alleles of susceptibility. Virulence, as usual, inherited recessively. Not a complex system of inheritance of resistance to diseases does not guarantee reliable protection of plants from pathogens. In the production of immune varieties, they quickly lose their resistance to pathogens due to an increase in the proportion of races that not controlled by specific genes of resistance. Therefore, the necessary condition for successful selection of immunity is a well-chosen and comprehensively studied source material. Introduction to the genotype of one additional resistance gene doubles decrease the number of races that can affect the plant.

The purpose of the work was to create and analyze the genetic material of soft winter wheat, obtained from the hybridization of ecologically and geographically distant forms, which combines genes of high quality economic and valuable characteristics and resistance to brown leaf rust (Lr 34) and wheat soil born mosaic virus (Sbm 1).

Selection of parents forms for the breeding process carried out with using marker analysis. Marker analysis one of the methods for identifying the genetic potential of the samples.

During the hybridization, as the mother form used domestic soft wheat varieties with genes of resistance to diseases, and for father forms high-yielding varieties of foreign selection were used.

550 samples from 55 combinations of crossings were created and analyzed in the result of the research. In the 40 received samples its around 7,3 % of the total number of materials, the complex genetic resistance to the soil mosaic virus and brown leaf rust was identified. In the 10% of the samples, the dominant gene Sbm 1 identified in genome and 11,3 % of lines has the resistance gene against the brown rust Lr 34.

In the result of hybridization of ecologically and geographically distant forms, samples with complex resistance against diseases, which will serve the source materials for the creation of new high-yielding varieties of culture, has been obtained.

***Key words**: soft winter wheat, genetic control of sign, source material, resistance, donor of gene, genetic collection.*

CPS 632.25:633.63
DOI 10.31395/2415-8240-2019-94-1-127-134

REALIZATION OF GENETIC POTENTIAL OF HYBRIDS OF BEET SACCHARINE IS IN THE CONDITIONS OF RIGHT-BANK FOREST-STEPPE OF UKRAINE

L. V. Vyshnevska, *PhD of Agricultural Sciences*
A. O. Sichkar, *PhD of Agricultural Sciences*
S. V. Rogalskyi, *PhD of Agricultural Sciences*
V. S. Kravchenko, *PhD of Agricultural Sciences*
Uman National University of Horticulture

На фоні застосування елементів інтенсивної технології вирощування буряку цукрового у сівозміні, де польові культури вирощують на основі органо-мінеральної системи живлення, показано продуктивність і якість перспективних вітчизняних гібридів буряку цукрового. Запропоновано оптимальний сортовий склад для виробництва.

На основі проведених досліджень рекомендуємо такий склад гібридів для Маньківського природно-сільськогосподарського району: Уманський ЧС–76, Український–73, Словянський ЧС–94.

***Ключові слова:** гібрид, урожайність, продуктивність, технологія вирощування, буряк цукровий.*

Analysis of recent research and publications. 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, 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 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. 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).

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
LSD_{05}	14	21	18	30		

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. 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
LSD_{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 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

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.

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. Yield capacity of sugar beet hybrids

Hybrid	Yield, dt/ha			Sugar degree, %			Sugar collection, dt/ha		
	2017	2018	aver age	2017	2018	aver age	2017	2018	mid dle
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

LSD_{05} for the yield capacity of 6.2 c/ha; for the sugar degree 0,7 %.

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 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.

Література

1. Гончарук Г. С. Якісна сівба – запорука високого врожаю. *Цукрові буряки*. 2001. №2. С. 8–9.

2. Бевз М. М. Залежність продуктивності цукрових буряків від сортових відмін. *Цукрові буряки*. 2000. №6. С. 8–9.

3. Кляченко О. Л. Продуктивність і якість сортів та гібридів цукрових буряків. *Цукрові буря*ки. 2000. №4. С. 14–5.

