THE EFFECT OF DIFFERENT ORGANIC AND CHEMICAL FERTILIZER RATES ON THE QUALITY OF THE WOOD USED FOR WINDS MUSICAL INSTRUMENTS

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Abstract

The winds musical instruments are those instruments where the sound is produced by vibrating of an air column inside the instrument body. Within 2008-2012 period there was researched the effect of different chemical and organic fertilizer on the growth of plum trees planted in the autumn of 2007 year at Research Station of Targu Jiu, both as regard the trees thickness and the quality of the instruments that were made of them. All chemical fertilizers rates used have as a direct effect the increasing of the plum tree trunk thickness from 16.7 mm to 119.5 cm (N120P80K80) as compared with 16.51 to 75.00 mm (control not fertilized) the increasing of the trunk thickness being more visible when manure was applied, the thickness of the plum trunk reaching 147-148 mm. From the wood of these plum trees there were handcrafted winds instruments (flute and pipe flute) whose quality decreased as the fertilizer rate used has increased. The mark obtained when chemical fertilizer was used was 7,81 the manure applying giving better results in this respect, namely, marks between 9.02 – 9.61. The best quality of the instruments was obtained when the plum trees were not fertilized at all. The depreciation of the quality of winds instruments as a result of fertilizer applying can be explained by the fact that chemical fertilizers determine the increasing of the hormonal substances of citokinone and auxine type that stimulates the growth of the plant cells. They have as an effect the forming of thinner cell walls. The cells are, also, more elongated. These thinner cell walls of the wood determine a lower quality of the musical winds instruments.

Key words: winds musical instruments, fertilizers, manure, plum tree, citokinones, auxines

In its instrumental variant, music was differently represented from a period to other. The musical instruments used to accompany folk traditions have a great variety and people preferences for some of them or others have been influenced either by their morphological particularities or by the easiness of purchasing or manufacturing them (Ghinoiu, 1994).

Our people has known and used in its folkloric manifestations a high number of musical folkloric instruments; the varied array of them begins with the simple leaf from a pear tree, birch bark or fish scald and ends with the most modern types of accordions and saxophones. The most used by people are simple instruments for whistling or winds instruments (Gasca, 1988).

The winds instruments are those instruments where the sound is produced by vibration of a column of air within the tube of the instrument. By introducing the air into the tube there is produced a periodical phenomenon of compression and release of the air into the tube and this uniform vibration produces a sound of constant height (Popescu, 2013).

Taking account that most of winds instruments are made of plants, especially fruit trees there appear the natural question if the fertilization of trees contributes to the quality of the winds instruments made of the wood from the trees.

MATERIAL AND METHOD

One of the most used species to manufacture winds instruments is the plum tree from which there can be made whistles, pipe, pan-pipe, both from branches and trunks.

In order to observe if one of the technological phases that is frequently used in plum tree technology, namely, the applying of fertilizers, have an influence on the quality of the winds instruments there was researched the effect of several rates of fertilizers and manure on the growth of young plum trees, in 2008-2012 period, at Research Station of Targu Jiu as well as the effect on the quality of winds instruments made of their trunk or branches.

There have been researched 10 treatments with fertilizers: V_1 – not fertilized, V_2 – $N_{30}P_{20}K_{30}$, V_3 – $N_{35}P_{25}K_{35}$, V_4 – $N_{40}P_{30}K_{40}$, V_5 – $N_{50}P_{40}K_{45}$, V_6 – $N_{60}P_{50}K_{50}$, V_7 – $N_{70}P_{55}K_{55}$, V_8 – $N_{90}P_{60}K_{60}$, V_9 – $N_{100}P_{70}K_{70}$ and V_{10} – $N_{120}P_{80}K_{80}$. The treatments with manure have been: V_1 – not fertilized (control), V_2 – 25 t/ha manure, V_3 – 35 t/ha manure, V_5 – 40 t/ha and V_6 – 50 t/ha manure. The manure that was applied

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had the following chemical composition: 0.254% N, 0.134% P_2O_5 and 0.412% K_2O.

There was recorded, within the 2008-2012 period, the growth in diameter of the plum trees planted in the fall of 2007 year. In 2012 there were confectioned winds instruments from the wood of these trees (whistles and pan-pipes) that were used to establish the quality of the sound.

RESULTS AND DISCUSSIONS

The growth in diameter of the plum trees

The using of fertilizers has revealed the fact that they determine the growth in diameter of the plum trees. This way, in 2008, the diameter of the trees increased as a result of applying fertilizers from 16.17 mm to 17.2 – 23.7 mm, with an annual growth of 1.08 – 7.0 mm. The highest growth was recorded with the $N_{120}P_{80}K_{80}$ fertilizer rate *(fig. 1)*.

