

Economic Effectiveness and Agricultural Indicators of Combinations Grafting-Varieties of Apple Plants

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<http://dx.doi.org/10.13005/bbra/2882>


(Received: 17 August 2020; accepted: 08 December 2020)

Research was carried out in the north-eastern part of the republic, in the Khuba-Khachmaz zone. Was carried out a comparative analysis of apple varieties on the different grafting and landing schemes. Namely, on the generative rootstock in the gardens, established in the village of Timiryazev of the Khuba region, according to the scheme 5x4m, in the village of Yeni Hayat of the Khusar region on the grafting M9 according to the scheme 461,25i and in the village of Dashliyatak of the Shabran region on the grafting MM106 according to the scheme 5x3 m. The agricultural yield was calculated to the formula, proposed by A.S Ovsyannikov by the formula: $\bar{O}_a = \bar{O}_s \bar{S}_a \bar{N} : 100$; here \bar{O}_s - Specific productivity, kg / m² crown projection; \bar{S}_a - area occupied by crown projection, i²; \bar{N} - Number of trees per hectare; 100- for transfer of kg, in centners / hectare. To determine the optimum area for plant nutrition were used generally accepted formula: $S_{op} = (D - 0,3) \times (D + 2)i^2$; D is the diameter of the crown in the period of full fruiting, i; 2- necessary gleam between rows, i; 0,3- the possibility of penetration of branches into the crown of a neighboring tree, i. Economic efficiency was determined by the method proposed by P. V. Dubrava. The results of research is different combinations varieties-grafting. It was determined that all varieties shows high profitability on different grafting. Also, identified a significant impact of the grafting both to the morphometric parameters, to the productivity and economic productivity of varieties. Varieties on the generative rootstock having a relatively large area of crown projection (11.3 m²), respectively, reduce the productivity of the crown to 3.63 kg / m², against of, having the smaller area of the crown projection (2.43 ... 7.96 m²) and accordingly high productivity (11.70 ... 5.40 kg / m²) on the clonal grafting as M9 and MM106. Relatively less crown volume creates conditions for reducing the area of supply trees, thereby increase the number of trees per unit area and, accordingly, an increase the agricultural harvest per hectare. This helps to increase the level of net income of varieties on clonal grafting. They have a net income of 3622.97 ... 16335.91 AZN is more than in the varieties of generative rootstock (3029.57 AZN). Accordingly, indicators of agricultural productivity, in varieties on clonal grafting, vastly more (correspondingly 598.92 ... 352.56 center / ha) than in the varieties on the generative rootstock (247.87 center / ha). At the same time, high and high quality productivity of varieties on clonal grafting contributes to the increase in net income and, together with them, the profitability of production. It should be noted that, the profitability of farming in gardens on generative grafting is 100.06%, then this indicator in apple gardens, on clonal grafting is much higher and amounts of 147.54% on MM106 and 381.14% on M9.

Keywords: Apple, Variety, Grafting, Productivity, Harvest, Net income, Economic efficiency, profitability.

The main valuable agricultural indicators of the variety on a par with quality indicators of fruits, are important parametric indicators of the crown, the yield and productivity of trees,

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in accordance with the parameters of optimal landing schemes, agrecultural yield and economic efficiency of selected combinations variety-grafting.