4. Яценко А. О., Моргун А. В., Сливченко А. М., Вишневська Л. В. Порівняльна оцінка продуктивності та стійкості до хвороб гібридів цукрових буряків різного походження. *Збірник наукових праць Уманського державного аграрного університету*. Умань. 2003. Вип. 56. С. 70–75.

References

1. Goncharuk, G.S. Qualitative sowing – a formula of high yield. *Sugar beet*, 2001, no. 2, pp. 8–9 (in Ukrainian).

2. Bevz M.M. Dependence of sugar beets productivity on varietal differences. *Sugar beet*, 2000, no. 6, pp. 8–9 (in Ukrainian).

3. Klyachenko O.L. Productivity and quality of sugar beets varieties and hybrids. *Sugar beet*, 2000, no. 4, pp. 14–15 (in Ukrainian).

4. Yatsenko A.O., Morgun A.V., A.Slyvchenko, V.Vishnevska. Comparative estimation of productivity and resistance to diseases of sugar beet hybrids of different origin. *Collection of scientific works of Uman State Agrarian University*, Uman, 2003, Issue 56, pp. 70–75 (in Ukrainian).

Аннотация

Вишневская Л.В., Сичкарь А.А., Рогальський С.В., Кравченко В.С.
Производительность гибридов сахарной свеклы в условиях Правобережной Лесостепи Украины

Современный этап развития мирового аграрного производства все более приобретает органо-биологического направлению, когда основой минерального питания полевых культур являются разные источники органической массы – гной, как важнейший источник органики в хозяйствах с развитым животноводством и нетоварная продукция полевых культур, сидераты в парах и промежуточных посевах, и другое местное органическое сырье [1, 2]. В балансе питания культур следует учитывать азот, получаемый в севообороте за счет ризобиальной и ассоциативной азотфиксации, азот осадков и, понятно, эффективно и рационально использовать актуальное плодородие почвы.

В этих условиях достаточно важно исследовать рост и производительность разных гибридов сахарной свеклы на органические источники питания. Поэтому рост и урожайность разных гибридов сахарной свеклы исследовали в севообороте, где все

культуры выращивают за счет питательных веществ органической массы нетоварной продукции предшественников, сидеральных паров и послеуборочной сидерации.

Анализ баланса питания в севообороте показывает, что азота, фосфора и калия, в слое почвы 0–60 см достаточно для реализации дебита влаги, которую культуры получают за счет осадков и постоянных запасов влаги в почве в нижних слоях почвы (0–150–200 см).

Урожайность гибридов сахарной свеклы зависит от сочетания влияния генетических и агротехнологических факторов. Генетический потенциал гибрида раскрывается тогда, когда их выращивают с использованием элементов интенсивной технологии, в том числе применение минеральных удобрений и средств защиты растений [3].

Наилучшую урожайность в среднем за два года имели гибриды Украинский ЧС–70 – 37,2 т/га и Белоцерковский ЧС–57 –37,3 т/га (табл. 4). Другие шесть гибридов имели на 1,5–2,0 т/га низшую урожайность. Лучше всего отзывается на улучшение условий выращивания гибрид Ялтушкивский ЧС–72, который увеличил урожайность из 28,0 т/га в 2017 году до 41,8 т/га в 2018 году.

В среднем за два года наивысшую сахаристость показали гибриды Уманский ЧС–76 и Славянский ЧС–94 – 16,2 %. Самую низкую сахаристость имел гибрид Белоцерковский ЧС–57 – 14,4 %. Соответственно за этот период сбор сахара составлял в гибриду Украинский ЧС–70 – 5,92 т/га, Славянского ЧС–94 – 5,68 и Уманского ЧС–76 – 5,71 т/га.

На основе проведенных исследований рекомендовано использовать гибриды, какие приспособленные к соответствующим условиям выращивания. Это гибриды Уманский ЧС–76, Украинский ЧС–73 и Славянский ЧС–94.

