SUMMARIES

Sowing of grass development process due to extensive and transitional farming

I. Prymak, M. Voytovik

The article highlights the sowing of grass development process and seed extraction methods from a red clover. It also tells us about the profitable cultivation of this plant due to extensive and transitional farming. The attention has been paid to a precondition for the red clover sowing at the farms. The main role of the centuries-old farming practice experience and some scientist work has been shown in the sowing of grass development process.

The early ripe (south-Russian), slowly ripe (middle-Russian) and mid-ripe clovers were considered to be of different genus. The term «genus» as a notion has been changed in the development process as well as knowledge about the clover. The notion meaning about this plant had been changing in the plant identification process. At first terms: “species”, “genus”, “specific difference” – have been named according to their specific difference. The clovers of red, white, pink colour and birds-foot trefoils were considered to be of different genus. Lately the red clover difference has been determined by the term «species» (and again, at the beginning as a genus – Russian clover and than as species – south-Russian and middle-Russian clover). Then the term «species» became more specific. The local clover species of certain areas have been named according to their features: early ripe or slowly ripe. For example: Perm, Yaroslavl, Central-Russia, Chernigiv, Kyiv etc. The term «species» became commonly accepted for all plants of that genus only in the last part of the XX century. A certain clover kind with certain useful agricultural features has been named “clover species”.

Before the foreign clover seeds, timothy and others were delivered to Russia the sowing of grass had been existed at the husbandries. As a rule, local seeds, seeds taken from wild growing herbs or cultivated grass at the nearby husbandries were used for the sowing of grass.

The fodder famine and an opportunity to get a high profit from selling seeds and hay became the main reason to improve the clover sowing for the agronomists that had good experimental results and experience in the sowing of grass. But that experience was accepted differently in the farming. The peasants sowing of grass formed at the beginning of the last quarter of the XVIII century.

The peasants sowing of grass on the meadows, farmsteads, waste plots of land, forest plots, lawns and areas out of the plots helped to save the old local species. The sowed seeds taken from import often died under the bad winter conditions in the central, south-western, south-eastern Russia areas. In the 80s of the XIX century the native landowners already knew about the local clover advantages and they were against the American import that was coming at that time to the Europe market.

Key words: development process, meadow clover, farming, husbandries, seed, income, profit, production experience.

Some features of stem length generation of winter wheat breeding numbers depending on their genotypes and growth environment

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The features of stem length generation of breeding numbers of winter wheat *T. aestivum of L.* of different origin as contrasted to hydrothermal indices in the years of research are presented. Semidwarf breeding numbers 17 CS, 26 CS and medium-grown standard variety Pearl of forest-steppe had a resistance to lodging at the level of 9 marks. It is found the effect of internodes of different location order on forming of wheat stem length. It is investigated the correlation of length of internodes according to their location. Certain coefficients of stem length and internodes variations are determined.

Wheat – one of the main food grain crops in Ukraine. Researches of the leading scientific establishments give evidence that the important factor of growth and stabilizing of crop productivity is creation and introduction of varieties with high potential of productivity and adaptation to the unfavorable patterns of environment. In the conditions of intensive production only plant varieties patient to lodging are able to use effectively the raised dosage of mineral fertilizers.

Wheat stem, or straw, is an organ discharging important physiological functions of photosynthesis and transporting metabolites in ontogenesis. The morphology and anatomy features of stem determine lodging resistance of plants and their ability to realize productive potential.

Nodes and internodes of wheat are formed on I and II stages of organgenesis yet to the beginning of stem growth, which is accepted to determine from the moment of lengthening of the first surface internode, i.e. phases of output in a tube (IV stage of organogenesis), when it is appeared the first stem node at the distance of 2-5 cm from the soil surface on the main sprout. This phase comes in 25-35 days after spring vegetation stimulation and lasts for 25-30 days. Growth of wheat stem shows up mainly the considerable lengthening of internodes and to a lesser extent their thickening. Length of straw, growth of which lasts to the beginning of beetle forming (IX stage of organgenesis), is controlled genetically and at the same time considerably depends on environment patterns.

The purpose of research was a comparative evaluation of semidwarf and medium-grown breeding numbers of soft winter wheat, obtained at Bila Tserkva experimentally-plant-breeding station in 2011-2013 by crossing of varieties belonging to different ecological groups, according to the length of main stem and internodes, and also determination of plant reaction limit of changing growth environment.

In 2011 semidwarf breeding numbers had a length of stem within the limits of 57,2-75,2 cm. It was examined that only numbers 26 CS and 17 CS had the highest index of lodging resistance– 9,0 marks.

In the group of medium-grown genotypes the index of lodging resistance varied from 5,0 marks (7 CS) to 8,6 marks (8 CS), with stem length – 85,6-98,1 cm. Due to internodes of different order of location stem length generation differed from semidwarf breeding numbers.

The analysis of stem length in 2012 testifies that medium-grown breeding numbers had, on the average, an index at the level of 2011 year. Stem length of semidwarfs, on the average, was on 5,2 cm greater. Under stem length criterion plant-

breeding numbers 17 CS and 22 CS exceeded an index of 2011 year on 13,1 and 9,4 cm accordingly. Plant-breeding numbers and standard varieties had lodging resistance with about 9,0 marks.

In 2013 stem length of semidwarf breeding numbers was formed in the most unfavorable conditions and was within limits of 49,4-56,0 cm, that was considerably below indices of the previous years. The stem length of medium-grown genotypes was 51,1-73,8 cm and according to these figures they belonged to semidwarf numbers.

Plant-breeding numbers 26 CS, 17 CS and medium-grown standard variety Pearl of forest-steppe had resistance to lodging at the level of 9,0 marks during the years of research and we recommended them to be used as parent material for creating varieties of universal type.

Key words: winter wheat, plant-breeding numbers, hydrothermal coefficient, stem length, internode.

Germination of spring wheat seeds depending on the depth of seeding

S. Kalenskaya, L. Karpenko

The results of studies are presented to determine the effect of depth of seeding of spring wheat varieties Rannya 93 and Mironivchanka, its germination on typical black soil of forest-steppe of Right-Bank of Ukraine. Field studies were carried out during 1997-1999 and secondly - in 2013-2014 at the scientific laboratory of crop rotation science department SS "Agronomic Research Station" NULES of Ukraine on typical low humus black soil.

In the scientific literature, devoted to the study of spring wheat, it is so often emphasized that spring wheat seeds have low germination that this statement became an axiom in textbooks and consciousness of specialists. We are of the opinion, this statement appeared on the basis of studies carried out in less favorable soil and climatic conditions of Ukraine, and those that are carried out in Ukraine, these are studies of 40-50 years, when farming standards in Ukraine were pretty low. Our study does not confirm this view and suggests that the germination of seeds of modern varieties of spring wheat in the conditions of typical black soil humus of forest-steppe of Ukraine can be quite high, but it depends on a number of agrotechnical activities. One of such agronomy measures, determining seed germination, is the depth of its embedding.

Research carried out by us in 1997-1999 showed that the depth of seeding significantly affect the germination of seeds. With increasing depth of seeding deeper than 6 cm field germination of seeds of the studied spring wheat varieties decreased and was as follows: Rannya 93 – 83,4 % at a depth of 8 cm sowing and 77,3 % at a depth of 10 cm sowing; cultivar Mironivchanka – 81,6 % and 74,6 %, respectively. Optimal seeding depth of spring wheat on typical black soil humus depth was 4 cm. On this account, the experience of Rannya 93 variety descended 88,7 % of the seeds, in Mironivchanka – 87,6 %. Seeds of spring wheat in the form of experience with shallow planting at 0,5-2,0 cm due to the rapid loss of seed with soil moisture also had lower germination 82,9-86,8 % of Rannya 93 and 82,9-86,9 % of Mironivchanka. Therewith, we found that sowing depth deeping to 8-10 cm retards time of phenological phases on delay germination amount, i.e. 2-4 days.

In the variety Mironivchanka with deep embedding field germination of seeds is reduced in larger sizes than Rannya 93. Obviously, this is due to the smaller mass of 1000 seeds in Mironivchanka. We have also found a close inverse correlation relationship between the depth of planting and field germination of spring wheat seeds of Rannya 93 variety, it was r = - 0,651, and of Mironivchanka r = - 0,798.

It is worth noting that when it is embedded the surface of seeds, which can be used with broadcast seeding method, germination is reduced in size, that should be taken into account to determine the optimum seeding rate. The amount of reduced field germination of seeds obtained in our experiments with surface seeding cannot be transferred to the working environment, as it is obviously underestimated. Indeed, in the model experiment, each seed was carefully wrapped with a layer of soil, while using broadcast seeding the part of seed remains on the soil surface and has a significantly lower germination.

The change of seeding depth from 2 to 4 cm virtually does not affect density of seedlings. Deeper seeding depth, which may be necessary in cases where the seed layer of soil is dry, requires an increase in seeding rate due to lower field germination. By increasing the depth of planting more than 4 cm shoots appear late in accordance with largest increase in sowing depth deeping, approximately 1 day for every centimeter increase the depth of seeding.

Key words: spring wheat, seeds, germination, depth of seeding.

Changing of available moisture reserves and winter wheat productivity depending on tillage and fertilization

V. Karpenko, O. Panchenko

Proper use of tillage and fertilization systems as well as their proper interaction plays an important role in increasing crop productivity. Indeed, because of global warming, reduction of rainfalls, traditional systems of primary tillage do not always work well. Therefore, the development and research of new primary tillage systems and their combination with the fertilization is important.

An important element in effective soil fertility is the water regime. Water is a part of the body of plants involved in the synthesis of organic compounds, supports turgor in cells, prevents overheating of plants. It affects the growth of roots, as an external factor that increases or decreases the mechanical resistance of the soil.

The main source of providing plants with the available moisture is precipitation and irrigation. During the growing season of crops, division of rainfalls is especially important. At the beginning of the spring growing season, stocks of productive moisture in the plow as well as in meter layer of soil makes up 70-80 % of marginal field moisture containment.

Research and production practice indicates that in the conditions of forested steppes of Ukraine there is sufficient rainfall, and with their efficient use high yields of crops can be harvested. However, large amount of productive moisture is lost from the soil due to several reasons: because of runoff of snowmelt and rainwater, physical evaporation – in spring and summer.

The value of water properties of soil for its fertility never was doubted. One of the reasons for this - the increasing manifestation of global warming, reduce of rainfall, a sharp reduction of organic, mineral and bacterial fertilizers, meliorants, simplifying of technologies, violation of terms and quality in performing agricultural activities as well as violations in scientifically grounded crop rotations, use of heavy agricultural machinery and so on.

The second reason - keeping water properties in a favorable range of values is a necessary condition to obtain the planned impact from fertilizers and meliorants which current price is very high.

Both of these reasons necessitate continuous maintenance of optimal soil conditions of soil for plants. This is especially true for black soil where the intensification of agriculture is at the highest level.

The issue of tillage and fertilization for crops, including for winter wheat, for the current period is not studied well. Indeed, in one case, the weediness of crops is increased, in the second one – agrophysical properties of soil fertility are worsening, in the third – yields are reduced. This depends on many factors that must be considered – weather conditions, predecessors and pre-predecessors in the rotation and biological features of crops, soils, fertilizers, soil pollution with weed seeds and others.

