

INTENSIVE APPLE PLANTATION PRODUCTIVITY IN FUNCTION OF FOLIAR FERTILIZATION APPLICATION

PRODUCTIVITATEA PLANTAȚILOR INTENSIVE DE MĂR ÎN FUNCȚIE DE APLICAREA FERTILIZĂRILOR FOLIARE

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Abstract. An investigation of development systems in apple foliar fertilization was performed by means of stationary research methods and fields. As study material of apple trees have served trees of three apple varieties Golden Delicious, Idared and Florina 8 years old grafted on rootstock M26. The planting system is 4x2 meters. In orchard was used foliar fertilization based on Urea46% N in different concentration of 0,4% to 1,2% of deferent stages of fruit development, Polyfeed (N₁₉P₁₉K₁₉) at a 0,1% concentration and CaCl₂ (0,5%, 0,7%). The Golden Delicious variety harvest increased from 25.5 t/ha in 2008 up to 31.1 t/ha in 2009, Idared is the variety who yields are from 18,3 t/ha in 2009 in control variant up to 29.1 t/ha in 2010 in variant 4. The Florina crop varieties ranged from 23.1 t/ha in 2008 up to 34.9 t/ha in 2010.

Key words: apple, concentration, variety, urea

Rezumat. Investigațiile cu privire la elaborarea sistemului de fertilizare foliară la măr s-au efectuat prin intermediul metodelor de cercetare staționare și câmp. Ca material de studiu au servit pomii de măr în vârstă de 8 ani din soiurile Golden Delicious, Idared și Florina, altoite pe portaltoiul M 26. Distanța de plantare 4x2 m. Ca fertilizant foliar s-a folosit uree 46% s.a. în concentrație de la 0,4 % până la 1,2 %, în diferite faze de dezvoltare a fructelor, Polyfeed (N₁₉P₁₉K₁₉) în concentrație de 0,1% și CaCl₂ (0,5% 0,7%). La soiul Golden Delicious producția a crescut de la 25,5 t/ha în anul 2008 până la 31,1 t/ha în anul 2009. La soiul Idared producția a crescut de la 18,3 t/ha în anul 2009, în varianta martor, până la 29,1 t/ha în anul 2010 în varianta 4. La soiul Florina producția a variat de la 23,1 t/ha în anul 2008 până la 34,9 t/ha în anul 2010.

Cuvinte cheie: măr, concentrație, soi, uree

INTRODUCTION

Along with the high productivity of the plantation a great attention should be given special attention to fruit quality because, it affects fruit production efficiency. Fruit quality depends on many factors, but primarily determined by the variety of biological features (Kudrjavec R. P., 1987, Sasnauskas A. et. al. 2006).

By a proper diet, made by fertigation or foliar normalization of load bearing fruit after binding, and interventions in green shoots growing on creating a balance between enjoyment and trees bud differentiation that leads to consistent and high quality production (Roșca C., Diaconiuc V 2005).

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MATERIAL AND METHOD

The investigations were conducted during the years 2008- 2010 in the apple orchard business 'Zubresti' SA, district Sraseni planted with trees grafted 1 year of age. Plantations establishment was carried out in spring 2003 with fruit varieties Golden Delicious, Idared and Florina grafted on M26 rootstock. Distance 4x2 m planting trees. Trees are driven by narrow crown zone located from north to south.

The investigations on the development of the foliar fertilization in apple are made stationary through research methods, field and laboratory. The variants are located in four repetitions each randomized trees in 32 variants. Agro-technical measures in the orchard is made in accordance with ago- technical guidance in force. Soil is maintained as field work by conducting an annual plowing in winter and as needed 3-5 cultivations. Urea 46% breast was in different concentrations on fruit development stages. Solutions consumption is 1.000 liters per hectare (table 1).

