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早熟黄肉猕猴桃新品种金猕4号的选育

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摘 要:金猕4号是由桂海4号自然授粉后实生选育出的早熟黄肉中华系猕猴桃新品种。果实椭圆形,果体饱满,平均单果质量86.35 g,果形指数为1.64,果皮绿褐色,果肉金黄色。软熟果实可溶性固形物含量(*w*,后同)22.41%,总糖含量15.20%,总酸含量0.93%,维生素C含量1390 mg·kg^{-1}。常温下可存放30 d以上,在(1.0±0.5)℃贮藏条件下可存放90~120 d。在陕西关中地区,盛花期为4月下旬,果实成熟期为9月中旬,果实生长发育期为140~145 d;萌芽率83.23%,成枝率59.11%,结果枝率83.47%,以短果枝结果为主(67.14%)。树势健壮,具有较强的耐热、耐寒能力。适宜陕西秦岭北麓和汉丹江流域低海拔区域及同类型气候区栽植,盛产期产量27.90 t·hm^{-2}。

关键词:中华猕猴桃;新品种;金猕4号;早熟;黄肉

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Breeding report of a new early-ripening yellow- fleshed kiwifruit cultivar Jinmi No. 4

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Abstract: In recent years, yellow-fleshed kiwifruit cultivars have become increasingly popular among consumers both domestically and internationally due to their bright fruit color and high content of carotenoids. Shaanxi Province, as the largest and most profitable kiwifruit production area in China, still mainly cultivates green-fleshed cultivars (*Actinidia deliciosa*), with a relative lack of yellow-fleshed kiwifruit (*A. chinensis*) varieties, especially early-ripening ones. In 2005, the seeds from open pollinated Guihai No. 4 fruits were collected and sowed. Therefore a population of seedlings was obtained in 2006. After many years of observation and evaluation of the characteristics of the trees and fruits of the seedling offsprings Jinmi No. 4 was found to have some significant advantageous traits: early maturity, yellow flesh, high quality and high yield. After regional adaptability testing at three sites over five years from 2017 to 2022, it was finally selected and registered in 2024. The one-year-old branches is smoothy with no hairs or only a few short pubescence on the its surface. The leaves are broad obovate and semi-leathery, with wavy margins and a light green color. And its flower inflorescence is a dichasial cyme, the pedicel length and the corolla diameter are 48.74 mm and 49.25 mm, respectively. The fruit is elliptical in shape, with plump fruit body, the longitudinal diameter. The transverse diameter and the fruit shape index are approximately 76.10 mm, 43.91 mm and 1.64, respectively. The average weight of fruit is 86.35 g. The skin is greenish-brown and flesh color is golden yellow. The contents of soluble solids, total sugar, titratable acidity and vitamin C in ripening fruit are 22.41%, 15.20%, 0.93% and 1390 mg·kg^{-1}, respectively. In Guanzhong District of Shaanxi Province, the peak flowering period is in late April, and the fruit is ripe in mid September, with a fruit development period of 140 to 145 days; and the bud

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break rate, branch formation rate and the fruit-bearing branch rate are, respectively, 83.23%, 59.11% and 83.47%, with short fruit-bearing branches being the main contributors (67.14%). It has a vigorous growth habit and stronger heat and cold tolerance. The fruits could be stored for more than 30 days at room temperature, and 90 to 120 days in cold storage (1.0 ± 0.5) °C. It is a diploid plant. It showed significant differences at the DNA level compared with the reported cultivars (like Nongda Jinmi, Heijin, Jinyan and Huayou). Suitable cultivation area would be the low-altitude areas of the northern foot of the Qinling Mountains and the Hanjiang and Danjiang River basins in Shaanxi, as well as in similar climatic zones; it has an average yield of 27.90 t · hm^{-2} in the full fruit stage. Cultivation techniques including establishment of orchards, the selection of male plants, shaping and pruning, flower and fruit management, as well as soil, fertilizer, and water management can refer to the practices used for Nongda Jinmi and Heijin. The breeding and promotion of Jinmi No. 4 could provide a new insight for optimizing the kiwifruit variety structure and for the staggered marketing of red, yellow, and green kiwifruit varieties in early, mid, and late seasons, in Shaanxi Province.

Key words: *Actinidia chinensis*; New cultivate; Jinmi No. 4; Early-ripening; Yellow flesh

近年来，金艳、Zespri® SunGold、农大金猕等中华系黄肉猕猴桃品种，因具有果肉色泽艳丽、富含类胡萝卜素等特征，备受消费者喜爱，逐渐发展成为国内外猕猴桃产业主栽品种[1-4]。陕西作为中国猕猴桃产业规模最大、效益最好的产区，其主栽品种仍是绿肉美味猕猴桃，黄肉中华猕猴桃品种相对缺乏。因此，优质高产黄肉猕猴桃品种的选育与推广种植，可为陕西地区猕猴桃品种结构优化、红黄绿早中晚错季上市奠定良好基础。