The aim of the research - to study and experimentally find out the most effective interaction of mechanical soil tillage and fertilization for the change of:

a) the contents of available moisture in the meter layer of soil;

b) productivity of winter wheat.

Our research has noted that the system of tillage and fertilization had a noticeable impact on the stocks of productive moisture.

Thus, replacement of long-lasting plow cultivation with surface cultivation led to a significant depletion of available moisture in 0-30 cm soil layer while planting of winter wheat in unfertilized areas up to 3,3mm and in fertilized areas up to 2,6-2,8 mm; in 0-100 cm meter soil layer respectively to 5.1 and 5.2 mm, and under NIR05 to 1,14-1,58 mm. In the combined long and shallow cultivation system, substantial depletion of productive moisture in this period was not observed. At the time of harvesting of winter wheat, stocks of available moisture in 0-30 cm and 0-100 cm soil layer were smaller under surface plow. Fertilization for all cultivation systems helped increase the stocks of productive moisture in the planting of winter wheat.

Productivity of the field with the winter wheat was the largest when the plow cultivation and combined cultivation systems were used.

When the surface cultivation was used, a significant reduction in grain yield of winter wheat was observed (0,37-0,58 t / ha, NIR05 0.36 t / ha). In the version with long-lasting shallow cultivation, significant reduction in yield of winter wheat was not observed. With the increasing levels of fertilization, was observed a significant increase in grain yield of winter wheat (2.2-2.4 t / ha, NIR05 0.39 t / ha) under all variants of tillage, grain-straw ratio also increased from 1,24 to 1,27, dry matter yield also significantly increased (4,35-4,39 t / ha, NIR05 0.64 t / ha), fodder units (3,37-3,79 t / ha, NIR05 0.54 t / ha) and digestible protein (0.180-196 t / ha, NIR05 0.02 t / ha).

It is found out that that the highest performance of winter wheat field was reached when the combined tillage systems were used. A significant decrease of performance was observed under surface tillage. With increasing levels of fertilization the productivity of winter wheat significantly increased for all tillage systems.

Key words: winter wheat, productive moisture, fertility, structure, performance, productivity, system of tillage, fertilization.

The sorts influence on winter wheat productivity under right-bank Forest-Steppe conditions of Ukraine

V. Hahula

The paper highlights the study results concerning winter wheat influence on its yield formation under right-bank Forest-Steppe conditions of Ukraine depending on predecessors. Also, it has been found that the yield varies depending on soil tillage and fertilization systems.

The main role in solving the national food security problem plays grain farming development in which priority belongs to the winter wheat production, which is the most important crop in the plant growing, which occupies 40 % of the grain acreage and forms 45-50 % of gross grain yield in Ukraine.

The best varieties potential yields level of winter wheat is not yet fully implemented. Thus, Ukrainian farmers main task in the nearest years is to increase productivity and to ensure the winter wheat grain production stability.

To increase winter wheat yield and to grain production under climate change mitigation and energy savings requirements, search for ways to improve high-quality technology and its use tactics are required.

The research aimed at determining winter wheat sort influence on grain yield formation under right-bank Forest-Steppe conditions of Ukraine depending on predecessors, tillage methods and fertilization.

The studies were conducted during the 2011-2014 at the Bila Tserkva National Agrarian University experimental field, located in the right bank steppes area of Ukraine.

We studied three winter wheat varieties: Podolyanka, Yasochka and Bat`ko in five rotations and their impact on the yield, depending on the predecessors, tillage methods and fertilization

To increase winter wheat yield and to increase grain production under climate change mitigation and energy savings requirements, we conducted search for defining ways to improve high-quality technology and its use tactics.

The greater high-quality stock variety is, is the greater is the possibility of the yield increase due to optimizing the sorts placement in soil-climatic and agro-technical niches that meet them.

The results showed that Podolyanka, Yasochka and Father winter wheat varieties yield changed significantly in the research due to weather conditions during the growing season, and the predecessors influence (peas, soybeans, winter wheat), cultivation methods (differential) and fertilization system.

The leading direct action factor influencing the studied varieties yield are fertilizers methods.

Key words: winter wheat, sort, yield, predecessors, tillage methods, fertilizer system.

Economic and energy efficiency of pea, winter wheat and sugar beet growing under various primary tillage

V. Kryzhanivskiy

Modern agriculture Ukraine is at the stage from intensive costly to more efficient and less energy-intensive crops growing technologies based on the principles of all the processes minimization. An important measure to minimize primary tillage in addition to reducing its depth nowadays is the plowing replacement with less energy, labor and fuel-cost cultivation.

The highest rate of peas energy efficiency (1.50) was under the cultivation for sugar beet in the plowing and the lowest one (1.38) – without primary tillage. For winter wheat the highest rate (3.50) was under cultivation and the lowest (3, 16) – under plowing and without basic cultivation. For sugar beet the highest rate of efficiency (5.22) under plowing and the lowest one (5.07) – under cultivation.

Soil tillage is one of the basic technology elements of peas, winter wheat and sugar beet growing. It is only efficient when well-chosen depending on soil and climatic conditions, meets the needs of cultivated crops and misaligned in scientifically grounded crop rotation. Tools and machines used for the relevant technological operations also play an important role in the process. Thus, the rational choice of the main cultivation is an important foundation for obtaining high and sustainable yields.

Under modern resource shortages Ukraine with its rich and fertile soil, continental and temperate humid climate, flat terrain and a high tillage percentage can take pride of place in the list of countries with stable agriculture. Positivity of this point is also reinforced with the geopolitical situation of Ukraine. It is located in Europe, adjacent to the economically developed countries, which are potential investors. Association with the EU makes it even more attractive in this regard. However, for those who want to invest money into the Ukrainian agricultural enterprises development, these positive characteristics are not enough.

Investors initially wish to receive an economic analysis of the case including the calculation of key indicators such as the size of variable and fixed costs, profit margins and business profits. Of course, all these calculations should be done with current agricultural prices and their volatility is currently quite fast.

It is also advisable to analyze risks in the event of price extreme changes. In addition to significant savings in of seed crops growing cost, low or even zero agriculture practice, this situation contributes to the positive factors of influence on agricultural soils. Mechanized tillage reduction or complete removal from agricultural technologies helps provides soil protection it from erosion and fertility potential saving use.

However, these technologies reduce significantly the effectiveness of mechanical tillage in performing one of its important functions – pesticides free crops protection from pests. In this regard, these agricultural technologies in modern agriculture are characterized with excessive pesticides loading. To improve the land productivity, many farmers use fertilizers that only aggrevade the soil environment. Crops efficient protecting from pests and pesticides wide use causes problems in agricultural landscapes.

Using an alternative system of mechanical tillage to control the pests that would differ in fuel consumption and were economically and environmentally reasonable use of natural fertilizers subsidiary can contribute to solving this problem. That is why non-tillage and tillage basic cultivation is recommended in terms of careful land use system in crop rotation, featuring the best efficiency in controlling weeds control. The essence of the careful use is in the sequential change during rotation of soil tillage with plow under sugar beet every 4-5 years using measures od non-tillage cultivation – disking and flat loosening between the plowings. Thus, due to agropolitical situation in Ukraine, the importance of determining the cost-effectiveness of different measures of soil cultivation in growing peas, winter wheat and sugar beet is significant.

Key words: peas, winter wheat, sugar beets, cultivation, basic tillage.

Soil biological activity change under tare-oat mixtures by different systems of soil tillage and levels of fertilization

A. Pavlichenko, O. Bondarenko, S. Vachniy

The soil biological activity depends on many factors. These include the weather conditions, technology, agriculture, and the kinds of crops. The successful conduct of ecological agriculture requires the high biological activity of the soil. Only organic substances that fall into the soil as a result of manure application and cultivation of forage leguminous and intermediates crops can actually be used. Soil microbial activity is affected by various factors. These include the organic matter content, acid index, soil physical properties, and course of the growing season. In many of these factors (except natural conditions) can be influenced by farming activities carrying out.

The use of growing crops flawed technologies degrades the soil biological activity. In literary sources the estimation of different influence of agricultural technologies on the activity of soil microorganisms is contradictory.

The research was conducted in a stationary field experiment during the 2009-2014 on experimental field of Bila Tserkva National Agrarian University in 5-fields fetus change rotation, expanded in space and time with 40 % saturation of cereals. We studied four basic tillage system and four levels of fertilizer.

In researches we spent the assessment of soil biological activity by the intensity of decomposition linen fabric in soil and the number of dedicated carbon dioxide. Biological activity is slightly higher under tare-oat mixtures than in other cultivated plants of crop rotation due to the fact that under fodder beet cultivation was carried out deep and were introduced the significant rules of organic fertilizers. Thus, for the period from 1st of May to 30th of May and from 1st of June to 30th of June, the weight of linen fabric reducing in the plow layer of black soil was respectively: by the systematic rack cultivation – 16.3 and 27.7 %, systematic without rack 19.5 and 30.2, combined – 15.5 and 25.6 and long shallow – 15.5 and 25.4 %. The difference in the amount of carbon dioxide that released during the first (from 1.05 to 30.05) and second (from 1.06 to 30.06) terms of definitions made per day, respectively, for the systematic rack cultivation – 351.5 and 367.5; combined – 111.6 and 217.2, long shallow 164.6 and in favor of plowing 306.0 mg/m2 per day.

The increase in fertilizer level is causes the discharge intensity of carbon dioxide increased from the arable layer soil. Thus, the introduction of a single level of fertilizer per 1 ha of arable of crop rotation the selection of carbon dioxide has increased by 6.85 %, double level – 12.87 % and triple level – by 18.47 % as compared with non-fertilized variants. Somewhat higher biological activity of the soil in the rotation is observed by without rack system than the combined and long shallow systems.

This figure was the lowest by the systematic rack cultivation. Our data are reflecting with the findings of scientists that in the lower layers, even at very high soil structuring the biological processes take place at a relatively in the low level. These layers of soil are less active by the surface cultivation, which means more slowly conversion of organic matter and the formation available nutrients for plants. Maximum biological activity of soil was observed in the 0-10 cm layer, which earned

the fertilizers and stubble, and the 10-20 and 20-30 cm layers the biological activity is decreased. For the combined and long shallow cultivation is observed a similar tendency. The highest biological activity of 0-10 cm soil layer is fixed by the without rack systematic cultivation with the double level of fertilization introduction.

In plant products manufacturing epy soil fertility increasing depends not only on organic and mineral components introduction and quality of tillage, but also on the compliance with the rules of predecessors selection and correct conduct of crop rotation. Maximum soil biological activity was observed in the 0-10 cm layer, which earned the fertilizers and stubble, and in the 10-20 and 20-30 cm layers biological activity is decreased.

Key words: soil biological activity, tare-oat mixtures, tillage system, level of fertilization.

Formation of the main ear length by means of the first filial hybrids of soft winter wheat cultivars

O. Bakumenko

The aim of research is to study the inheritance of the main ear length of soft winter wheat by hybrids of the first filial obtained by crossing cultivars that are carriers of wheat-rye translocations.

