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苹果晚熟新品种华妃的选育

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摘 要:华妃是以金冠为母本、华富为父本杂交选育的晚熟苹果新品种。果实近圆形,果形指数0.86,平均单果质量为181 g。果面光洁,无果锈、果棱、蜡质和果粉,着鲜红色,外观极佳,套袋栽培不除袋,果皮较薄,果肉淡黄色,肉质细脆,汁液多,香甜爽口,有清香味,品质极上。果实去皮硬度为7.0 kg·cm^{-2},可溶性固形物质量分数为15%,可溶性糖质量分数为12.3%,总酸质量分数为3.15 g·kg^{-1},维生素C质量分数为111.2 mg·kg^{-1}。适应性强,适宜在金冠种植区栽植。在辽宁兴城地区,果实成熟期在10月下旬,全生育期为170 d左右。早果性与丰产性良好。6年生高接树单株产量为35 kg。果实可在冷库条件下贮藏4~5个月。

关键词:苹果;新品种;华妃;晚熟

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Breeding report of a new later ripening apple cultivar Huafei

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Abstract: Huafei is a late-ripening apple cultivar with cold-resistance and wide suitable-area derived from the cross between Golden Delicious (female parent) and Huafu (male parent) at the Research Institute of Pomology, Chinese Academy of Agricultural Sciences. In 1998, over 300 seeds were bred through hybridization, among which 67 hybrid seedlings were cultured in 1999. In 2007, the plant numbered B98-63 was found to have good fruit characteristics. In 2008, the B98-63 was recognized as an excellent variety and regional cultivation experiments were performed in Xingcheng, Suizhong of Liaoning. The results of the regional cultivation test were good, and it was registered by the Ministry of Agriculture and Rural Affairs in 2020. Officially named as Huafei. The tree of Huafei is open tree gesture. Matured leaves are medium-green, 5.90 cm long, 4.78 cm wide, biserrated, the shape of the tip is gradually pointed, leaf blade outwards in relation to shoot. There are five flowers on each inflorescence on average. The flower is pink, 4.00 cm across. The fruit of Huafei is nearly round. The fruit shape index is 0.86, and the average fruit mass is 181 g. The fruit is covered with bright red, and the surface is smooth with no lenticels and fruit rust. The flesh is light yellow, tender, crunchy, juicy and clear fragrance. The peeled hardness is 7.0 kg·cm^{-2}, the soluble solids content is 15%, the soluble sugar content is 12.3%, the total acid content is 3.15 g·kg^{-1}, and the vitamin C content is 111.2 mg·kg^{-1}. It tastes sweet, with excellent quality. The fruit full growth period is about 170 d and it matures in late October in Xingcheng, Liaoning. Huafei has strong ability of storage. The cold storage of fruit life is six months, after storage, the fruit is quite good quality. The Huafei tree has moderate vigor, strong branching ability, easy development of flower buds and strong early fruit. Generally, grafted seedlings will bloom and bear fruit in the third year after being planted. Top grafting in the mature tree, the trees of Huafei will bear fruits two years later. The yield of triennial and sexennial grafted plants is 9.4 kg and 35 kg respectively. Trees of

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Huafei have high yields and will not easily suffer fruit abscission The cold resistance of the branches of Huafei is similar to that of Golden Delicious. The resistance to trunk apple ring rot is better than Golden Delicious. Orchard should better choose neutral soil that is flat or less sloping and has great ability of fertilizer retention, as well as great drainage conditions. The spacing of plant and row is 3 m×4 m. Fertilize at least three times in a growth period, once in spring, June and August respectively. Bagging cultivation is carried out 30−45 days after the flowering period, and the bag-removing is carried out from 15 to 25 days after the fruit ripening period. Simplify the management of the orchard, reduce short cut as much as possible in the process of pruning. In the pruning process, we can thin branches, put branches slowly, and pull branches appropriately.

Key words: Apple; New cultivar; Huafei；Late ripening

苹果（*Malus pumila* Mill.）是深受我国消费者喜爱的水果，也是我国出口创汇的重要果品。我国苹果产量和栽培面积均为世界第一，但主栽品种多为富士系品种，占我国苹果栽培面积的三分之二[1]。这导致我国苹果市场品种单一，缺乏活力，仅红富士品种在我国苹果市场中占比便高达69.6%[2]，自主选育的品种占比不足15%[3]，单一的富士系中大果型苹果已无法满足消费者多种感官的需求，而且品种单一，缺乏自主选育的优良品种，已经严重阻碍了我国苹果产业的发展。培育综合性状优良的小果型苹果，以此来调整和丰富我国苹果市场，满足消费者的需求，促进苹果产业更好的发展已成为我国苹果育种工作的重点。

1　选育经过

中国农业科学院果树研究所苹果育种课题组用金冠品种作母本、华富品种作父本，1998年进行杂交，得到300余粒杂交种子。翌年播种育苗，经过连续多年自然淘汰，最终有67株定植杂交苗成活并结果。2005年实生母树开始结果，连续多年观察，发现所结果实果面光洁，果实鲜红色，外观美丽，口感香甜。2008年，在辽宁兴城、绥中等地进行区域栽培试验，结果显示该品种果实品质上乘，性状稳定。2020年通过农业农村部登记，正式命名为华妃（备案编号：GPD苹果(2020)210021）（图1）。

