

## ROOTSTOCKS OF FRUIT CROPS IN BELARUS

**Vyacheslav SAMUS, Soltan GADZHIEV, Vitaliy POPLAVSKIY,  
Nina DRABUDKO**

*RUE “Institute for Fruit Growing of the NAS of Belarus”, 2 Kovalev str.,  
Samokhvalovitchy, Minsk region, Republic of Belarus.*

*E-mail: [belhort@it.org.by](mailto:belhort@it.org.by)*

Biological and economic characteristics of recommended for cultivation and promising clonal rootstocks of fruit crops according to the results of complex evaluation in stoolbed, nursery and orchard in 1985–2005 are presented in the paper.

According to the complex indices the following apple rootstocks are recommended for cultivation in the Republic: rootstocks PB-4, B.396, M.9, M.26, B.118, B.545, MM.106-13. The following rootstocks are passed to the system of State variety trials: apple rootstock 106-13, plum rootstocks VPK-1, OD-2-3, VVA-1, cherry and sweet cherry AVCh-2, VSL-2, Gisella-5, Damil GY-79.

**Key words:** clonal rootstocks, winterhardiness, vigor, biological, economic and morphological characteristics, precocity, productivity, Belarus.

**Introduction.** Nowadays the most effective type of orchard is intensive one-row orchard planted on clonal rootstocks. The type of clonal rootstocks can change the vigor, precocity, yield and resistance to biotic and abiotic factors of grafted plants without impact on inheritance of cultivar properties (1).

The applied rootstock must be winter hardy, well-adapted to the environmental conditions of the region, highly compatible with grafted cultivars, resistant to fungi and virus diseases, gaining precocity, high yield and fruit quality as well as forming compact trees for convenient maintenance and cropping (3).

According to the food standards adopted in the Republic of Belarus, gross production of fruits and small fruits must be not less than 800 thousand ton per year. Yearly gross production of fruits and small fruits was on the average 300–400 thousand ton during the last 5 years, which comprised 40–50% of the required production.

Substantial increase of fruit production in the Republic may be possible in case of creation of new orchards with dense plantation design. Intensification in horticulture can be achieved by the use of dwarf clonal rootstocks (5). Early fruiting of such trees allows shortening unproductive period and optimum planting density due to the fact that compact trees makes land use of areas more effective, eventually gaining high profits.

**Materials and methods.** The research was carried out at the Institute for Fruit growing of the NAS of Belarus in 1985–2005.

Objects of research where the following groups of rootstocks:

35 forms of apple tree: B.118, B.396, V-9, B.476, B.545, 71-3-150, 71-3-195 (Russia, Michurinsk SAU); B-16-20, B-7-53 (Russia, Dagestan FBES); ARM-18 (Armenia, RIH&G); P1, P2, P14, P22, P59, P60 (Poland, Institute in Skierniewitse), M.9 Emla, M.9 N-9-84, M.9 Rene Nikolaya, M.9 Pajam 1, M.9 Pajam-2 (England, East Malling Research Station), Supporter-1, Supporter-3 (Germany, Institute of Pomology at Dresden-Pillnitz), D-1161, D-471, D-1071, D-3331, D-2854, Don-70-382, Don-70-362 (Ukraine, Artemovskiy HES), J-TE-E, J-TE-D, J-TE-F (Czech republic); MM.106-13, PB-4 (Belarus, Institute for Fruit Growing of the NAS of Belarus);

pear: 6 forms – *Cydonia x oblonga* BA-29 (France, INRA), quince <sup>1</sup>/19, <sup>1</sup>/22, <sup>1</sup>/33 (Belarus, Institute for Fruit Growing of the NAS), SI-4-2 and SI-2-10 (Ukraine, Research institute in Mliev named after L. P. Simirenko UAAS) and 7 forms of pear rootstocks obtained from All-Russia Research Institute of Horticulture named after I. V. Michurin (Russia) – pear-10, 217-24-4, 218-5-4, 218-6-4, 3-21-32, 218-4-4;

plum: 14 forms – 21-11, 21-20 (Russia, I.V.Michurin CSL at Michurinsk), OD-2-3 (Russia, Voronezh State Agrarian University named after K. D. Glinka), GF 655/2 (France, Research station La Grande Ferrade at Bordeaux), SVG 132-2, SVG 11-19, 140-2, VPK-1 (Russia, All-Russia Research Institute of Siberia name after M. A. Lisavenko at Barnaul), Gayovata, 9-250, 9-259, VVA-1, VSV-1, VVA-146 (Russia, the Crimean Experimental Research Station RIP at Krymsk);

