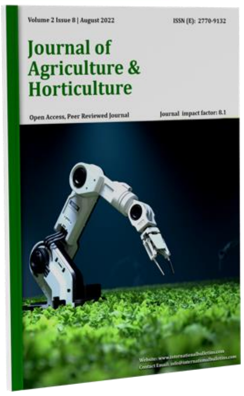

THE IMPACT OF THE DIAMETER OF THE COMPACTING PISTON OF THE DEVICE ON THE QUALITY INDICATORS OF THE BIOHUMUS POT.

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Abstract: The article presents the results of experimental research on the selection of the diameter of the compacting piston of the pot preparation device developed for the purpose of growing seedlings and the effect of changing the diameter of the compacting piston on the quality indicators of the pot.

Key-words: Pot, biohumus, compacting piston, quadratic deviation, damage, arc-shaped molds, density of pot walls, strength, moisture.

Introduction: Experiments were conducted by changing the diameter of the compacting piston of the device in order to achieve quality pot preparation by the device, the thickness of the pot wall, the preparation of the pot wall, and the density of the pot walls to meet the agronomic indicators, and to reduce damage to the pot [1,2,3].

Analysis and results: Experiments were carried out by changing the diameter of the compacting piston of the device for making pots from biohumus from 70 mm to 85 mm in intervals of 5 mm during seedling cultivation. In order to prepare pots from biohumus, a mixture of biohumus with 19 and 21% moisture content was prepared, and the pressure of pneumatic cylinders was taken as 400 kPa. In studying the diameter of the compacting piston of the device for making pots from biohumus, pot wall preparation, pot wall thickness and pot wall density, as well as their mean square deviations, pot damage were taken as the main quality indicators [4, 5, 6, 7].

The results of the experiments are presented in Table 1 and Figs 1-6.

Solution method: Changing the diameter of the compacting piston of the device from 70 mm to 85 mm led to a uniform decrease in the thickness of the wall of the pot and an increase in its mean square deviation even at different moisture levels of the biohumus mixture. For example, when the piston diameter was changed from 70 mm to 85 mm at 19 and 21 % moisture content of the mixture, the wall thickness uniformly decreased from 15 mm to 7,5 mm, and its root mean square deviation increased from ±0,5 mm to ±1,1 mm and from ±0,3 mm to ±1 mm, respectively [8,9,10,11, 12].

The decrease in the thickness of the pot wall can be explained by the fact that the volume of the cavity between the piston and the arc-shaped molds, where the walls of the pot are made, decreases with the increase in the diameter of the compacting piston.

When the piston diameter was changed from 70 mm to 80 mm, the pot wall preparation increased from 78% to 91% and from 80% to 94% at both 19 and 21% humidity. When the diameter of the piston was 85 mm, the preparation of the wall of the pot was reduced to 84% and 86%, respectively, at 19 and 21% humidity. Mean square deviations have not changed. This can be explained by the fact that the piston compresses the available volume of the mixture in the space between the arc-shaped molds to form the walls of the pot.

When the diameter of the compacting piston of the device was changed from 70 mm to 85 mm, the density of the pot walls increased from 1,2 to 1,42 *g/sm³* and from 1,25 to 1,44 *g/sm³* at 19 and 21% moisture content of the biohumus mixture, and its mean square deviation decreased from ±0,28 *g/sm³* to ±0,12 *g/sm³* and from ±0,25 *g/sm³* to ±0,10 *g/sm³* respectively.

