

## 香榧新品种‘磐安长榧’的选育

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**摘 要:**‘磐安长榧’是从磐安县香榧古树中选育出的新品种,母树为嫁接古树,通过无性繁殖培育子代。该品种种实、种核、种仁均为细特长形,与当前主栽品种‘细榧’明显不同;种实平均单个鲜质量6.8 g,纵径3.62 cm,横径1.73 cm,种形指数2.10,假种皮厚0.33 cm,鲜出核率37.13%,干出核率70.24%;种核平均单个鲜质量2.5 g,纵径3.45 cm,横径1.18 cm,核形指数2.95,壳厚0.08 cm,干核出仁率69.08%;种仁平均单个干质量1.1 g,含油率50.4%,可溶性糖含量(w,后同)2.87%,蛋白质含量14.0%,品质上,商品性能优。在浙江磐安开花期4月中旬,成熟期第二年9月上旬,树势强,结果早,丰产,稳产,经济寿命长。幼苗和幼树喜阴湿,怕高温干旱和强日照,开始结实后又需要有充足的阳光,对环境条件的适应性较好。经子代测定,其种实性状、种仁风味与亲本表现一致,是一个稳定变异。‘磐安长榧’适宜在浙江省香榧产区栽培,其栽培技术要求与‘细榧’相同。

**关键词:**榧树;新品种;‘磐安长榧’

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## Breeding report of a new *Torreya grandis* cultivar ‘Pan’an Changfei’

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**Abstract:** ‘Pan’an Changfei’ is a new cultivar selected from old trees of *Torreya grandis* in Pan’an county of Zhejiang province. The variation maternal plant was an old grafting tree, and the progenies were cultivated through asexual reproduction. It is a bud mutation variety. It was initially selected in 2005 for its thin and long seed. The variation maternal plant was discovered in Dapan town, Pan’an county. Through grafting, planting of ‘Pan’an Changfei’ was expanded in 2010. And the DUS testing finished in 2017. Finally, the new variety of *Torreya grandis* was registered in 2018 after several years’ selection. This cultivar is a tall tree, attaining a height of 11 m. The tree is vigorous with circular or semicircular crown and open tree gesture. Leaves are linear lanceolate, 0.8-2.2 cm long, and 0.2-0.3 cm wide. The upper epidermis of its leaf is dark green and the lower epidermis is light green. It is a dioecism plant, the floral bud is a mixed bud, and ovules are attached to the middle part of bearing branch. The seed is drupaceous and encircled by arillus. The shape of its seed (nut, kernel) is thin and extra long, and is different from the shape of *Torreya grandis* ‘Xifei’. The average single mass of fresh seed is 6.8 g, and the average vertical diameter and horizontal diameter of seed is 3.62 cm and 1.73 cm, re-

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spectively. The average index of seed shape is 2.10, and the average peel thickness is 0.33 cm. The average ratio of fresh nut and seed is 37.13%, while the average ratio of dry nut and seed is 70.24%. The mean fruit weight of fresh nut is 2.5 g. The mean vertical diameter and horizontal diameter of nut is 3.45 cm and 1.18 cm, respectively. The mean index of nut shape is 2.95, and the mean shell thickness is 0.08 cm. The mean ratio of dry kernel and nut is 69.08%. The mean weight of dry kernel is 1.1 g, and the oil content of dry kernel is 50.4%. The content of soluble sugar and protein is 2.87% and 14.0%, respectively. The seed quality is excellent and the product performance is good. The anthesis period is mid April, the mature period is early September of next year, and the seed development period is 17 months in Pan'an, Zhejiang province. Its seedlings and young trees need dank environments and fear high temperature, drought and intense sunlight, but the mature trees are resistant to cold, heat and drought. Through progeny testing, the results showed that its performance was consistent with maternal plant in the shape of seed and kernel quality. It is a stable variation. It is suitable for cultivation in *Torreya grandis* growing areas of Zhejiang province. Its cultivation requirements are the same as *Torreya grandis* 'Xifei'. It should choose subacidity to neutral sandy soil which is flat and has ability of moisture and fertilizer retention and the altitude should be less than 800 m. Virus-free seedlings were planted with row spacing of 4 m × (4-5) m and 450-670 plants per hectare, and the configuration of pollinizer is 5%. For young trees, the tending managements should focus on shading at 5-9 months, trees management, applying fertilizers. For adult trees, the tending managements should put emphasis on fertilizing, weeding, loosening the soil, increasing the set of fruit, pruning and training properly, strengthening the comprehensive control of pests and diseases.