The research on F_1 was carried out in 2013-2014 on experimental field of Sumy National Agrarian University, part of the north-eastern Forest Steppe of Ukraine. The climate of the area is continental. The average day and night (average annual) temperature in the growing 2013/2014 year was 9,5 ºC that is 2,1 ºC higher the long-term rate (7,4 ºC). The absolute maximum of the temperature (34 ºC above zero) marked during the second decade of August, the minimum of temperature (26 ºC below zero) during the third decade of January. The amount of rainfall was 552,6 mm, that is 40,4 mm less of many years norm (593mm).

30 hybrid combinations, created as a result of complete circuit diallel crossing scheme (6x6) of soft winter wheat have been taken as the material for research. The wheat cultivars of different genetic origin (Myronivs’ka rann’ostygla, Epoha odes’ka, Rozkishna) and cultivars – carriers of wheat-rye translocation (1AL/1RS – Smuglyanka, 1BL/1RS – Kryzhynka and Remeslivna) have been used as crossing components. Hybrid seeds were sown by hand, in a 3-fold repetition according to the scheme: the maternal parent, hybrid, staminate parent. Phenological observations were carried out during the vegetation, at their complete ripeness – structural analysis of sheaves. Based on the data of obtained results the heterosis level and phenotypic dominance degree were determined in the first generation hybrids.

A significant differentiation between first-generation hybrid according to the length of main ear was determined during the analysis. The manifestation of true heterosis (0,30-16,30 %) and overdominance were observed in 17 % of hybrid combinations. In most cases, heterosis in accordance with the main ear length occurred in 3 combinations (K.27 – Smuglyanka / Remeslivna and reciprocal – K.11 and K.26 – Kryzhynka / Smuglyanka), with two translocations. The combination K.15 (Kryzhynka / Rozkishna) where one of the parent forms is a sort-carrier of 1BL/1RS translocation showed heterosis effect. The combination K.5 (Myronivs'ka rann'ostygla / Rozkishna) where parents do not contain genotype translocations had the highest heterosis effect (16,30 %). However, negative heterosis (-15,97 %) was observed in inverse combination (K.18)

According to the length of the main ear with a negative heterosis effect (from -0,65 to -23,39 %) of the studied combinations 83 % were shown up, 5 of them were without translocations (K.4, K.9, K.10, K.24, K.25), 11 were where one of the parent forms contains 1BL/1RS translocation. The negative heterosis effect was observed in reciprocal combinations where both parent forms were carriers of 1BL/1RS translocation (K.12 – Kryzhynka / Remeslivna and K.16 – Remeslivna / Kryzhynka). 6 combinations with one of the parent forms containing 1AL/1RS translocation and combination K.17 (Remeslivna / Smuglyanka) with two translocations were characterized with the same effects. The lowest rate was in K.25 (Rozkishna / Epoha odes'ka), where the parent forms do not contain translocations in their henotype. Also, this index was negative (-8,22) in inverse combinations (K.10).

Studying the nature of phenotypic inheritance of the main ear length it was found out that from 30 hybrid combinations overdominance appeared in 5 (17 %), partial positive dominance in 3 (10 %), intermediate inheritance in 10 (33 %), partial negative inheritance in 10 (33 %), depression in 2 (7 %).

It should be mentioned that the indices of phenotypic overdominance as a high true heterosis were observed mainly in combinations formed with wheat-rye translocations (K.15, K.27, K.11 and reciprocal K.26). These inverses combinations (except K.11 and K.26) to the above mentioned group with overdominance had a disposition of nearby class inheritance – partial positive dominance (K.17 – Remeslivna / Smuglyanka) and intermediate inheritance (K.22 – Rozkishna / Kryzhynka). It should be noted that depression showed reciprocal combinations (K.3 and K.18 – Myronivs'ka rann'ostygla / Remeslivna) according to the index of the main ear length where one of the parent forms is carrier of 1BL/1RS translocation.

Manifestation of true heterosis and overdominance according to the length of the main ear is observed in most combinations in which parent forms contain 1BL/1RS or 1AL / 1RS translocation in their genotype. According to the results of analysis the best hybrid combinations as for «the length of the main ear»: with the 1BL/1RS – Kryzhynka / Rozkishna; with both of translocations – Smuglyanka / Remeslivna and reciprocal combination Kryzhynka / Smuglyanka; without translocations – Myronivs'ka rann'ostygla / Rozkishna. The combination of the parent forms, which are carriers of wheat-rye translocation effects positively on the formation of the main ear length and foreknows successful work as for creation of new patterns that become carriers of wheat-rye translocations. Hybrids can form dense ear, which will give possibility to get highly productive plants despite the low expression of overdominance as for the studied traits

Key words: winter wheat, hybrid combinations**,** wheat-rye translocations, main ear length, inheritance, heterosis.

Wheat varieties and first generation hybrids resistance to septoriosis under the conditions of North-East Forest Steppe regions of Ukraine

O. Osmachko

The research aim: studying genetic diversity of soft winter wheat varieties collection and their hybrids concerning their resistance under the conditions of natural infectious background in the north-east forest and steppe regions of Ukraine; formation of genotypes work collection for obtaining new selection material.

125 sorts of winter wheat varieties were used as the research material, which are listed in the National register of crop varieties, suitable for distribution in Ukraine in 2012 and 28 first generation hybrids.

The researches were conducted during 2012-2014 on the research field of Sumy National Agrarian University. The field is located in Sumy region in the north-eastern part of forest-steppe. Buckwheat was a precrop.

The research setting in the collection seedbed was conducted on the plots with the area of 1 м2 by hand SR-1 seeder, 3 times repeating, arranged in systemic way. The varieties – carriers of wheat-rye translocations – were used in the hybridization : 1AL/1RS – Zolotokosa, Vesnianka; 1 BL/1RS – Kryzhynka and Remeslivna. Hybridization was carried out by the scheme of reciprocal crossing according to the generally accepted methods. F1 sowing was made by hand in the hybrid seedbed together with parental forms according to the scheme: ♀ – F1 – F1 (reciprocal combination) – ♂. Phenological observation, accounting and assessment, testing the varieties collection and hybrids resistance to septoriosis were conducted on the natural infectious background.

Crops features phenotype predominance degree index in the first generation hybrids was determined with the formula of B. Griffing; the data grouping was made according to the classification of G. Beil, R. Atkins. Mathematical data processing was conducted with the computer software Microsoft Excel 2003.

In 2013-2014 testing soft winter wheat samples collection resistance for septoriosis resistance was conducted. The research varieties were divided into four groups: 8,8 % – highly sensitive, 4, % – sensitive, 33,6 % – slightly sensitive, 16,8 % – stable. Three varieties were singled out with 7 points resistance – Smuglianka, Myronivska Zolotoverkha and Oberih Myronivshchyny and 18 varieties with the resistance of 6 points – Vesnianka, Zolotokosa, Zymoiarka, Demetra, Kalynova, Kolos Myronivshchyny, Remeslivna, Kuialnyk, Syrena Odeska, Myronivska 67, Ukrainka Odes'ka, Turunchuk, Kryzhynka, Stolychna, Elehiia, Akter, Lars.

These sorts are of great value for the practical selection regarding their resistance to septoriosis agent. According to the results of hybridology analysis, 3,6 % of hybrid combinations with high resistance (8,5 points) were revealed. 46,4 % of hybrids had 7-6 points resistance to septoriosis agent. 35,7 % of hybrids were slightly sensitive. 14,3 % of combinations were sensitive. On the basis of phenotype predominance degree index it was revealed that among hybrid combinations 32,1 % showed overdominance, 14,3 % – partial positive dominance, 14,3 % – intermediate feature inheritance, 21,4 % – partial negative dominance, 17,9 % – depression.

Hybrid combinations with overdominance (hp = 1,2-18) reciprocal – Zolotokosa / Ovidii, Vesnianka / Kalynova and direct – Zolotokosa / Astet, Zolotokosa / Kuialnyk, Zolotokosa / Kosoch, Kryzhynka / Remeslivna and inverse – Podolianka / Zolotokosa are of the greatest value in the selection of soft winter wheat resistance to septoriosis. In five combinations of nine maternal forms have 1AL / 1RS translocation, and three combinations of parental forms and one combination with both parental and maternal forms have 1BL / 1RS translocation. Hybrid resistance in this group was higher according to the indices of parental forms. The dominance of parental form (hp = 0,8-1) was found out in four reciprocal combinations : Doskonala / Zolotokosa, Tsarivna / Zolotokosa, Astet / Zolotokosa, Vesnianka / Poliska 9. In three combinations a parental form brings 1AL/1RS translocation (Zolotokosa variety) and one combination has a maternal form (Vesnianka variety). Direct combinations – Zolotokosa / Tsarivna, Kryzhynka / Rozkishna and inverse combinations – Vilshana / Zolotokosa, Antonivka / Zolotokosa were characterized by intermediate inheritance (hp = from -0,5 to 0,3). There was one combination, whose maternal form had 1AL/1RS translocation, and one – 1BL/1RS translocation, and two combinations where parental form had 1AL/1RS translocation. Partial negative inheritance (hp = from -1 to -0,6) is typicalic for hybrid combinations – Zolotokosa / Doskonala, Zolotokosa / Vilshana, Zolotokosa / Antonivka, Kosoch / Zolotokosa, Poliska 90 / Vesnianka, Remeslivna / Kryzhynka. In three combinations maternal forms have1AL/1RS translocation, and in two combinations parental forms and in one combination both parental and maternal forms have 1BL/1RS translocation. «Depression» type of inheritance (hp = from -1,2 to -9) was found out in hybrids like Kuialnyk / Zolotokosa, Zolotokosa / Podolianka, Vesnianka / Vasylyna, Vasylyna / Vesnianka and Rozkishna / Kryzhynka.

Among the five combinations two in maternal forms have 1AL/1RS translocation and two in parental forms and one in parental form have 1BL/1RS translocation. The hybrid resistance in this group was lower by the parental forms indices. Heterosis was observed in nine hybrid combinations; it was 32,1 % of the samples researched. Negative effect of heterosis was in 17 combinations (60,7 %). The highest effect of heterosis – 31,5 % – was found out in the Kalynova / Vesnianka. combination

Key words: winter wheat, resistance, variety, resistance genes, septoriose.

Dyesilyet herbicides, Biolan plant growth regulator and Ryzobofit microbiological specimen influence on soil microflora and soybean symbiotic apparatus

O. Holodryha, L. Rozborska, I. Leontyuk, O. Zabolotnyi

The conducted research proved that the studied preparations affected the activity of soil microorganisms and symbiotic activity of soybeans differently. The total number of microorganisms depended on the norms of Dyesilyetand its compatible combination with Biolan and Ryzobofit.

Thus, the total number of bacteria in 10 days was within 112 % under using Biolan (20 ml/ha) and under using Ryzobofit (100 g/t) it was 114 %. Applying Dyesilyet helped to increase the total number of bacteria up to 120 %. The complex usage of Dyesilyet and Biolan increased the total number of bacteria significantly that was 130 and 136 % according to the application norms. Using Dyesilyet with Ryzobofit had the highest rates in the experiment. Here we observed the highest number of bacteria that was 138 and 144 % according to the norms of the preparations use. The number of micromycetes on the 10th day after applying of the preparations while processing by Biolan and Ryzobofit increased to 142 and 150 % respectively. Dyesilyet application ensured micromycetes growth in the number to 134-137 %. The complex use of Dyesilyet and Biolan provided micromycetes increase to 159 %, and with Ryzobofit – to 166 % compared with the control. Thus, the combined use of Biolan with Dyesilyet as well as Ryzobofit ensures the increase of bacteria and micromycetes that improves mineralization of organic residues and provides soybean plants with nutrients.