1- table

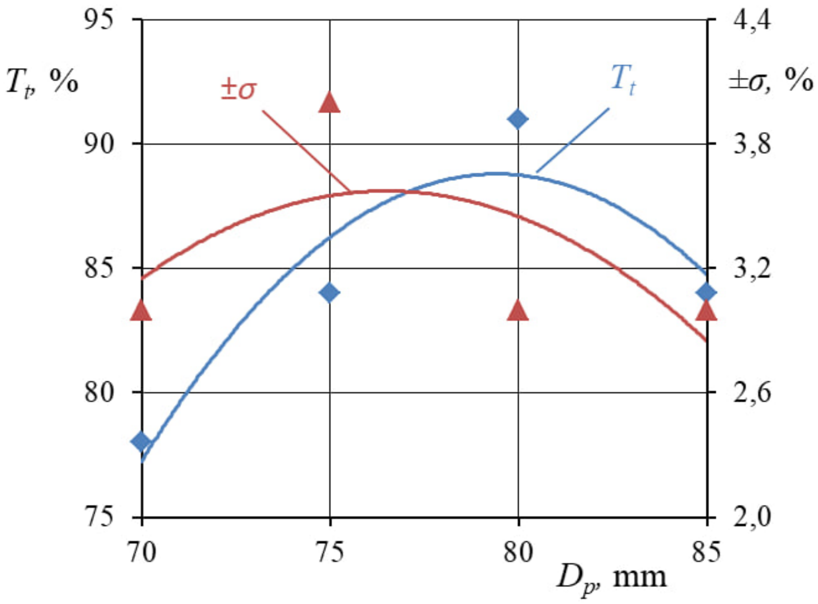
The influence of the diameter of the compacting piston on the quality parameters of the prepared biohumus

/r	Name of indicators	Value of indicators							
		Condenser piston diameter; D_p, *mm*							
		70		75		80		85	
		Moisture content of the biohumus mixture; *W, %*							
		9	1	9	1	9	1	9	1
	The thickness of the wall of the pot, *mm* T_d $\pm\sigma$	5 ,5	5 ,3	2,5 ,7	2,5 ,5	0 ,9	0 ,8	,5 ,1	,5
	Preparation of the wall of the pot, % T_t $\pm\sigma$	8	0	4	5	1	4	4	6
	The density of the walls of the pot, *g/sm³* ρ_t,								

	$\pm\sigma$	,2 ,28	,25 ,25	,25 ,15	,3 ,2	,35 ,13	,4 ,11	,42 ,12	,44 ,10
	Damage of the pot, % T_{sh}	0	8	2	0				

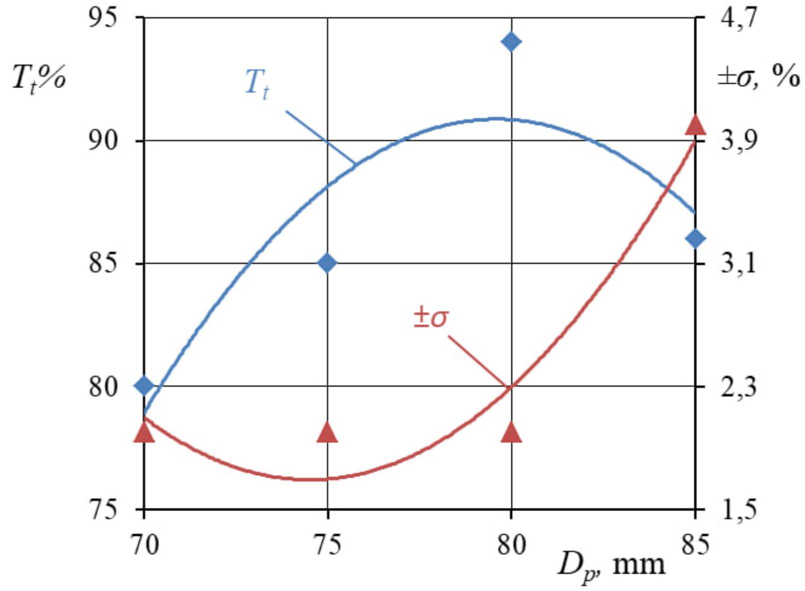
This can be explained by the increase in the diameter of the piston and the decrease in the volume of the space between the arc-shaped molds, resulting in an increase in the compression between the arc-shaped molds and the compacting piston [13, 14, 15,16].

