OTTAWA 3 CLONAL APPLE ROOTSTOCK

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Station of Origin: Research Station, Agriculture Canada, Ottawa, Ontario
Plant Breeder: D.S. Blair [1] and S.H. Nelson[2] and further developed by L.P.S.Spangelo[3] and S.O. Fejer
Year released: 1974
Parentage: Robin x Malling 9

Ottawa 3 (*Malus baccata* (L.) Borkh. X *M. sylvestris* Mill.) X Jaune de Metz = chance French crab apple seedling of possibliy Trans-caucasian origin is a new dwarfing clonal apple rootstock developed at the Agriculture Canada Research Station, Ottawa, Ontario. It produces dwarf to semidwarf trees slightly smaller than Malling 26 (M26) and larger than M9, but because of its superior hardiness it is better adapted to Canadian conditions.

ORIGIN

Ottawa 3 was produced from a breeding and selection program initiated by D. S. Blair (deceased) and S. H. Nelson (now University of Saskatchewan), and further developed by L. P. S. Spangelo and S. O Fejer. It was selected at Ottawa in 1956 from the progeny of Robin X M9. It was tested under orchard conditions from 1967-1973 at Ottawa and Smithfield, Ontario; and was also under observation at Frelighsburg, Quebec; «Kentville, Nova Scotia; and Geneva, New York. It was outstanding for winterhardiness, early bearing of the scion cultivar, high yield in relation to dwarf tree size and tolerance to viruses. At Ottawa, it also proved satisfactory as an interstock on *Malus robusta* rootstock, producing intermediate-sized trees. This combination of several desirable characteristics demonstrated during the limited test period justifies its early release.

DESCRIPTION

Ottawa 3 is a dwarfing stock, producing swarf to semidwarf orchard trees when grafted with Mc Intosh or other commercial cultivars. Transverse sections show that the percentage bark in its roots is 65%.

Flowers and early foliage. Flowers single in clusters of 4-6, mostly 5; diameter when fully expanded, 48-55 mm. Flower color (Royal Horticultural Society Color Charts): closed buds petal-base white, edged with small amount of Neyron Rose 623/1; freshly opened buds inner color, base of petals white, edge Neyron Rose 623/2 to 632/3; fully expanded flowers retain Neyron Rose 623/3 mainly at petal edge; the haft of newly opened flowers is sgite; pedicel green and 20-35 mm long (average 30 mm). Early foliage: leaves are open with a light green, some with a very light bronze edge.

Summer growth characters (current season, juvenile shoots from stoolbed). General habit: shoots moderately vigorous, 75-80 cm long, erect, stout with a few thornlike laterals at base; stools are not prolific, rooted shoots only one-third the number of the most prolific Ottawa selections. Wood greenish at base, changing to dark reddish-brown, covered with dense whitish pubescence; texture slightly rough, very faintly striated; lenticels numerous and fairly conspicuous, round to oval, mostly oval, creamy white; leaves large, oval; base rounded; apex

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acuminate, sometimes downturned; finely and regularly serrate; surface flattish; margin very slightly undulating; pose mainly horizontal, sometimes slightly upturned; rpper surface dark green, slightly glossy; many short hairs on undersurface, mainly on veins; thick,leathery and rugose; petiole stout, slightly channeled; 14-21 mm long (average 17); tinged with res at base; much upturned, some erect; very numerous hairs; stipule very large, some as long as petiole; few serrations, almost entire; broadly lanceolate, slightly sickle-shaped; usually horizontal.

Fruit. Diameter 51 mm, depth 48 mm; round, slightly oblong, unequal and ribbed; sometimes slightly oblique, basin wide, medium depth, wrinkled; color yellow, blushed 20% with a light lively red; stem 27-42 mm long, average 38 mm, medium thick; calyx very large, protruding; flesh creamy yellow.

Time of defoliation: Very late.

Propagation: Three-year average rooting of softwood cuttings in mistbeds, in sand and peat moss in equal amounts was only 34%. When Proroot and peat moss (3:1) were used 1 yr, rooting was 62%. When propagated in stoolbeds, an average of six rooted shoots were obtained per stool over 3 yr. Root cutting trials conducted in the winters and springs of 1972-1973 and 1973-1974 at St-Jean, Quebec, on a large scale (2,500 cuttings) revealed that Ottawa 3 lends itself very well to this means of propagation. Root cuttings were grouped into three categories based on rate of leafing out. The percentage of success was 85% for the first group to leaf out, 75% for the second, and 60% for the third. A technical bulletin explaining this technique has been prepared (Granger and Hogue 1974).