We also investigated the effects of preparations on the activity of some physiological groups of microorganisms. We found that the most sensitive to the herbicide were nitrate bacteria of I and II phase of nitrification. Application of Biolan and Ryzobofit positively impact the development of physiological groups of microorganisms. Thus, in 10 days of herbicide application they reduced in number significantly as compared to the control, especially at herbicide effect representing 91-95 % of nitrate bacteria of I phase and 92-94 % of nitrate bacteria of II phase. When using Dyesilyet with Biolan the number of nitrate bacteria of I phase increased slightly, representing 98-101 % of the control and the number of nitrate bacteria of II phase was 92-94 % of the control. The complex use of Dyesilyet with Ryzobofit boosted the number of nitrate bacteria of I phase up to 101-103 % and reduced nitrate bacteria of II phase to 86-88 %.

Ammonifiers number in the experiment depended on the norm of the herbicide and its combination with Biolan and Ryzobofit. Under applying Dyesilyet the number of ammonifiers was within 108-111 %. At combined using with Biolan the number grew to 119 and 115 % respectively. The complex application of Dyesilyet with Ryzobofit provided ammonifiers growth within 120-122 % .

Cellulose destructive bacteria were insensitive to Dyesilyet playing an important role in soil fertility. The number of cellulose destructive bacteria was slightly higher than in the control and almost did not depend on Dyesilyet norm. However, most of them are observed using Dyesilyet normally 0.6 l/ha together with Ryzobofit 100 g/t, representing 121 % of the control.

The studied preparations Dyesilet, Ryzobofit and Biolan affect positively the symbiotic activity of soybean crops and development of bacteria, micromycetes and other physiological groups of microorganisms of rhizosphere on both the 10^{th} and the 25^{th} days. Application of Dyesilyet inhibits slightly the development of individual physiological groups of microorganisms, compared with options where Ryzobofit and Biolan were used. But their number is fully restored after 25^{th} day.

Key words: soybean, herbicide, Dyesilyet, regulator growth, Biolan plant, Ryzobofit, soil microflora, symbiosis, tubercle bacteria.

Effect of microbial preparations on the potato crop structure in the Carpathian region

V. Boroday, T. Danilkova, N. Voytseshina, V. Koltunov

The tough sanitary requirements are applied towards the growing of potatoes for food purposes. The intensive farming systems based on chemicals have led to a significant land degradation, violation of the ecological balance of agro-ecosystems, deterioration in the quality of agricultural products, radionuclide and heavy metals – carcinogens, pesticides, various chemical minerals contamination. The accumulation of xenobiotics by plants from the soil determines the extent of the initial inclusion in the food chain in the system: soil – agricultural crops – people. In recent years, the development of methods of environmental protection has studied as an alternative way to chemical methods of protection, affecting the ecology of the agrophytocenoses.

Multi-method study of the efficacy of the composition of biological preparations based on bacteria strains *Pseudomonas fluorescence* AR-33, *Agrobacterium radiobacter* 204, *Enterobacter nimipressuralis* 32-3 were not carried out or were studied fragmentarily in growing potatoes, as well as their effectiveness in the application at all stages (treatment of tubers in spring, during the growing season, before the storage) in Ukraine.

The studying of conditions under which the cultivation and processing techniques have a minimum number of non-standard forms, diseased tubers was the purpose of investigation. The aim of research was to study the influence of abiotic factors, timing of planting, processing of chemical and biological agents on yield and its structure in Lviv region. The study was conducted during 2009-2012. Planryz was studied as biological preparation – *Pseudomonas fluorescence* strain AR-33, 2.0 l/ha, Diazophit (active ingredient – bacteria *Agrobacterium radiobacter*, 0,2 l/ha), Phosphoroenteryn – biological preparation based on phosphorus bacteria *Enterobacter nimipressuralis* 32-3, 0.2 l/ha. Phitotsyd was used as biological control (based on *Bacillus subtilis*, 1 l/ha). The tubers were treated by preparations before planting, before the storage and plants during the budding. Experiments conducted on the 1st term (27-30 April), 2nd (12-15 May). The study was conducted in 4 districts of Lviv region, which differ in their soil and climatic conditions: West Woodlands, Radekhiv area; West Zone of steppe, Zhovkivsky area; Carpathian Foothills area, Strysky area; Carpathian, Skole district. The crop was harvested the 3rd week of August – 2nd week of September. Repeated experiments – 3-5 fold. The third term of planting (late May) was unsuitable from the economic side (low yield), but because it has been excluded from the scheme of studies. The study was carried out by conventional methods. Statistical analysis of the data was performed by a computer program Excel.

It was found that the productivity and marketability, the standard fraction of potatoes tuber increased at treatment of biological preparations (Phitotsid, Planriz, Diazophit and Phosphoenterin) on the average in varieties and planting terms in Lviv region. In this case, the composition of the non-standard fraction changed due to a significant decrease of small, mechanically damaged and diseased tubers. The yield of potatoes exceeded the control in 1.3-1.7, and the number of infected tubers decreased in 2,1-5,4 times. The concentrations of Planriz 2.0-2.5 l/ha, and Planriz + Diazophit +PMB – 2.5+0.2+0.2 l/ha were the best among the variants. The 1st planting time in the third decade of April was the best due to the smaller number of tubers damaged by disease.

The using of Planryz, Diazophit and Phosphoenteryn softened the action of unstable weather conditions, especially the excess moisture, contributed to a more yield, high marketability of potatoes and non-standard potatoes in comparison with control. Using a mixture of Planryz, Phosphoenteryn (PMB) and Diazophit as environmentally safe microbiological preparations based on microorganisms will improve phosphorus and nitrogen nutrition potatoes contribute to accelerate the growth process, strengthen the immune system of plants due to the production of biologically active substances that contribute to biocontrol of pathogens followed increase productivity and commercial quality potatoes. These properties make it possible to use these microbiological agents in Bioorganic agriculture. In the future study of plant resistance, biological products processed, with lesions pathogens that are important for the development of highly efficient environmentally friendly measures to protect plants from disease. The study of plant resistance, processed by biological preparation, at affect of pathogens is in the works in the future that are important for the development of highly efficient environmentally measures to protect plants from disease.

Key words: *Solanum tuberosum* L., microbiological preparations, marketability, diseased, stability

The influence of polyfunctional microbial preparations on the structural and dynamic features of microbiocenosis and legumes productivity

S. Didovich, E. Turina, R. Kulinich, S. Abdyrashitov, T. Gorgylko, A. Didovich

At the present time the main priorities in agricultural production in Ukraine and Russia are ecology of its branches, natural resources conservation, energy saving and economic efficiency. Therefore biotechnology of soybean, pea and other legumes breeding had been designed. It is based on the strategy of joint using of biological preparations by applying heterotrophic microorganisms of different action (symbiotic nitrogen fixing, phosphate mobilizing and growth-promoting activity, antagonistic activity to phytopathogens, entomocide activity to phytophagans), allowing to raise plant productivity, to protect the plants from pathogen infection, to control the quantity of phytophagans, and to get qualitative and ecologically safe products of plant-grower.

However, alternative ways of creation of the efficient plant–microbial systems and all-round studies of the mechanism of micro- and macro-partners interaction, conditions of their efficient functioning have a requirement in a further search. Special emphasis should be laid on the influence of phototrophic microorganisms – chyanobacteria on functional efficiency of the plant-microbial system. Chyanobacteria form a constant active part of soil biota, they are bound by a complex interaction with all its components, and take part in different processes in soil. Few studies have been examined the influence of biotechnology on soil-forming processes in agrocoenosis.

This work has investigated the influence of pre-sowing treatment seeds by microbial drugs on the basis of effective heterotrophic (nitrogen-fixing nodulating bacteria, growth-promoting and phosphate mobilizing microorganisms, and microorganisms-antagonists of the phytopathogenes) and phototrophic microorganisms (cyanobacteria) on changes of microbial cenoses and its functional structure (the number of the main ecological trophic groups of microorganisms, the ratio of mineralization and oliogotrophic indices) and seed productivity of legumes in the period of their growing in the steppe zone of Crimea.

It was found out that the phases of development of plants, legumes species and introduction of poly-functional preparations influenced the formation and functioning of microbial cenoses in the legumes rhizosphere.

The possibility of biological activity intensification in the rhizosphere of soil at different stages of legumes ontogenesis applying the heterotrophic and phototrophic microorganisms was proved. Usage of poly-functional preparations affected indices of mineralization, oliogotrophic and microbiological transformation of organic substance in the rhizosphere, but intensity of these processes was different depending on preparations.

Activation of microbiological transformation of organic substance in the rhizosphere soil was observed at the end of the legumes growing season, but the intensity of this process was different from according to the variants of bacterization: in the rhizosphere of peavine – in the variant of application Rhizobofit + Phosphoenterin + Biopolicid and mycorrhizal fungi with Rhizobofit, in the rhizosphere of soybean and pea – cyanobacterial consortium bacterization. Besides, application of biologies increased seed productivity of soybean, peavine and lentil by 0,30–0,48 t/ha and contents of protein in seeds by of 1-3%.

Key words: poly-functional preparations, legumes, soil microbiological processes, yield structure, seeds productivity, microbial cenosis.

Influence of mineral fertilizers and retardant protection on productivity of malting spring barley

S. Kalenska, R. Kholodchenko, B. Tokar

The results of studies on the influence of norms of mineral fertilizers and crop retardant protection on grain yield of malting spring barley are presented. It is established that the highest yield of spring barley of studied varieties was obtained at a norm of fertilization $N_{90}P_{90}K_{120}$ through the use of retardants Hlormekvat-chloride 750 and Terpal. For the growing of spring barley without retardants usage the most effective fertilization norm is $N_{60}P_{60}K_{80}$ kg a. s./ha.

Our research found that growing the investigated varieties of spring barley in the conditions of Right-bank Forest-steppe of Ukraine without the use of fertilizers and retardant protection provided yield at 2,96–3,45 t/ha, while on variants with norm of fertilization $N_{60}P_{60}K_{80}$ it was higher by 33,4–57,4 % (4,14–5,08 t/ha). During fertilization $N_{90}P_{90}K_{120}$ indicators of crop yield surpassed variant without fertilizers on 29,3–43,4 % and amounted to 4,04–4,63 t/ha depending on the variety. Slightly lower performance numbers of crop on the maximum variant of fertilization explained lodging of crops due to high nutrients availability, especially nitrogen.

According to the project of growing technology which included handling of crops with retardants Hlormekvat-chloride 750, yield on control plots (without fertilizer) was 3,08–3,39 t/ha, and on entering mineral fertilizers in norm $N_{60}P_{60}K_{80}$ it was increased to 55,5–71,1 % to 5,10–5,55 t/ha. The largest yield of this project technology had the variant of fertilization $N_{90}P_{90}K_{120}$ and it was 5,45–5,98 t/ha, that exceeded the control variant (without fertilization) to 66,2–84,2 %. Comparing growing technology project that involved handling of crops Hlormekvat-chloride 750 without the usage of retardants, we must say that its yield was higher by 17.1 % on average in varieties and fertilization norms.