图1　苹果晚熟新品种华妃

Fig. 1　A new late ripening apple cultivar Huafei

2　主要性状

2.1　经济性状

华妃果实呈近圆形，果形指数0.86，平均单果质量为181 g，果型一致，单果质量整齐。果梗长度为3.0 cm左右，粗度中等，梗洼浅；萼片宿存，半开张。果实外观洁净光滑，无果棱、蜡质、果粉和果锈，有水晶透明状美感。果面鲜红色，色泽均匀；果皮较薄呈白色。果心小。果肉淡黄色，气味清香，质细汁多，甜脆爽口，品质极上。果实去皮硬度为7.0 kg·cm^{-2}，可溶性固形物质量分数为15%，可溶性糖质量分数为12.3%，总酸质量分数为3.15 g·kg^{-1}，维生素C质量分数为111.2 mg·kg^{-1}（表1）。果实成熟期晚，在辽宁

表1　华妃与主要栽培品种的果实经济性状

Table 1　The economic characteristics between Huafei and main varieties

品种 Cultivar	单果质量 Fruit mass/g	果形指数 Fruit shape index	硬度 Hardness/（kg·cm^{-2}）	w（可溶性固形物）Soluble solid content/%	w（可溶性糖）Soluble solid content/%	w（总酸）Total acid/（g·kg^{-1}）	w（维生素C）Vitamin C content/（mg·kg^{-1}）	成熟期 Maturation date
华妃 Huafei	181	0.86	7.00	15.0	12.3	3.15	111.2	10月20日 Oct. 20
寒富 Hanfu	304	0.87	6.89	13.6	10.2	3.67	29.5	9月26日 Sept. 26
金冠 Jinguan	256	0.89	7.30	14.3	11.8	4.15	35.0	10月5日 Oct. 5

兴城地区，华妃成熟期为10月下旬。耐贮性强，在冷库条件下贮藏4~5个月。

2.2 植物学特征

华妃树型为分枝型，树冠开张，主干灰褐色。一年生枝深红褐色，披稀疏茸毛，节间长，皮孔中多。成熟叶片中等绿色，叶片长5.90 cm，宽4.78 cm，叶柄长2.37 cm，水平着生于枝条上，叶尖渐尖，叶缘复锯齿，叶面平展，背面有稀疏茸毛。每个花序5朵花，花冠直径4.0 cm左右。花蕾颜色粉红色，花瓣叠生，椭圆形。

2.3 生物学特性

2.3.1 *生长结果习性* 华妃树势中庸，3年生幼树高2.51 m，东西冠径2.13 m，南北冠径2.05 m，主干粗度4.49 cm。成枝力强，一年生枝条长度40 cm，粗度0.71 cm。成花能力与早果性良好，结果以中短果枝为主，定植嫁接苗后3 a即可开花结果，平均单株产量为3.0 kg；大树高接2 a后即可结果，并形成产量。2010年在辽宁省兴城市韩家村，对部分大树进行高接换头，高接品种为华妃，高接第3年单株产量为9.4 kg，每666.7 m^2产量为696.5 kg，之后单株产量逐年增加，在高接后第6年单株产量可达到35.0 kg，每666.7 m^2产量达到2585.0 kg（表2），产量高，且果实成熟后不易落果。华妃为小果型苹果，产量低于寒富和金冠，但稳产性和品质要优于寒富和金冠。

2.3.2 *物候期及抗逆性* 在辽宁省兴城地区，4月上旬萌芽，5月4日左右为初花期，5月7日前后进入盛花期，果实成熟期为10月下旬。果实全生育期为170 d左右。华妃枝条抗寒性中等，与金冠相近；但抗枝干苹果轮纹病能力优于金冠。

表2 华妃和主栽品种的产量情况

Table 2 The yield between Huafei and main varieties kg

品种 Cultivar	2012		2013		2014		2015		平均 Average	
	单株产量 Yield per plant	每666.7 m^2产量 Yield per 666.7 m^2	单株产量 Yield per plant	每666.7 m^2产量 Yield per 666.7 m^2	单株产量 Yield per plant	每666.7 m^2产量 Yield per 666.7 m^2	单株产量 Yield per plant	每666.7 m^2产量 Yield per 666.7 m^2	单株产量 Yield per plant	每666.7 m^2产量 Yield per 666.7 m^2
华妃 Huafei	9.4	696.5	16.3	1205.5	27.2	2009.1	35.0	2 585.0	22.0	1 624.0
寒富 Hanfu	11.8	873.2	22.5	1665.0	39.0	2886.0	51.0	3 774.0	31.1	2 299.6
金冠 Jinguan	11.0	814.0	20.5	1517.0	33.5	2481.0	44.3	3 277.3	27.3	2 022.3

注：2010 年为高接后第 1 年。

Note: The first year of top grafting is 2010.

3 栽培技术要点

（1）选地势平坦或坡度缓和、背风向阳、排水以及土壤营养状况良好的壤砂土地建园。选择健壮一级华妃苗进行栽植，栽植前施足有机肥，株行距3 m×4 m为宜。栽植后浇水，覆地膜。

（2）要注重树体营养管理，一个生长周期内要至少施肥3次。第1次施肥在春季，主要施足农家肥，并浇水；6月初施第2次肥，主施氮肥和磷肥；8月份施第3次肥，以磷酸二氢钾为主，可配合少量钙、镁等元素复合肥一起施用。

（3）花后30~45 d进行套袋，不除袋。果园尽可能进行简化管理。注重夏季修剪，修剪过程中尽可能减少短截，多进行疏枝，缓放枝条，适当拉枝，调整枝条开张角度，避免枝条互相遮光。

（4）华妃生长周期内要注意对苹果轮纹病、腐烂病及早期落叶病等病害的防治。

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