

浓香型蓝莓新品种辽蓝503的选育

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摘 要: 辽蓝503是以北高丛蓝莓品种斯巴坦(Spartan)为母本、南高丛蓝莓种质资源N5为父本通过杂交选育的F₁代浓香型蓝莓新品种。果柄长, 果穗较松散, 扁圆形, 果皮蓝黑色, 果粉厚, 果蒂痕小而干; 果实大, 平均纵径1.59 cm, 横径2.09 cm, 平均单果质量3.2 g, 最大单果质量4.2 g。可溶性固形物含量(w, 后同)14.2%, 总糖含量12.5%, 可滴定酸含量0.63%, 维生素C(Vc)含量11.3 mg·100 g⁻¹, 花青苷含量91.54 mg·100 g⁻¹, 果实味甜, 有多种水果香味, 香味浓郁, 品质极上, 极丰产, 成熟期一致。辽宁大连地区露地3月初开始萌芽, 4月中下旬盛花期, 6月底至7月初成熟; 温室11月萌芽, 12月初开始开花, 2—4月成熟。该品种为南北丛品种杂交类型, 低温需冷量600 h, 适宜北方日光温室和塑料大棚栽培。

关键词: 蓝莓; 新品种; 辽蓝503; 浓香

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Breeding report of a new blueberry cultivar Liaolan 503 with rich aroma

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Abstract: Aroma is one of the core indicators of the fruit quality of blueberry (*Vaccinium uliginosum* L.). A rich and fragrant aroma is an important factor that attracts consumers to make a purchase, greatly enhancing the eating experience. In the market, blueberry varieties with a pleasant fragrance stand out due to their unique aroma, are more likely to win the favor of consumers, and thus have stronger market competitiveness. The Liaoning Institute of Pomology has been committed to the cultivation of new blueberry varieties. It has successfully developed high-quality blueberry varieties such as Liaolan 513 and Liaolan 515 in the Liaolan series. More than 15 000 hybrid progenies have been raised for the continuous innovation of new varieties. Aiming at the aroma traits of the fruits, the research team has combined multiple hybrid combinations. Liaolan 503 is an F₁ hybrid individual bred with the northern highbush blueberry variety Spartan as the female parent and the southern highbush blueberry germplasm N5 as the male parent. The crossing was carried out in February 2008. 44 hybrid offspring were obtained in 2009. The observations on fruit traits, growth and fruiting habits were conducted from 2011 to 2014. The hybrid offspring coded as 08-48-32 was selected for its thick bloom, rich aroma, excellent taste and high yield. In 2024, the Plant Variety Right was obtained from the National Forestry and Grassland Administration of China and it was named Liaolan503 (Variety Right Number: 20240793). It had an up-

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right tree posture. The leaves were ovate, dark green, and covered with a silver - gray layer on the surface. One-year-old branches were red in color, with 5 to 8 flower buds on the branch top. The corolla was white, cylindrical, and had ridges, while the calyx was gray to green. The fruit stalk was long, and the fruit cluster was relatively loose. The fruit peel was blue-black with thick bloom, and a small and dry plucking scar, presenting an attractive appearance. The fruits were large, the average size of each fruit was 1.59 cm×2.09 cm, with an average single fruit weight of 3.2 g, and the maximum single fruit weight could reach 4.2 g. The soluble solid content was 14.2%, the total sugar content was 12.5%, the acid content was 0.63%, the Vc content was 11.3 mg · 100 g⁻¹, and the anthocyanin content was 91.54 mg · 100 g⁻¹. The fruits were sweet, with a rich aroma and quality was extremely high. The productivity was high, the maturity was highly consistent. In the open field in Dalian, Liaoning Province, the bud burst began in early March. The full-bloom period was in mid to late April, and the fruit maturity period was from the end of June to early July. In greenhouse, the bud burst occurred in November, the flowering began in early December, and the maturity period was from February to April. This variety had a chilling requirement of 600 hours, and should be suitable for cultivation in greenhouses and plastic tunnel. It should be cultivated in fertile with over 3% organic matter content and 5 to 5.5 pH value. The nursery trees should be propagated by tissue culture and the spacing should be 1.2 m × 2.0 m. The autumn pruning in mid-September was recommended. The double-layer films for cold protection was suggested greenhouse cultivation in the north.