cherry and sweet cherry: 36 forms – P-1, OVP-2, OVP-3, OVP-4, OVP-5, OVP-6, V-2-180, B-2-230, B5-88, C-8-101, Rubin (Russia, All Russia Research Institute of Horticulture at Oriol), VC-13, LC-52, L-2, VSL-2, Mahrovaya-2, Plakuchaya (Ukraine, the Crimean ERS), P-7, P-3–Moscovia, Izmaylovskiy (All Russia Breeding and Technology Institute for Fruit Growing and Fruit Nurseries, Moscow, Russia), AVCh-2 (Russia, All Russia Research Institute of Siberia named after M. A. Lisavenko at Barnaul), Rossoshanskaya No.2, Rossoshanskaya No.3, Studenkovskaya (the Ukraine, Artiomovskaya ESH), Gisella-5, F-1/12 (Germany), Damil GY-79 (Belgium), Meteor (the US), Oblachinskaya (Yugoslavia), 16-53, Antipka 18/19, Antipka 18/20, 53/1, 9-78/23, 17/40, 14/2 18-1 (Belarus, Institute for Fruit Growing of the NAS).

Research and observations were carried out according to „Programma i metodika izucheniya klonovix podvoev v Pribaltiyskikh respublikah i Byelorusskoy SSR” (Elgava, 1980).

**Results.** High winter hardiness was found in apple tree rootstocks B.118, B.396, V-9, B.491, B.476, B.545, B-16-20, PB-4, B-3, D-1161, J-TE-E, MM.106-13; pear rootstocks SI-4-2 and SI-2-10, pear-10, 3-21-32; plum rootstocks VPK-1, VVA-1, GF 655/2, 140-2, OD-2-3, 9–250, VSV-1; cherry and sweet cherry rootstocks OVP-2, B-2-230, B-2-180, C-8-101, LC-52, VSL-2, L-2, VSL-2, Izmaylovskiy, Gisella-5, Damil GY-79.

The following rootstocks have the highest value and quality of stoolbed rooting: apple rootstocks B.396, PB-4, ARM-18, B.491, B.118, B.476, B-7-35, B-16-20, pear-

quince VA-29, SI-2-10, plum rootstocks VPK-1, cherry and sweet cherry rootstock VSL-2. The selected rootstocks provided the output of 15–20 rooted stoolbeds from 1 mother plant, rooting score was 4.5, trunk diameter at ground level – 7–11 mm, mean length of stoolbed – 50–80 cm.

The following rootstocks were rooted worse (score 3.0): apple rootstocks M.9, M.26, D1161, pear rootstocks SI4-2, plum rootstocks OD-2-3, cherry and sweet cherry LC-52, L-2.

**Table. Economic and biological characteristics of adapted and perspective clonal rootstocks of fruit crops**  
**Lentelė. Ekonominės ir biologinės registruotų ir perspektyvių vegetatyvinių poskiepių charakteristikos**

Rootstock Poskiepis	Vigour Augumas	Propagation method Dauginimo būdas	Planting density in orchard, tree/ha Sodinimo sode tankumas, vaism./ha	Yield during full fruiting Derlius visiško derėjimo metu, t/ha	Precocity, year Derėjimo pradžios metai	Anchorage Įsitvirtinimas dirvoje
Apple / Obelys						
PB-4	Super-dwarf Nykštukinis	Stoolbeds Augynai	2500	40	2	Weak, trellis required Silpnas, reikia atramų
B.396	Dwarf Žemaūgis	Stoolbeds Augynai	1666	32	2	Weak, trellis required Silpnas, reikia atramų
M.9	Dwarf Žemaūgis	Stoolbeds Augynai	2500	40	2	Weak, trellis required Silpnas, reikia atramų
M.26	Semi-dwarf Pusiau žemaūgis	Stoolbeds Augynai	1666	32	2	Trellis required Reikia atramų
B.118	Semi-vigorous Pusiau augus	Stoolbeds Augynai	1250	30	2	Good, trellis temporary required Geras, laikinai reikia atramų
B.545	Semi-dwarf Pusiau žemaūgis	Stoolbeds Augynai	1250	30	2	Good, temporary trellis required Geras, laikinai reikia atramų
MM.106-13	Semi-vigorous Pusiau augus	Stoolbeds Augynai	1250	35	2	Good, temporary trellis required Geras, laikinai reikia atramų
Pear / Kriaušės						
VA-29	Semi-vigorous Pusiau augus	Stoolbeds and hardwood cuttings Augynai ir sumedėję auginiai	1250	20	3	Good, temporary trellis not required Geras, nereikia laikinų atramų

