

# 优质柚类新品种水蜜柚的选育

段 慧<sup>1,2</sup>, 路 瑶<sup>1,2\*</sup>, 罗彬彬<sup>1,2</sup>, 李树举<sup>1,2</sup>, 肖良春<sup>3</sup>

(<sup>1</sup>常德市农林科学研究院, 湖南常德 415000; <sup>2</sup>湖南省现代农业(水果)产业技术体系常德试验站, 湖南常德 415000; <sup>3</sup>常德果丰农业开发有限公司, 湖南常德 415000)

**摘要:** 优质柚类新品种水蜜柚是从一个地方柚实生单株选育而来的。果实呈圆球形或扁圆形, 果形指数0.81左右, 平均单果质量977 g, 果皮光滑, 整齐度高, 耐贮存。果肉黄绿色、汁多化渣, 可食率达65%, 全果榨汁率51%, 可溶性固形物含量(w, 后同)11.2%, 可滴定酸含量0.08%, 维生素C含量28.2 mg·100 g<sup>-1</sup>。在湖南省常德市4月开花, 11月底至12月初成熟。水蜜柚树势中庸, 挂果后偏弱, 需加强肥水管理, 栽培管理的关键在于促根, 对炭疽病较敏感, 抗寒性较弱, 冬季低温需采取防寒措施, 其他抗性与普通蜜柚类似。

**关键词:** 柚; 新品种; 水蜜柚; 优质

中图分类号: S666.3

文献标志码: A

文章编号: 1009-9980(2023)09-2016-04

## Breeding of a new high-quality pomelo cultivar Shuimiyou

DUAN Hui<sup>1,2</sup>, LU Yao<sup>1,2\*</sup>, LUO Binbin<sup>1,2</sup>, LI Shuju<sup>1,2</sup>, XIAO Liangchun<sup>3</sup>

(<sup>1</sup>Changde Institute of Agriculture and Forestry Science, Changde 415000, Hunan, China; <sup>2</sup>Changde Experimental Station of Hunan Modern Agricultural (Fruit) Industry Technology System, Changde 415000, Hunan, China; <sup>3</sup>Changde Guofeng Agricultural Development Co., Ltd, Changde 415000, Hunan, China)

**Abstract:** A new pomelo cultivar Shuimiyou originated from an individual seedling, which was found at Taoyuan County of Hunan province. It was initially selected in 2008 for its high-quality, low-acid, soft-flesh and high juice content. To further observe the propagation and characteristics of the cultivar, it was grafted and propagated in 2009. Through many years of investigation on botanical/biological characteristics and fruit quality during the citrus bearing seasons, this new cultivar showed excellent genetic stability and high fruit quality. After test of the distinctness, uniformity and stability, the new pomelo cultivar Shuimiyou was finally selected in 2018. It was registered by Changde Institute of Agriculture and Forestry and Changde Guofeng Agricultural Development Co., Ltd [GPD Citrus (2018) 430020]. The average fruit weight is 977 g. The longitudinal diameter and transverse diameter of the fruit are 14 mm and 17 mm, respectively. The shape of fruit is oblate or spherical, and the average fruit shape index is 0.81. The peel is yellow-green in color with a smooth surface. The thickness of pericarp is about 1.3 cm and the edible rate is up to 65% of the whole fruit. The juice extraction rate is as high as 79 percent. The soluble solid content (SSC) is 11.2%. The total sugar content is 3.24 g per 100 g juice. The titratable acid content is 0.08%. The ascorbic acid content is 28.2 mg per 100 g of fruit juice. The fruit of this cultivar can be stored for almost 6 months at room temperature in Changde city of Hunan province, and the annual supply can be basically realized under cold storage condition. Spring-growing shoots of Shuimiyou are sensitive to low temperature, resulting in curly leaves. There are hairs on immature fruit surface of Shuimiyou. The phenological period of Shuimiyou is slightly later than the ordinary pomelo varieties. The period of sprouting of spring bud is in March, flowering period is in mid-late

收稿日期: 2023-04-23

接受日期: 2023-07-30

基金项目: 湖南省现代农业(水果)产业技术体系常德试验站; 常德市柚类工程技术研究中心(CD016-20210105-802772); 常德市科技创新项目(CDKJJ20220275)