Under conditions of spring barley treatment by Terpal, indicators of crop yield of the variant without fertilizers were 3,23–3,52 t/ha, while fertilizing at the rate of $N_{60}P_{60}K_{80}$ increased them by 58,5–74,7 % and compounded 5,30–5,82 t/ha. With the variant $N_{90}P_{90}K_{120}$, yield was highest in the experiment and was 5,82–6,29 t/ha, that exceeded the variant without fertilizers by 74,4–88,6 %. In other words, according to the processing conditions of the crop by Terpal, the yield at an average of varieties and fertilization norms was higher by 22.7 % compared with the control (without retardants). It should also be said that the highest rates of yield had Vodogray and Hladis varieties, and the smallest ones were Konserto and Kangu.

Having regard to the research, it is possible to draw the following conclusion. The priority principle of spring barley cultivation technology is establishment of rational amount of fertilizers, that is considered to be a framework for realizing crop productive potential. The usage of retardant crop protection promotes preservation of more plants per unit area by increasing their resistance to lodging and has a positive effect on yield formation due to biochemical changes in the plant organism. It should also be taken into account that the multi-method application of retardants with fertilization is effective during the

quantitative enlargement of the last. Using only fertilizers in typical black soil humus Right-bank Forest-steppe of Ukraine the studied varieties of spring barley allow yield to be 4,14–5,08 t/ha ($N_{60}P_{60}K_{80}$), and providing increased rate of fertilization to $N_{90}P_{90}K_{120}$ yield reduces to the level of 4,04–4,63 t/ha due to crop lodging. Using of Hlormekvat-chloride 750 retardant drug in combination with the above fertilizer application norms spring barley provides yielding of grain right-on 5,45–5,98 t/ha, and the application of Terpal – 5,82–6,29 t/ha.

Key words: malting spring barley, fertilizer application norms, retardants, productivity.

Dynamics of leaf apparatus, root mass formation and sugar accumulation of various sugar beet biological forms

L. Karpuk, O. Krykunova, M. Kykalo, V. Polischuk

According to sugar beet yield formation during the periods of intense roots growth, the value of daily sugar increments in them – is very high. With the slowdown in root growth the dry weight and daily sugar increments is reduced. But in the period of growth processes inhibition under the influence of unfavorable weather conditions are not always observed termination of sugar growth in the roots. Change of sugar content in the raw mass of sugar beet root during the growing season is in the opposite direction of the change of water content in it; the ratio of these substances is constantly changing during the growing season of crop.

Earlier studies are proved that the sugar content of roots depends primarily on the length of the period of active growth and development, and sucrose may be the only component through which the end of the growing season there is an increase of dry weight of roots.

The sugar accumulation in sugar beet goes continuously, slowly at the beginning of sugar accumulation and more intense – in the second half, at the end of the growing season is slowing. The increasing pace of sugar accumulation is coincides with the formation of the largest leaf area of crop and fastest of plants growing.

Experimental researches were conducted on the experimental field of Bila Tserkva National Agrarian University during 2010–2012. Technology of sugar beet growing on test plots was common for the forest-steppes of Ukraine, except for the elements that were studied.

Total area was16.2 m^2, accounting – 13.5 m^2, repetition – 4-thou-time. For research are used sugar beet diploid pelleted seed hybrids: Ukrainian ChS 72, Leopard, Zoom and triploid hybrid pelleted seed: Umansky ChS 97, Oryx, Murray.

Over the research years on intensity of leaves formation, growth and development of roots is influenced not only the field germination, varietal composition but also weather conditions during the growing season. The share of weather conditions influence was 73 %.

In average of research years the daily gain of root mass held in July and August most intensively, which coincided with the most intense of leaf apparatus increase.

The growth of root weight is depending on biological forms of sugar beet held differently depending on the phase of plant development. Thus, from sowing to the beginning of September intensely growth of roots mass held in triploid hybrids and from September to harvesting – on the contrary in diploid hybrids of both domestic and foreign origin. In addition, hybrids of foreign selection of both biological forms is differed the intense of roots mass growth in autumn from September prior to harvesting, compared with hybrids of domestic origin.

In average of research years there is a tendency intensive gain weight of roots both biological forms of hybrids of domestic origin in August compared with foreign, and hybrids of foreign selection is differing the intense of roots mass growth in the autumn from September prior to harvesting. The intensity of roots mass growth and leaf surface depends on the provision of plant by moisture regardless of biological forms of beet and their origin. According to optimal or excessive moisture plants growth and development are satisfactory both of domestic and foreign origin and even with a slight deficit of moisture this process is slow down and leaf apparatus is fades regardless of the phase of plant development.

Research has established the regular increase of sugar growth in the roots of both biological forms of sugar beet. On average of research years during the growing season, from early July to September sugar content increase in diploid forms was 5.8 %, triploid – 6.0 %.

There were not significant differences depending on the biological forms.

Most intensive sugar is accumulates in the roots in July and August, regardless of hybrids of both biological forms of sugar beet, which coincided with the most intensive growth of root mass and leaf apparatus mass accumulation.

The average of three years the dynamics of the sugar content is gradually increasing to 0.8-2.5 % from one account date to another, regardless of biological forms of sugar beet. There was no significant difference on the dynamics of sugar accumulation in the root, depending on the varietal composition of hybrids.

Key words: sugar beet, biological forms, the dynamic of leaf apparatus growth, the dynamic of root mass growth, sugar content.

Damage pests and diseases peach trees with organic technology cultivation in the Southern Ukrainian Steppe

T. Gerasko

The aim of our study was to determine the effect of organic cultivation technology to defeat disease and pest damage of peach in the southern Steppe of Ukraine. Field experiment was laid in February 2010 on the lands of the Melitopol district of Zaporozhye region. Plant material for research was peach variety of Redheyven grafted on apricot. Repeated experience of 4-fold, 10 trees in each repetition. Variations: 1 – control (lacking any spraying); 2 – biological protection, spraying apple cider vinegar (200 ml per 10 liters of working solution); 3 – Chemical protection products: Bordeaux mixture, Horus, Delan, Aktellik (in accordance with the manufacturer's instructions); 4 – biosecurity, bacterial, viral and fungal preparations industrial production (Gaupsin, fitosporin, Lepidocide, Pentafag-C Trihodermin); 5 – biological protection, biologics (same as in embodiment 4) + vegetable preparations (same as in embodiment 6); 6 – protection of plant products (garlic tincture, tincture of horseradish, onion peel broth, broth of red hot pepper), made our own. The remaining processing methods were the same in all

variations: the soil was kept under natural sod (10-15 cm), tree trunks were mulched with hay (thickness of the layer of mulch was 15-20 cm), beginning in April with an interval of 3 weeks was carried out irrigation 80-100 l for each tree.

Average score defeat disease and pest damage was determined generally accepted methods. Results processed statistically by analysis of variance.

Lack of treatment led to an increase of defeat trees Clasterosporium carpophilum A and peach leaf curl (Taphrina deformans T), but reduced the loss and damage by pests Monilia cinerea (Bonord) Hon. Protection of plant products was ineffective against Clasterosporium carpophilum A. Chemical protection also does not eliminate the peach leaf curl. Treatment of apple cider vinegar significantly reduced lesion Clasterosporium carpophilum A and peach leaf curl, which could potentially have a positive impact on productivity and longevity peach tree.

During the growing season peach main pests were striped moth and aphids. Comprehensive protection for biological products and herbal supplements, as well as chemical protection did not reduce the number of pests. This can be explained by the fact that the enhanced protection frightened beneficial insects. Indeed, in the absence of treatments striped moth damage was minimal. Settling aphids most observed on treatment options with apple cider vinegar and herbal preparations. But after the middle of June, we observed a sharp decrease in the number of aphids and on the beginning of august they have almost disappeared.

Effectiveness of biological products was low. By themselves, they do not solve the problem of protection from pests and diseases. In our view , there are several reasons for this result. First, biologics have a minimum temperature at which they can work (+ 16 °C). At the time when control of fungal diseases should carry out in October and during the swelling buds of spring when the temperature does not reach the minimum. Second, domestic biologics have not antiviral activity. Thirdly, today still poorly understood interaction between a biological products in tank mixtures .

Thus we can say that the lack of treatments resulted in increased destruction of trees Clasterosporium carpophilum A and peach leaf curl (Taphrina deformans T), but decreased Monilia cinerea (Bonord) Hon destruction and damage by pests is likely due to the preservation of beneficial organisms. Plant protection was ineffective against Clasterosporium carpophilum A. Treatment of apple cider vinegar significantly reduced lesion Clasterosporium carpophilum A and peach leaf curl (Taphrina deformans T) that can be remotely positive effect on productivity and longevity peach trees. The settlement of aphids observed in most versions of apple cider vinegar treatment and herbal preparations, but before the harvest aphids are gone. In the absence of treatments striped moth damage was minimal.

Key words: organic gardening, peach, peach diseases and pests.

Treptolem effects on oil poppy morfogenesis, productivity and qualitative characteristics

S. Polivaniy, V. Kuryata

Oil Poppy is a valuable food and technical culture. The seeds of poppy are used in a pastry shop and bakery industry. The poppy oil obtained by the coldpress method of long time does not turn rancid, which determines its high food value and wide use in bakery and canning industry.

Gradual production of this crop increase is foreseen In Ukraine, according to the Government program of poppy cultivation development. Application of economically expedient cultivation methods able to provide high seed yields is an important means of increasing oil-bearing crops productivity, including to the poppy.

The analysis of the world crops growing trends progress testifies that applying crops height synthetic regulators is one of the priority directions of solving the problem of high and stable yields. This compounds group gives the opportunity to regulate purposely the separate ontogenesis stages in order to mobilize the crop potential possibilities that influences agricultural products productivity and quality. Thus, the paper aims at defining treptolem influence on productivity, morfogenesis and oil content in the poppy seeds.

The field experiments were held in the village of Borivka, Chernivtsi district, Vinnytsya region in 2010, in the village of Kuz’myn, Krasyliv district, Khmelnytskiy region in 2011, in the village of Tokarivka, Jmerinka district, Vinnytsya region in 2010 on Berkut oil poppy variety. The experiment areas were 10 м^2. Plants were treated singly with treptolem solution concentration of 0,025 – 0,035 ml/l in June 16, 2011, June 18, 2010. and June 17, 2014 in the budding phase by sprinkler. The control crops were sprinkled by tap water. Treptolem influence on poppy morphogenesis, productivity and poppy oil content and quality characteristics was studied in the field experiment.

It was found out that poppy treatment with treptolem caused increase in linear sizes, stems thickening and more intensive branching, leaves area and mass increase. More powerful leaf apparatus formation ensures increased productivity of poppy oil crops. Applying the substance causes positive changes in the yield structure – increase in fruit number per plant, seeds number in boxes, the seeds weight. This contributed to poppy productivity increase. The substance action increased oil content in poppy seed, improved its qualitative characteristics.