Table continued  
Lentelės tęsinys

Rootstock Poskiepis	Vigour Augumas	Propagation method Dauginimo būdas	Planting density in orchard, tree/ha Sodinimo sode tankumas, vaism./ha	Yield during full fruiting Derlius visiško derėjimo metu, t/ha	Precocity, year Derėjimo pradžios metai	Anchorage Įsitvirtinimas dirvoje
Plum / Slyvos						
VVA-1	Dwarf Žemaūgis	Softwood and hardwood cuttings Žalieji ir sumedėję auginiai	2000	25	2	Weak, trellis required Silpnas, reikia atramų
OD-2-3	Semi-dwarf Pusiau žemaūgis	Softwood and hardwood cuttings Žalieji ir sumedėję auginiai	1500	20	2	Weak, trellis required Silpnas, reikia atramų
VPK-1	Semi-vigorous Pusiau augus	Softwood cuttings Žalieji auginiai	1250	20	2	Good, temporary trellis not required Geras, nereikia laikinų atramų
Cherry and sweet cherry / Vyšnios ir trešnės						
OVP-2	Semi-vigorous Pusiau augus	Softwood cuttings Žalieji auginiai	1250	18	2	Good, temporary trellis not required Geras, nereikia laikinų atramų
Ismaylovskiy	Semi-vigorous Pusiau augus	Softwood cuttings Žalieji auginiai	1250	18	2	Good, temporary trellis not required Geras, nereikia laikinų atramų
VSL-2	Dwarf Žemaūgis	Softwood cuttings and stoolbeds Žalieji auginiai ir augynai	1666	22		Weak, trellis required Silpnas, reikia atramų

The following rootstocks have high rooting (85–100%) in propagation by softwood cuttings: plum rootstocks OD 2-3, VPK-1, 140-2, 9-250, VVA-1, cherry and sweet cherry rootstocks OVP-2, Izmaylovskiy, C-8-101, B-2-180, VSL-2, AVCh-2.

Assessment of clonal rootstocks showed that the output of rootstock layers is determined by both meteorological conditions during vegetative period and biological specifics of rootstocks. Maximum output of standard rootstocks (75–88%) was found for the rootstocks of apple – B.396, B.118, ARM-18, B-7-35, B.476, J-TE-E, pear-quince VA-29, plum VPK-1, cherry and sweet cherry OVP-2, Ismaylovskiy,

VSL-2, LC-52, B-2-180, C-8-101.

The following rootstocks were distinguished by precocity and yield efficiency: apple rootstocks PB-4, B.396, M.9, M.26, ARM-18, B-7-35, B-16-20, B.118, B.545; pear-quince VA-29; plum VPK-1; cherry and sweet cherry OVP-2, Ismaylovskiy, B-2-230 [2,4].

**Conclusions.** According to the complex indices the following apple rootstocks are recommended for cultivation in the Republic: rootstocks PB-4, B.396, M.9, M.26, B.118, B.545, MM.106-13. The following rootstocks are passed to the system of State variety trials: apple rootstock 106-13, plum rootstocks VPK-1, OD-2-3, VVA-1, cherry and sweet cherry AVCh-2, VSL-2, Gisella-5, Damil GY-79.

*Gauta*

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*Parengta spausdinti*

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## VAISMEDŽIŲ POSKIEPIAI BALTARUSIJOJE

**V. Samus, S. Gadzhiev, V. Poplavskiy, N. Drabudko**

*Santrauka*

Šiame darbe pateiktos biologinės ir ekonominės rekomenduojamų auginti ir perspektyvių vegetatyvinių poskiepių charakteristikos remiantis 1985–2005 metais atlikto vertinimo poskiepių dauginimo augyne, medelyne ir sode rezultatais. Kompleksiškai įvertinus, auginti Baltarusijoje rekomenduoti šie obelų poskiečiai : PB-4, B.396, M.9, M.26, B.118, B.545, MM.106-13. Į valstybinius veislių tyrimus įtraukti šie poskiečiai: obelų poskiepis 106-13, slyvų poskiečiai – VPK-1, OD-2-3, VVA-1, vyšnių ir trešnių poskiečiai – AVCh-2, VSL-2, Gisella-5, Damil GY-79.

**Reikšminiai žodžiai:** vegetatyviniai poskiečiai, atsparumas šalčiui, augumas, biologinės, ekonominės ir morfologinės charakteristikos, ankstyvumas, derlingumas, Baltarusija.