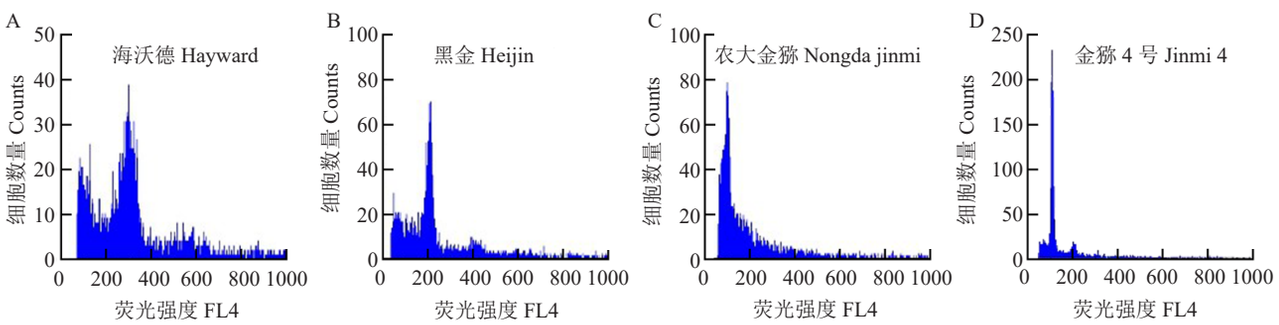
1　选育过程

金猕4号是由桂海4号自然授粉后实生选育的新品种。2005年，收集桂海4号自然授粉的果实，用其种子进行播种，2006年获得实生后代群体。2007—2011年，对后代群体生长势进行评价，筛选出树体长势具有显著优势特点的优系材料21个。2012—2016年，对挂果的21个优系材料进行连续4年的观察评价，初选出早熟、黄肉、优质、高产的中华猕猴桃优良株系1个。2017—2022年，采集接穗在陕西眉县、岐山、杨凌地区进行大树高接，以中华系农大金猕为对照[3]，进行品种比较试验。多年的比较试验结果表明，该优系遗传性状稳定、特异性状表现显著。2024年获得陕西省农业农村厅颁发的果树品种登记证书[登记编号：陕登猕猴桃（2024）004]，命名为金猕4号。

2　主要特征特性

2.1　倍性鉴定

以已知倍性的海沃德（六倍体）、黑金（四倍体）、农大金猕（二倍体）为对照，对金猕4号进行倍性鉴定。检测结果表明，金猕4号为稳定的二倍体植株（图1）。



A. 海沃德；B. 黑金；C. 农大金猕；D. 金猕 4 号。

A. Hayward; B. Heijin; C. Nongda jinmi; D. Jinmi 4.

图 1　倍性检测结果

Fig. 1　The result of ploidy tested

2.2 植物学特征

1年生枝光滑，表面无毛或少附有短茸毛；皮孔白色、短梭形、较大；叶片阔倒卵圆形、半革质；叶缘波状、浅绿色；花柄长48.74 mm，花冠直径49.25 mm，多为二歧聚伞花序；花萼5~7片，绿色；花瓣6~7片，米白色；花药黄色，花丝淡绿色；花柱姿态斜生或水平，30~38枚，白色（表1）。

2.3 果实经济性状

果实椭圆形（图2），果体饱满，纵径76.10 mm，横径43.91 mm，果形指数为1.64。果个较大，均匀一

表1 金猕4号和农大金猕的植物学性状特性比较

Table 1 Comparison of botanical characteristics of Jinmi 4 and Nongda Jinmi

品种 Cultivar	物候期 Phenological periods			1年生枝 Annual branch				
	萌芽期 Germination period	花期 Full blooming	果实成熟期 Maturity period	表皮粗糙度 Rugosity of epidermis	皮孔长度 Length of branch hole skin/mm	皮孔宽度 Width of branch hole skin/mm	皮孔形状 Shape of branch hole skin	皮孔颜色 Color of branch hole skin
金猕4号 Jinmi 4	3月15—18日 Mar. 15th to Mar. 18th	4月18—25日 Apr. 18th to Apr. 25th	9月13—15日 Sept. 13th to Sept. 15th	光滑 Smooth	2.43±0.03	1.37±0.01	短梭形 Short fusiform	白色 White
农大金猕 Nongda Jinmi	3月16—18日 Mar. 16th to Mar. 18th	4月19—24日 Apr. 19th to Apr. 24th	9月13—16日 Sept. 13th to Sept. 16th	光滑 Smooth	2.59±0.02	1.36±0.01	短梭形 Short fusiform	黄（褐）色 Yellow (brown)

品种 Cultivar	叶 Leaf							
	叶形 Leaf shape	叶长 Leaf length/cm	叶宽 Leaf width/cm	叶柄长 Petiole length/cm	叶厚 Leaf thickness/mm	叶缘 Edge of foliage	叶色 Leaf color	叶质 Leaf texture
金猕4号 Jinmi 4	阔倒卵圆形 Broad obovate	10.47±0.12	14.22±0.15	6.92±0.12	0.65±0.01	波状 Undate	浅绿 Light green	半革质 Semi-leathery
农大金猕 Nongda Jinmi	阔倒卵圆形 Broad obovate	10.06±0.11	13.53±0.22	6.31±0.10	0.61±0.01	波状 Undate	绿色 Green	革质 Leathery