Key words: Blueberry; New cultivar; Liaolan 503; Rich aroma

香气是衡量蓝莓品质优劣的核心指标之一^[1]。对于消费者而言,馥郁的香气是吸引其购买的重要因素,大大提升食用体验感。在市场上,有香味的蓝莓品种凭借独特气味脱颖而出,更易获得消费者青睐,从而拥有更强的市场竞争力^[2],其中南高丛蓝莓品种 Eureka Sunrise 果实自带浓郁香气,也被称为花香蓝莓,该品种果实硬脆、甜度高,是目前市场上最优质、最受欢迎的蓝莓品种之一,其他蓝莓品种在果实香气上不及该品种。因此,在品质、产量、抗性的选育基础上,培育香味浓郁的蓝莓品种对提升蓝莓果实综合品质具有重要意义。辽宁省果树科学研究所长期致力于蓝莓新品种培育,在对蓝莓的品质^[3-4]、贮藏性^[5]、果实大小^[6]、香气^[7]等性状的遗传规律进行系统研究基础上,开展蓝莓杂交育种,育成优质鲜食品种辽蓝513^[8]、辽蓝515^[9]等辽蓝系列新品种,现累计杂交后代1.5万余株,为新品种持续创新奠定了试材基础。针对果实香气性状,笔者团队组配了多个杂交组合,经过十余年筛选评价,选育出具有多种水果香味、果粉厚、口感佳等特点的蓝莓新品种辽蓝503(图1)。

1 选育过程

2008年2月,在辽宁省果树科学研究所日光温室

蓝莓试验区,以北高丛蓝莓品种斯巴坦为母本,南高丛蓝莓种质资源N5为父本进行常规杂交育种,同年7月收获杂交种子,2009年2月播种,获得杂交后代44株。组合号:08-48,2010年6月定植于实生选育圃,2011年开始结果,连续多年对果实性状、生长结果习性等进行观察,选出4株优系在庄河、丹东等基地嫁接后进一步筛选,其中代号为08-48-32的优系综合表现突出,组织培养扩繁后于2015—2022年在庄河、丹东等地进行区域试验。结果表明该品种具有低温需冷量少、早熟、成熟一致、果粉厚、味甜且具多种水果香味,品质极上,丰产性好,土壤适应性强等特点。DUS测试表明,与相似品种斯巴坦相比,该品种在果粉厚度、叶片性状、1年生枝(向阳面)颜色、果实形状、果实香气等方面存在特异性。经组织培养多代扩繁,苗木整齐一致、个体间没有明显差异,茎、叶、花、果等植物学特征及物候期、生长势、结果习性等生物学特性稳定一致。2023年通过专家现场审查,命名为辽蓝503,2024年12月25日获得国家林草局新品种授权,品种权证书编号:20240793。

2 主要性状

2.1 植物学特征

树姿直立;叶片卵圆形、深绿色、全缘、单叶互



上:丰产状;下:结果状。

Up: High-yield; Down: Fruiting.

图1 蓝莓新品种辽蓝 503

Fig. 1 Blueberry new cultivar Liaolan 503

生,叶面银灰色;1年生枝红色,枝条顶端着生花芽5~8个,花芽尖圆,总状花序,由7~10个花朵组成,花冠白色,圆柱状,有棱脊,花萼灰绿。

2.2 果实主要经济性状

果柄长,果穗较松散,果皮蓝黑色,果粉厚,果蒂痕小而干;果实大,平均纵径1.59 cm,横径2.09 cm,平均单果质量3.2 g,最大单果质量4.2 g,可溶性固形物含量(w,后同)14.2%,总糖含量12.5%,可滴定酸含量0.63%,维生素C(Vc)含量11.3 mg·100 g⁻¹,花青苷含量91.54 mg·100 g⁻¹,果实味甜、有多种水果香味,香味浓郁,品质极上,极丰产,成熟期一致,定植第2年即可结果,第4年进入丰产期,666.7 m²产量达989.7 kg(表1)。