In particular, under the influence of treptolem both the number of saponification number and aethereal number grew in comparison to the control. The increase of iodic number in comparison to the control proves the increase of nonsaturated fat acids content. Yet, decrease in acid value is observed. Thus, the regulators treated crops quality oil is higher compared with the control.

The food value of poppy oil is determined largely by the fat acids profile. Palmitic, palmitolein, stearin, olein, linolic, arachic, α- linolenic acids presence was defined in Berkut poppy variety seed, the oils food value and the significance for the human and animals organisms are different.

The analysis of correlation between nonsaturated and saturated higher fat acids testifies that treptolem treatment provide the increase in the content of the nonsaturated fat acids.

Key words: oil poppy (Papaver somniferum), growth regulator, treptolem, productivity, oil quality, higher fat acids.

Peculiarities of tulips raising depending on the technologies of their development in the greenhouse conditions
O. Knyazyuk, R. Kreshun

The investigation was conducted in 2013-2014 in the greenhouse "Flora" in Kalynivka, Vinnytsia region.

Oval tulip bulbs were selected for the growing and they were carried into a room with controlled t^0 and humid level. Tulips of different varieties and shape were used for the growing in order to blossom at least for a month.

Terry tulips were chosen as early flowering, Triumphal – as mid flowering and Darvin as late flowering tulips. Such varieties as Diplomat, Hudotnyk and London were chosen for early flowering. Their bulbs were cooled according to the Dutch technology (t^0 +9^0 and +5^0). Tulips of other varieties were chosen for mid and late terms of growing.

After the analysis of influence of t^0 level on the duration of flowering, and obtaining of market quality flowers, we came to the conclusion that the least duration of flower forcing (37 days) was obtained at t^0 + 18-20^0. 5 degree Dutch technology of tulip bulbs storage was used during 3-4 weeks. The optimal t^0 for mid terms tulip forcing is +14-16^0 and flowering shoots duration is 45 days. To get flowers in later terms the t^0 should be 10-12^0 and at the same time it is possible to supply market quality flowers of tulips on the 62d day.

Similar behaviour was observed at application 9-degrees technology of storage of bulbs of tulips.

At 9 degrees technology, bulbs, what were selected for early terms, at a given temperature kept to the first decade of October, and for the receipt of late growing - to the middle of October. When sprouts attained 7-9 cm, and it is early to start growing, a temperature was reduced to 0-2 ℃ for 2-3 days.

At 9 degrees technology after storage of bulbs in a refrigerator for the best taking root after growing the temperature of soil is maintained within the limits of a 10-11 ℃, air 11-13 ℃. For increasing of cutting quality growing of tulips was conducted at lower temperature 12-14 ℃. A period from planting of bulbs to flowering for the early sorts of tulips presents 6-7 weeks, and for middle and late - 8-9 weeks.

The traditional cooling of bulbs is applied at a temperature 10-12 ℃ for growing of tulips in middle and late terms. If it is needed to detain flowering of flowers a temperature goes down to 2-3 ℃, for 2-3 days. In future, till flowering, the temperature of air gradually rises to 17-18 ℃. For lengthening of term of flowering, receipt of an increase colouring of flowers it is necessary to low the air temperature to 12 ℃.

At application of traditional technology of receipt of commodity products of flowers of tulips duration of their growing proceeds on the average on 3-5 days, as compared to Dutch.

The least duration of growing floriferous sprout (44 days) at the early terms of growing of tulips at a temperature condition 18-20 ℃. The same mechanism is at middle terms. At establishment of temperature condition within the limits of 10-12 ℃ in the late terms of growing of tulip the period of growing floriferous of sprout lasts 65 days.

At industrial production of tulips it is expedient to apply those technologies of growing which are possible to be managed. Dutch technology of cooling of bulbs at 9 and 5 degrees during 3 weeks allows to get flowers on a cut in the planned terms.

The least duration of growing of tulips (37 days) was received at the temperature condition of the closed soil at 18-20 ℃. For the conveyer supply of tulips in later terms (on 62d day) a temperature condition in a greenhouse it is better to maintain at the level of 10-11 ℃.

Key words: varieties of tulips, technology of growing, temperature condition, terms of growing.

"Karmalyukove Podilla" national natural park reforestation after black frost damage
V. Vakolyuk, V. Lavrov

The results of *Quercus robur* L. and *Quercus petraea* Liebl. tree crowns ecological status and recovery features determination after ice damage in 2000 are given on the example of "Karmalyukove Podilla" National Natural Park (NNP).

The icing resulted in creating favourable conditions for the pests and diseases evolution: trees biological resistance has reduced, a lot of open mechanical wounds on trees and dead wood has appeared. The shattered forest belts has become more vulnerable to negative abiotic factors.

Therefore, the process of their recovery is long and complicated. The peculiarity of these forests development is the dynamic reciprocal phenomena "recovery – trees withering" counteraction since the consequences of ice damage worsened due to the of pests and diseases negative impact.

It is shown that oak forest belts have the ability to recover after crowns damage through the formation and development of water shoots on the branches and the trunk. Natural mechanism of partially lost aboveground biomass bringing into compliance with the underground one of the forest belt functions. This is also contributed by increasing the trees crowns and trunks lightening due to the heavy tent dilution.

The intensity of the crowns recovery and their further growth depends on trees breed, age, degree of ice and other factors damage, as well as the state of neighbour trees. Different crowns shapes are formed depending on the damage extent. Under intensive icebreaking, sticks formation is concentrated closer to the crown base skeleton and partly below the trunk. As a result, the restored crown is formed much more compact and "falls" below the trunk, i.e. the crown relative height increases. The crowns largest relative height (40.3 %) formed due to secondary sticks were found in the area of trees very strong ice damage. Weak icebreaking causes predominantly sticks forming at the periphery of a lower part of the crown.

The intensity of water sticks formation increases to 3.2 points with increasing the crowns ice damage degree up to the limit of 20 %. The crown lose of more than 20 % causes a sharp decrease in the intensity of sticks formation. The trees that have lost more than 50 % almost lose their ability of sticks formation below 2.2 points. However, the most persistent samples can recover even with the loss of 70 % of the crown biomass. It is unreasonable to take trees with less than 30% ice damaged crowns in sanitary felling.

The total area of crowns horizontal projection in damaged trees has almost doubled within 4 years after icebreaking. Crowns growth annual radius increased differently depending on the tree oak age: those aged 100–120 had 3–5 m diameter,

aged 50 – 3–4 m, young – 2–3 m. Regardless the origin of the oak trees belts and their age (from 40 to 120 years), the most developed trees of I and II Kraft classes have more potential to restore crowns after icebreaking.

The connection between *Q. Petraea* trees crowns horizontal projection and their age middle reliable. *Q. Robur* crowns resoration is faster than that of the neighbor grown *Q. Petraea* crowns. A tendency of diminishing «relation of crowns projection area to the trees feed area» index with the trees age. However, feeding area of competing *Q. Robur* and *Q. Petraea* changes with the age and the changes are different. Changing the relation between feed area and the age of *Q. Robur* is positive or upward, and that of *Q. Petraea* is negative (or downward, negative). As age of trees

Thus, *Q. Robur* in mixed forest belts is more competitive than *Q. Petraea* in terms of the competition for the environment resources. The *Q. Robur* crowns restoration after ice damage goes faster than in its neighbor *Q. Petraea*: the crowns horizontal projection and the trees feed area grow faster with age the, while the value of their relation diminishes).

Key words: oak tree belts, crowns ice damage, crowns restoration, intensity of sticks formation, crowns horizontal projection, trees feed area

Ecological features of the runoff formation and transformation in theurban and rural landscape

A. Pitsyl

The article highlights the ecological evaluation assessment of the surface runoff in the urban and rural catchments at the populated territories. The surface runoff peculiarities formation of the different origin and water quality indices have been explored in Zhytomyr and Strygivka catchments, from which water gets to the hydrological network and reservoirs.

The surface runoff coefficients have been determined in the different urban catchments that are different according to their structure: private buildings areas with household plots, pig complexes, AGF “Edelveis”, motorways with paved and sealed cover within settlements.

The rainfall and melt-water composition of the surface runoff in the urban and rural catchments at the populated territories with different infrastructure has been systematized depending on the anthropogenic load of the surface runoff. The storm water composition list of the main pollutants has been specified in the surface runoff.

It has been found that pollution of the rainfall and water-melt (except suspended solids concentration in the runoff) is not significantly different: in average the water-melt runoff is higher in 2,2 times than in the rain fall runoff (330,5 mg/L and 150,0 mg/L, respectively). Hydro chemical parameters of the melting runoff with average indices for the last 5 years overcame MPC: according to COD basins for cultural and household usage (MPC=30 mgO_2/L), for petroleum products (MPC=0,3 mg/L) and suspended solids (MPC=0,75 mg/L).

The concentration of the surface runoff pollutants is the most toxic in fall and winter, the least – in spring and summer. These characteristics are related to both climatic features of the terrain and the territories with technological regime.

It has been established that surface runoff coefficient in the areas of private buildings with small holdings, pig farms, roads with paved and sealed cover within the village is equal to: 0,29 ± 0,01; 0,91 ± 0,1 and 0,41 ± 0,04 according to the coefficient that varies from 12 to 15 %. The research results give an opportunity to generalize outwash and runoff coefficients in three structurally different areas.

It has been proved that outwash of the solid part at private homes with household plots is 2,34 ± 0,34; on the roads with paved and sealed cover within the village – 0,72 ± 0,08; at the pig farm territory -1,70 ± 0,03 t ha^{-1}

The Turbidity of flow as the main indicator of outwash quantity evaluation with paved and sealed roads cover within the village has a value 0,91 ± 0,11 g $L^{-1,}$ which is in two times higher than the pig farm area (0,43 ± 0,02 g L^{-1}) and it is in three times higher than the private area of household plots 0,29 ± 0,01 g L^{-1}. The average value for the outwash has too high variable level – 31-43 %, and the value for the turbidity of runoff varies from 14 to 18 %.

On the basis of our own research we suggest a protection system for urban and rural populated territories aimed to lessen pollution and repeated risk pollution in the rivers and water reservoirs.

Key words: ecology, pollution, catchment, surface runoff, landscape.

Soybean productivity depending on varieties, crop cultivation methods and seeding rate

O. Milenko

The main aim of our research was to analyze the change of the soybean productivity, depending on varieties, cultivation methods and a seeding rate.

The experiment scheme had three factors:

1. Varieties: Romantyka and Ustya;
2. Cultivation methods: without cultivation, mechanical cultivation, chemical cultivation;
3. Seeding rates: 600, 700, 800 and 900 thousand/ha.

A soybean was sowed in 15 cm distance between rows by a common line method in the third ten-day period of May. The crop cultivation methods were used for each test example by different means, according to the scheme rate. Two test examples were cultivated by before shoots and after shoots drilling method in concordance with the mechanical cultivation method. The chemical cultivation method, aimed to lessen the weed amount and carried out at the experiment test examples, was done due to the sprinkling plant leaves with the herbicides in the 3rd phase (the herbicides that were used for the research: Basagran (bentazon – 48 %) – in a normal state 2 l/ha and Fyuzilad Super (fluazifop-p-butyl – 12.5 %) – in a normal state 2 l/ha.

