

FEATURES OF SUGAR BEET PLANTS GROWTH AND DEVELOPMENT DEPENDING ON THE QUALITY OF SEED

In the article the features of sugar beet plants growth and development depending on the quality of seed was investigated. It is proved that the field similarity and uniformity of sugar beets plants placing in the row directly dependent on the quality of seed. Quality seed provides field germination and friendlier growth in field increased. It is established the direct relationship between field similarity and density of sugar beet plants.

Keywords: *sugar beet, uniformity of placing, field germination, plant density, seed quality*

Introduction. The widespread introduction of intensive, efficient sugar beet cultivation technology is contributed to increasing the requirements for sowing qualities of seed, and especially to its laboratory similarity, which is directly related to the field similarity [1, 2].

Field similarity and uniformity placement of plants sugar beets in the row directly depend on the quality of sown seed and are important indicators. According to L.S. Zenin data [3], plant density and uniformity of their distribution along the length of the row is one of the main factors of high productivity of sugar beet. By uniformity placing of plants in the process of continued growth and development of is provided the same area of nutrition, and thus to harvest have the most aligned roots in magnitude. Due to these losses are reduced during sugar beet harvesting the roots are less traumatized and better stored in piles.

Therefore, the aim of our research was to establish the features of sugar beet plants growth and development depending on seed quality.

Materials and methods. Researches with uniformity placement of sugar beet plants, field similarity and density of plantings depending on seed quality were conducting in 2010–2013 in experimental field of Bila Tserkva national agrarian university, that situated in the right bank part of the central Forest-steppe of Ukraine.

The total area of the plot is 16.2 m², accounting – 13.5 m², repetition – 4th single. For study were used triploid hybrid seed of domestic breeding Alexandria with laboratory similarity from 80 to 100% with intervals of 5%. Determination of field similarity of seed, uniformity placement of plants and density of plants after the appearance of full staircase was performed according to the method that developed by the Institute of Sugar Beet [4]. Statistical processing of research results was conducted on a personal computer with Statistica 8.0 program using.

Research results. It was established that by the seed sowing of various laboratory similarity from 80 to 100% stronger sprouted seed with laboratory similarity more than 91-95 and 95% (Table. 1).

Table 1

**Dynamics of seeding emergence of sugar beet depending on
laboratory similarity of seed (average for 2010-2013)**

Variant – laboratory similarity	Number of stairs on the day of registration, pcs./2 m of row								
	7-th	8-th	9-th	10-th	11-th	12-th	13-th	14-th	15-th
80–85 %	1,1	1,9	2,9	4,1	5,0	5,9	7,2	8,6	10,1
86–90 %	2,3	3,2	4,2	5,7	7,1	8,2	9,8	11,1	12,3
91–95 %	2,8	4,1	5,3	6,6	8,6	10,0	11,6	13,1	14,4
over 95 %	2,9	4,5	6,0	7,7	9,5	10,9	12,5	14,0	15,2

Thus, in variants where seed sowing with the laboratory germination 91-95% and over 95% the number of stairs on the 7th day was within 2,8- 2,9sht./2 linear meters line and after 15 – 14,4-15,2 pcs./2 linear meters line, while as for seed sowing with the lower laboratory similarity 80-85 and 86-90% had less stairs on 0,5-1,8 on 7th day and 2 ,2-5,1 pcs./2 linear m on the 15th day.

Weather conditions that prevailing during the period of sowing and emergence seeding (GTC = 1.3) for the years of research conducting was influenced both the dynamics of seeding emergence and on the field germination of seed. Field studies have confirmed the results of previous experiments concerning the relationship of laboratory and field germination. In the field also established that between laboratory and field germination of seed there is a close correlation. Higher laboratory germination of seed, than it is smaller the difference between laboratory and field similarity. By varying field and laboratory germination the similarity was different, depending on the conditions that arise in the field on sowing period (Fig. 1).