Ключевые слова: *гибрид, урожайность, производительность, технология выращивания, сахарная свекла.*

Annotation

Vyshnevska L.V., Sichkar A.O., Rogalskyi S.V., Kravchenko V.S.

Realization of genetic potential of hybrids of beet saccharine is in the conditions of right-bank forest-steppe of ukraine

The current stage of development of world agricultural production is increasingly acquiring the organo-biological direction, when the basis of the mineral nutrition of field crops are various sources of organic matter - pus, as the most important source of organic matter in farms with developed animal husbandry and the marketable products of field crops, green manures in pairs and intermediate crops, and other local organic raw materials [1, 2]. Nitrogen produced in crop rotation due to rhizobial and associative nitrogen fixation, precipitation nitrogen and, of course, effective and efficient use of the actual soil fertility should be taken into account in the balance of nutrition of crops.

Under these conditions, it is quite important to investigate the growth and productivity of different hybrids of sugar beet on organic food sources. Therefore, the growth and yield of different hybrids of sugar beet were investigated in crop rotation, where all cultures are grown at the expense of the nutrients of the organic mass of non-salable products of precursors, green fallow and post harvest green manure.

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

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

The best yields on average in two years were the hybrids Ukrainian ChS – 70 - 37.2 t / ha and Belotserkovsky ChS – 57 –37.3 t / ha (Table 4). The other six hybrids had a lower yield by 1.5–2.0 t / ha. The Yaltushkivsky emergency response — 72, which increased the yield from 28.0 t / ha in 2017 to 41.8 t / ha in 2018, best responds to the improvement of growing conditions.

On average, in two years, hybrids Umansky ES-76 and Slavyansky ES-94 showed the highest sugar content - 16.2%. The Belotserkovsky Emergency Situation – 57 hybrid had the lowest sugar content — 14.4%. Accordingly, during this period, the sugar harvest in the hybrid Ukrainian Emergency Situation –70 - 5.92 t / ha, Slavyansk Emergency –94 - 5.68 and Umansky Emergency Response – 76 - 5.71 t / ha.

On the basis of the research conducted, it is recommended to use hybrids that are adapted to the appropriate growing conditions. These are hybrids Umansky ES-76, Ukrainian ES-73 and Slavic ES-94.

Key words: *hybrid, crop capacity, producing capacity, technology of growing, sugar beet.*

УДК 634.836:631.542:547.56
DOI 10.31395/2415-8240-2019-94-1-134-147

ВПЛИВ СИСТЕМИ ФОРМУВАННЯ КУЩІВ НА ПОКАЗНИКИ ФЕНОЛЬНОГО КОМПЛЕКСУ ВИНОГРАДУ

О. Б. Ткаченко, *доктор технічних наук*
Одеська національна академія харчових технологій
О. І. Пашковський, *аспірант*
В. В. Тарасова, *молодший науковий співробітник*
Національний науковий центр «Інститут виноградарства і виноробства ім. В. Є. Таїрова»

У статті відображено результати досліджень впливу системи формування кущів на показники фенольного комплексу винограду сортів Ароматний та Загрей. У якості контрольованих показників розглядались наступні: технологічний запас, масова концентрація, частка полімерних форм у загальній кількості фенольних речовин, абсолютна та відносна активність оксидазної системи винограду. Встановлені системи формування, що дозволяють отримувати виноград з низьким потенціалом до окислення фенольного комплексу.

Ключові слова: *система формування, Ароматний, Загрей, якість, фенольний комплекс, оксидазна активність*

Постановка проблеми. Досягнення вчених ННЦ «ІВіВ ім. В. Є. Таїрова» (Україна) останніх десятиліть в області селекції дозволили поповнити український сортимент винограду новими технічними сортами. Однак, існуючий підхід до технології вирощування не дозволяє в повній мірі реалізовувати їх технологічний потенціал.

Таким чином, дослідження нових прийомів сортової агротехніки з