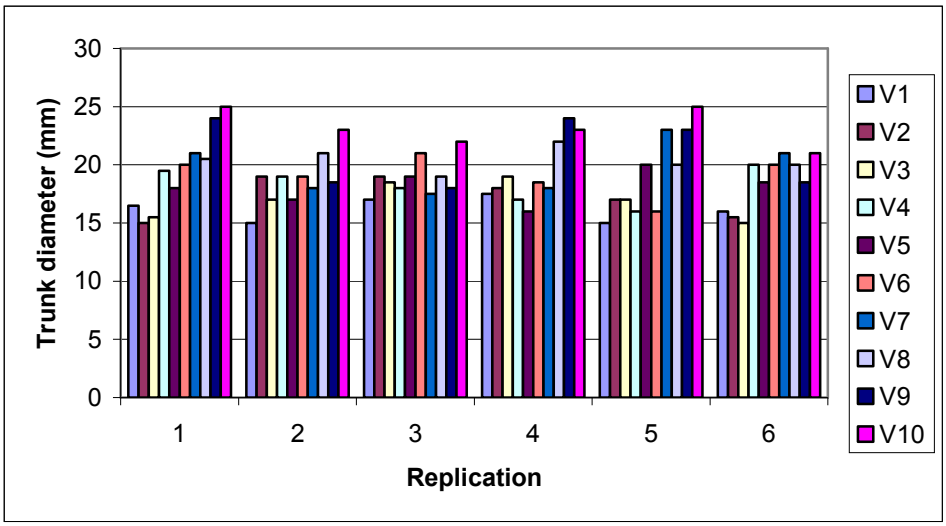

Figure 1 **Trunk diameter in 2008 in function of fertilizer rates**

In 2012, the diameter of the plum trees planted in the autumn of 2007 and fertilized by fertilizers have reached 75 mm in comparison with 16.17 mm with not fertilized treatment, while with the other treatments where fertilizers were applied, the diameter reached values of 82.67 – 119.50 mm the increasing of the trunk diameter being 5.15 times higher than not fertilized treatment *(fig. 2)*.

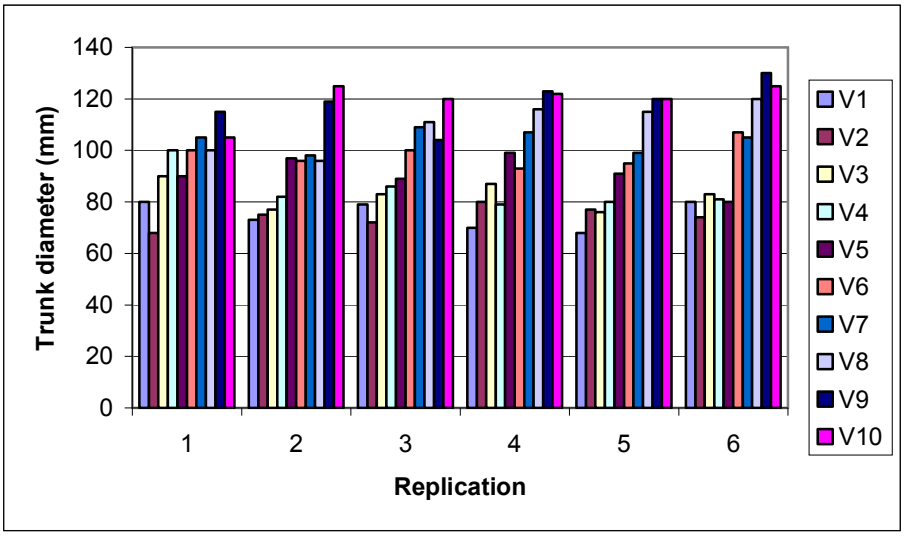

Figure 2 **Trunk diameter in 2012 in function of fertilizer rates**

The applying of manure rates of 25, 30, 35, 40 and 50 t/ha (in comparison with the not fertilized control) during 5 years (2008-2012) on young plum trees planted in the fall of 2007 year has emphasized that the 40 and 50 t/ha rates has determined the highest increase in trunk diameter, reaching 147-148 mm in comparison with 76.3 mm with the not fertilized treatment, being 1.5 times higher in the first year and 6.68 times after 5 years of experiment *(tab.1)*.

