

黄皮新品种华蜜黄皮的选育

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摘要: 华蜜黄皮是以白糖黄皮为母本、郁南无核黄皮为父本进行杂交,从杂交F₁代群体中单株优选而成的黄皮新品种。果实鸡心形,果皮橙黄色;肉质细嫩,风味蜜甜,有香气;平均单果质量7.98 g,平均单果种子数1.1粒,可食率69.6%;可溶性固形物含量(w,后同)18.8%,总糖11.8%,还原糖5.4%,可滴定酸0.1%,维生素C 602 mg·kg⁻¹。华蜜黄皮树势较旺,丰产稳产性较好,早熟,在广州6月底至7月上旬成熟,成熟度较一致,适宜在广东省黄皮产区推广种植。

关键词: 黄皮;新品种;华蜜黄皮;有性杂交;早熟;栽培技术

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Breeding of a new wampee cultivar Huami Huangpi

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Abstract: Huami Huangpi is a new wampee [*Clausena lansium* (Lour.) Skeels] cultivar with excellent appearance and honey flavor. The seedling was derived from a cross between a pure sweet cultivar Baitang Huangpi (female parent) and a main cultivar Yunanwuhe Huangpi (male parent), which located at College of Horticulture, South China Agricultural University (Tianhe district of Guangzhou city, Guangdong province). In the spring of 2002, the artificial crossing was developed and finally 16 hybrid plants were obtained. From 2006 to 2008, the hybrid progenies (BW population) started blossoming and fruiting successively. And it was initially selected for its early maturing, excellent appearance, honey flavor and high quality. Then, the bud sticks of it were obtained for grafting, following with investigations of the resulting plants biological characteristics and fruit quality. After regional adaptability testing at three regions (Tianhe District of Guangzhou city, Conghua District of Guangzhou city and Chaozhou city, Guangdong province) over four years from 2016 to 2019, it has passed the expert identification in July 2019 and was certificated in November 2020 by the Crop Variety Approval Committee of Guangdong Province (assessment No. 20200004) and named Huami Huangpi. Trees of Huami Huangpi is spherical, with grey brown trunk. The leaves are deep green and wide-ovate, with shallow undulate margin, acute tip and broad-cuneate base. The average length and width of the leaf are 10.12 cm and 4.84 cm, respectively. The fruit shape is heart-shaped, with average fruit weight of 7.98 g and edible rate of 69.6%. The average longitudinal diameter and transverse diameter of the fruit are 30.42 mm and 21.54 mm, respectively. The fruit apex is obtuse round with light depressed and the fruit base is round. And the radiate veins on it were obscure. The fruit peel is orange with peppery taste, and the flesh is waxy yellow, with

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tender texture, sweet and little sour taste and honey flavor. The seeds are reniform, full and the surface is smooth. The soluble solids content of fruit is 18.8%, the total soluble sugar is 11.8%, the total acid content is 0.1%, and the vitamin C content is 602 mg · kg⁻¹. Huami Huangpi is an early-maturing cultivar. It harvests from the late of June to early July in Guangzhou. The cultivar grows strongly with high yield, stable yield and wide adaptability. It is suitable for cultivation in the wampee production areas located in Guangdong province.

Key words: Wampee; New cultivar; Huami Huangpi; Hybridization; Early-maturing; Cultivation technique