Analysis of data, submitted by various researchers show that from the geographical conditions of cultivation, economic indicators are also change. In mountainous conditions, many indicators of the production economy, surpasses the indicators of production in the lowland zone. In their opinion, this is facilitated to relatively lower costs in the applied agrotechnical (combating of pests and diseases, lack of irrigation, etc.) activities. At the same time, trees, entering the fruiting period earlier, contribute to a rapid return on costs^{1,4,8}. On the economy of fruit production also influence varietal features. Determined that cultivation of the variety of Renet Simirenko in the foothill zone, significantly exceed those in the mountainous and lowland zone, both in the quality of the fruit and on the profitability of production. This is facilitated to high relative humidity of air in the highlands, also low air humidity of air and high temperature in the lowland zone. And vice versa, in the varieties of Leskensk fruits is better quality and the profitability is high both in the foothill and in the lowland zone¹⁰. It is necessary to proceed from a unique feature of the variety, strictly adhere to the agrotechnical requirements of the variety. Here, the height and other conditions of grafting is main factors^{13,14,15,16}. Mulching, applying of herbicides, fertilizers and other factors is effecting to the agriculture and economic indicators at apple varieties^{11,12,18,19}. The same, the results are obtained in other republics. In Belarus at the right agrotechnical care, in apple trees, the profitability of production increases depending at the variety in the range of 218.0-480.7% and 218.7-264.1%^{7,8}. As reportes by Dogeyev Kh. D, the main condition for the successful cultivation of fruit crops in Dagestan is selection of varieties for the specific environmental conditions of the area. In his experiments, the average profitability of apple varieties was 41.2%, of varieties Aidared is 77.3%; in varieties of cherry-plum averaged 96.3%, in the variety of Pearl 117.5%, in the variety of Abundant 180.8%; in the plum is average of 84.6%, in the varieties of Hungarian 86.7%; in the varieties of cherry of Dagestanka and Riddle average 141.9%³.

In the literature, seen materials concerning influence of the grafting to the agricultural indicators of the variety - graft [2,5,6,10]. Proceeding from this, some researchers recommends during established gardens use low-growth grafting and high-harvest varieties for suppression of growth and increase harvest. This increases the profitability of production⁵.

Our research is aimed, to study the impact of combinations variety-grafting to the agricultural and economic indicators of the apple tree.

RESULTS AND DISCUSSION

The analysis of the obtained data showed a significant difference between the orchards, depending on the grafting (table 1). Thus, the area of the projection of the crowns, the necessary indicator for determining the coefficient of productivity of the crowns, more in varieties grafted on the generative rootstock (11.3 m²) and relatively less in varieties grafted on clonal grafting M9 (2.43 m²) and MM106 (7.96 m²).

Areas of plant nutrition, depending at the grafting distinctive. Accordingly, the number of trees in varieties on clonal grafting more, than on the generative rootstocks.

This significantly affects to the agricultural harvest, where the varieties on the clone grafting M9 gives significantly more harvest (598.92 c / ha) than on the generative rootstock (247.87 c / ha) and on the other cloned grafting MM106 (352.56 kg / ha).

High indicators of economic harvest contribute to increased economic efficiency of the agriculture (table 2).

Calculation of the economic efficiency of combinations various- grafting of apple tree, shown that the production expenses in apple orchards on generative rootstock are relatively lower (3019.69 AZN.) than on the varieties of MM106 (4493.83 AZN.) and M9 (5997.31 AZN.).

However, high and high quality harvest of varieties on clonal grafting helps to increase net income and, together with them, profitability of production. So, if the profitability of the agriculture in the gardens on the generative rootstock is 100.06%, this indicator in apple orchards on clonal grafting is much higher and is 147.54% on MM106 and 381.14% on M9.

Table 1. Morphometric and agricultural indicators of different combinations varieties- grafting of apple

Grafting	Sort	Area of crown projection, m ²	Coefficient of crown productivity, kg / m crown ²	The average diameter of crown, l	The area of plant nutrition, l ²	Number of trees on ha, pieces	Agricultural productivity, center / ha
Forest apple	Khala	10,64	3,91	3,28	15,73	636,0	264,59
	Jonaqored	10,99	3,15	3,34	16,23	616,0	213,25
	Qrani Smit	12,51	3,42	3,55	18,04	554,0	237,03
	Fuje	10,59	3,78	3,26	15,57	642,0	256,99
	Renet Simirenko	12,33	3,55	3,52	17,77	563,0	246,43
	Golden delishes x972	10,69	4,22	3,28	15,73	636,0	286,91
	Jonagold	11,36	3,35	3,38	16,57	604,0	229,86
	Average	11,3	3,63	3,37	16,52	607,0	247,87
	Khala	2,19	12,9	1,53	4,34	2304,0	650,90
	Jonaqored	2,74	7,83	1,71	5,23	1912,0	410,20
M-9	Golden reinders	2,44	13,26	1,62	4,78	2092,0	676,85
	Qrani Smit	2,50	12,14	1,64	4,88	2049,0	621,87
	Aydared	2,38	10,87	1,59	4,63	2160,0	558,81
	Red Vinter	2,36	11,19	1,59	4,63	2160,0	570,42
	Fuje	2,37	13,74	1,59	4,63	2160,0	703,38
	Average	2,43	11,70	1,61	4,73	2120,0	598,92
	Khala	6,76	5,87	2,6	10,58	945,0	374,99
	Jonaqored	7,64	4,74	2,77	11,78	849,0	307,45
	Qrani Smit	8,52	5,32	2,92	12,89	776,0	351,73
	Fuje	7,72	6,11	2,78	11,85	844,0	398,11
MM-106	Renet Simirenko	8,28	5,01	2,88	12,59	794,0	329,37
	Golden delishes x972	7,53	6,43	2,75	11,64	859,0	415,91
	Jonagold	9,27	4,35	3,05	13,89	720,0	290,34
	Average	7,96	5,4	2,82	12,17	827,0	352,56

