

INFLUENCE OF SIZE OF SOWN FRACTIONS ON PRODUCTIVITY OF SUGAR BEET BIOLOGICAL FORMS

The article deals with the results of researches on the influence of size of sown fractions on productivity of sugar beet biological forms in the conditions of Western Forest-Steppe zone of Ukraine. It is proved that the magnitude of heterosis is more apparent in biological forms of triploid forms of sugar beet compared with diploid forms.

Keywords: *sugar beet, biological form, sown fraction, productivity*

Introduction. Different quality of sugar beet seed is characterized, above all, a great diversity of its by the size. On the basis of previous researches [1] it is found that the fractional composition of seed, that the existence of different fractions is predetermined genetic characteristics, growing conditions, additional presowing seed preparation with its physical properties improving.

According to the V. Dankov and A. Matsebera data's [2], by the sugar beet seed growing of the central Forest-Steppe of Ukraine, fruit fraction of 3.0-3.5 mm was 30.8%, fraction of 4.5-5.5 mm – 14.2, in Western Forest-Steppe 19.3 and 20.2% respectively According to the V. Balan data [3], by the without planting methods of cultivation, regardless of varietal characteristics, the bulk of the seed fruit is constitute fraction of 3.5-4.5 mm (60–70%) and characterized by the high content of fruit fraction of 2.5-3.5 mm, especially 3.0-3.5 mm (30-40%). This issue particularly acutely rose in relation with the creation and implementation of new hybrids of sugar beet, which are based on cytoplasmic male sterility in which the share of seed of fraction 3.0-3.5 mm is reaches to 21% or more of the total weight of seed [4]. Numerous researches are confirming [5, 6] that hybrid seed in diameter less than 3.5 mm has energy of germination and laboratory similarity at the level of 85-90%, and gives a high level of sugar beet productivity.

In relation to this, *the goal of our researches* was determined the influence of size of sown fractions on productivity of sugar beet biological forms.

Materials and methods. Field's researches were conducted during 2009-2012 in the experimental field of "Maksagro" FG Khmelnytsky region, laboratory researches – in the laboratory of seed production of Institute of bioenergy crops and sugar beet of NAAS of Ukraine. Sown area of plots is 100 m², accounting area – 50 m². Repeated is quadruple. For the experiments conducting annually (2009-2012 years) in the Kiev plant seed harvested seed of 3,25-3,5 , 3.5-4.5 and 4.5-5.5 mm fractions with virtually the same laboratory germination of Ivano-Veselopodilskiy ChS 84 (IVP ChS 84) triploid forms and diploid forms of Ukrainian ChS 72.

Experiments were conducted in accordance with generally accepted method of field experience and guidance of the Institute of bioenergy crops and sugar beet NAAS of Ukraine [7]. Statistical analysis of experimental data was performed by analysis of variance with modern software package using on a personal computer [8].

Results and discussion. Evaluate of the productivity of hybrids of sugar beet is a root yield, sugar content and yield of sugar per hectare. These factors are depending on many factors: weather and climate, soil, farming, and many others. Based on the thesis that the roots grow from seed, is meaning it different quality in size in this context is particularly important.

This context analyzing the yield of roots, depending on the size of the sown fractions (Table), it is note the following. In average of research years the best results are obtained by the sowing of the seed of a big fraction of 4.5-5.5 mm. Thus, by the sowing of seed fraction 4.5-5.5 mm the yield of roots in the diploid form was – 43.2 t/ha for the use of 3.25-3.5 mm seed fraction – 40.5 t/ha, which is on 0.6 t/ha less than in the control variant, while in the triploid form (IVP ChS 84) – 46.6 and 44.1 t/ha respectively, which is also on 0.6 t/ha less compared with the control. That is, the

yield of sugar beet triploid forms (IVP ChS 84), irrespective of the size of sown fractions was higher compared to the diploid form (hybrid Ukrainian ChS 72).