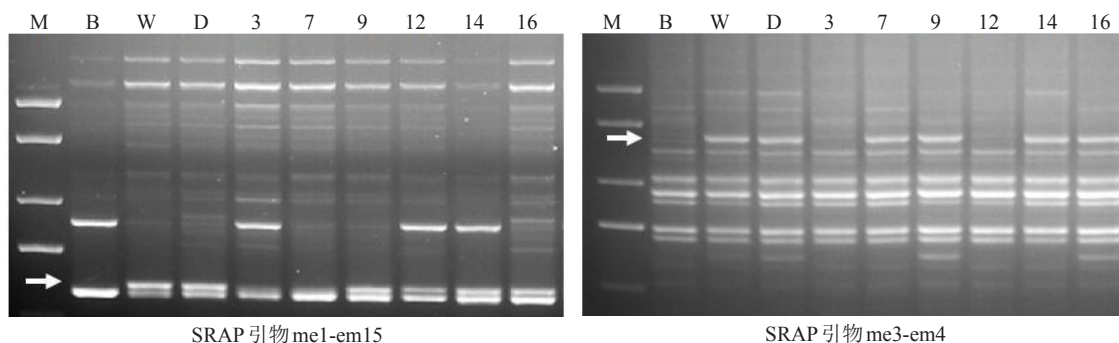
黄皮[*Clausena lansium* (Lour.) Skeels]为芸香科(Rutaceae)黄皮属常绿果树,原产于我国华南和西南地区,已有1500多年的栽培历史^[1],主要分布于广东、广西、海南、福建、云南、四川、贵州及台湾等地区^[2],是华南地区的优稀水果。黄皮风味独特,甘甜或甜酸可口,营养及药用价值丰富,富含有机酸、氨基酸、维生素C、黄酮苷、微量元素等多种对人体有益物质,且具有清心明目、健脾开胃、化痰平喘、抗氧化、解酒护肝等功效,深受消费者的喜爱,属于经济效益较高的果树。

黄皮一直以实生选种为主,人工杂交育种开展少,仅有郁南无核黄皮和大鸡心黄皮两大主栽品种,均存在果实大小不均、成熟度不一致、风味偏淡或偏酸等问题。此外,主栽品种单一导致黄皮集中上市,鲜果供应期短,不能满足市场需求。因此,开展人工杂交培育熟期错开、酸甜适宜、种子少、可食率高的优良新品种,以提高黄皮的果实品质,可望改善广东省的黄皮品种结构,延长黄皮鲜果供应期,适应生产者和消费者的不同需求。

1 选育过程

华蜜黄皮(单株编号为BW16)是华南农业大学园艺学院黄皮育种课题组以白糖黄皮为母本、郁南无核黄皮为父本进行杂交选育出的优质黄皮新品种。2002年春季杂交,获得杂交果实44个,共收获种子49粒,于当年7月播种,获得杂交苗16株,2004年定植于华南农业大学园艺学院育种果园。

由于黄皮的小花为两性花,属于自花授粉植物,且具有多批次开花的特性,这使其在开展人工杂交过程中非常容易发生自交而产生假杂种,且黄皮为多年生木本果树,童期及育种周期均较长,因此,对杂交苗进行早期鉴定十分必要。利用SRAP分子标记技术,参考杨向晖等^[3]的黄皮SRAP反应体系,对BW群体中的16株杂交苗进行了真实性鉴定,筛选出10对父本特异引物,确认真杂种为16株,真杂种比例为100%。其中,引物me1(5'-TGAGTCAAACCGGACC-3')、em15(5'-CACTGCGTACGAATTATG-3')组合和me3(5'-TGAGTCAAACCGGTCA-3')、em4(5'-GACTGCGTACGAATTGCA-3')组合的扩增情况显示,BW16均具有父本郁南无核黄皮的特异条带(图1中白色箭头所示),证明BW16为真杂种。



M. DL2000 marker; B. 母本白糖黄皮; W. 父本郁南无核黄皮; D. 大鸡心黄皮; 3. BW3; 7. BW7; 9. BW9; 12. BW12; 14. BW14; 16. BW16(华蜜黄皮); 箭头所指为父本特异条带。

M. DL2000 marker; B. female parent Baitang Huangpi; W. Male parent Yunanwuhe Huangpi; D. Dajixin Huangpi; 3. BW3; 7. BW7; 9. BW9; 12. BW12; 14. BW14; 16. BW16(Huami Huangpi); The arrows show the special band of the male parent.

