

大粒中熟红皮石榴新品种峰州红的选育

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摘 要:峰州红是从山东枣庄峰城石榴园中发现的大粒、中熟、红皮石榴新品种。果实扁圆球形, 果皮浅红色, 平均单果质量460 g, 平均百粒质量55.1 g。鲜果出汁率45%, 可溶性固形物质量分数16.2%, 籽粒淡红色, 味甜, 综合品质优异。果实发育期120 d左右, 在山东枣庄地区9月中下旬成熟。树体早产、丰产、稳产。抗裂果, 自然条件下裂果率8%~9%, 耐贮藏。适合山东石榴产区栽培。

关键词:石榴; 新品种; 峰州红; 大粒; 中熟; 红皮

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Breeding report of a new big seed, mid-maturing and red peel pomegranate cultivar Yizhouhong

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Abstract: Yizhouhong found in Yicheng district, Shandong province, is a new big seed, mid-maturing, and red peel pomegranate cultivar. The resource survey work was carried out in the main producing areas of Shandong province in 2007. 22 fine individual pomegranates were preliminary selected in 2010. 2-year-old cuttings were used to establish the garden in the spring of 2012, it bore a small amount of fruit in the same year. Systematic investigation on the growth and fruiting habits, biological and botanical characteristics was from 2012 to 2015, and then the superior strains were reselected. Among them, the fine individual pomegranate in Yicheng district Liuyuan town Zhu village, had the characteristics of big seed, high juice yield, high content of soluble solids, resistance to fruit cracking, mid-maturing. Regional adaptability testing was carried out at three sites (Yicheng district, Shizhong district, and Shanting district), and cutting and grafting experiments were carried out at the same time. After many years of continuous observation, Yizhouhong had characteristics of distinctness, uniformity, stability, and the fine comprehensive characteristics. This species is a small tree, attaining a height of 2.6-4.0 m. The tree is vigorous with semicircular crown. Young branches are gray-yellow, perennial branches are gray, branches thorns are very dense. Leaves are long elliptic, entire, base cuneate, 4.7 cm long, 2.1 cm wide. The surface is leathery and smooth. Mature Leaves are dark green. Petiole is light red, 6 cm long. Flower is red, large amount, single-lobe and has 6 pieces petals. Sepals are erect. Yizhouhong is a medium-mature variety. The fruit is nearly oblate spherical, surface light red, average fruit weight 460 g, average 100-grain mass 55.1 g. Juice yield 45%, the content of soluble solid 16.2%, grains are reddish, taste

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sweet. It has excellent comprehensive traits. The fruit development period is 120 d and it matures in mid to late September in Zaozhuang city, Shandong province. It is resistant to dehiscent fruit, and the rate of fruit cracking is only 8%-9% under natural conditions. Suitable cultivation area is Shandong pomegranate producing area, this variety can bear fruits next year after planted, has high yield potential. Orchard should choose the section with deep soil layer, good site conditions and water irrigation conditions. This species likes strong light and warm climate. The absolute minimum temperature should above $-17\text{ }^{\circ}\text{C}$. The best planting area is the sunny slopes of hills with an altitude of about 120 m. In the northern region, the plain must consider frost damage and take antifreeze measures. Spacing in the rows and spacing between rows are $(2-3)\text{ m}\times(3-4)\text{ m}$. Fertilization period includes fertilizer in autumn, and topdressing before flowering, young fruit expansion stage, fruit color turning stage. Watering period includes before germination, before fruit expansion and before freezing. After leaves falling and before germination, the whole garden should be sprayed with lime sulphur at a degree of $3^{\circ}-5^{\circ}$. In the growing season, it is necessary to take agricultural and physical prevention and control as the basis, biological prevention and control as the core, chemical prevention and control as the supplement, give full play to the control role of natural factors, and comprehensively prevent and control the occurrence and spread of diseases and insect pests.

Key words: Pomegranate; New cultivar; Yizhouhong; Big seed; Mid-maturing; Red peel

石榴是集生态、经济、社会效益,观赏价值与保健功能于一体的功能性果树^[1]。石榴产业作为山东省重点支持的果树产业,为枣庄市的特色林果产业、乡村振兴的支柱产业。目前,山东石榴栽培面积达1万 hm^2 ,占全国总面积的1/12,年产量6万t,占全国总产量的1/20^[2]。山东石榴主要分布在枣庄市峄城区,主栽品种有峄城大青皮甜、峄城大红皮甜、峄城大马牙甜、峄城三白甜等,优点是果个大、外观美、含糖量高、可溶性固形物含量高,但缺点也很突出,主要是籽粒小、晚熟、易裂果,尤其是与占领石榴鲜果市场的四川会理青皮软籽、突尼斯软籽相比,由于果实成熟期晚,普遍不能赶在中秋、国庆期间上市,严重影响了山东石榴的上市销售和第一产业发展。因此,选育大粒、中熟、红皮、抗裂果等综合性状优良的品种,是山东石榴育种的重要目标,是有效提高山东石榴品种市场竞争力的重要手段。

