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PRODUCTIVITY OF SUGAR BEET HYBRIDS UNDER THE CONDITIONS OF THE RIGHT-BANK FOREST STEPPE OF UKRAINE

Vyshnevskaya L.V. – Candidate of Agricultural Sciences, Associate Professor,
Uman National University of Horticulture

Kononenko L.M. – Candidate of Agricultural Sciences, Associate Professor,
Uman National University of Horticulture

Rogalskyi S.V. – Candidate of Agricultural Sciences, Associate professor,
Uman National University of Horticulture

Kravchenko V.S. – Candidate of Agricultural Sciences, Senior Lecturer,
Uman National University of Horticulture

Based on the conducted research, it is recommended to use hybrids that are adapted for corresponding growing conditions in Mankivka natural agricultural area. These hybrids are Umanskyi ChE-76, Ukrainskyi-73, Slovianskyi-94.

The average yield of the best two years was: Ukrainian SS-70 – 372 c/ha and Bila Tserkva SS-57 – 373 c/ha. The other six hybrids had a lower yield of 15-20 centners per hectare. The best way is to improve the growing conditions of the hybrid Yaltushkovsky WWF-72, which increased yield from 280 c/ha in 2017 to 418 c/ha in 2018.

For two years, the Umansky World Championship-76 and Slavic World Cup-94 showed the highest sugar content – 16.2%. The lowest sugar content was in the Bila Tserkva SS-57 hybrid – 14.4%. Accordingly, during this period, the collection of sugar amounted to the Ukrainian SS-70 hybrid – 59.2 centners/hectare, Slavic World Cup-94 – 56.8, Uman's World Cup-76 – 57.1 centners/hectare.

The yield of sugar beet hybrids depends on the combination of the influence of genetic and agronomic factors. The genetic potential of the hybrids is revealed when they are grown using the elements of intensive technology, including the use of mineral fertilizers and plant protection products.

Key words: hybrids, genetic potential, intensive technology, sugar beet.

Вишневіська Л.В., Кононенко Л.М., Рогальський С.В., Кравченко В.С. Урожайність гібридів цукрового буряку в умовах Правобережного Лісостепу України

На підставі проведених досліджень рекомендується використовувати гібриди, які адаптовані для відповідних умов вирощування в Маньківському природному сільськогосподарському районі. Ці гібриди Уманський ЧЕ-76, Український-73, Слов'янський-94.

Середня врожайність кращих двох років склала: українська СС-70 – 372 ц/га і Біла Церква СС-57 – 373 ц/га. Інші шість гібридів мали нижчий урожай 15-20 ц/га. Найкращим способом є поліпшення умов вирощування гібрида Ялтушковського WWF-72, який підвищує врожайність від 280 ц/га в 2017 році до 418 ц/га у 2018 році.

За два роки Чемпіонат світу з Уманського чемпіонату-76 і Чемпіонат світу з футболу Слов'янський-94 показали найвищий вміст цукру – 16,2%. Найнижчий вміст цукру був у гібриді Білоцерківського СС-57 – 14,4%. Відповідно, протягом цього періоду збір цукру склав український гібрид СС-70 – 59,2 ц/га, Кубок світу-94 – 56,8, Уманський чемпіонат світу – 57,1 ц/га.

Урожайність гібридів цукрових буряків залежить від поєднання впливу генетичних і агрономічних факторів. Виявлено генетичний потенціал гібридів при їх вирощуванні з використанням елементів інтенсивної технології, включаючи використання мінеральних добрив і засобів захисту рослин.

Ключові слова: гібриди, генетичний потенціал, інтенсивні технології, цукрові буряки.

Вишневіская Л.В., Кононенко Л.М., Рогальский С.В., Кравченко В.С. Урожайность гибридов сахарной свеклы в условиях правобережной Лесостепи Украины

На основании проведенных исследований рекомендуется использовать гибриды, которые адаптированы для соответствующих условий выращивания в Маньковском естественном сельскохозяйственном районе. Эти гибриды – Уманский ЧЕ – 76, Украинский – 73, Славянский – 94.