**Key words:** *Torreya grandis*; New cultivar; 'Pan'an Changfei'

香榧是红豆杉科(Taxaceae)榧树属(*Torreya*)植物榧树种(*Torreya grandis*)中优良品种的统称<sup>[1]</sup>,是我国特有的珍贵经济树种。浙江省是我国香榧主产地之一,其中磐安县香榧栽培历史悠久、资源丰富,境内的玉山区域是我国香榧最早的发源地,至今已有1300多年的栽培历史<sup>[2]</sup>。当前,香榧生产中广泛栽培和推广的是'细榧'(*Torreya grandis* 'Xifei')等良种<sup>[3]</sup>,而关于香榧新品种选育研究,所见报道很少。'磐安长榧'(*Torreya grandis* 'Pan'an Changfei')是从磐安县丰富的香榧古树资源中选育出的一个长籽型品种,该品种种实成熟期与'细榧'一样为9月上旬,种仁含油率很高,但其假种皮、核壳更薄,种仁品质更加松脆,商品性能优。

## 1 选育过程

2005年,在资源调查过程中发现优株,母树位于磐安县大盘镇长坑村,为嫁接起源古树,树龄500 a(年)以上,树体、枝叶等性状与'细榧'相近,开花结实物候期也相同,与'细榧'最大的差别是种实和种核均为特长型,明显比'细榧'要长。其后经调查在长坑村及周边村又发现同类型的古树16株。经嫁接繁殖,在当地已培育种植了小规模的后代,

部分已开始结实,种实性状及种仁风味与亲本表现一致。2016—2018年对其种实性状、种仁品质连续进行了观测测定,结果发现其种仁品质可与'细榧'媲美,商品性能优,是一个很有推广价值的优良品种。2017年9月通过了DUS测试,2018年6月获得了国家林业和草原局授权颁发的《植物新品种权证书》,品种权号:20180143。

## 2 品种特性

### 2.1 植物学特征

'磐安长榧'成年结果树树冠为圆头形或半圆头形,树姿开张,树势旺盛,树高可达11 m。叶线状披针形,正面深绿色,背面淡绿色,长0.8~2.2 cm,宽0.2~0.3 cm,叶尖刺较短。雌雄异株,雌花芽为混合芽,一般由结果母枝顶侧芽分化而成,胚珠成对生于结果枝中部的叶腋,种子核果状,全部包于肉质假种皮中,种柄短,先端有小突尖头,成熟时假种皮由绿色变为淡黄绿色。

### 2.2 生物学特性

2.2.1 生长结果习性 '磐安长榧'幼苗和幼树一年抽2~3次梢,成年结果树一般一年只抽一次春梢,生长较为缓慢。盛产期大树营养枝长5.5~9.0 cm,

着生叶片 14~21 对;当年生结果枝长 3.2~7.5 cm,着生幼果 4~13 个;头年结果枝长 3.5~8.8 cm,着生膨大果 1~4 个。种子第二年发育成熟,从开花授粉到种子成熟历时 17 个月,经缓生期、速生期、充实期、成熟期四个发育阶段。2 a 生榧树砧木嫁接该品种后,一般 4~5 a 开始挂果(少数 3 a 挂果),15 a 后进入盛产期。利用地径 6~8 cm 的榧树大砧嫁接,一般 3~4 a 始果,10~12 a 盛产期。盛果期大树一般株产榧蒲 50~100 kg,最高为 250~300 kg,丰产、稳产。

**2.2.2 物候期** 萌芽期:花芽(混合芽)3 月中下旬,叶芽 4 月上旬。胚珠展现期 4 月上旬,传粉滴吐露期 4 月中旬,胚珠脱落期 5 月,落果期第二年 5—6 月。种子发育期:缓生期头年 5 月初—当年 4 月底、速生期当年 5—6 月、充实期 6 月底—9 月上旬、成熟期 9 月上旬。

### 2.3 种实性状

如表 1 所示,‘磐安长榧’种实长倒卵状椭圆形,平均鲜单实质量 6.8 g,纵径 3.62 cm,横径 1.73

cm,种形指数(纵径/横径)2.10,假种皮厚 0.33 cm,鲜出核率 37.13%,干出核率 70.24%。种核长倒卵状椭圆形,纵径 3.45 cm,横径 1.18 cm,核形指数 2.95,平均鲜单核质量 2.5 g,壳厚 0.08 cm,干核出仁率 69.08%。种仁长倒卵状椭圆形,饱满,实心,平均干单仁质量 1.1 g,含油率 50.4%,可溶性糖含量 2.87%,蛋白质含量 14.0%,脂肪酸组成:油酸 34.8%、亚油酸 41.5%、棕榈酸 8.1%、金松酸 8.3%、硬脂酸 3.5%、11,14-二十碳烯酸 1.9%、其他 1.9%,炒制后脱衣方便,质松脆,商品性能优。

‘磐安长榧’与‘细榧’主要区别是种实、种核、种仁形状均为细特长形,明显比‘细榧’长;单个种实平均质量较‘细榧’轻;假种皮、核壳比‘细榧’薄,出核率、出仁率比‘细榧’高;种仁质松脆、香味浓,品质更优(图 1)。

### 2.4 抗性

**2.4.1 抗寒性** ‘磐安长榧’母株生长于低山山脚缓坡海拔 530 m 处,年龄 500 a 以上,经受了无数次的

表 1 ‘磐安长榧’与‘细榧’种实主要性状比较表

Table 1 Comparison of seed characters between ‘Pan’ an Changfei’ and ‘Xifei’