作者简介: 段慧, 女, 硕士, 农艺师, 主要从事柑橘育种与栽培研究。Tel: 15873677960, E-mail: 276682507@qq.com

\*通信作者 Author for correspondence. Tel: 15873676126, E-mail: 66765373@qq.com

April to early-mid May, and the full blossom period is in early May. The first physiological fruit drop period is in early-mid May, the second physiological fruit drop is in early-mid June, and the fruit ripening period is from late November to early December in Changde city of Hunan province. The tree has intermediate vigor and the main fruit-bearing shoots are sprouting in spring. The average yield with 6–10 years old trees reaches up to 2508 kg per 666.7 m<sup>2</sup>. After years of observation, it was found that the cold tolerance of Shuimiyou was poor. During the whole development stage, the lowest temperature cannot be less than –5 °C, and the lowest temperature at seedling stage cannot be less than –3 °C. In winter, chill-proof measures should be taken in northern area of Hunan. The tree vigor of Shuimiyou is moderate and it will become weak after fruiting. The cultivation should focus on promoting root growth and strengthening fertilizer and water management to ensure the balance between vegetative and reproductive growth.

**Key words:** Pomelo; New cultivar; Shuimiyou; Hight-quality

柚为芸香科柑橘属常绿乔木,果实即为柚子。中国既是主要的柚子生产国家,也是主要的消费国家。但目前市场上低酸型的柚类品种一般汁少,而汁多的品种一般含酸量较高或苦麻味明显,缺少低糖、低酸、多汁的优质柚子品种。水蜜柚的选育很好地填补了这一市场空白,因其低糖、低酸、高固酸比、多汁、化渣等优异特性深受消费者喜爱。

## 1 选育过程

2008年,一个柑橘种植户在湖南省常德市桃源县漆河镇发现一农户家自产的实生柚子清甜低酸、风味独特,随后他向常德市农林科学研究院水果研究团队咨询,农林科学院研究团队经研究,发现这是

一个优质柚类地方种质资源。2009年,研究团队对该资源进行高接扩繁,经2010—2012年对高接后群体的特征特性观测、果实品质分析、丰产稳产性测定以及抗病性观测,认为该资源确实表现优异,2013年开始小面积推广种植。2017年,团队邀请常德市农学会组织专家进行了现场测产评价,到会专家一致认为该资源果实风味独特、低酸清甜、细嫩爽滑、汁多化渣、果形端正、表面光滑、性状稳定、丰产稳产、耐贮存,是一个优良地方柚类新品系。2018年,常德市农林科学研究院与常德果丰农业有限公司合作登记了该品种,因其清甜、多汁的突出特性,特命名为水蜜柚(图1),登记编号[GPD柑橘(2018)430020]。



图1 柚类新品种水蜜柚

Fig. 1 The new pomelo cultivar Shuimiyou

## 2 品种特性

### 2.1 植物学特征

树冠呈自然圆头形,树势中庸,树梢中等长、新梢平均长度21.5 cm,叶背有茸毛,枝条开展,刺无或极少。叶为单身复叶,阔披针形,叶基形状楔形,尖端渐尖,翼叶中等大,倒三角形,叶脉明显,长6~15 cm,

宽2.5~8.0 cm,叶缘波状,油胞点小,叶片揉破气味较浓,幼叶淡绿。春梢对低温敏感,叶片卷曲,夏梢秋梢生长正常。花白色,革质,花瓣4~5瓣,中等大,花粉囊呈黄色。果实8月底之前有茸毛,9月后逐渐褪去。

### 2.2 物候期

水蜜柚在湖南常德地区3月初萌芽,花期较分散,3月中下旬开始现蕾,4月中下旬至5月中上旬均

有开花,盛花期相对集中在5月初,5月中上旬第1次生理落果,6月中上旬第2次生理落果。3月中下旬至5月下旬抽发春梢,5月下旬至8月上旬抽发夏梢。果实11月底至12月初成熟,按沈兆敏<sup>[1]</sup>的熟期分类方法,水蜜柚属晚熟柚。

