

## Germinating Capacity of Grasses During Lawn Agrophytocenoses Making Depending on Pre-Sowing Tillage Method

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**Abstract:** All owners of gardens, houses, cottages would like to enjoy themselves the green lawns with soft grass. The green lawns, plants and different plant compositions are necessary especially in daily tempo of life and work, in urban environment. The landscape gardening aimed to the artificial environment creation with application of natural components always helps with achievement of these purposes. Lawn it is the base for each landscape composition. The herbaceous covering is mostly one of essential component of parks construction both in urban and rural environment. Lawns can be independent form of landscaping. Long-lived and well-kept lawns are necessary attribute of modern life. But the quality lawns creation requires a lot of financial costs, first of all, for fertile layer for sowing and seeds of foreign selection purchasing. Use of existent fertile layer and seeds of grass of domestic selection allows expenditures reduction and quality lawns making. Soil tillage before sowing lawn agrophytocenosis has a great impact on formation of closed lawn covering from the first year of stand. The pre-sowing cultivation with centre hoes to a depth of 6-8 cm and sowing of domestic selection seeds allow getting good and excellent quality stands at the first year of life of mixed grass crops under the study and forming closed and diffusive covering up to the 82 % with stand density 12222 sprouts/m<sup>2</sup> at the end of the first vegetation period.

**Key words:** Lawn agrophytocenosis • Pre-sowing tillage • Mixed grass crops • Cultivation • Disking

### INTRODUCTION

The making attracting and first of all long-lived lawns is an effortful and difficult process [1, 2]. They mostly use delivered soil for process acceleration, but it increases the cost of lawn making and delivered soil not always meets the requirements and does for growth and development of grass. It is better to use available soil [3].

The optimal time for lawns sowing in Preduralie is the spring period. There is enough moisture for seeds germination at this time and after germination we can get good quality lawns even at the first year under favorable conditions. [4-8] are unison in opinion that it is necessary to prepare soil carefully before grass sowing: the surface should be plane, without large lumps and clods, root residues of previous plants and weeds.

The research on lawns making and maintenance in Preduralie for developing improved agricultural methods during long-lived lawn grass agrophytocenoses making has been carried out since 2003 at the Perm State Agricultural Academy at the General Farming and Plant Protection Department.

### MATERIALS AND METHODS

The experiment Impact of soil tillage and care method on root mat formation from perennial grass and lawn quality was laid on training experimental field of the Perm State Agricultural Academy (PSAA) in 2003. The scheme of experiment is displayed in table 1.

The area of plot is 6.25 m<sup>2</sup>, replication-sixfold, distribution-random. The prevernal harrowing with spike-tooth harrow BZTS-1 was carried out after soil became workable to tillage. After weeds mass appearance the pre-sowing tillage was conducted according to scheme: cultivation with KPS-4, disking with BDT-3 and preliminary mineral fertilizers application (NPK)<sub>60</sub> g/m<sup>2</sup>. The soil of experimental plot is sod middle podzolic (typical for Preduralie), humus content-2.3-2.4%; pH=5.0; P<sub>2</sub>O<sub>5</sub>=120-185 mg eq/100 g.; K<sub>2</sub>O=145-160 mg eq/100 g. The seeding rate is red fescue grass 13.3 g/m<sup>2</sup>; meadow fescue grass 18 g/m<sup>2</sup>; Kentucky bluegrass 8 g/m<sup>2</sup> and timothy grass 7.9 g/m<sup>2</sup>, when germination capacity is 100%. The sowing conducted in the third decade of May

by hand. The cutting down was carried out with lawnmower MDTYM 6018 SPS according to experiment scheme separated by 5 and 10 days.

**RESULTS AND DISCUSSION**

The varieties of domestic selection, the most adapted for region’s weather conditions, were taken for research on lawn agrophytocenoses in Preduralie (Table 2).

The grass seeds taken for sowing met the requirements of sowing standard State Standard 12037-81 and 12038-84 [5, 6]. Kentucky bluegrass and timothy grass had the lowest germinative energy and it had impact on field germination rate of study mixture with them.

The pre-sowing tillage has a significant impact on grass germination and consequently on it further development and stand quality especially during the first year. The pre-sowing cultivation with centre hoes and pre-sowing disking with disk operative parts were examined for study of pre-sowing tillage during lawn making. Soil pulverization, loosening, partial soil reversing, trimming of weeds took place during cultivation and soil pulverization, trimming of developing weeds-during disking. The assessment of soil tillage quality, determination of topsoil hardness and compactness were conducted after tillage. The soil hardness was determined by Golubev hardness tester, compactness-by gravimetric method [9], the tillage quality on the base of Research Institute of Agriculture-Non-Chernozem Areas method [12]. As a result it was determined that the most optimal tillage was during cultivation (quantity of clods in average during replication was 5-7%, furrow depth-3.2-3.6 ñm; weeds were trimmed completely. The weeds also were

completely trimmed during pre-sowing disking, but quantity of clods was 15-19%. The soil hardness (table 3) after cultivation in topsoil was 1.81 kg/ñm<sup>2</sup> and after pre-sowing disking it was slightly higher-2.01 kg/ñm<sup>2</sup> (LSD<sub>05</sub>= 0.02)