1 选育经过

2007年在山东石榴主产区开展资源普查工作。2010年初选红皮石榴优良单株22个,2012年采用2年生扦插苗建园,当年开花并少量结果。2012—2015年对单株生长结果习性和生物学、植物学特性系统调查,复选优良品系。其中,在枣庄市峄城区榴园镇朱村石榴园中优选出的红皮石榴优良单株,具备果实籽粒大、鲜果出汁率高、可溶性固形物

含量高、抗裂果、中熟等综合优良特性。2012年开始在枣庄市峄城区、市中区、山亭区进行区域试验,同时进行扦插和嫁接试验。2015年深秋骤然降温和2016年初极端低温冻害后树体地上部冻死,2016年春利用根蘖苗重新建园。经过多年连续观测,该品种性状具备特异性、一致性、稳定性,综合性状优良,发展前景广阔。2018年9月,枣庄市科技局组织专家进行现场测产验收。2019年10月,峄州红石榴鲜果参加2019北京世界园艺博览会优质果品大赛并荣获金奖,为此次大赛石榴产品类的唯一金奖,峄城石榴鲜果首获世界金奖殊荣。2020年7月,山东林学会组织专家进行第三方评价,专家组一致认为,“峄州红石榴品种的选育”成果在大粒红皮中熟石榴品种选育研究方面有创新,居国内领先水平。2020年12月通过山东省林木品种审定委员会审定,并定名为峄州红(图1)。证书编号:鲁S-SV-PG-024-2020。

2 主要性状

2.1 植物学特征

参照石榴属DUS测试指南和石榴品种种质资源植物学特征描述项目及标准^[3-4]进行评价,该品种为小乔木,生长势强,树冠半开张,成龄树高2.6~4.0 m。一年生枝灰黄色,多年生枝灰色,枝刺密集。叶片长椭圆形,全缘,先端钝圆,叶面革质、光滑,单叶对生或簇生,新叶黄绿色,成熟叶深绿色,叶



图1 石榴新品种峰州红

Fig. 1 A new pomegranate cultivar Yizhouhong

脉黄绿色,叶片长4.7 cm,宽2.1 cm,叶柄淡红色,长6 mm。花量大,花瓣6枚,红色,单瓣,雌蕊1枚,雄蕊约110枚,花萼筒状或钟状,萼筒中等,萼片直立。

2.2 生长结果习性

幼树生长势强,树冠成形快,5年生树高2.57 m,冠幅2.15 m,地径4.2 cm。扦插后第1年即可开花,第2年开始有一定产量,结果株率达到4.0%,4年生树每株平均产量10.6 kg。利用10年生峰城大红皮酸为砧木嫁接峰州红,成活率均在93%以上,第2年开始结果,平均株产2.2 kg,3年生树平均株产11.6 kg,4年生树平均株产21.7 kg。总之,利用扦插、嫁接两种手段,树体均表现出早产、丰产、稳产特性,连续结果能力较强。

2.3 果实主要经济性状

峰州红为中熟品种。果实扁圆球形,果皮浅红色,平均单果质量460 g,平均百粒质量55.1 g,鲜果出汁率45%,可溶性固形物质量分数16.2%,籽粒淡红色,味甜。自然条件下裂果率8%~9%。在山东枣庄地区9月中下旬成熟。综合性状优良。

峰城大红皮甜为峰城区地方主栽红皮品种。表2为峰州红与对照品种峰城大红皮甜的平均单果质量、鲜果出汁率、平均百粒质量、可溶性固形物含量共4个主要经济性状指标的对比情况,可以看出,峰州红的平均单果质量与鲜果出汁率这两个指标与对照品种相比,差异不显著。但峰州红的平均百粒质量、可溶性固形物含量分别比对照品种提高了66.4%、10.9%,而且均达到显著差异水平。

2.4 抗裂果特性

表1 峰州红与峰城大红皮甜果实主要经济指标的比较

Table 1 Comparison of main economic indicators between Yizhouhong and Yichengdahongpitian

品种 Cultivar	平均单果质量 Average fruit mass/g	百粒质量 100-grain mass/g	w(可溶性固形物) Soluble solids content/%	鲜果出汁率 Fresh fruit juice yield/%
峰州红 Yizhouhong	460.0 ab	55.1 a	16.2 a	45.0 a
峰城大红皮甜 Yichengdahongpitian	500.0 a	33.1 b	14.6 b	43.0 a
与对照相比 Compared with the control/%	-8.0	+66.4	+10.9	+4.6

注:表中数据后的不同小写字母表示 $p < 0.05$ 水平差异显著。下同。

Note: Different small letters after the data in the table show significant difference at $p < 0.05$. The same below.