图1 BW群体部分杂交苗的SRAP分子标记鉴定情况

Fig. 1 Identification of BW population by SRAP molecular marker

该杂交后代群体(简称BW群体)于2006—2008年陆续进入开花结果期,BW16因其早熟且品质优良被确定为甜黄皮类的早熟初选优株。2009—2016年在品种对照观察圃内进行高接扩繁和品种比较试验,并于2016—2019年在广州市天河区、广州市从化区、潮州市饶平县等地开展区域试验和生产试

验。结果表明,该品种早熟,成熟度较一致,蜜甜低酸,有香气,品质优良,且遗传性状稳定,适宜在广东省黄皮产区种植。2019年7月通过了广东省农作物品种审定委员会的现场鉴定,2020年11月通过了广东省非主要农作物品种评定,定名为华蜜黄皮(图2),评定编号为粤评果20200004。



图2 黄皮新品种华蜜黄皮

Fig. 2 A new wampee cultivar Huami Huangpi

2 主要性状

2.1 植物学特征

华蜜黄皮树姿直立,树冠为圆形,树势中等。树干灰褐色,树皮粗糙。当年生秋梢颜色为灰黑色,复叶主轴长度平均12.6 cm,复叶柄长度平均1.0 cm,复叶柄直径平均3.60 mm,复叶柄为圆形,颜色为灰绿色。华蜜黄皮为奇数羽状复叶,小叶数多为11枚,小叶着生方式为平面互生。小叶阔卵形,绿色且无毛,叶缘浅波浪状,叶尖突尖,叶基阔楔形,小叶平均长度10.12 cm,宽度4.84 cm,叶形指数2.09。花序形状为中圆锥形,花序主轴绿色,花序平均长度28.8 cm,花序平均宽度26.4 cm,花序长宽比为1.09;花蕾倒卵形,绿白色,有5条稍凸起的纵脊棱;花瓣唇形,黄白色;雄蕊10枚,离生;花药黄色,椭圆形。子房球形,表面多被毛,5个心室;花柱直立,表面少量被毛;花萼黄绿色,离生。

2.2 生物学特性

2.2.1 枝梢生长习性 华蜜黄皮末次秋梢萌发的时期一般在9月下旬至10月上旬。宜在早春对大树进行高接换种,由于砧木根系发达,树体营养积累多,幼年树每年可抽生4~5次新梢,两年后可形成丰产的树形。成年树结果时,一年可抽梢2~3次,采果后抽秋梢2次。

2.2.2 开花结果习性 华蜜黄皮12月开始进行花

芽分化,1月下旬至2月上旬现蕾,即可见“白绿点状”的花芽,2月上中旬为抽穗期,2月下旬进入初花期,3月上旬为盛花期,3月下旬为谢花期。正常情况下,同一株华蜜黄皮的花期约为1个月,单穗的花期约为20 d。4月下旬果实开始迅速膨大,5月下旬果基部位的果皮开始转为黄色,绿色慢慢褪去,为转色期;6月中旬至6月下旬,果皮全部转为黄色,果实开始有弹性,果皮较之前明显变薄,果实已接近成熟,可溶性固形物质量分数为15.0%~18.0%,可以食用;在7月上旬,果实的可溶性固形物质量分数超过18.0%,风味和口感佳,具有该品种的特点,果肉细嫩化渣,蜜甜多汁。期间落果高峰有2次,第1次在谢花后20 d左右,第2次在谢花后45 d左右。

2.3 果实性状

果实鸡心形,平均单果质量7.98 g,果实纵径30.42 mm,横径21.54 mm。果顶浅凹,放射纹不明显;果基浑圆,放射纹不明显。果皮橙黄色,皮上有果锈,油胞明显,无被毛,味辣。果肉蜡黄色,肉质细嫩,风味蜜甜,有香气,果汁含量多。种子饱满,肾脏形;种皮黄绿色,表面光滑;种帽黄褐色,脉纹明显;子叶黄绿色,肾脏形。平均单果种子数1.1粒,可食率69.6%,可溶性固形物含量(w,后同)18.8%,总糖11.8%,还原糖5.4%,可滴定酸0.1%,维生素C 602 mg·kg⁻¹(表1)。