Winterhardiness. When evaluated in field plots at Ottawa under a portable low temperature chamber, Ottawa 3 was consistently hardier than M26.

Performance in nursery. Bud compatibility with the cultivars McIntosh and Quinte was high, 92 and 93%, when measured in the first growing season from the budded stock. Thirteen different cultivars were successfully budded to Ottawa 3 and field-planted in 1972 at Smithfield.

Diseases and pests. Ottawa 3 was resistant to collar rot (*Phytophthora cactorum* (Leb. & Cohn) Schroet.), in tests conducted by D.L.McIntosh, Research Station, Agriculture Canada, Summerland, B.C. It also has some virus resistance. Trees previously inoculated with five known viruses and evaluated by M. F. Welsh of the same Station showed no virus sumptoms. However, among the Ottawa clonal stocks tested by M. F. Welsh (personal communication) at Summerland in 1973, Ottawa 3 was the most sensitive to the virus causing brown line decline. When it was topworked with virus-infected apple clones, a deep groove frequently developed at the bud union, with dead, brown bark filling the groove. Some trees broke at the union, others declined gradually and died. In Frelighsburg, Quebec, brown line decline symptoms were found in 1973 on a few trees grafted with non-indexed scions of Jerseymac, but no such symptoms were found when virus-indexed scions of the same cultivar were used. In 1973, the Post Entry Quarantine Station, Sidney, B.C., reported that Ottawa 3 was virus- negative when tested with their domestic virus indicator range. . Furthermore, trees grafted with non-indexed McIntosh and Quinte cultivars showed no virus symptoms in the Ottawa and Smithfield orchards at a time when certain other Ottawa rootstock selections grafted with scions of the same McIntosh died, possibly of virus diseases. However, the use of virus-indexed sources of scion wood is recommended. Ottawa 3 is susceptible to powdery mildew *(Podosphaera leucotricha* (Ell. & Everh. (Salm.) and to woolly aphid (*Eriosoma lanigerum* Hausm.).

Performance in the Orchard. Several Ottawa rootstocks and M26 dwarfing rootstocks were grafted with McIntosh and Quinte and were also used as intermediate stocks on *M. robusta* 5 rootstock with McIntosh scions. Tree size and early fruit yield at Ottawa were recorded in detail between 1967 and 1972 (data to be published separately). Data for Ottawa 3 and M26 dwarfing rootstock and for Ottawa 1, 2, and 4 non-dwarfing selections grown in the same trial show the superiority of the dwarfing rootstocks, especially Ottawa 3, in size contral, early yield, and high yield per unit area, both as rootstock and interstock (Table 1). In addition, fruit color (Table 2) was satisfactory and sometimes superior on Ottawa 3; fruit size was variable, but tended to be slightly smaller in Ottawa 3.

Availability of Stock. Stock is being increased at the Research Station. Agriculture Canada, St-Jean, Québec. It is expected that it will be available through nurserymen in 1976.

The authors are indebted to Dr. M. F. Welsh and Dr. D. L. McIntosh, Research Station, Agriculture Canada, Summerland, B.C., for their assistance in testing Ottawa 3 for reaction to viruses and collar rot; also to Mr. E. J. Davis, now retired, for technical expertise in the early selection and propagation of the Ottawa rootstocks.

References: GRANGER, R.L. and HOGUE, E.J. 1974
Propagating apple rootstocks by root cuttings.
Agric. Can. Tech. Bull. 550: 1-6

Table 1. Productivity and growth of McIntosh and Quinte apples on various clonal rootstocks and/or interstocks