Table 2. Economic efficiency of combinations varieties - grafting of apple

Grafting	Sort	The number of trees, pieces / ha	Harvest, center/ ha	Production costs, man./ha	Cost price of production, c / man.	Realization price of 1 center of a crop, man.	Total income, man.	Net income, man.	Profitability, %	
1	2	3	4	5	6	7	8	9	10	
Forest apples	Khala	636,0	264,59	3061,5	11,57	22,2	5873,9	2812,4	91,86	
	Jonaqored	616,0	213,25	2933,1	13,75	25,2	5373,9	2440,8	83,22	
	Qrani Smit	554,0	237,03	2992,6	12,63	26,0	6162,78	3170,18	105,93	
	Fuje	642,0	256,99	3042,5	11,84	26,4	6784,54	3742,04	122,99	
	Renet Simirenko	563,0	246,43	3016,1	12,24	20,2	4977,89	1961,79	65,04	
	Golden delishes x972	636,0	286,91	3117,3	10,87	25,8	7402,28	4284,98	137,46	
	Jonagold	604,0	229,86	2974,7	12,94	25,1	5769,49	2794,79	93,95	
	average	607,0	247,87	3019,69	12,26	24,41	6049,25	3029,57	100,06	
	M-9	Khala	2304,0	650,90	6127,3	9,41	41,5	27012,35	20885,05	340,85
		Jona-qored	1912,0	410,20	5525,5	13,47	47,7	19566,54	14041,04	254,11
Golden reinders		2092,0	676,85	6192,1	9,15	48,2	32624,17	26432,07	426,87	
Qrani Smit		2049,0	621,87	6054,7	9,74	49,7	30906,94	24852,24	410,46	
Aydared		2160,0	558,81	5897,0	10,55	50,8	28387,55	22490,55	381,39	
Red Vinter		2160,0	570,42	5926,1	10,39	49,4	28178,75	22252,65	375,5	
Fuje		2160,0	703,38	6258,5	8,90	51,5	36224,07	29965,57	478,8	
average		2120,0	598,92	5997,31	10,23	48,4	28985,77	22988,45	381,14	
MM-106		Khala	945,0	374,99	4537,5	12,1	27,8	10462,22	5924,72	130,57
		Jonaqored	849,0	307,45	4368,6	14,21	32,3	9930,64	5562,04	127,32
	Fuje	776,0	351,73	4479,3	12,74	33,7	11853,30	7374,00	164,62	
	Renet Simirenko	844,0	398,11	4595,3	11,54	34,3	13655,17	9059,87	197,16	
	Golden delishes x972	794,0	329,37	4423,4	13,43	30,0	9881,10	5457,70	123,38	
	Jonagold	859,0	415,91	4639,8	11,16	33,1	12893,21	8253,41	177,88	
	average	720,0	290,34	4412,9	15,2	32,2	9348,95	4936,05	111,86	
		827,0	352,56	4493,83	12,91	31,91	11146,37	6652,54	147,54	

CONCLUSIONS

1. Apple varieties grafted on clonal rootstocks, in comparison with strongly grown generative rootstocks, have a relatively smaller growth, but a higher coefficient of productivity.
2. Smaller morphometric indicators of varieties on clonal grafting, helps increase the number of trees in hectare and thereby increase the agricultural productivity. Respectively, increases production expenses.
3. The highest productivity of the agricultural harvest and profitability are different at the varieties of clone grafting M9.

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