Table 1

**Productivity of biological forms of sugar beet depending on size of sown fractions
(average of 2009-2012)**

Biological form	Fraction of seed, mm	Yield, t/ha	Sugar content, %	Sugar yield, t/ha
diploid	3,25–3,5	40,5	15,9	6,4
	3,5–4,5	41,1	15,9	6,5
	4,5–5,5	43,2	15,8	6,8
triploid	3,25–3,5	44,1	15,8	7,0
	3,5–4,5	44,7	15,8	7,1
	4,5–5,5	46,6	15,7	7,3
SSD ₀₅ biological form		1,8	0,2	0,5
HIP ₀₅ fraction of seed		1,6	0,3	0,7

Thus, our research shows that significant differences in yield of roots that grown from seed-sized 3.25-3.5, 3.5-4.5 and 4.5-5.5 mm not setting. There is a tendency to its increase with size fraction increasing.

Determination of sugar content in sugar beet root before harvest is showed that on this indicator the differences depending on the size of sown seed and biological forms were not observed (see Table). The difference in sugar content of roots between the variants was within 0.1-0.2%.

Thus, our researches and literary sources presented above are allowed concluding the following: sugar content in roots does not depend of the size of sown fractions.

The final evaluate of the productivity of sugar beet is yield of sugar per hectare which is in direct proportion to the yield of roots and sugar content. Therefore, there is the same pattern in the analysis of these indicators that we determined (see Table).

On average of four years, in diploid and triploid forms a slightly larger yield of sugar was obtained by the seed sowing of 4.5-5.5 mm fraction. And the difference between this fraction and the fraction of 3.5-4.5 mm is small and amounts in the diploid hybrid Ukrainian ChS 72 – 0.3 t/ha, while in the triploid hybrid IVP ChS 84 – 0.2 t/ha (SSD₀₅ fraction of seed = 0.7 t/ha). That is, when to take over control the 3.5-4.5 mm seed fraction, in the average of research years as a significant increase compared with the seed fraction 4.5-5.5 mm, and a significant reduction compared to seed fraction 3,25-3,5 mm in our experiments was not. The difference, which is checked, should be seen as a tendency.

Presents data analyzing is also necessary to be noted that under the same conditions of sugar beet growing in productivity triploid form is exceeds diploid. So if in diploid hybrid Ukrainian ChS 72 by the sowing of 4.5-5.5 mm fraction of seed sugar yield was 6.8 t/ha, in triploid IVP ChS 84 – 7.3 t/ha, which is on 0.5 t/ha more (see Table).

Conclusions. Yields of roots in both of biological forms of sugar beet, their sugar content, and eventually yield of sugar per unit of area practically did not depend of the size of sown fractions that investigated. However, some benefits in the whole of sugar beet productivity by the seed sowing of big fraction 4.5-5.5 mm should be regarded as a tendency and did not provide them decisive importance when fractions of seed for sowing choosing in production. In average of research years the value of heterosis is more apparent in the triploid hybrids than in the diploid. Yield of sugar beet in the triploid form was 44.1-46.6 t/ha, sugar content – 15.8-15.7%, yield of sugar – 7.0-7.3 t/ha, while in the diploid – 40.5-43.2 t/ha; 15.8-15.9%; 6,4-6,8 t/ha respectively.

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Анотація

Кикало М.М.

Вплив розміру посівних фракцій на продуктивність біологічних форм цукрових буряків

У статті висвітлено результати досліджень щодо впливу розміру посівних фракцій на продуктивність біологічних форм цукрових буряків в умовах Західного Лісостепу України. Результатами досліджень встановлено, що величина гетерозису більшою мірою проявилася у триплоїдних біологічних форм цукрових буряків, порівняно з диплоїдними формами.

Ключові слова: цукрові буряки, біологічна форма, посівна фракція, продуктивність

Аннотация

Кикало М.М.

Влияние размера посевных фракций на продуктивность биологических форм сахарной свеклы

В статье отражены результаты исследований влияния размера посевных фракций на производительность биологических форм сахарной свеклы в условиях Западной Лесостепи Украины. Результатами исследований установлено, что величина гетерозиса в большей мере проявилась у триплоидных биологических форм сахарной свеклы по сравнению с диплоидными формами. Не установлено достоверных различий по урожайности корнеплодов, выращенных из семян, размеры которых составляют 3,25-3,5, 3,5-4,5 и 4,5-5,5 мм.

Ключевые слова: сахарная свекла, биологическая форма, посевная фракция, продуктивность