品种 Cultivar	种实(种核、种仁)形状 Shape of seed (nut, kernel)	种形指数 Index of seed	核形指数 Index of nut	鲜单实质量 Single mass of fresh seed/g	鲜单核质量 Single mass of fresh nut/g	假种皮厚 Peel thickness/ cm	鲜出核率 Ratio of fresh nut and seed/%	干核出仁率 Ratio of dry kernel and nut/%	含油率 Oil content of dry kernel/%
磐安长榧 Pan’an Changfei	细特长形 Thin and very long	2.10	2.95	6.8	2.5	0.33	37.13	69.08	50.4
细榧 Xifei	粗长形 Wide and long	1.56	2.26	9.4	3.2	0.38	34.38	67.62	52.5



图 1 ‘磐安长榧’(左)与‘细榧’(右)鲜种实和干种仁对比

Fig. 1 Comparison of fresh seed and dry kernel between ‘Pan’ an Changfei’ (left) and ‘Xifei’ (right)

寒冻天气,调查未发现受冻害的历史记录。

2.4.2 抗高温干旱性 ‘磐安长榧’与‘细榧’一样,幼苗和幼树喜阴湿,怕高温干旱和强日照,过了营养生长期开始结实后又要求有充足的阳光。‘磐安长榧’根系为肉质根,好气性强,怕积水。

2.4.3 抗病性 ‘磐安长榧’抗病强,据调查,其苗木、幼树和大树病虫害发生很少,只要立地条件适宜,正常管理一般没有病害发生。

## 2.5 SSR分子鉴定

如图2所示,采用33对SSR引物对‘磐安长榧’进行分子鉴定<sup>[4]</sup>,以‘细榧’和实生榧树中的一株小圆榧作为对照,33对引物中有14对能区分开‘磐安长榧’和小圆榧,但33对引物均无法区分开‘磐安长榧’和‘细榧’。因为‘磐安长榧’的母树为500a生嫁接树,调查中又未能找到其实生母树,推测‘磐安长榧’为‘细榧’的芽变品种。

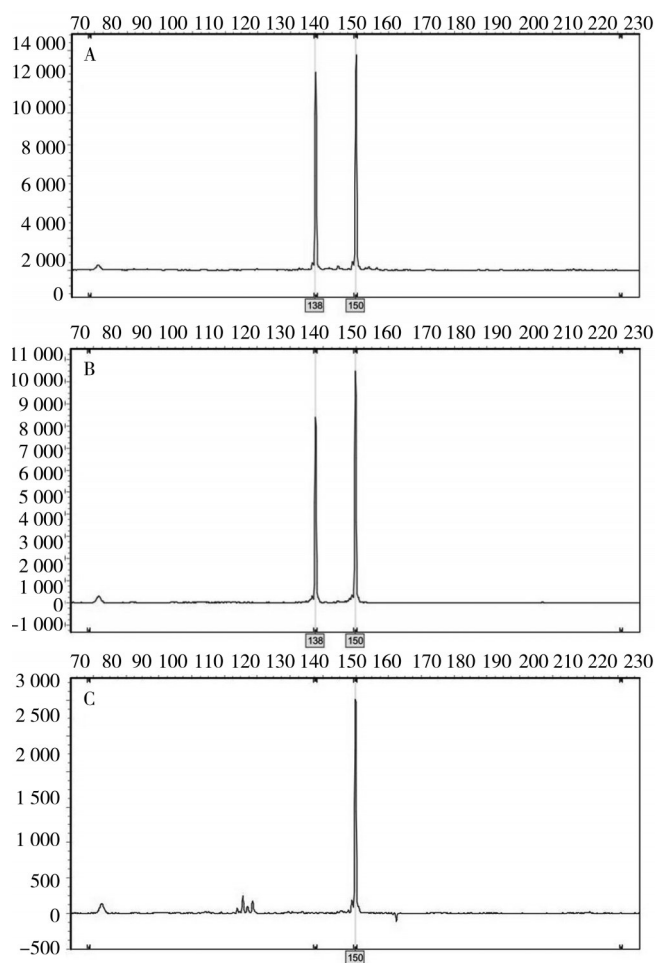


图2 引物ZAFU-4在‘磐安长榧’(A)、“细榧”(B)和小圆榧(C)中的扩增图谱

Fig. 2 Polymorphic fingerprint detected by ZAFU-4 for ‘Pan’an Changfei’ (A), ‘Xifei’ (B) and Xiaoyuanfei (C)

## 3 栽培技术要点

‘磐安长榧’适合在浙江省香榧产区栽培,其栽培技术要求与‘细榧’等相同<sup>[5]</sup>。

## 4 推广发展前景

2005年发现优株后就开始从母株上采集接穗嫁接繁育子代,进行品种遗传稳定性测定和栽培技术研究,2010年开始有计划地嫁接繁殖苗木,开展多点种植试验和推广,随着品种知名度的提升,当前‘磐安长榧’鲜种实售价每kg价格要比‘细榧’高10~20元,同等规格的嫁接苗价格要高一倍,市场前景广阔。目前,除磐安县本地多点引种栽培外,已推广到浙江省东阳市、诸暨市、龙游县等地栽培,累计发展面积50 hm<sup>2</sup>。

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