Средняя урожайность лучших двух лет составила: украинская СС-70 – 372 ц/га и Беля Церковь СС-57 – 373 ц/га. Остальные шесть гибридов имели более низкий урожай 15-20 ц/га. Лучшим способом является улучшение условий выращивания гибрида Ялтушковского WWF-72, который повысил урожайность от 280 ц/га в 2017 году до 418 ц/га в 2018 году.

За два года Чемпионат мира по Уманского чемпионата-76 и чемпионат мира по футболу Славянский-94 показали высокое содержание сахара – 16,2%. Низкое содержание сахара было в гибриде Белоцерковского СС-57 – 14,4%. Соответственно, в течение этого периода сбор сахара составил украинский гибрид СС-70 – 59,2 ц/га, Кубок мира-94 – 56,8, Уманский чемпионат мира-76 – 57,1 ц/га.

Урожайность гибридов сахарной свеклы зависит от сочетания влияния генетических и агрономических факторов. Выявлен генетический потенциал гибридов при их выращивании с использованием элементов интенсивной технологии, включая использование минеральных удобрений и средств защиты растений.

Ключевые слова: гибриды, генетический потенциал, интенсивные технологии, сахарная свекла.

The current stage of the world agricultural production development is increasingly becoming of an organic and biological direction, that is when the basis of field crops mineral nutrition is various sources of organic mass, such as manure, as the most important source of organic matter in the farms with developed livestock production and by-products of field crops, green manured fallows and intermediate crops, as well as another local organics [1, p. 2]. In the crop nutrition balance of the nitrogen, obtained in the crop rotation as a result of rhizobial and associative nitrogen fixation, and the nitrogen precipitation should be taken into account. The efficient and rational use of actual soil fertility is also important.

Research methodology. In these conditions it is important to investigate the growth and productivity of various hybrids of sugar beets on organic sources of nutrition. Therefore, the growth of yield of different sugar beet hybrids was investigated in crop rotation, where all the crops are grown due to the nutrients of organic mass of by-products of forecrops, green manured fallows and afterharvesting green manuring.

Analysis of the nutrition balance in crop rotation shows that nitrogen, phosphorus and potassium in the soil layer of 0-60 cm are sufficient for the implementation of the moisture discharge, which the crops receive due to precipitation and permanent moisture reserves in the lower soil layers (0–150–200 cm).

It is also important to note that field crops are grown without the use of pesticides. A similar system with some other methods of soil cultivation is used on large areas in the Shishatskyi district of Poltava region, headed by the famous specialist in Agriculture S.S. Antonets.

Research results. Sugar beet hybrids were grown in the third field of a six-field crop rotation. The forecrop was winter wheat, which was grown in a green manure fallow. The amount of nitrogen after the green manure crop burying in the layer of soil of 0–40 cm (above ground + root mass) is 300–340 kg/ha, the amount of phosphorus is 65–80, and potassium – 180–220 kg/ha. We do not count nitrogen, left in the soil by bulb and associative bacteria. There are also other sources of nitrogen. For example wheat, in addition to crop rotation yields of 60–65 dt / ha brings with grain 140–160 kg/ha, phosphorus 56–64, potassium 90–120 kg/ha. That is, the background of sugar beet supply was quite high. It is important to note, because the majority of farms which grow sugar beet on small areas, because of the lack of funds, are not able to use high rates of mineral fertilizers. Such farms need to make wider use of optimal variants of organic and biological technologies, the is they need sugar beet hybrids, which would more fully utilize this organic background and natural potential

of Ukrainian soils and react to the use of certain elements of the modern minimalized technology of cultivating this crop.

For producers of sugar raw materials, the National Register of Plant Varieties of Ukraine offers more than 100 varieties and hybrids of sugar beet. It is necessary to choose the most productive and affordable hybrid for sowing. Hybrids that were sown in our experiment were placed on equal terms.