**2.3 果实经济性状**

水蜜柚果实圆球形或扁圆形,果顶无凹陷、无乳突,果基无放射性沟纹。果实横径约17 cm,纵径约14 cm,整齐度好,果形指数0.81左右。单果质量

977 g左右,可食率高达65%。果皮薄、较韧,平均厚度1.3 cm,黄色,油胞较密,微凸或平生。海绵层浅粉红色,囊瓣肾形,平均13瓣左右,果实种子40粒左右。果肉黄绿色,囊瓣较薄,汁胞较大,多汁化渣,风味清甜,酸味极低,固酸比高,微苦,合理管理可减少苦味。可溶性固形物含量11.2%,可滴定酸含量0.08%,维生素C含量28.2 mg·100 g<sup>-1</sup>。水蜜柚果实较耐贮存,常温可存放至翌年5月,低温贮存时间更长(表1)。

表 1 水蜜柚与琯溪蜜柚、沙田柚果实主要性状比较

Table 1 The comparison of main fruit characters among Shuimiyou, Guanximiyou and Shatianyou

| 品种<br>Cultivar      | 单果质量<br>Single fruit<br>mass/g | 果形<br>Fruit shape               | 可食率<br>Edible<br>rate/% | w(可溶性固形物)<br>Soluble solid<br>content/% | w(可滴定酸)<br>Titratable acid<br>content/% | 种子数<br>Seed<br>number | 风味<br>Flavor                  | 出汁率<br>Juice<br>yield/% |
|---------------------|--------------------------------|---------------------------------|-------------------------|-----------------------------------------|-----------------------------------------|-----------------------|-------------------------------|-------------------------|
| 水蜜柚<br>Shuimiyou    | 977                            | 圆球形或扁圆形<br>Spheroidal or oblate | 65                      | 11.2                                    | 0.08                                    | 32                    | 纯甜多汁<br>Pure sweet and Juicy  | 51.0                    |
| 沙田柚<br>Shatianyou   | 1110                           | 梨形<br>Pear-shape                | 39                      | 11.0                                    | 0.23                                    | ≥100                  | 纯甜少汁<br>Pure sweet less juice | 19.4 <sup>[2]</sup>     |
| 琯溪蜜柚<br>Guanximiyou | 1206                           | 倒卵形<br>Obovate                  | 58                      | 11.6                                    | 0.77                                    | 0                     | 酸甜<br>Acid and sweet          | 59.0 <sup>[3]</sup>     |

2.4 生长结果习性

水蜜柚树势中庸,在湖南常德每年抽3次梢,春梢对低温敏感,叶片卷曲,夏梢、秋梢生长正常。早果性能较好,管理到位第4年即可实现挂果,挂果后树梢偏弱,需加强肥水管理。自花结实性好,畸形果稍多,须疏除。

2.5 抗性和适应性

水蜜柚抗溃疡病,对炭疽病较敏感,其他病害抗性与普通蜜柚类似。较不耐低温,小苗能承受的临界低温为-3℃,大树能承受的临界低温为-5℃,在湖南常德冬季需覆盖防寒。

3 栽培技术要点

3.1 定植

定植前重施基肥,改良土壤,起垄栽培。采取行距4.5~5.0 m、株距2.5~3.0 m的定植密度。宜采用大苗移栽,栽植2~3年生无病毒容器大苗,移栽第2~3年即可结果,以缩短成园期,提早结果。

3.2 整形修剪

标准树形为自然圆头形,幼年树宜轻剪,定植后适当调整树梢生长方向、长度、密度,修剪多在生长季完成。大量结果后着重减去较多的隐蔽枝、病虫枝、交叉枝,回缩衰老枝组、疏除密生枝,控制花量、

提高花质。重点培养春梢和早秋梢结果,及时抹除夏梢,提高坐果率,放早秋梢,增加下一年的结果枝基数量。

3.3 促花促果

采取前期保果、后期疏果的办法,既保证有一定的坐果量,又保证较高的品质<sup>[4]</sup>。在开花坐果期,多次喷施磷酸二氢钾、氨基酸等有机营养保花保果,尽量不喷九二〇等生长激素,以免增厚果皮,影响果实品质。在果实膨大期,根据树势确定树体负载量,及时疏除不正常的小果、畸形果和粗皮大果,保证果实良好的商品性。