峰州红具有优良的抗裂果特性。2013—2015年,连续3 a对峰州红和对照品种峰城大红皮甜的坐果、裂果情况进行调查统计(表2)。可以看出,峰州红的坐果数显著多于峰城大红皮甜。在常规管理、果实不套袋等情况下,峰州红3 a平均裂果率仅为8.5%,比对照品种降低了23.5%,且差异显著。

2.5 物候期

在山东枣庄地区,峰州红3月底萌芽,4月初展叶;4月上旬为新梢生长期,4月中旬进入新梢速生期,5月初达到生长高峰,以后进入缓慢生长期,7月底出现第二次生长高峰,9月底以后枝梢生长转慢;11月上、中旬落叶;5月中旬为始花期,5月下旬至6月初进入盛花期,6月中旬为末花期;9月中下旬为果实成熟期。果实发育期120 d左右。

表2 峰州红与峰城大红皮甜的坐果、裂果情况比较

Table 2 Comparison of fruit setting and cracking between Yizhouhong and Yichengdahongpitian

调查年份 Investigation year	品种 Cultivar	树龄 Age/a	株数 Number of trees	果实数 Fruit number	裂果数 Dehiscent fruit number	裂果率 Rate of dehiscent fruit/%
2013	峰州红 Yizhouhong	3	10	282 a	23 b	8.1 b
	峰城大红皮甜 Yichengdahongpitian	3	10	220 b	71 a	32.2 a
2014	峰州红 Yizhouhong	4	10	317 a	28 b	8.8 b
	峰城大红皮甜 Yichengdahongpitian	4	10	224 b	69 a	30.8 a
2015	峰州红 Yizhouhong	5	10	330 a	28 b	8.5 b
	峰城大红皮甜 Yichengdahongpitian	5	10	242 b	80 a	33.1 a
平均 Average	峰州红 Yizhouhong	-	-	-	-	8.5 b
	峰城大红皮甜 Yichengdahongpitian	-	-	-	-	32.0 a

3 栽培技术要点

3.1 园址选择

对土壤要求均不严格,棕壤、褐土均可,但仍以土层深厚、立地条件较好、具备水浇条件的地段果实质量、丰产性要好。性喜强光照和温暖的气候,应在绝对最低气温高于 $-17\text{ }^{\circ}\text{C}$,大于 $10\text{ }^{\circ}\text{C}$ 的活动积温在 $3000\text{ }^{\circ}\text{C}$ 以上,地下水位低于 1 m ,土壤pH值在 $6.5\sim 8.2$ 的地带建园。海拔在 120 m 左右的山地丘陵阳坡为最佳栽植区域,其他坡向是次适宜栽培区域;在北方地区的平原地、滩地建园须考虑冻害等因素,采取防冻措施。

3.2 建园

选用生长健壮、无病虫害的扦插苗、嫁接苗建园,要求根系完整,侧根 10 根以上,地径 1 cm 以上,苗高 80 cm 以上。株行距采用 $(2\sim 3)\text{ m}\times(3\sim 4)\text{ m}$ 。土地解冻后至萌芽前栽植。栽植坑大小一般宽、深各 80 cm ,栽后灌足水,覆盖黑色地膜。

3.3 土肥水管理

基肥早施,秋季果实采收后及时施入,以有机肥为主,混加少量氮素化肥。施肥量按每生产 1 kg 果实,施入有机肥 2 kg 。追肥的3个时期分别是开花前、幼果膨大期、果实转色期,前期重视氮肥,后期逐渐增大磷、钾肥比例。施肥方法是树冠下开沟,沟深 $30\sim 40\text{ cm}$,追肥后及时灌水。叶面追肥,通常在石榴花期、果实膨大期、根系活动弱而吸收养分不足时,为增大叶面积、加深叶色、增加叶厚度以提高光合效率时,或者在某些微量元素不足、引起缺素症时进行。浇水的3个重点时期为萌芽前、果实膨大前、封冻前。另外,根据天气和土壤墒情实际,积极做好旱浇涝排工作^[5]。

3.4 病虫害防治

与青皮石榴相比,红皮石榴的抗病性不强,需加大病虫害防控力度。冬季做好清园工作。落叶后和萌芽前这两个时期,全园要喷布 $3\sim 5$ 波美度石硫合剂,防治石榴干腐病、蒂腐病、疮痂病,以及榴绒粉蚧、日本龟蜡蚧等病虫害。生长季节,坚持“预防为主、防治结合”的防控理念,以农业防治和物理防治为基础,以生物防治为核心,以化学防治为补充,充分发挥自然因素的控制作用,综合防控病虫害的发生蔓延^[6]。

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