Table 1

Scheme of experience

Foliar fertilization performance period	Nutrient concentration %			
	V1 (control)	V2	V3	V4
Urea 46% active substance				
After flowering (75% of flowers have fallen)	Water	0.4	0.5	0.6
When fruits have the size of a peanut (fruit diameter reached 10-12 mm)	Water	0.7	0.8	0.9
When fruits have the size of a walnut (the fruit had reached 25-30 mmin diameter)	Water	1.0	1.1	1.2
Polyfeed (N19:P19:K19)				
When fruits are ripe state (20-30 July)	Water	0.1	0.1	0.1
Calcium chloride (CaCl ₂)				
With 20-30 days before harvesting the fruit	Water	0.5	0,6	0,7

RESULT AND DISCUSSIONS

In 2008 the fruit number of Golden Delicious variety per tree was from 109 to 192 in control variant until the variant 4, average fruit weigh from 98 g up to 136 g. The number and weight of fruit in variant 2 and 3 is between 116 and 150 fruit and 116 g and 127 g per fruit in variant 3. Fruit crop in 2008 was biggest high in variant 3 (23.8 t/ha) followed by variant 4 (23.5 t/ha) and variant 2 (19.9 t/ha). The lowest recorded harvest in control variant to 15.9 t/ha. In 2009 the fruit number of the Golden Delicious variety was higher than in 2008 year but the difference between the variant were also high. Thus, the lowest number of fruit was recorded in control variant (173 fruit) that took on average 109 grams, and the largest number of fruit was recorded in variant 4 with 230 fruits per tree with an average weight of 136 g. In variant 2 were 180 fruits with weighing 119 g and 198 fruit in variant 3 weight 129 g. In the 2009 yield per hectare Golden Delicious variety is in strict accordance with the number of fruit per tree and their average weight. Thus, in control variant was 23.6 t/ha, and in fourth variant to 31.1 t. In 2010 the Golden Delicious variety fruit harvest was quantify less than in 2009 year but higher than in 2008 year. In control variant was obtained the lowest

number of fruits (100) and the largest amount in variant 4 (1721). The average weight of fruit in 2010 year was with small difference between the variant 2 where the average weight was 114 grams. The fruit crop per hectare in 2010 year where with great difference, between the variants average. Thus, in control variant the yield was 17.0 tons. The biggest harvest was recorded in variant 4 to 28.6 t/ha.

Table 2

**Fruit production by variety and concentration of foliar applied fertilizers (Urea 46%)
(Rootstock M26, Distance of panting 4x2, S.A. „Zubrești“, 2008 - 2010)**

variant	Number of fruit per tree			weight average 1 fruit g			t/ha		
	year 2008	year 2009	year 2010	year 2008	year 2009	year 2010	year 2008	year 2009	year 2010
Golden Delicious									
V1	109	173	100	98	109	134	15,9	23,6	17,0
V2	116	180	152	127	119	114	19,9	26,8	21,8
V3	150	198	169	116	129	133	23,8	29,4	25,8
V4	192	230	171	136	136	134	23,5	31,1	28,6
DL,5%	-	-	-	-	-	-	0,25	0,24	0,28
Florina									
V1	162	168	178	104	124	125	23,1	26,7	27,8
V2	172	170	184	113	134	142	24,0	28,2	32,6
V3	183	173	190	137	125	141	29,7	26,8	33,5
V4	197	178	205	141	135	117	29,9	30,2	34,9
DL, 5%	-	-	-	-	-	-	2,14	1,95	3,71
Idared									
V1	170	110	155	100	133	99,3	21,9	18,3	19,3
V2	173	117	170	121	143	113	25,9	20,9	24,1
V3	175	130	186	120	144	108	27,2	23,4	25,2
V4	180	148	195	132	136	119	28,1	25,1	29,1
DL, 5%	-	-	-	-	-	-	1,87	2,7	2,85