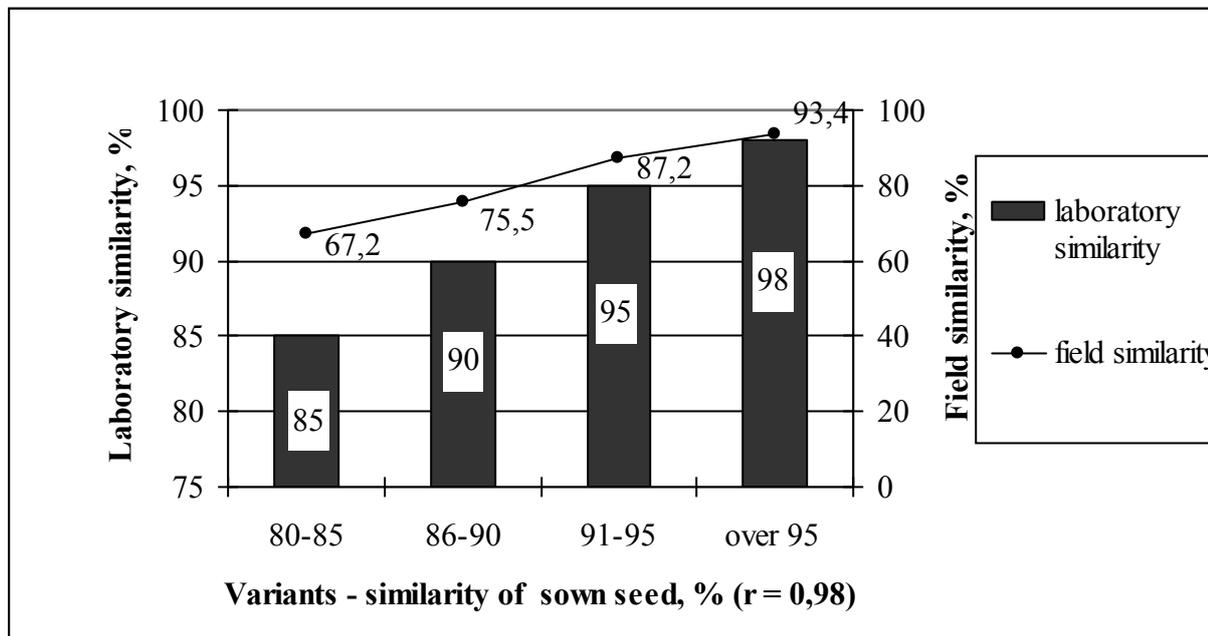


Figure. 1. Field similarity of seed ($SSD_{05} = 4,9$ %, average of 2010-2013)

On average over four research years the smallest field germination in experiment was fixed in this variant, where seed sowing was performed with laboratory similarity 80-85% - 67.2%, and the highest - 93.4% at seed sowing with similarity more than 95%.

Field similarity in the variants in which seed is sowing with the laboratory similarity 86-90% and 91-95% was 75.5 and 87.2% respectively. The obtained results show that the field similarity largely depends on the laboratory germination of seed.

Dynamics of seeding emergence and field germination is influenced on sugar beet plants density, which was determined after complete stairs receipt (Fig. 2).

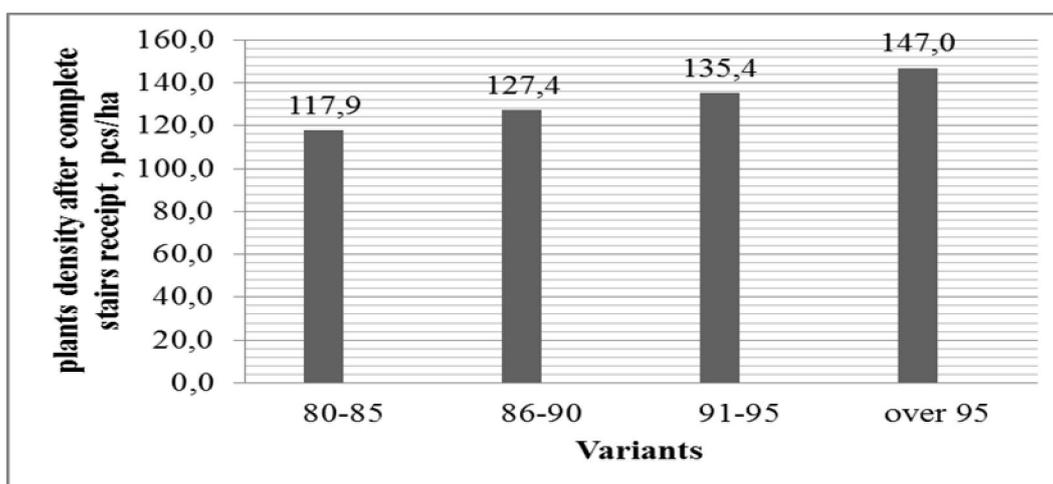


Figure. 2. Plants density after complete stairs receipt (SSD₀₅ = 11,1 thousand/ha, average of 2010–2013)

It is established a direct relationship between the field germination of seed and plants density after receiving full stairs. The higher field germination is the greater density of plants. Thus, on average, over four years the greatest density of plants after the appearance of complete stairs – 147,0 thousand pcs./ha recorded in the variant where seed sowing was performed with laboratory similarity over 95%.