2.3 物候期

该品种在辽宁大连地区露地栽培条件下,3月初萌芽,4月中下旬盛花期,花期5~10 d,果实于6月

底至7月初成熟;温室栽培条件下,11月萌芽,12月初开花,2—4月果实成熟。

2.4 生长结果习性和适应性

该品种为南北丛品种杂交类型,需要一定的低温期来完成休眠,低温需冷量为600 h,遗传了父本的适应性特点,土壤适应性强。适宜北方日光温室和塑料大棚栽培。

3 栽培技术要点

3.1 土壤改良

定植前利用草炭、腐熟有机肥(牛粪、羊粪等)对园地土壤进行改良,要求疏松透气且有机质含量高,有机质含量3%以上,土壤pH 5.0~5.5为宜。

3.2 苗木选择

选择生长健壮的组培苗,营养钵苗高20~30 cm,分枝数2~4个,确保根系发达,白根布满营养土且未

表1 辽蓝503与相似品种斯巴坦主要性状比较

Table 1 Comparison of main characteristics between Liaolan 503 and similar cultivar Spartan

品种 Cultivar	果实 形状 Fruit shape	w(可溶性 固形物) Soluble solid content/ %	香气 Aroma	果粉 Bloom	1年生枝(向 阳面)颜色 One year- old branch (sun-facing side) colour	花冠 形状 Corolla shape	花冠 棱脊 Corolla ridge	花芽 形状 Flower bud shape	果穗紧 密程度 Bunch density	丰产性 Yield	低温需冷量 Low-chilling requirement/h	土壤适应性 Soil adaptability
辽蓝503 Liaolan503	近圆形 Round	14.2	浓 Rich	厚 Thick	红色 Red	圆柱状 Cylindrical	有 Yes	尖圆形 Rounded - pointed	稀疏 Sparse	极丰产 Extremely high	600	强 Strong
斯巴坦 Spartan	扁圆形 Oblateness	12.4	淡 Weak	薄 Thin	绿色 Green	坛状 Urceolus	无 No	尖长形 Elongat- ed - pointed	紧密 Tightness	一般 Low	1000	弱 Weak

盘根。定植株距 1.2 m,行距 2.0 m,每 666.7 m²栽 278 株。

3.3 施肥管理

早秋或结合越冬防寒施基肥,在树冠外围挖 30 cm 深的沟,每 666.7 m²施 2000~3000 kg 腐熟农家肥,混施 10~15 kg 酸性肥料,拌匀搂平;滴灌园可在花后果实膨大期施用 EC 值 2.0~3.5 mS·cm⁻¹ 的全元素营养液 2~3 次,同时可配合喷施 0.1%~0.2% 有机液体叶面肥,促进果实膨大。秋季施腐熟有机肥加硫酸铵及微量元素肥料;花芽分化期可叶面喷施 0.1% 磷酸二氢钾 2~3 次。

3.4 水分管理

采用滴灌、微喷等方式在萌芽期、新梢迅速生长期、浆果膨大期保持田间持水量 60%~80%,封冻前灌一次封冻水。

3.5 整形修剪

幼树期以扩大树冠、增加枝量为主,对过密的枝条、细弱枝、病枝等进行疏除,培养 3~5 个粗壮萌蘖枝成为结果主丛枝,定干高度 30 cm。成年树主要培养高产结果树形,改善通风透光条件,修剪时应注意保留足够的结果母枝,以保证来年的产量。此外必须重视 9 月中旬的秋剪,适当短截新梢,剪除未成熟的嫩梢,促使剪口下枝条形成花芽。

3.6 越冬防寒

该品种为南北杂交品种,耐寒性较北高丛品种差,北方塑料大棚栽培建议采用双层膜进行防寒。

3.7 病虫害防治

温室栽培时一般在花前喷施 800~1500 倍多抗霉素、啞霉胺或异菌脉等杀菌剂防治灰霉病。

3.8 采收

该品种果实成熟期较一致,配合修剪可按串果

采收。

参考文献 References:

[1] 李秋棉,罗均,李雪萍,陈维信. 果实香气物质的合成与代谢研究进展[J]. 广东农业科学,2012,39(19):104-107.
LI Qiumian, LUO Jun, LI Xueping, CHEN Weixin. Advances in the study on the biosynthesis and metabolism of volatile compounds in fruits[J]. Guangdong Agricultural Sciences, 2012, 39 (19): 104-107.

[2] 黎源,董涛. 果实香气物质的研究进展[J]. 热带生物学报, 2013,4(3):266-275.
LI Yuan, DONG Tao. Advances on study of fruit aromatic substances[J]. Journal of Tropical Biology, 2013, 4(3):266-275.