As a result of previous work, the following optimized version of sugar beet cultivation technology was applied at the plant growing department of Uman National University of Horticulture: the main soil cultivation consisted of wheat stubble and shredded straw breaking with the disc harrow. The first cultivation was carried out directly on the day of the forecrop harvesting, the second – after weed germination. The plowing was carried out by a plow with a skim colter at a depth of 24–26 cm. In autumn, the arable land was smoothed with a cultivator.

Table 1

Dynamics of mass accumulation of root crops by sugar beet hybrids

Hybrid	Root crop weight, g				The mass gain, g	
	July 20		August 20		2017	2018
	2017	2018	2017	2018		
Ukrainian ChS–70	238	382	316	421	78	39
Umanskyi ChS –76	242	302	350	363	60	61
Verkhniatskyi ChS –63	303	265	363	300	60	35
Lhovsko–Verkhniatskyi ChS –31	223	335	286	363	63	28
Yaltushivskyi ChS–72	209	387	266	420	57	33
Bilotserkivskyi ChS–57	237	270	352	312	115	42
Slovianskyi ChS–94	269	250	294	308	29	58
Shevchenkivskyi	209	332	355	385	146	53
HiC ₀₅	14	21	18	30		

The sowing was carried out on April 18–20 by a breeding drill-machine manufactured in Germany. Seed material was treated with insecticides and fungicides to protect sprouts from pests and diseases [4]. There were eight hybrids in the experiment, namely: Ukrainian ChS–70, Umanskyi ChS–76, Verkhniatskyi ChS–63, Lhovsko–Verkhniatskyi ChS–31, Yaltushivskyi ChS–72, Bilotserkivskyi ChS–57, Slovianskyi ChS–94, Shevchenkivskyi.

During the growing season, the determination of the mass accumulation dynamics and sugar content of root crops was made (Table 1, 2).

During this period the vegetative mass was most intensively accumulated by the root crops of such hybrids as Bilotserkivskyi ChS–78 g and Shevchenkivskyi – 99 g. The obtained data testify that the above mentioned hybrids are gaining weight in the second half of the growing season, indicating their late ripeness. The hybrid Umanskyi ChS–76 is worth noting, as it has stable weight gain of the root, regardless of cultivation in different years (Table 2).

In 2017, the sugar degree of root crops as of July 20 and August 20 was higher compared to the same period in 2018. But over the same period the sugar accumulation was more intense in 2018, which is explained by different weather conditions over the years. The hybrids Yaltushivskyi ChS–72 and Shevchenkivskyi showed the most intensive sugar accumulation two years average of 3,0–3,2 points (Table 2).

Table 2

Dynamics of sugar accumulation by sugar beet hybrids

Hybrid	Root crop sugar degree, %				The sugar degree increase, points	
	July 20		August 20		2017	2018
	2017	2018	2017	2018		
Ukrainian ChS–70	13,6	10,7	15,4	13,8	1,8	3,1
Umanskyi ChS–76	14,1	10,8	16,3	15,1	2,2	4,3
Verkhniatskyi ChS–63	14,2	10,8	15,6	14,2	1,4	3,4
Lhovsko-Verkhniatskyi ChS–31	13,8	10,5	16,0	14,7	2,2	4,2
Yaltushivskyi ChS–72	12,8	10,5	15,8	13,7	3,0	3,2
Bilotserkivskyi ChS–57	13,2	10,8	15,8	13,9	2,6	3,1
Slovianskyi ChS–94	14,1	10,6	16,7	14,3	2,6	3,7
Shevchenkivskyi	14,0	10,4	17,2	13,4	3,2	3,0
HiP ₀₅	0,3	0,2	0,4	0,3		

The yield capacity and sugar degree of the hybrid root crops depends to a large extent on their leaf diseases affection. The data of hybrids estimation according to the degree of affection by the most harmful illnesses are given in tab. 3

Average of two years, such hybrids as Bilotserkivskyi ChS–57, Slovianskyi ChS–94, Shevchenkivskyi were affected by cercosporosis on 6–8 points, the other hybrids were affected within 5 points (Table 3).