品种 Cultivar	花 Flower							
	花序 Inflorescence	花瓣 Petal	花萼 Sepal	花柱 Style	花丝颜色 Thrum color	花药 Anther	花冠直径 Flower diameter/mm	花柄长 Flower stalk/mm
金猕4号 Jinmi 4	二歧聚伞 Dichasium	6~7，米白色 6-7, Off white	5~7，绿色 5-7, Green	30~38，白色 30-38, White	淡绿 Light green	44~51，黄色 44-51, Yellow	49.25±0.18	48.74±0.35
农大金猕 Nongda Jinmi	二歧聚伞 Dichasium	6~8，米黄色 6-8, Off-white	7~9，绿色 7-9, Green	26~46，白色 26-46, White	淡绿 Light green	45~68，黄色 45-68, Yellow	40.17±0.10	38.18±0.11

品种 Cultivar	果实 Fruit							
	果形 Fruit shape index	纵径 Longitudinal diameter/mm	横径 Horizontal diameter/mm	单果质量 Single fruit mass/g	*w*（可溶性固形物） Soluble solids content/%	*w*（总糖） Total sugar content/%	*w*（总酸） Total acid content/%	*w*（维生素C） Vitamin C content/（mg·kg^{-1}）
金猕4号 Jinmi 4	椭圆形 Oval	76.10±0.13	43.91±0.07	86.35±1.57	22.41±0.21	15.20±0.49	0.93±0.01	1 390 ±4.68
农大金猕 Nongda Jinmi	圆柱形 Cylindrical	58.63±0.21	52.67±0.10	66.47±0.89	20.66±0.17	14.80±0.61	0.99±0.02	1940 ± 7.82

图2 猕猴桃新品种金猕4号

Fig. 2 A new kiwifruit cultivar Jinmi 4

致，平均单果质量86.35 g。果皮绿褐色，果肉金黄色。软熟果实可溶性固形物含量（*w*，后同）22.41%，总糖含量15.20%，总酸含量0.93%，维生素C含量1390 mg kg^{-1}。果实耐贮藏，常温下可存放30 d以上，在（1.0±0.5）℃贮藏条件下可存放90~120 d。

2.4　生长结果习性与物候期

树势较强，枝条健壮，萌芽率83.23%，成枝率59.11%，结果枝率83.47%，坐果率98.65%，以短果枝结果为主（67.14%）。陕西关中地区，3月中旬萌芽，4月下旬开花，9月中旬果实成熟，果实生长发育期为140~145 d。盛产期产量27.90 t·hm^{-2}。

2.5　DNA指纹图谱鉴定

利用6对SSR分子标记引物，对金猕4号与已报道的黄肉猕猴桃品种农大金猕、黑金、金艳、华优等进行鉴定，并构建分子身份证和DNA指纹图谱（表2，图3）。结果表明，与已报道的品种相比较，金猕4号在DNA水平上均存在显著差异。

表2　基于SSR分子标记的分子身份证

Table 2　Molecular ID cards based on SSR molecular markers

品种 Cultivar	SSR-P1	SSR-P2	SSR-P3	SSR-P4	SSR-P5	SSR-P6
华优 Huayou	00000010111	0000011011	010011111100	000010100010101	00000001	01111111100
黑金 Heijin	00100000110	1010010011	010011010100	000001000110101	00101111	01101100100
金艳 Jinyan	01110000111	0000000011	110111100100	000001000001101	00000001	11111111100
农大金猕 Nongda Jinmi	00000010000	0010010101	000000000000	000001010000111	00000001	10000000000
金猕4号 Jinmi 4	00000010110	0000000001	010111111000	001001011111111	00111111	01100111100

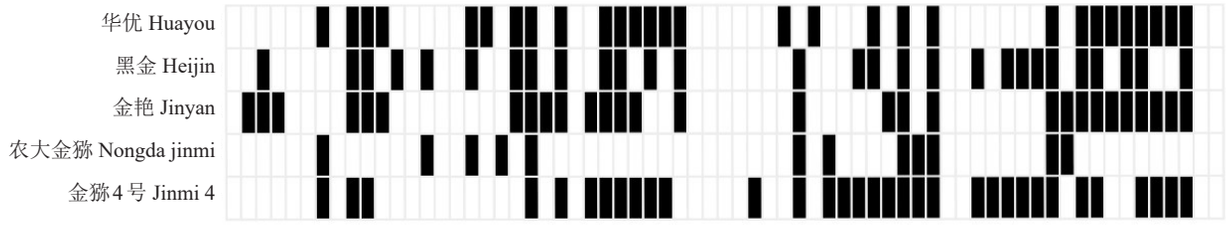


图3　基于SSR分子标记的DNA指纹图谱

Fig. 3　DNA finger printings based on SSR molecular markers

3　栽培技术要点

适宜陕西秦岭北麓和汉丹江流域低海拔区域及同类型气候区栽植。建园、雄株配置、整形修剪、花果管理及土肥水管理等可参考农大金猕和黑金[3,5]。

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