The soybean varieties Romantyka and Ustya gave the worst yield at the test example areas with no weed control. It was noted that when the varieties sowing rate was increased from 600 to 900 thousand/ha, they gave better yield. The mechanical cultivation method, used for Romantyka, enlarged the yield in 2.1 times in comparison with the test examples without care. It meant that natural weed growth lessened the yield on 52 %. The sowing rate productivity with 600 thousand seeds/ha at the level with 1.83 thousand/ha was formed. The yield productivity, enlarged to 0.22 thousand/ha, was the result of the increasing in the sowing rate to 700 thousand/ha. Being increased in the sowing rate to 800 thousand/ha, the agrophytocenosis

compression influenced on the productivity improvement – 0.16 thousand/ha. The next compression with a maximum seed sowing rate 900 thousand/ha influenced on the productivity rate – 1.96 thousand/ha. It also showed that an interspecific soybean competition existed, it had a negative influence on the sawing rate and lessened the yield productivity rate on 0.25 thousand/ha in comparison with the test examples where the sawing rate was 800 thousand/ha.

The chemical cultivation method, used for Romantyka, gave worse yield in comparison with the mechanical method. The average productivity was lessened on 0.02 thousand/ha. The average productivity was increased in 2.21 times in comparison with no cultivation method. The minimum sowing rate 600 thousand/ha in combination with the chemical method, used for Romantyka, gave the yield at the level of 1.82 thousand/ha. Being increased in the sowing rate to 800 thousand/ha, the next agrophytocenosis compression influenced on the yield lessening (2.03 thousand/ha). A maximum seed sowing rate (900 thousand/ha) had influence on the yield, continuing to lessen it on 0.1 thousand/ha.

The soybean variety Romantyka (with the sowing rete 800 thousand/ha) gave the highest productivity – 2.21 thousand/ha at the test areas, cultivated by the mechanical care method. The best result of the soybean sowing yield (2.16 thousand/ha) was gained due to the seed sowing (with 700 thousand seeds/ha) at the test areas, cultivated by the chemical care method.

The soybean varieties Ustya gave better yield, which was 2.3 times higher at the test example areas, cultivated by the mechanical method, than at the areas with no weed control, it meant that yield loss through the weed growth was 57 %. The sowing rate with 600 thousand seeds/ha gave the yield with the level 1.82. The increase in the sowing rate to 700 thousand seeds/ha had influence on yield productivity and it was enlarged on 0.29 % thousand/ha. The next compression (800 thousand/ha) afforded opportunity to increase yield productivity only on 0.12 % thousand/ha. The maximum seed sowing rate with 900 thousand/ha influenced Ustya’s yield productivity and it was enlarged on 0.17 thousand/ha.

The chemical method gave 12 % higher yield than the mechanical care method. The yield productivity was 2.19 thousand/ha. It provided the yield productivity on 0.2 thousand/ha, increasing the sowing rate to 700 thousand/ha.

The next compression with 800 thousand seeds/ha influenced on the increase of the yield productivity to 2.62 thousand/ha, it meant that the difference between the yield productivity was 0.23 thousand/ha. Increasing the sowing rate to 900 thousand seeds/ha, we had the value of 2.53 thousand/ha, it meant that the seed compression didn’t have a good influence on the soybean yield in other words it was lower on 0.09 thousand/ha than at the area with sowing rate 800 thousand/ha.

Ustya (the soybean varieties) gave the best yield (2.62 thousand/ha) due to the chemical care at the test example areas with the seed sowing rate 800 thousand/ha. The next seed sowing concentration (to 900 thousand/ha) provided the increase the interspecific soybean competition but it lessened the yield productivity. The mechanical care method gave the best yield (2.4 thousand/ha) at the test example areas with the seed sowing rate 900 thousand/ha.

Ustya’s soybean sowing had better reaction to the compression than Romanyka. The optimal soybean sowing rate for Romanyka due to the line sowing was 700–800 thousand seeds/ha. The optimal soybean sowing rate for Romanyka – 800-900 thousand/ha. It was worth noting that the yield productivity was higher at the test example areas with no weed control and Romanyka had better competitive ability with the weed than Ustya.

Key words: soybean, varieties, seeding rate, crop cultivation method, productivity.

Formation of yield and grain quality indices based on soybean crop protection system against weeds and diseases in the condition of sufficient moisture

V. Shcherbachuk

Factors affecting soybean productivity and seed quality are weedery (soybean has low competitiveness to weeds), as well as defeat of plants by numerous diseases of different etiology, arisen from the soybean crops area expansion in different regions of Ukraine. As modern soybean technologies need a reliable, environmentally safe and economically viable systems to protect crops from weeds and diseases, it is important to select the herbicides (tank mixes) and highly efficient fungicides for double using to soybean crops in order to protect plants for a long vegetational season.

The paper presents the results of a three-year (during 2012-2014) experimental research on the effect of the herbicides and fungicides usage in order to protect soybean crops from weeds and affection for a long growing season, the formation of photosynthetic and grain productivity of soybean, and quality indicators of grain as well.

The study was carried out on dark grey degraded (podzolized) soil with the following agrochemical indices: humus at a depth of 0-20 cm by Turin is 2,0-2,11 %; providing alkali-hydrolyzed nitrogen is low; a degree of mobile forms of phosphorus and potassium is high.

The reaction of soil solution is nearly neutral – 5,9.

It is a three-time repeated experiment. Randomization method was used for option placement. It was used Ustya soybean variety (originator – NSC "Institute of Agriculture NAAS"). Soybean cultivation technology was common for the soil-climatic zone.

The results of a three-year research show that yield and grain quality indicators of Ustya soybean largely depend on the weed and disease protection system. Thus, in the first variant with using the soil herbicide Harnesses (2,5 l/ha) the soybean productivity was the lowest and amounted to 2,21 t/ha.

In the second variant Harnesses (2,5 l/ha) + Bazahran (2,0 l/ha) + Harmony (7 g/ha) were used in a three-leaf phase. It provided grain yield at the level of 2,62 t/ha, which is 0,41 t/ha or 18,6 % higher compared to the first variant with soil herbicide Harnesses (2,5 l/ha).

The application of herbicides Bazahran (2,0 l/ha) + Harmony (7 g/ha) provided soybean yield at the level of 2,32 t/ha, which is 0,11 t/ha or 4,9 % higher compared with the control variant. It is necessary to note that at this variant soybean plantings much suffer from grass weeds.

The application of Pulsar (0,75 l/ha) + Bazahran (2,5 l/ha) in a three-leaf phase provided the highest yield (2,74 t/ha). It is 0,53 t/ha or 24,0 % higher to control variant.

A direct relationship (r = 0,67) was detected as a result of correlation and regression analysis between yield and herbicides.

By using fungicides the lowest yield (2,20 t/ha) was observed at variant with Impact K (0,8 l/ha) + Coronet (0,6 l/ha).

The highest soybean yield (2,70 t/ha) was observed at variant with Coronet (0,6 l/ha) + Abakus (1,5 l/ha). It is 0,50 t/ha or 22,7 % higher compared with the first variant.

Results of regression-correlation analysis showed that there is direct strong relationship (r = 0,99) between yield and using of fungicides.

It was found that the highest protein content (34,5 %) was formed at variant with herbicides Pulsar (0,75 l/ha) + Bazahran (2,5 l/ha).

The highest oil content (20,5 %) was observed at variant with Harnesses (2,5 l/ha). It was checked strong inverse relationship (r = -0,71) between protein and oil.

With the use of fungicides the highest protein content (37,8 %) was noted at variant with Coronet (0,6 l/ha) + Abakus (1,5 l/ha). That is 5,3 % higher compared to the first variant with Impact K (0,8 l/ha) + Coronet (0,6 l/ha).

Oil content in this variant was 19,4 %. It was found a strong inverse relationship (r = -0,99) as a result of correlation analysis between oil and protein.

In the Western Forest-steppe the highest grain yield of Ustya soybean (2,74 t/ha) is formed by applying in a three-leaf phase Pulsar (0,75 l/ha) + Bazahran (2,5 l/ha). The highest protein content (34,5 %) is set at this variant.

Double serial using of fungicides Coronet (0,6 l/ha) + Abakus (1,5 l/ha) in the early stages of budding and flowering completion provided obtaining the highest yield (2,70 t/ha) and the highest protein content (37,8 %). It was observed inverse correlation dependence between protein and oil.

Key words: productivity, soybean, variety, protein, oil, herbicides, fungicides.

Yielding of seed crops of millet and economic efficiency of using recommended elements of the technology

S. Poltoretskyi

Analysis of forming peculiarities of the cereals market in Ukraine demonstrates a constantly growing interest in millet purchasing from not only national customers but also export-oriented companies. Thus, only in conditions of 2011/2012 marketing year millet export increased more than two times – to 57.8 thousand tons and according to analysts in the following years it could reach 65 thousand tons.

One of the measures to improve the efficiency of growing high-yielding millet crops is to use high quality sowing material adapted to specific soil and climatic conditions of varieties. Thus, according to scientists the impact of this factor in forming level of crop yielding ranges from 8 to 50 % or more under different conditions, while the proportion of seed cost in the overall cost of growing technology can reach 25 %.

The aim of research was to improve elements of technology and economic efficiency of growing high-quality millet seeds by selecting predecessors, systems and levels of fertilizing, timing, methods of sowing and rates of seeding, peculiarities of threshing and duration of softening rolls that will provide improving of yielding properties of millet seeds in conditions of unstable humidity of Southern Right-Bank Forest.

Field studies were done during 2003–2014 in the experimental field of educational and scientific-industrial complex of Uman National University of Horticulture which is situated in Mankivka natural agricultural area of Middle-Dnieper-Bug district of Ukrainian Right-Bank Forest-Steppe Province.

Economic evaluation of using studied technological elements was carried out by the method of determining economic efficiency of using results of scientific research and development kinds of work, new equipment, inventions and innovations in agriculture.

Obtained results and analysis of economic efficiency indicators point to the fact that in a Right-Bank Forest-Steppe the most efficient investment in technology of seed millet crops provides applying of a complete mineral fertilizer in the rate of $N_{60}P_{60}K_{60}$ in combination with sowing not later than the second decade of May by the conventional line method and seeding rate of 3.5 million units of similar seeds/ha. If it is necessary to postpone sowing to a later date wide-sowing with seed rate at the level of 2.0-2.5 million units of similar seeds/ha provides greater profitability. Using separate threshing of seed crops when it is 65-70 % degree of seed ripeness in a panicle with the duration of softening rolls no longer than six days will allow receiving the maximum cumulative profit for two generations. Direct threshing is appropriate only when in the dead-ripe stage of ripe crops to 85-90 % of mature seeds in panicle, followed by its use in food and feed purpose.

Using recommended agricultural methods will ensure the return of production costs and high profitability for next extended reproduction and development production and fully satisfy interests of agricultural commodity producers.

Key words: millet, seeds, productivity, maternal crops, crops first seed progeny, economic efficiency.

Variability of sugar beet seeds viability signs depending on different genetic origin

V. Balan, A. Kulyk, V. Zmievsky, M. Scheglovsky

Using high quality seed is one of the most important links in the system of sugar beet production since it does not only carry a hybrid genetic potential but is an important element of sugar beets growing technology. That is, the seed is not only a part of the organism that completes its life cycle, but is also a new independent body, which carries the basis of a new plant. That is why it is characterized with both and viability and vitality.