Rootstock	Fruit yield (g)				Yield/volume (g/m^3)	Tree size 1972 (cm)			
	67	70	71	72	72	Girth	Height	Spread	
					McIntosh				
0-3	2671a*	5163 *b*	13583 *ab*	15840 *cd*	1867 *a*	18 *e*	232 *d*	254 *g*	
M26	2187 *ab*	9373 *a*	10766 *b*	11104 *d*	1180 *b*	22 *d*	261 *d*	373 *fg*	
0-1	398 *bc*	3124 *bc*	15255 *ab*	25311 *abc*	1014 *bc*	32 *b*	384 *b*	354 *cd*	
0-2	569 *bc*	5148 *b*	17689 *ab*	27270 *a*	1059 *bc*	31 *b*	369 *b*	388 *b*	
0-4	516 *bc*	1653 *c*	12650 *ab*	30046 *a*	1075 *bc*	32 *b*	388 *b*	379 *bc*	
0-3/R5†	2310 *a*	9167 *a*	19131 *a*	26617 *ab*	1386 *b*	26 *c*	320 *c*	335 *de*	
M26/R5	1069 *bc*	3719 *bc*	12975 *cd*	17146 *bcd*	1235 *b*	25 *c*	297 *c*	299 *ef*	
0-1/R5	1298 *ab*	3669 *bc*	17066 *ab*	24658 *abc*	677 *cd*	34 *a*	430 ab	406 ab	
0-2/R5	191 *c*	4187 *bc*	18306 *a*	21392 *abc*	497 *d*	36 *a*	445 *a*	426 *a*	
0-4/R5	220 *c*	1678 *c*	11812 *ab*	24658 *abc*	1118 *bc*	28 *c*	367 *b*	349 *cd*	
					Quinte				
0-3	1216 a	8904 *a*	12361 *b*	15187 *b*	2113 *a*	19 *c*	265 *b*	228 *b*	
M26	580 *b*	5671 *bc*	12002 *b*	15350 *b*	1584 *b*	21 *bc*	270 *b*	271 *b*	
0-1	491 *bc*	8036 *abc*	36583 *a*	42294 *a*	1160 *bc*	31 *ab*	418 *a*	401 *a*	
0-2	646 *b*	9558 *a*	37120 *a*	41804 *a*	1230 *bc*	31 *a*	411 *a*	403 *a*	
0-4	177 *c*	5178 *c*	29594 *a*	33639 *a*	1018 *c*	28 *b*	402 *a*	399 *a*	

*Annual means followed by different letters different at $P = 0.05$ separately for McIntosh and for Quinte

†Malus robusta 5.

Table2. Fruit size and color of McIntosh and Quinte apples on various clonal rootstocks and/or interstocks

	Size (g)			Color score (1-5)		
Rootstock	69	70	71	69	70	71
			McIntosh			
0-3	161 *c*[*]	86 *b*	166 *cd*	4.0 *a*	3.3 *a*	3.3 *bc*
M26	187 *ab*	103 *a*	171 *bcd*	2.5 *bc*	3.3 *a*	3.0 *cd*
0-1	172 *abc*	93 *ab*	169 *cd*	0.3 *d*	1.4 *bc*	3.3 *bc*
0-2	178 *abc*	95 *ab*	173 *bcd*	0.1 *d*	0.8 *c*	3.1 *bcd*
0-4	191 *a*	95 *ab*	203 *a*	1.7 *cd*	2.1 *abc*	2.7 *d*
0-3/R5†	189 *ab*	99*ab*	176 *bcd*	3.0 *b*	2.9 *a*	3.9 *a*
M26/R5	189 *ab*	104 *a*	174 *bcd*	1.2 *cd*	2.6 *ab*	3.4 *abc*
0-1/R5	200 *a*	92 *ab*	195*ab*	0.6 *cd*	2.0 *abc*	3.3 *bcd*
0-2/R5	191 *a*	99 *ab*	193 *abc*	0.7 *cd*	1.7 *abc*	3.2 *bcd*
0-4/R5	169 *bc*	96 *ab*	162 *d*	2.1 *c*	2.0 *abc*	3.7 *ab*
			Quinte			
0-3	42 *a*‡	83 *a*	108 *c*	-‡	3.0 *a*	3.8 *a*
M26	40 *a*	90 *a*	125 *b*	-	2.8 *a*	4.0 *a*
0-1	40 *a*	82 *a*	144 *a*	-	2.8 *a*	3.7 *a*
0-2	40 *a*	91 *a*	119 *bc*	-	3.3 *a*	3.9 *a*
0-4	40 *a*	78 *a*	121 *b*	-	3.3 *a*	3.4 *a*

[*] Annual means followed by different letters differed at $P = 0.05$ separately for McIntosh and for Quinte.

†Malus robusta 5.

‡Harvested before its season.