Table 1

Vitezele medii anuale, absolute şi relative, de creştere a diametrului trunchiului, în perioada 2008-2012, pentru soiul de prun Stanley, în funcţie de dozele de îngrăşămite organice aplicate

Treatment	Average diameter (mm)		Average anual trunk diameter growth (mm)								Average diameter (mm)	
	2008		2009 - 2008		2010 - 2009		2011 - 2010		2012 - 2011		2012	
	A	R	A	R	A	R	A	R	A	R	A	R
V1	16,17	100	10,00	61,84	16,50	63,05	17,50	41,01	16,16	26,85	76,32	471,9
V2	20,33	100	11,00	54,11	20,84	66,52	22,49	43,11	24,67	33,04	99,33	488,5
V3	21,83	100	10,00	45,81	23,00	72,25	31,17	56,85	27,67	32,17	113,67	520,7
V4	21,67	100	10,83	49,98	25,50	78,46	37,50	64,65	32,50	34,03	128,00	510,6
V5	24,00	100	11,33	47,21	27,67	78,32	46,67	74,08	38,33	34,95	148,00	616,6
V6	22,00	100	12,16	55,27	27,67	81,00	47,00	76,01	38,17	35,07	147,00	668,1

A – absolute values of trunk diameter or diameter growth, in mm.
R – relative values of trunk diameter or diameter, in %.

The quality of manufactured winds instruments

From the wood of plum trees that were fertilized by different rates of fertilizers and manure during 5 years there were confectioned, in 2012 year, winds instruments (whistles and pan-pipes), three for each treatment that represented the replications for the quality of instruments; these instrumented were played by specialists who appreciated their quality by marks (Serban, 2005). These results are presented in tables 2 and 3.

Table 2

The quality of winds musical instruments as a result of applying fertilizers (marks)

Treatment	Mark	Relative mark	Difference	Signification
V_1 – not fertilized	9.75	100	-	Control
V_2 – $N_{30}P_{20}K_{30}$	9.12	93	-0.63	-
V_3 – $N_{35}P_{25}K_{35}$	9.19	94	-0.56	-
V_4 – $N_{40}P_{30}K_{40}$	9.02	92	-0.73	0
V_5 – $N_{50}P_{40}K_{45}$	8.84	90	-0.91	0
V_6 – $N_{60}P_{50}K_{50}$	8.91	91	-0.84	0
V_7 – $N_{70}P_{55}K_{55}$	8.45	86	-1.30	00
V_8 – $N_{90}P_{60}K_{60}$	8.06	83	-1.69	000
V_9 – $N_{100}P_{70}K_{70}$	8.00	82	-1.75	000
V_{10}– $N_{120}P_{80}K_{80}$	7.81	80	-1.94	000

DL 5%=0.71; DL 1%=1.05; DL 0.1% = 1.44

The analysis of these results shows that the winds instruments of best quality are obtained when no fertilizers are applied to plum trees (not fertilized control). This treatment obtained the highest mark, of 9.75 while the treatments which determined the highest increases of the trunk diameter as a result of applying $N_{120}P_{80}K_{80}$ have obtained the lowest mark, of 7.81, treatments of $N_{40}P_{30}K_{30}$, $N_{50}P_{40}K_{40}$ and $N_{60}P_{50}K_{50}$ were significant negative, the treatment of $N_{70}P_{55}K_{55}$ was distinct significant and treatments of $N_{90}P_{60}K_{60}$ and $N_{120}P_{80}K_{80}$ were very negative significant.

In comparison with the fertilizers, the applying of manure has little diminished the quality of winds musical instruments, most of treatments with different rates of manure the marks ranging between 9.02 and 9.61 *(tab.3)*.

Table 3

The quality of winds musical instruments as a result of applying manure (marks)

Treatment	Mark	Relative mark	Difference	Signification
V_1 – not fertilized	9.82	100	-	Ctrl
V_2 – 25 t/ha	9.61	97	-0.21	-
V_2 – 30 t/ha	9.66	98	-0.16	-
V_2 – 35 t/ha	9.50	96	-0.32	-
V_2 – 40 t/ha	9.02	92	-0.80	00
V_2 – 50 t/ha	8.46	86	-1.36	000

DL 5%=0.54; DL 1%=0.79; DL 0.1% = 1.08

The depreciation of the quality of the winds musical instruments as a result of fertilizers or manure can be explained by the fact that they determine the increasing of the hormonal substances produced by the plants of citokinones and auxine types; they stimulates the cells extension and, as a result, the walls of the cells are thinner (Bronzanti, 2003). These

thinner walls of the cells from the wood of the trunk or branches from which the winds instruments are made of determine a lower quality of the wood and, consequently, a reduced quality of the instruments (Bloom, 2002).

CONCLUSIONS

The experiments performed with the plum trees planted in the autumn of 2007 year with the aim of researching the effect of several fertilizer and manure rates have emphasized that the rates N100P70K70 and N120P80K80 as well as 35, 40 and 50 t/ha manure have recorded the highest thickness of the trees trunk;

The analysis of the quality of the winds instruments confectioned from the wood of the plum trees that were fertilized by chemical fertilizers and manure during 5 years showed that the best quality was obtained when the trees were not fertilized at all and then the wood of trees fertilized by moderate rates of manure.

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