There are both external and purely genetic factors causing either complete destruction of seed or its considerably lower viability. This is particularly evident at the very beginning of fertilization process, i.e. in pollen tubes germination. Pollen tubes sprouting inhibition is observed in the pestle tissue under self-pollination in sugar beet. Even if the fertilization occurs, the embryo often dies because of its tissue and endosperm incompatibility. The embryo may die as well when it is fully formed due to the embryo different parts partial deformation or its generative sphere (perisperm) underdevelopment That is, homozygosity, formed by inbreeding, weakens the viability of the whole organism and reduces seed germination significantly.

A comprehensive assessment of breeding materials of different genetic origin on the grounds of the generative systems, vigor and germination, i.e. developing methods of sugar beet source material identification on these grounds in breeding and seed-growing process is a way to increase sugar beet seeds viability.

The analysis showed that a full range of plants variability on the basis of seeds viability is detected within the breeding numbers of different genetic origin.

The study has shown that seed viability feature variability depends on both pericarps reproductive system, that is, on their cultivation condition, and the breeding numbers of different origin.

Reproductive system of different origin pericarps was different. The most compact plants in terms of architectonics were in ordinary hybrids, which included 80-100 1st order shoots, 130-140 second order shoots and 6-10 third-order shoots with insemination density of 28-36 pcs. / 10 cm segment of escape, seed binding degree was 85-90 %, seed production – 63.5-150.2 g. the highest variability was noted in the features like 2nd order shoots (S-50.0-55.7 %) and seed productivity (C- 63.2-70,7 %) which indicates the possibility of high-performance plants selecting.

The seed viability also depends on pericarps of different breeding origin. The highest average germination energy, germination and fruit weight of 1000 were in usual ordinary plants (71 %, 78 % and 13.0 g) and in ordinary hybrids they were (72 %, 76 % and 13.5 h) in male sterile component these figures were somewhat lower.

Thus, a full range of variability on the basis of seeds viability within different breeding numbers was detected: in a male sterile component the variation coefficient was 15.4-19.5 % in a usual ordinary plants it was – 15.0-20.6 %, in an ordinary hybrid – 16,0-19,9 %. The presence of a particular spectrum intrapopulation variability for seed productivity and viability opens up the possibility of these characteristics breeding improvement by means of selection.

Key words: seeds viability, germination energy, germination, source material identification, genetic origin.

Winter wheat new varieties productivity under different agroecological conditions

O. Ulich

The influence of environmental factors on the new registered soft winter wheat varieties adaptability, plasticity and productivity display has been studied. It has been found out they are characterized with different ecological capacity, show profound specific response to agroecological conditions in their cultivation areas. It has been found out that the new registered varieties of winter wheat realize their natural productive potential differently in different soil and climatic zones, environmental and and under varying weather conditions and stress.

Boriya, Gilea, Konka, Fermerka, Zhadana, Melodia Odes’ka, Shchedrist’ Odes’ka, Sorrial varieties are better adapted to the steppe zone conditions and provide higher productivity. However, hydrothermal conditions are different in each subzone, microzone and geographical spot of the zone, which causes plants different heat, light and moisture provisionand the shifts in the timing of onset and duration phonological phases setting and organogenesis duration, changes in the growth and reproducing processes intensity, shooting density formation, plant survival, changes in the reaction to the agrotechnological techniques which ultimately affect the the crops productivity. That’s why the studied varieties formed different productivity in different ecological conditions under conditions of individual breeding stations.

Some of the new registered soft winter wheat varieties are not adapted to soil and climatic conditions of the steppe zone, especially on the feautures of cold- and drought resistance, stress factors endurance and varying weather conditions. Miheltsa, Stab, SHTRU 061884, Sofiyka, Chornobrova, Midas, Lukullus and other varieties form lower productivity in the steppe zone.

It has been found out that the highest tolerance and adaptation to the forest-steppe soil and climatic conditions is typical for Gilea, Boria, Astarta, the Nyva Odes’ka, Shchedrist’ Odes’ka, Melodia Odes’ka, Prydnistrovs’ka, Sorrial, Dagmar and other varieties. Among them, the highest productivity potential have Shchedrist’ Odes’ka, Boriya, Malynivka, Gilea, Sorrial varieties. For three years their productivity in Man’kivka breeding stations and in Vinnytsia regional center ranged from 8.66 to 9,76 t/ha for three years. In some subzones and microozones of many regions other varieties had high productivity rates. However, for Miheltsa, Stan, Sofiyka, Chornobrova and Bilyava the conditions of forest steppe zone not fully meet their biological properties, which resulted in a lower yield.

Polissya zone agroecological conditions crovide better realization of the natural potential of Boriya, Gilea, Coloniya, Midas, Sorrial varieties. Their average yield at the examination establishments in Polissya zone is 5.69 - 6.18 t/ha, they took first place in the productivity research at all points. In the Andrushivka breeding stationi subzone the first two variaties formed the yield of 7,15-7,19 t/ha.

The research results reveal that winter wheat varieties with optimal genetic information program must be chosen for each ecological region that would embody the highest number of useful features and properties. The basic requirement of the varieties placing in soil and climatic zones, subzones, microzones must be the compliance of a variety properties to the natural environmental conditions, farming and economic environment in which it is grown and their adaptive capacity.

New varieties of winter wheat resact distinctively to agri-environmental conditions in their cultivation areas. The latter have a significant impact on the variety adaptability, plasticity and productivity display. To solve the problem of the environmental adaptability and unleashing the performance potential it is necessary to introduce a differentiated approach to their placement in the agro-climatic zones, subzones, microzones in accordance with the varieties requirements for breeding and biological properties.

For a set of of ecological adaptability, plasticity and performance indicators, Melodia Odes’ka, Shchedrist’ Odes’ka, Boriya, Gilea, Zvytiaha, Konka, Fermerka varieties should be placed in the steppe zone; Boriya, Gilea, Astarta, Nyva Odes’ka, Shchedrist’ Odes’ka - in the forest zone; Boriya, Gilea , Nyva Odes’ka, Oberih Myronivskiy, colonies, Dagmar, Midas, Sorrial, Balaton – in Polissya zone.

Melodiya Odes’ka, Boriya, Gilea, Sorrial, Dagmar varieties are notable for their wide agroecological adaptability and plasticity as well as for their genotype ability to realize their potential and resist the specific environmental conditions.

Key words: winter wheat, varieties, genetic potential, productivity, biological properties, agroecological zones, subzones, microzones.

Economic and agrobiological assessment of soft winter wheat new varieties

O. Ulych, S. Tkachyk, S. Likar, V. Hahula

The results of research in economic and agrobiological assessment of productivity level, adaptive and agrobiological properties of soft winter wheat new varieties. The studies show that the new varieties of soft winter wheat characterized permitted to commercial circulation are characterized with different economic and agrobiological trait, natural productivity potential and adaptive characteristics. A large part of them have very high productivity. The average yield of the investigated varieties for 2010-2012 years was 5.16 t/ha in the steppe area, 6.27 t/ha in the forest-steppe, Polissya – 5.57 t/ha. On Kirovograd and Donetsk regions breeding stations the productivity in the steppe zone reached 6.48 and 6.67 t/ha, on Vinnytsia plant varieties examination center and Man’kivka breeding stations steppe zone it was 8.06 and 8.26 respectively, and on Andrushkivka and Gorodenka breeding stations in Polissya it was 6.66 and 6.23 t/ha. Maximum yield of Lira Odes’ka, Sotnytsya, Calancha, Matrix, Ethel, Tatsitus varieties reached more than 10 tons/ha.

However, modern intensive varieties, along with their high genetic potential, have not only positive but negative properties as well. In particular, they form a high yield mostly under favorable environmental conditions and significant energy costs though reduce the yield dramatically under their deterioration. This results in observing significant reduce in resistance to abiotic and biotic stress situations which cause the yield high dependence on weather freak and its high fluctuation for years. Thus, the average yield of the studied varieties in the steppe zone in 2010 was 6.23, in 2011−5.47, in 2012 – 3.79 t/ha; in the steppe zone it was respectively 5.06, 7.83 and 5.93 t/ha. The difference between the highest and lowest index in the steppe zone is 39.2 and 35.5 per cent in the steppe zone. The variation in yield between favorable and unfavorable weather years for Sailor, Zadumka Odes’ka, Lanoviy, Dobrochyn, Arktis and Rrayevyd varieties in the steppe zone and Lanovyy, Ethela and Esperiya varieties in forest-steppe reaches over 40 %.

Economic and agronomic value of winter wheat varieties depends not only on the performance of productivity, but, to a large extent, on their adaptive properties, resistance to stressful events. Each varieties is characterized with a specific level of stress resistance. According to academician A.A. Zhuchenko, there is a need to move from the maximum yield to sustainable high yield, due to the varieties with higher adaptability to weather and climatic stressors and harmful species. Only Sotnytsya, Lira Odes’ka and Oriyka varieties have good environmental adaptability and adaptive properties and are able to generate high productivity in many subzones and microzones of steppe and forest-steppe.

In varieties economic and agronomic assessment special attention should be paid to the indicators of winter – and frost resistance, which is an important feature of their biological activity and often determine the genotype suitability for production, since its cultivation is related to the risk of the thinning or freezing in some years. Among the studied varieties only Maria, Lira Odes’ka, Vykhovanka Odes’ka, Lanoviy, Zadumka Odes’ka, Gurt, Tsarychanka have above average winter hardiness, a significant part of the varieties – its average level that is insufficient for successful wintering in unfavorable years and Matrix, Ethela, Henesi, Arktis, Yuvivata 60 varieties are characterized with low winter hardiness. No randomly some of them at very thin out significantly after wintering and the productivity is reduced. In 2012 at Nikopol, Krasnogvardejsk, Pervomayske breeding stations and Kherson station the varieties of Fidelius, Tonatsiya, Sailor, Arktis, Matrix, Ethela, Henesi, Esperiya thinned significantly or even died.

It is equally important to have drought-resistant varieties which are able to provide plant normal functioning during dry periods and to lower the productivity to a lesser extent under climate change and global warming. Maria, Lira Odes’ka, Lanoviy, Calancha, Sotnytsya and other varieties are characterized with higher drought resistance in the steppe zone. The resistance is lower in Tatsitus, Fidelius, Sailor, Dobrochyn, Khyst, Tsarychanka, Legenda Myronivska, Yuvivata 60, Arktis, Matrix, Esperiya, Orzhytsya, Gubernator Donu varieties.

The number of varieties listed in the Register of good quality grain, meeting the requirements on strong and valuable wheat varieties has increased significantly recently. The investigated varieties can form the highest and most stable grain quality under appropriate agricultural technologies. Varieties with high protein content in grain and gluten have been found.

Economic and agrobiological assessment of the studied varieties under changing hydrothermal climate conditions of Ukraine demonstrates the their relatively large competitiveness at high productivity and adaptability rates. Increased yield in modern terms is mainly due to increase their resistance to stress factors Adaptation to specific agro-ecological conditions is important in maximizing the genetic potential of the varieties yield.

Key words: winter wheat, variety, yield, soil-climatic zone, adaptive properties, hardiness, drought resistance, grain quality.