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## **BIOENRICHMENT OF POULTRY MANURE BY ASSOCIATION OF A FUNGUS TRICHODERMA HARZIANUM**

**The purpose.** To study features of growth of association of fungi *Trichoderma harzianum* 128 at enrichment of compost of organic matter on the basis of poultry manure and to evaluate perspectives of bioenrichment of compost. **Methods.** Laboratory (for simulation of process of bioenrichment); industrial (approbation of technique of enrichment); field (determination of efficiency of compost at growing potato); statistical. **Results.** In conditions of model experiments the optimum terms of introduction in compost substrate of agronomically valuable microorganisms depending on their predominant functions are fixed. Application of *T. harzianum* 128 for 2-nd month of enrichment of compost promotes prompt growth of strange micromycets. Efficiency of technique is shown under production conditions. The gained biocompost is characterized by heightened total carbon and nitrogen, positively influences productivity of potato and product quality. **Conclusions.** Enrichment of compost of substrate on the basis of poultry manure at add-on of association of *T. harzianum* 128 ensures intensification of mineralization processes and accumulation of agronomically valuable microorganisms — active destructors of organic matter and producers of physiologically active joints. The gained biocompost is perspective for use in farming industry.

**Key words:** compost, successions of assemblages of microorganisms, poultry manure, *Trichoderma harzianum*.

Characteristic features of modern and promising apple varieties are fecundity, the ability to enter ferns on the second - the third year after planting in the garden, to quickly increase yields from year to year [1]. Research results F.H. Alston and I.W. Bates [2], T.Visser [3] and R.S. Shidakova [4] showed that the above-mentioned properties are positively correlated with the yield, which in the apple varieties is genetically determined and depends on the number of generative kidneys and the ability to tie fruits that are stored despite abnormal natural

phenomena, namely: the fall of the hail, strong wind, sharp fluctuations in temperature (drought, heat and cold), mushroom disease, pests and the like.

Many scientists believe that the early and intense fruiting sources are Alkmen, Antor, Askold, Idared, Golden Resistent, Golden Delishes, Carol, Mantet, Jonathan, Grennie Smith, Winter Lemon, Renet Simirenko, Horneygold, Radogost, Rosavka, Teremok [5, 6, 7, 8, 9]. According to P.V. Kondratenka [10], T.E. Kondratenko [11], O.V. Melnyk [12], the most rapidly growing and yielding in the zone of the forest-steppe of Ukraine, are most marked by Antey, Askold, Gala, Cimeria, Kulikovsky, Quinti, Mantet, Teremok, Radogost, Rovessnik, Rummy Mountaineer.

The productive value of a variety that can be offered for introduction into production as a means of improving the productivity of the main fruit crop determines its breeding and yield.

The purpose of our research was to comprehensively study new varieties of apple of foreign selection and allocation of perspective, whose plants are adapted to the conditions of the western forest-steppe Ukraine. One of the main tasks was to determine the degree of their fecundity and yield.

**Methods and conditions.** The laying of experiments, all records and observations were carried out in accordance with the "Program and method of sorting fruit, berry and nut tree crops" [13].

The objects of research are 10 foreign and three control varieties - Idared, Calvay Snow and Renet Simire DP "Novosilky" of the Institute of Horticulture (IS) of NAASU in spring 2002 under the scheme of 4x3 m, crown shape - spindle bush in the absence of irrigation.

The soil of the experimental site is dark gray, podzolized, medium-sandy, on a carbonate forest, typical for the forest-steppe zone.

The climate of the region is moderately continental. Rainfall reaches 597 mm. The smallest period of research (521 mm) was recorded in 2007, the largest (728) - in 2005. The long-term amount of active temperatures of 10°C and above is 25800°C, the average annual temperature of air is 5,80°C. The sum of active temperatures (10 ° C and above) ranged from 2882 (2006) to 3244 ° C (2010). Most of the winters were "soft", the minimum air temperature was minus 17.2 -22.0 0C, the more severe (2006) - minus 28.50 C. Weather conditions of growing periods 2004-2007, 2010 and 2011. were unstable, but generally satisfactory for normal growth and development of trees.