The compaction piston diameter of the device was reduced from 20% to 6% and from 18% to 5% in the experiments carried out at 19 and 21% moisture content of the biohumus mixture, respectively. This is due to the fact that when the diameter of the compacting piston is small, the thickness of the pot wall increases, and its hardness decreases [17, 18, 19].



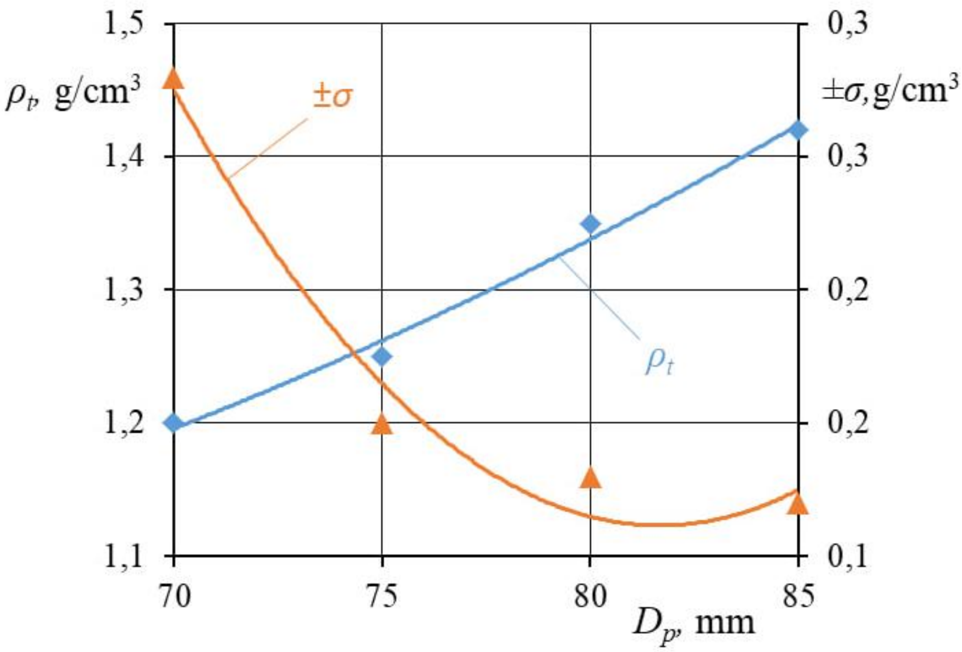
When it is W = 19 %

Fig 1. The graph of the variation of the preparation of the pot wall (T_t) and its mean square deviation ($\pm\sigma$) depending on the diameter of the compressing piston (D_p)



