明显的早实性。以中短果枝结果为主, 分枝力强, 侧枝结果力较强。母树侧枝结果枝占比 50.3%, 果枝率 70.2%, 多为三果和四果, 平均每果枝坐果 2.6 个(图 2), 平均冠幅投影面积干果产量 0.36 kg·m<sup>-2</sup>。

### 2.4 坚果品质特性

坚果圆球形, 三径均值 2.84 cm; 种壳刻纹大而浅, 厚度 0.87 mm; 单果质量 7.32 g, 仁质量 4.93 g, 种实饱满肥厚, 核仁浅紫色, 易取整仁, 出仁率 67.35% (图 3)。核仁含油率 65.1%, 蛋白质含量 18.5%, 食味香纯, 无涩味、口感细腻(表 2)。



图 3 云香 1 号坚果品质特性

Fig. 3 Nut quality character of Yunxiang 1

表 2 云香 1 号与对照品种漾濞泡核桃坚果品质比较

Table 2 Comparison of nut quality between Yunxiang 1 and control variety Yangbipao walnut

品种 Variety	三径均值 Average value of three diameter/cm	果形 Fruit shape	单果质量 Single fruit mass/g	仁质量 Kernel mass/g	出仁率 Kernel rate/%	饱满程度 Fullness	取仁难易 Difficulty of kernel extraction	仁色 Kernel color	食味 Flavor	口感 Taste	壳厚 Thickness of shell/mm	含油率 Oil content/%	w(蛋白质) Protein content/%
云香 1 号 Yunxiang 1	2.84	圆球 Spherosome	7.32	4.93	67.35	饱满 Plump	易取整仁 Easy to extract whole kernels	浅紫色 Light purple	香纯, 无涩味 Rich aroma, no astringency	细腻 Delicate texture	0.87	65.1	18.5
漾濞泡 Yangbipao	3.52	扁圆球 Oblate sphere	12.10	6.53	53.97	饱满 Plump	易取半仁 Easy to extract half kernels	黄白色 Yellowish white	香纯微涩 Rich aroma, little astringency	稍粗 Little rough texture	1.10	61.2	20.5

## 3 栽培技术要点

### 3.1 种植范围

适宜在云南鲁甸海拔 1600~2100 m, 年均温 12~16 °C, 年降雨量 800~1100 mm, ≥10 °C 活动积温 ≥3500 °C 区域及相似气候区种植。

### 3.2 定植

适宜在休眠期定植, 可采用 6 m×7 m 或 7 m×8 m

的株行距, 也可在田边地角灵活栽种。定植穴规格为 80 cm×80 cm×80 cm, 每穴施足基肥(腐熟农家肥 20~30 kg+三元复合肥 0.3 kg)。

### 3.3 水肥管理

每年 9—10 月结合施入基肥(20~50 kg·株<sup>-1</sup>)深耕土壤, 提倡粮林间作与绿肥种植。1 年追肥 2~3 次: 展叶初期至开花前(3—4 月)施用速效氮肥; 幼果膨大期(5—6 月)施用氮肥+复合肥; 坚果硬核期

(7—8月)主施磷钾复合肥。在春早期(3—4月)应根据土壤墒情浇水1~2次。

### 3.4 整形修剪

定干高度为1.2~1.5 m,采用开心形或疏散分层形树形,通过环剥及施用生长调节剂控冠促产。

### 3.5 病虫害防治

重点防治果实害虫(核桃举肢蛾)、蛀干害虫(云斑天牛)、枝梢害虫(木蠹蛾)、叶部害虫(金龟子、绿叶蝉)及细菌性黑斑病。秋冬季节对树干涂白。

## 4 应用前景

云香1号核桃大树嫁接后第2年开始挂果,具有优良的早实特性,且丰产性能好,果枝率为70.2%,平均冠幅投影面积干果产量 $0.36 \text{ kg} \cdot \text{m}^{-2}$ ,在云南核桃种植基地的提质增效与品种结构优化中具有显著潜力。该品种的推广应用预期将有效提升核桃果品的产量与质量,增强市场竞争力,并提高产业的综合效益。

坚果圆球形,均匀美观,种实饱满肥厚,核仁浅紫色,易取整仁,出仁率高,口感极佳,是少有的小果型核桃良种,可应用于仁用核桃食品及其在旅游、休闲小食品等方面的开发。

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