

# A STUDY OF APPLE ROOTSTOCKS IN INTENSIVE ORCHARDS

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In this study, apple production in Dutch-type high density (2500-3333 trees per hectare) orchards on M.9 T337 rootstock, with fertigation, was evaluated in various soil and climatic zones of the Ukraine. In addition, preliminary results of assessment of apple tree productivity on M.9, B 396 (62-396), M.26, B 118 (54-118) and MM.106 apple rootstocks in Uman, central zone of the Ukraine, are presented.

In spring 1995 the experimental Dutch-type orchards, 1 ha each, were established. Trees of the cultivars 'Gala' (Red and Must clones), 'Granny Smith', 'Elstar Elshof', 'Golden Delicious' (clones B and Reinders), 'Jonagold' ('Jonaveld', 'Jonica' and 'Wilmuta'), 'Fuji' and 'Red Boskoop', budded at 10-20 cm above the ground, were imported from Holland. Spacing in the orchard was from 3 to 4.5 m between rows and 1 m within a row. The characteristics of tree vigour and cropping, cold damage, irrigation control, orchard soil management and nutrient requirements of trees as well as fruit storage ability and economical effects were recorded in the years 1995-1998.

The highest yield, on average 18.4 t/ha in the second year and 36.5 t/ha in the third year after planting, was obtained in the Kherson area in the Southern zone of Ukraine (Table 1). The cold damage of trees after winter of 1995/1996 did not exceed 1.6 on a 25-point scale. In the central zone (Uman area) the highest total yield, above 60 t/ha in the three-year period, was obtained from cultivars 'Gala', 'Golden Delicious clone B' and 'Wilmuta' (Table 2).

In spring 1995 another experimental orchard in the Central zone was planted with trees of 'Florina', 'Idared' and 'Melrose' on M.9, B 396, M.26, B 118 and MM.106 rootstocks; this plant material was raised in a local nursery. The lot was not irrigated. The highest cumulated yield (for the 3rd and 4th year after planting) was obtained on M.9 rootstock (Table 3).

Table 1. Yields in the Dutch-type orchards on M.9 T337 rootstock [t/ha], depending on location

Location and zone	Cultivar	Year after planting			Total for 3 years (1996-1998)
		2 (1996)	3 (1997)	4 (1998)	
Kyiv (North)	'Gala Red'	6.30	14.37	4.99	25.66
	'G. Delicious B'	10.92	24.75	7.30	42.97
	'Idared'	10.86	14.50	4.97	30.33
	'Wilmuta'	7.61	25.11	5.66	38.38
Uman (Centre)	'Gala Red'	2.35	50.17	10.05	62.57
	'G. Delicious B'	0.83	45.23	19.08	65.14
	'Idared'	4.81	27.32	4.08	36.21
	'Wilmuta'	1.12	36.12	29.56	66.80
Kherson (South)	'GalaRed'	16.94	46.78	25.13	88.85
	'G. Delicious B'	19.40	58.93	28.88	107.21
	'Idared'	16.84	19.28	27.38	63.50
	'Wilmuta'	20.28	21.00	31.13	72.41
LSD <sub>0.05</sub>		13.3			

Note. Tree number per ha for particular cultivars and locations was recalculated to 2500

Table 2. Yields [t/ha] of different apple cultivars in the Dutch-type orchard in Uman; rootstock M.9 T337, density of 2500 trees/ha

Year after planting	'Elstar Red'	'Fuji'	'Gala Red'	'G.Del. clone B'	'G. Del. Reinders'	'Granny Smith'	'Idared'	'Jonaveld'	'Wilmuta'
2 (1996)	2.39	1.76	2.35	0.83	1.04	2.05	4.81	1.03	1.12
3 (1997)	21.73	18.68	50.17	45.23	29.60	18.95	27.32	30.17	36.12
4 (1998)	24.33	12.78	10.05	19.08	15.07	16.63	4.08	19.08	29.56
Total for three years	48.45	33.22	62.57	65.14	45.71	37.63	36.21	50.28	66.80

Table 3. Cumulative yield [t/ha] obtained in the 3rd and 4th year after planting from three apple cultivars on different type rootstocks in Uman

Cultivar	Rootstocks					Mean for cultivars
	M.9	B 396	M.26	B 118	MM.106	
'Florina'	27.01 (2000)	10.41 (1667)	16.11 (1429)	10.41 (1429)	14.38 (714)	15.66
'Idared'	24.18 (2174)	19.18 (2000)	20.37 (2000)	17.10 (2000)	21.58 (1111)	20.48
'Melrose'	11.35 (1429)	11.76 (1250)	4.47 (1111)	3.82 (1111)	3.89 (667)	7.06
Mean for rootstocks	20.80	13.78	13.66	10.44	13.28	

Note. Tree number per ha is indicated in brackets below the yield figures.