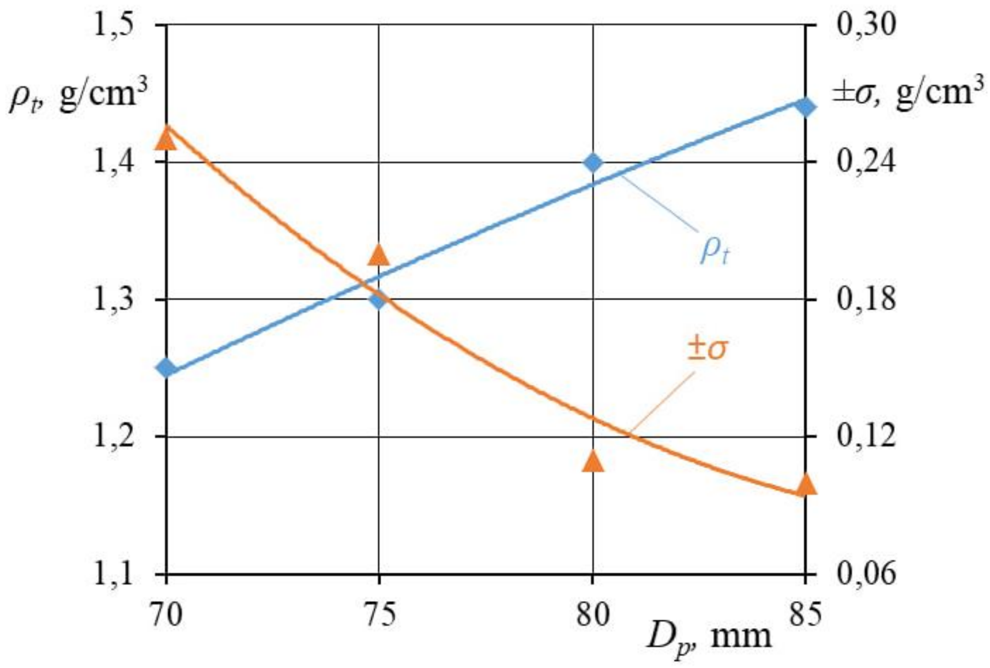
When it is W = 21 %

Fig 2. A graph of variation of pot wall preparation (T_t) and its root mean square deviation (±σ) as a function of compacting piston diameter (D_p)



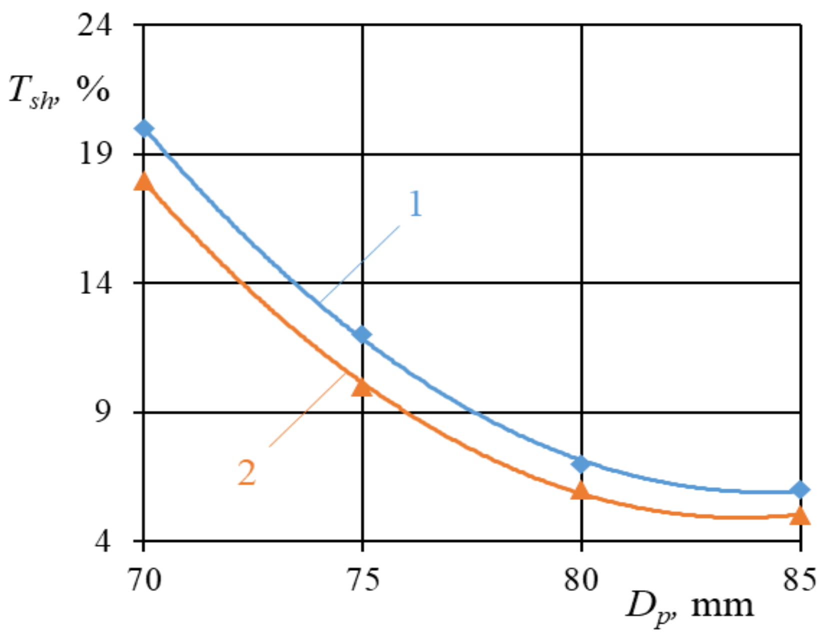
When it is W = 19 %

Fig 3. The graph of the variation of pot wall density (ρ_t) and its mean square deviation (±σ) as a function of the densifying piston diameter (D_p)



When it is W = 21 %

Fig 4. The graph of the variation of pot wall density (ρ_t) and its mean square deviation ($\pm\sigma$) as a function of the diameter of the compacting piston (D_p)



When it is 1 - W = 19 %; When it is 2 - W = 21 %

Fig 5. The graph of the change of pot damage (T_{sh}) depending on the diameter of the sealing piston (D_p)

The graphical relationships presented in Figs 1-5 can be expressed by the following empirical formulas

For Fig 1, when W = 19%

For Fig 2, when W =21%

For Fig 3, when W = 19%

For Fig 4, when W =21%

For Fig 5

Summary: According to the results of the experimental research, when the diameter of the compacting piston of the device is 80 mm, the preparation of the pot wall is maximum, the density of the pot walls is optimal, and the damage to the prepared pot is the least.

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