**Research results.** Early fertility of a variety is determined by the term of its introduction into fruiting and the rate of growth of yield. Sometimes the introduction of apple into fruiting is considered to be the year when at least 50% of the registered tree species are formed by 3 kg of fruit and more [14].

Estimation of the terms of the introduction of the studied varieties in fruiting showed that in the third year of growth yields at the level of control or significantly higher was in Antea plants - 3.1 kg / dec. (2.6 t / ha), Vessalini - 3.0 kg / well. (2.5 t / ha), Zaslavsky - 8.0 kg / dec. (6.7 t / ha), Nadzeini - 6.8 kg / well. (5.7 t / ha) and Syagrín - 4.3 kg / well. (3.6 t / ha). In the following year (2005), for the most part (85%) varieties, this indicator was only 1.0 - 2.1 kg / dec. Single fruits were recorded on the trees of Zaslavsky and Remembrance Syabarova (Table 1). The yield of the Imanta was 5.1 kg / der. The reason for the weak laying of flower buds in the above-mentioned varieties is due, apparently, to a small amount of precipitation in June and the first decade of July 2004 of the previous year (3.4 and 14.2 mm) - respectively. During this period, the plants of Antey and Nadzeyne were characterized by stable yields without its growth (Table 1). The introduction into fruiting for the fifth year (2006) of growth was noted in the trees of the varieties Alysya, Vernbnoe, Kalvyly snow (k.), P'amyati Syubarova and Chavrnitsa; Their yield was 3.3 - 11.7 kg / dec. At the latest, they began to bear the fruits of Renet Simirenko, whose yield for the sixth year of growth amounted to 5.1 t / ha (Table 2).

Table 1

**Characteristics of flowering and yield of apple trees during the period of introduction into fruiting, 2004 - 2005 IS NAAN, State Enterprise "Novosilki"**

Varyant	The degree of flowering, ball	, kg / year	The degree of flowering, ball	Yield, kg / yr.	Year of introduction into fruit-wearing
	2004		2005		
Idared (k.)	4,0	3,6	2,5	2,1	Third
Alessia	3,0	1,1	2,5	0,4	Fifth
Antey	3,8	3,1	1,0	3,2	Third
Vrbnoye	0,1	Single fruits	4,5	1,1	Fifth
Vsesilina	8,0	3,0	1,0	1,3	Third
Zaslavsky	5,0	8,0	1,0	Single fruits	Third
Imant	6,0	1,9	3,0	5,1	Fourth
Calvi Snow (k.)	3,0	2,3	7,0	1,2	Fifth
Nadjeyny	4,3	6,8	2,0	4,1	Third
Memory of	Single	0,1	4,5	Single fruits	Fifth

Syubarova	inflorescences				
Renet Simirenko (k.)	5,0	2,5	5,0	1,0	Sixth
Syabrin	5,5	4,3	7,0	2,1	Third
Chavranice	Single	0,1	4,0	1,1	Fifth
SSD <sub>05</sub>		0,83		0,51	

Trees of the studied varieties entered fruiting in the seventh (2008) year of growth. The highest yields in this period (15.0 - 21.9 t / ha) were recorded in Antey, Vernbnoe, Nadzeyni, Syabariny and Chavrantsi, low in Aydarid (12.5 t / ha), Zaslavsky (13.3), Imanta (13.6), in the memory of Syubarova (12.3), even lower (7.8-9.3 t / ha) in Alesi, Vsesaliny and the controlling Snow Calvy and Renet Simirenko (Table 2). In general, the fruiting of most of the varieties in that year was very weak, the yield was 0.25 -8.30 tons per hectare. The following year (2009), the intensity of flowering of most varieties was 2.0-3.0, and in Idared, Imanta, Memory of Suebarova and Syberni - 5 - 7 points. The reason was the adverse weather conditions. So, although humidity in July of the previous year (2008) and was sufficient (87.4 mm), 86.5% of precipitation occurred in the first decade of the month, when the maximum air temperature (+36 0C) was noted. Thus, insufficient soil moisture in the third decade of July in combination with air drought and high air temperature negatively affected the laying of flower buds of most of the studied varieties. In 2009, when their trees were in the "pink bud" phase, frostbite was observed (in the third decade of April to minus 3.50 ° C). All this influenced the formation of their harvest. In the same year (2009), the high percentage of fruit fastening was recorded in the varieties Alyssa, Vernbinoe, Vsesilina, and despite the weak flowering (2-3 points), their yield was 5.5-8.3 t / ha.