The Florina variety in 2008 year, the fruit number in control variant was (162) and highest in variant 4 with 197 fruits that have registered an average weight of 141 g. The smaller fruits were in control variant with 104 g. In the remaining variants had a ranging number from 172 fruits of tree, average fruit weight of 113 g in variant 2, and 183 fruit per tree with an average weight of 137 g in variant three. In 2009 year the number of fruit in control variant was 168 fruits per tree and their average weight of 124 g. Under variant two the number of fruit was 170 pieces per tree with a weight of 125 g. In 2010 year the number of fruits was lowest in control variant 178 fruits with an average weight of 125 g. The highest number of fruits was recorded in variant 4 with 205 fruit and an average weight of 117 g/ fruit. The highest index of fruit number and weight was observed in variant 3 with a 190 fruit number and an average weight of 141 g where the dose applied was 0.5%; 0.8%;1.1% of Urea 46%N. The average weight of fruit was higher in variant 2 with 142 g of fruit where the number was 184 pieces/ tree. The quantities fruit of the Florina variety in 2008 years was the smallest amount in control variant (162

fruit) with a total harvest of 23.1 t/ha and the largest amount of fruit per hectare was recording in variant 4 with 29.9 t/ha. In 2010 year the amount of fruit of Florina variety was a tree growing in comparison with those previous years of study was in growing (2008- 2009) and recorded the largest amount of fruit per tree and per hectare in variant 4 where concentration of foliar applied fertilizers (Urea 46%N) were 0.6%; 0.9%; 1.2% and amounted to 34.9 t/ha.

In 2008 year to the Idared variety the fruit number is between values of 170 in control variant and 180 in variant 4. The fruit mass was 100 g in control variant which has not been applied foliar fertilization based of nitrogen on Urea 46% higher breast and fruit were obtained in variant 4 with 132 g. In third year (2010) were recorded 155 fruit in control variant with an average weight of 99.3 g of fruit. Under variant two the number of fruit was 170 with an average weight of 108 g. The largest number of fruit was in variant 4 where was 195 fruits with an average weight of 119 g. The yields per hectare are in sequence with the number of fruits as well as their average weight. Following foliar fertilization the harvest applied per hectare yield is higher than the control variant and recorded a harvest of over 20 tons per hectare where the largest quantities of fruits were recorded in variant 4 where the concentrations o fertilizer was 0.6%; 0.9%; and 1.2%.

CONCLUSIONS

1. Following foliar fertilization the harvest applied per hectare yield is higher than the control variant and recorded a harvest of over 20 tons per hectare where the largest quantities of fruits were recorded in variant 4 where the concentrations o fertilizer was 0.6%; 0.9%; and 1.2%.

2. In 2010 year the amount of fruit of Florina variety was a tree growing in comparison with those previous years of study was in growing (2008- 2009) and recorded the largest amount of fruit per tree and per hectare in variant 4 where concentration of foliar applied fertilizers (Urea 46%N) were 0.6%; 0.9%; 1.2% and amounted to 34.9 t/ha.

3. In the 2009 yield per hectare Golden Delicious variety is in strict accordance with the number of fruit per tree and their average weight. Thus, in control variant was 23.6 t/ha, and in fourth variant to 31.1 t.

REFERENCES

1. **Balan V., 2000** - *Îndrumări tehnologice pentru producătorii de fructe*. Agenția de consultanță și școlarizare în agricultură. Chișinău: ACSA, p. 10-31.
2. **Kudrjavec R. P., 1987** - *Produktivnost' jabloni*. Agropromizdat, Moskva, 303
3. **Rogut V., 2007** - *Tangența recoltei și fertilizarea*. Cercetări în pomicultură. Institutul de Pomicultură, Chișinău, Știința, vol. 6, p. 85-87.
4. **Roșca C., Diaconiuc V., 2005** - *Fertilizarea foliară la măr în condițiile ecosistemului pomicol Hirău-județul Iași*. Lucrări științifice USAMV Iași, Anul XLVIII, Seria Horticultură, Iași: vol. I (48), p. 125-128.
5. **Sasnauskas A. et. al., 2006** - *Productivity and fruit quality of scab resistant apple cultivars and hybrids*. Journal of Fruit and Ornamental Plant Research, vol. 14, p. 247-255.