The compactness of topsoil after cultivation reached 1.45 g/ñm<sup>3</sup>; after disking-1.36 g/ñm<sup>3</sup>. The germination of grass was defined in 2 weeks after braiding during stand formation in all variants of experiments before the first cutting down according to method of I.V. Kobozev and others (2003) [2]. The sprouts density on the lawns varied in the embodiments 4740-10352 sprouts/m<sup>2</sup> èèè 2672-5448 plants/m<sup>2</sup> (table 4). Higher sprouts density was identified after disking: 7144 plants/m<sup>2</sup> in average. But the best quality of stand was received with mixture I application (red fescue grass 50% + meadow fescue grass 50%) after cultivation-10352 sprouts/m<sup>2</sup>. The lowest germination 4740-6328 sprouts/m<sup>2</sup> was received with application of mixtures II and III after both cultivation and disking.

The most favorable conditions for life and development of plants were identified after cultivation. The quality of sprouts after cultivation increased to the ending of vegetation period in average to 9153 sprouts/m<sup>2</sup> (projective covering-76%), in comparison with after disking-7285 sprouts/m<sup>2</sup>. The lawns sown after cultivation differed by significantly closed stands and plane surface according to the visual estimate.

The carrying out more frequent cuttings down (every 5 days) increased the intensity of grass tillering. So sprouts quantity in almost all study lawns increased in average after cultivation within the range of 555-2000 sprouts/m<sup>2</sup>; and after disking-2555-4000 sprouts/m<sup>2</sup> to the end of the first vegetation period.

Table 1: The scheme of experiment Impact of soil tillage and care method on root mat formation from perennial grass and lawn quality

Pre-sowing tillage, 6-8 cm		Pre-sowing disking, 6-8 cm	
Cutting down in 5 days	Cutting down in 10 days	Cutting down in 5 days	Cutting down in 10 days
Red fescue grass ( <i>Festuca rubra</i> ) 100%			
Mixture I red fescue grass 50% + meadow fescue grass ( <i>Festuca pratensis</i> ) 50%			
Mixture II red fescue grass 35% + meadow fescue grass 35% + Kentucky bluegrass ( <i>Poa pratensis</i> ) 30%			
Mixture III red fescue grass 25% + meadow fescue grass 25% + Kentucky bluegrass 25% + timothy grass ( <i>Phleum pratense</i> ) 25%			

Table 2: Grass seeds sowing qualities

Crop	Variety	Germinative energy, %	Laboratory germination, %	Pureness, %	M <sub>1000</sub> , g
Red fescue grass	Sverdlovskaja	76	86	96	1.14
Meadow fescue grass	Sverdlovskaja 37	79	94	91	2.00
Kentucky bluegrass	UrGU	63	95	99	0.45
Timothy grass	Utro	60	78	78	0.36

Table 3: Impact of pre-sowing tillage on topsoil physical properties, 2003

Soil layer, cm	Cultivation		Disking	
	Soil hardness, kg/cm <sup>2</sup>	Soil compactness, g/cm <sup>3</sup>	Soil hardness, kg/cm <sup>2</sup>	Soil compactness, g/cm <sup>3</sup>
0-5	1.81	1.45	2.01	1.36
5-10	1.80		2.13	
10-15	1.80	1.35	2.09	1.31
15-20	1.84		1.96	
LSD <sub>05</sub>	0.02	0.06	0.02	0.06

Table 4: Impact of pre-sowing tillage on sprouts density and lawns stand formation, pcs/m<sup>2</sup>, 2003

Lawn agrophytocenosis	Cultivation			Disking		
	Sprouts	Vegetation ending		Sprouts	Vegetation ending	
		Cutting down in 5 days	Cutting down in 10 days		Cutting down in 5 days	Cutting down in 10 days
Red fescue grass	7411	7667	10333	8123	9944	7389
Mixture I	10352	12222	11667	9022	11667	7667
Mixture II	4740	7556	5556	5222	4944	6611
Mixture III	5077	9778	8444	6328	3611	6444

### CONCLUSION

The disking as pre-sowing tillage and preparation of soil before lawns sowing allowed receiving more similar sprouts with density in average 5222-9022 sprouts/m<sup>2</sup>. The most optimal conditions for life and development of grass make it possible to form more closed stand after cultivation with density of planting to 10352 sprouts/m<sup>2</sup> in mixed grass crop I. The content of mixed grass crop and presence of late developing grass, in particular of Kentucky bluegrass, has an impact on lawn quality from the first year of life (mixture II and mixture III).

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