Table 3

Sugar beet hybrids affection by leaf diseases

Hybrid	Affection by diseases					
	Cercosporosis, point		Mildew, %		Viral icterus, %	
	2017	2018	2017	2018	2017	2018
Ukrainian ChS–70	6	5	25	12	10	10
Umanskyi ChS–76	6	5	30	12	11	10
Verkhniatskyi ChS–63	6	5	25	15	15	9
Lhovsko-Verkhniatskyi ChS–31	7	6	25	10	11	9
Yaltushivskyi ChS–72	7	7	25	15	12	10
Bilotserkivskyi ChS–57	9	8	30	15	11	9
Slovianskyi ChS–94	8	7	35	12	12	12
Shevchenkivskyi	8	7	30	12	12	10

Such hybrids as Umanskyi ChS–76, Bilotserkivskyi ChS–57, Slovianskyi ChS–94, Shevchenkivskyi were affected by mildew by 25–35%, the other hybrids by 12–15%. All the hybrids were affected by viral icterus almost at the same level – 10–12%.

The yield capacity of hybrids depends on many factors, both agronomic and hereditary ones. Under the equal conditions of cultivation, the genetic potential of hybrids, created by domestic breeders, prevails (Table 4).

The best average yield capacity for the two years had: Ukrainian ChS–70 – 372 dt/ha and Bilotserkivskyi ChS–57–373 dt/ha (Table 4). The other six hybrids had a yield capacity lower for 15–20 dt/ha. The hybrid Yaltushivskyi ChS–72 showed the

Table 4

Yield capacity of sugar beet hybrids

Hybrid	Yield, dt/ha			Sugar degree, %			Sugar collection, dt/ha		
	2017	2018	average	2017	2018	average	2017	2018	middle
Ukrainian ChS–70	345	399	372	16,8	15,1	16,0	58,0	60,3	59,2
Umanskyi ChS–76	312	396	354	16,9	15,5	16,2	52,7	61,5	57,1
Verkhniatskyi ChS–63	325	387	356	15,8	14,7	15,3	51,4	56,8	54,1
Lhovsko-Verkhniatskyi ChS–31	300	391	345	15,6	15,6	15,4	46,8	59,9	53,4
Yaltushivskyi ChS–72	280	418	349	16,0	14,5	15,3	44,9	60,7	52,8
Bilotserkivskyi ChS–57	348	397	372	14,3	14,4	14,4	49,9	57,2	53,6
Slovianskyi ChS–94	311	395	353	16,7	15,6	16,2	52,0	61,6	56,8
Shevchenkivskyi	339	367	353	15,9	15,5	15,7	54,0	56,9	55,5

HiP₀₅ for the yield capacity of 6.2 c/ha; for the sugar degree 0,7%.

best reaction to the growing conditions improving. It increased its yield capacity from 280 dt / ha in 2017 to 418 dt / ha in 2018.

Average of two years, Umanskyi ChS–76 and Slovianskyi ChS–94 showed the highest sugar degree of 16.2%. The hybrid Bilotserkivskyi ChS–57 had the lowest sugar degree – 14.4%. Accordingly, during this period, the collection of sugar amounted to 59.2 dt / ha by the Ukrainian ChS–70 hybrid, 56.8 dt / ha – by Slovianskyi ChS–94, and 57.1 dt / ha by Umanskyi ChS–76.

The yield capacity of sugar beet hybrids depends on the combination of the influence of genetic and agronomic factors. The genetic potential of hybrids is revealed when they are grown using the elements of intensive technology, including the use of mineral fertilizers and plant protection means [3].

Conclusion. Based on our research, we recommend to use the hybrids that are adapted to the appropriate growing conditions in Mankivka natural and agricultural area as much as possible. These are such hybrids as Umanskyi ChS–76, Ukrainian ChS–70 and Slovianskyi ChS–94.

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