3.4 土肥水管理

水蜜柚树势中庸,挂果后偏弱,在栽培中应着重促根,加强肥水管理,以保证营养生长和生殖生长平衡。全年施肥以壮果肥和采果肥为主,肥料以腐熟有机肥和水果专用肥为主,壮果肥在7月施用,采果肥在采收后施用。除了充分保障树体需要,还需重点改善土壤条件,可通过施用生物菌有机肥、黄腐酸等结合中耕松土促进根系生长。春季视不同树势适当追施速效肥促发新梢。6月应通过肥水管理控制夏梢抽生,减少落果。夏季雨量大时及时排水,防止裂果。夏秋季干旱时应及时灌水防旱。

### 3.5 病虫害防治

水蜜柚对炭疽病敏感,其他病害抗性与普通蜜柚类似。病虫害防治应重视冬季清园,每年12月至次年2月,对树体进行整形修剪,使树体通风透光,树形结构合理。同时将病虫枝、枯枝清理掉并及时处理,减少病源基数。12月用石硫合剂喷1次、次年2月喷波尔多液1次进行清园。

平时还应注意溃疡病、砂皮病、潜叶蛾、红蜘蛛、柑橘大食蝇等病虫害的防治,注意统防统治。

### 3.6 冬季防寒

经过多年观测,水蜜柚对低温的抵抗力较差。2018年底2019年初常德市遭受多年不遇的低温,柑橘遭受严重冻害,水蜜柚也受冻严重。但因水蜜柚品质极佳,2019年至2022年,不断有种植户和投资者种植,不少种植户对水蜜柚冬季抗冻性认识仍然不足或抱侥幸心理,冬季未覆盖防寒或覆盖不及时等,导致受冻情况普遍发生。因此,水蜜柚在冬季低温地区必须采取大棚设施栽培或简易拱棚、立柱等覆盖防寒布、遮阳网等防寒栽培方法,以确保水蜜柚冬季不受冻害,降低投资风险。

## 4 品种推广前景

水蜜柚果实果形端正,整齐度高,果皮光滑,油胞细腻,商品性好,且耐贮存。果肉多汁,化渣性好,可溶性固形物含量12.0%,可滴定酸含量0.08%,固酸比高达150,具有低糖、低酸、高固酸比、多汁、化

渣等优异特性。目前市场上低酸的柚类品种汁少,而汁多的品种一般含酸量较高,水蜜柚很好地填补了这一市场空白,消费者认可度极高。水蜜柚因优异的品质,被评为2022年度湖南省十大农作物优异种质资源,发展前景极好。

### 参考文献 References:

- [1] 沈兆敏. 早熟柚类品种发展中的若干意见[J]. 果农之友, 2011(5): 3-4.  
SHEN Zhaomin. Several opinions on the development of early-maturing pomelo varieties[J]. Fruit growers' Friend, 2011(5): 3-4.
- [2] 赵婉彤, 江东. 晚熟杂交柚新品种夏蜜柚的选育[J]. 果树学报, 2023, 40(6): 1265-1268.  
ZHAO Wantong, JIANG Dong. A new late ripening hybrid pomelo cultivar Xiamiyu[J]. Journal of Fruit Science, 2023, 40(6): 1265-1268.
- [3] 位高生, 胡承孝, 谭启玲, 朱东煌, 李潇彬. 氮磷减量施肥对琯溪蜜柚果实产量和品质的影响[J]. 植物营养与肥料学报, 2018, 24(2): 471-478.  
WEI Gaosheng, HU Chengxiao, TAN Qiling, ZHU Donghuang, LI Xiaobin. The effect of nitrogen and phosphorus fertilizer reduction on yield and quality of Guanxi pomelo[J]. Journal of Plant Nutrition and Fertilizer, 2018, 24(2): 471-478.
- [4] 龙桂友, 黄洪, 张凤, Alessandra Gentile, 邓子牛, 李娜. 糖橙新品种‘橘湘元’的选育[J]. 果树学报, 2019, 36(3): 388-391.  
LONG Guiyou, HUANG Hong, ZHANG Feng, Alessandra Gentile, DENG Ziniu, LI Na. A new seedless orange 'Juxiangyuan' selected from Succari mutant[J]. Journal of Fruit Science, 2019, 36(3): 388-391.