Field germination, for this was also the highest. In the variant where seed sowing was performed with laboratory similarity 80-85% the field germination was the lowest and the lowest was in accordance with the density of plants - 177.9 thousand pcs./ha. A similar relationship between field germination of seed and plants density after receiving full staircase was observed for seed sowing with similarity 86-90% and 91-95%. Between field germination and plants density after emergence of the full is set staircase a strong positive correlation ($r = 0,71$) (Table 2).

Table 2

Correlation interrelation between field germination of seed and plants density of sugar beet, $p < 0,05$ $N=16$

Index	Dispersion	Standard deviation	Field similarity, %	Plants density, thousand pcs/ha
Field germination, %	129,9	11,4		0,71
Plants density, thousand pcs/ha	606,8	24,6	0,71	

One of the main factors of beets yield is uniformity placement of plants in the row increasing. Uniformity placement of plants along the row (the coefficient of variation of intervals) on 1% increases roots yield at least on 0.12 t/ha. By this their sugar content increases [5].

The coefficient of variation shows the standard deviation to the arithmetic mean of the population. According to B.M. Dosp'yehov [6], the variability of asked is considered insignificant if the coefficient of variation less than 10%, an average if more than 10% but less than 20%, and significant if the coefficient of variation of 20%.

On the average of research years coefficient of variation in the variant where is seeding the seed with the laboratory similarity 80-85% is exceeded the level of 20% and amounted of 21.6%, ie the uniformity placement of plants is characterized by considerable variability. This is due to the encrusted seed for sowing use, high uniformity placement of which is pneumatic seeder even hard to provide. By seed sowing with laboratory similarity 86-90% and 91-95% the coefficient of variation was somewhat lower and ranged on variations in the range of 13.1 to 18.6% (Table 3).

Table 3

The coefficient of variation of uniformity of sugar beet plants placing in a row

Variant – laboratory similarity of seed, %	Coefficient of variation, %				Average over four years
	2010	2011	2012	2013	
80–85	24,2	20,4	19,7	22,1	21,6
86–90	17,3	19,8	17,3	20,1	18,6
91–95	15,6	19,4	11,5	15,1	15,4
Over 95	11,8	11,9	16,7	12,0	13,1

That is, with laboratory germination of seed increasing there was trends lower the coefficient of variation, due to higher field germination and therefore a greater number of larger or smaller intervals from the set.

The data obtained indicate a strong influence of uniformity placing plants in a row on the development of sugar beet sowings compared to field germination and plants density. Under the conditions of uniformity placing sugar beet plants in a row and more completely the system of agrotechnological measures using, which will be sowings established the optimal area of plants nutrition formed, which contributes to the correct formation of roots and strong leaf mass, and ultimately influence on their productivity.

Conclusions. According to seed sowing with similarity more than 85% the intensity of its germination in the field is increased.

The dependence between laboratory and field germination of seed and plants density is established. The higher laboratory germination is the higher its laboratory similarity and greater density of plants. Between field germination and plants density there is a strong positive correlation ($r = 0,71$). The highest field similarity and, respectively - density of plants - 147.0 thousand units/ha was in the variant, where seed sowing was performed with laboratory similarity over 95%.

In the variant with laboratory similarity of 80-85% the coefficient of variation was higher the level of 20% and amounted to 21.6%, ie the uniformity placement of plants is characterized by considerable variability. This is due to the encrusted seed for sowing use, high uniformity placement of which is pneumatic seeder even hard to provide.

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Анотація

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Особенности роста и развития растений цукрових буряків залежно від якості насіння

У статті досліджено особливості росту і розвитку рослин цукрових буряків залежно від якості висіяного насіння. Доведено, що польова схожість та рівномірність розміщення рослин цукрових буряків у рядку напряму залежать від якості насіння. Якісне насіння забезпечує підвищену польову схожість та дружніше проростання його в полі. Встановлено пряму залежність між польовою схожістю та густиною рослин цукрових буряків.

Ключові слова: цукрові буряки, рівномірність розміщення, польова схожість, густина рослин, якість насіння

Аннотация

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Особенности роста и развития растений сахарной свеклы в зависимости от качества семян

В статье исследованы особенности роста и развития растений сахарной свеклы в зависимости от качества высеянных семян. Доказано, что полевая всхожесть и равномерность размещения растений сахарной свеклы в рядке напрямую зависят от качества семян. Качественные семена обеспечивают повышенную полевую всхожесть и дружелюбное прорастания их в поле. Установлена прямая зависимость между полевой всхожестью и густотой растений сахарной свеклы.

Ключевые слова: сахарная свекла, равномерность размещения, полевая всхожесть, густота растений, качество семян.