表 1 华蜜黄皮与对照品种果实主要经济性状比较

Table 1 Comparison of main economic characters between Huami Huangpi and the control cultivar

品种 Cultivar	平均单果质量 Average fruit mass/g	可食率 Edible rate/%	w(可溶性固形物) Soluble solids content/%	w(总糖) Total sugar content/%	w(可滴定酸) Total acid content/%	糖酸比 Total sugar/ Total acid ratio	w(维生素C) Vitamin C content/ (mg·kg ⁻¹)	风味 Taste	果实成熟期(广州) Fruit maturation period(Guangzhou)
华蜜黄皮 Huami Huangpi	7.98	69.60	18.80	11.80	0.10	118.00	602.00	蜜甜 Sweet with honey flavor	6月底至7月上旬 From late June to early July
郁南无核黄皮 Yunanwuhe Huangpi	7.99	73.00	21.00	16.30	1.37	11.90	536.00	甜酸 Sweet and sour	7月中下旬 Form mid-July to late July

注:数据来自农业部农产品及加工品质量监督检验测试中心(广州)。

Note: The data were from Supervision and Testing Center for Agricultural Products and Processing Products Quality, Ministry of Agriculture and Rural Affairs, Guangzhou, P.R. China.

2.4 主要优点

华蜜黄皮在广州地区的成熟期为6月底至7月上旬,比主栽品种郁南无核黄皮和大鸡心黄皮早20 d左右,可提早黄皮的鲜果供应期,错开了主栽品种上市的高峰期。此外,华蜜黄皮同一果穗上的果实成熟期较一致,易于管理。果实外形美观,橙黄鲜亮,果肉细嫩化渣,蜜甜低酸,糖酸比较郁南无核黄皮高,有香气。该品种具有成熟期早、成熟度较一致、蜜甜质优等显著优势。

3 栽培技术要点

3.1 定植建园

华蜜黄皮宜选择土壤有机质丰富、排灌良好、开阔向阳的地段建园。株行距(2.5~3 m)×(3.5~4 m),定植季节以春植(3—4月)为好,也可秋植(9—10月),定植时要保持水分充足,以温度20~25℃定植最佳。

3.2 整形修剪

幼树定植成活后,在树干40~60 cm处短截定干,待侧芽抽发后,选留3~4条分布均匀、长势均衡的健壮枝条作为一级主枝,待一级主枝生长到20~25 cm时再次进行短截,促进分枝,以后每次分枝选留2~4条健壮枝条作为副主枝,经过2~3 a(年)可培养成通风透光的自然圆形丰产树冠。成年结果树的修剪主要是在采收后将结果多、长势弱的弱枝及内膛枝剪除。

3.3 肥水管理

幼龄树施肥应遵循勤施薄施的原则,定植成活并抽一次梢老熟后,可在每次梢芽萌动前和转绿期各施1次稀薄粪水或0.2%尿素水,采用“一梢两肥”

法促发和培育壮梢。结果树每年施肥3~4次,施肥以有机肥为主,辅以适量复合肥,主要集中在现蕾前后、谢花后、采果后。前两次可用麸饼肥和复合肥加水稀释后进行淋施,后者可适当增加施肥量;采果后施重肥以促进树体恢复及秋梢的抽发,可用鸡粪肥挖沟进行深施,对于树势较差、挂果多的单株应适当增加施肥量,以促进树体的恢复和秋梢的抽发。

3.4 病虫害防治

广东省黄皮种植区危害较严重的病虫害主要有:霜疫霉病、炭疽病、红蜘蛛、锈壁虱、蚜虫、吹绵介壳虫、白蛾蜡蝉等。因此,在华蜜黄皮的嫩梢抽生期,注意防治梢腐病;在花穗抽生期和开花前期,注意防治霜疫霉病;在果实成熟期,注意防治炭疽病。果实生长发育及成熟期,若遇连续的阴雨天气,易受霜疫霉病危害,应及时喷药防治,并清除果穗上的烂果。

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