[3] 刘有春,魏永祥,王兴东,刘成,蒋明三,张舵,袁兴福,陶承光. 南高丛越橘品种‘Sapphire’和北高丛品种‘Berkeley’正反交后代果实糖酸组分含量的遗传倾向[J]. 中国农业科学,2014,47 (24):4878-4885.
LIU Youchun, WEI Yongxiang, WANG Xingdong, LIU Cheng, JIANG Mingsan, ZHANG Duo, YUAN Xingfu, TAO Cheng-guang. Inheritance tendency of sugar and acid contents in the reciprocal cross progenies’ fruits of Southern × Northern High Bush Blueberry (*Vaccinium*) [J]. Scientia Agricultura Sinica, 2014, 47(24):4878-4885.

[4] 刘有春,鄂辉邦,刘成,王兴东,杨艳敏,孙斌,张舵,袁兴福,魏永祥. 越橘半同胞系杂交后代果实糖酸性状的变异和遗传倾向[J]. 果树学报,2016,33(6):664-675.
LIU Youchun, E Huibang, LIU Cheng, WANG Xingdong, YANG Yanmin, SUN Bin, ZHANG Duo, YUAN Xingfu, WEI Yongxiang. Variability and inheritance of sugar and acid content in blueberry (*Vaccinium*) fruit of half-sib crosses[J]. Journal of Fruit Science, 2016, 33(6):664-675.

[5] 刘有春,刘威生,王兴东,杨艳敏,魏鑫,孙斌,张舵,杨玉春,刘成,李天忠. 基于越橘南高丛与北高丛正反交群体的果实贮藏相关性状筛选及其遗传倾向[J]. 中国农业科学,2020,53 (19):4045-4056.
LIU Youchun, LIU Weisheng, WANG Xingdong, YANG Yan-min, WEI Xin, SUN Bin, ZHANG Duo, YANG Yuchun, LIU

- Cheng, LI Tianzhong. Screening and inheritance of fruit storage-related traits based on reciprocal cross of Southern $\times$ Northern High Bush Blueberry (*Vaccinium* Linn)[J]. *Scientia Agricultura Sinica*, 2020, 53(19):4045-4056.
- [6] 刘有春, 李嘉琦, 刘成. 越橘果实大小遗传规律及其与花冠、叶面积的相关性研究[J]. *果树学报*, 2023, 40(10):2050-2060.
- LIU Youchun, LI Jiaqi, LIU Cheng. Investigation on inheritance of fruit size and its correlation with corolla and leaf area in blueberry (*Vaccinium*) [J]. *Journal of Fruit Science*, 2023, 40(10): 2050-2060.
- [7] 李嘉琦, 刘有春, 王兴东, 杨艳敏, 林佳琦, 魏鑫, 刘成. 基于电子鼻的蓝莓重要亲本及杂交后代香气物质研究[J]. *北方果树*, 2024(4):6-12.
- LI Jiaqi, LIU Youchun, WANG Xingdong, YANG Yanmin, LIN Jiaqi, WEI Xin, LIU Cheng. Non-destructive detection of blueberry parents and progenies aromas based on electronic nose[J]. *Northern Fruits*, 2024(4):6-12.
- [8] 刘有春, 王兴东, 王宏光, 王升, 魏鑫, 袁兴福, 魏永祥, 刘成, 陶承光. 早熟蓝莓新品种辽蓝 513 的选育[J]. *果树学报*, 2023, 40(11):2490-2493.
- LIU Youchun, WANG Xingdong, WANG Hongguang, WANG Sheng, WEI Xin, YUAN Xingfu, WEI Yongxiang, LIU Cheng, TAO Chengguang. Liaolan 513, a new early-ripening blueberry cultivar[J]. *Journal of Fruit Science*, 2023, 40(11):2490-2493.
- [9] 刘有春, 王兴东, 杨玉春, 杨艳敏, 孙斌, 张舵, 魏鑫, 王莉, 高树清, 魏永祥, 蒋明三, 刘成. 蓝莓新品种‘辽蓝 515’[J]. *园艺学报*, 2024, 51(增刊 2):43-44.
- LIU Youchun, WANG Xingdong, YANG Yuchun, YANG Yanmin, SUN Bin, ZHANG Duo, WEI Xin, WANG Li, GAO Shuqing, WEI Yongxiang, JIANG Mingsan, LIU Cheng. A new blueberry cultivar ‘Liaolan 515’ [J]. *Acta Horticulturae Sinica*, 2024, 51(Suppl. 2):43-44.