At the age of nine (2010), this indicator was high (over 25 t / ha) in control varieties (Calville Snow and Renet Simirenko) and in Antea (Table 2). At the level with them foster-bearing trees were Zaslavsky, Nadzeyny, Pamyaty Syabarovoy and Sybery. The latter trees formed the highest yield for the whole period of study - 50.6 t / ha. The yields of Idared, Alyus, Vrbnoye and Imant were also counted (19.9 - 24.0 t / ha), and the least yielding ones were Vsesylina (14.5 t / ha) and Chavarnitsu (18.3). In 2011, the Kalwil snow (control), and also Vernbinoe and Vsesilina, which yielded 19.3-24.0 t / ha, were stable in 2011. In the trees of Alesi and the Memorial of Syabarov, this figure was 13.4 and 13.7 t / ha respectively. In

all other varieties, the yield was very low (1.8 - 5.3 t / ha), while Zaslavsky and Renet Simirenko trees did not bear fruit at all.

Table 2

**Yields of the studied Belarusian apple varieties (2002: garden, 4x3 m, rootstock 54-118), 2006-2012, state enterprise "Novosilki"**

	Yield (t / ha) over the years							
	2006	2007	2008	2009	2010	2011	2012	average for 2009 - 2012
Idared (k.)	7,5	5,0	12,5	3,3	23,1	5,0	23,3	13,7
Alessia	7,0	2,7	9,4	5,5	24,0	13,0	21,3	15,9
Antey	16,1	0,1	21,7	0,4	41,0	1,8	30,0	18,3
Vrbnoye	6,6	3,0	21,3	6,2	20,1	19,3	14,5	15,0
Vsesilina	4,6	3,0	9,3	8,3	14,5	22,5	7,5	13,2
Zaslavsky	15,1	0,16	13,3	1,6	39,6	0,0	30,8	18,0
Imant	1,1	7,6	13,6	4,0	19,9	5,3	10,8	10,0
Calvi Snow (k.)	2,8	3,3	8,1	1,4	27,8	24,0	21,6	16,9
Nadjeyny	16,3	2,0	18,3	3,0	28,6	2,6	27,4	15,4
Memory of Syubarova	6,7	5,5	12,3	4,0	28,1	13,4	17,5	15,8
Renet Simirenko (k.)	0,6	5,1	7,8	0,25	38,5	0,0	29,0	18,7
Syabrin	16,4	7,3	16,6	8,0	50,6	2,2	33,3	23,5
Chavranice	9,8	0,3	15,0	0,5	18,3	13,7	22,2	13,7
SSD <sub>05</sub>	4,30	3,53	3,71	2,55	10,44	5,17	8,46	6,10

The following year (2012) high yields (29.0 t / ha) formed the plants of the Renet Simirenko variety (k.), With Antey, Zaslavsky, Syabarín and Nadjeyny (Table 2). Yields (21.3 - 23.3 t / ha) were also trees of the varieties Aidared (k), Alysya, Kalvly snow (k.) And Chavrñitsa.

The results of calculating the coefficient of periodicity of fruit bearing in the six - nine - year plantation showed that most of the studied Belarusian varieties are characterized by irregular fruiting. Varieties of Antey, Graf Ezzo, Zaslavsky, Nadzeyny and Renet Simirenko are characterized by periodic fecundity (J more than 75%). Annually, the trees of the control grade Calville snowy fruited (J = 39%).

**Conclusions** Studies have shown that the Antey, Nadzeyna, and Syabarine varieties in growing on a subsoil of 54-118 rainfed conditions (Western Forest-steppe) are characterized by a high rate of fast-growing trees and annual fruiting in the first years after planting in the garden. Early introduction to fruiting was noted at the trees of Aydared (k.), Vsesilini and Zaslavsky.

In the age of full fruiting on the rich, the harvest was recognized as Siabrin (23.53 t / ha), medium-yielding Antey, Zaslavsky, Nadzeyne, Alysya, Vernbnoe and Memorial Syubarova.

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