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### **Ecological ability of again registered grades of winter soft wheat**

**The purpose.** Study of ecological ability and response of again registered grades of winter soft wheat on agro-ecological conditions in places of their growing, influence of ecological-adaptive factor upon the level of productivity and implementation of their genetic potential and determination of grades for conforming zones.

**Methods.** Field, laboratory, statistical.

**Results.** Influence of environmental factor is studied on development of adaptability, plastic properties and productivity of again registered grades of winter soft wheat. It is clarified that they are characterized by different ecological ability, manifest deep specific responses to agroecological conditions in places of their growing. It is fixed that again registered grades of winter soft wheat in different soil-climatic zones, ecological and varying weather environment and at different stressful loads realize differently their natural fruitful potential.

**Conclusions.** For solution of problem of ecological adaptability and disclosing potential of productivity of grades of winter soft wheat it is necessary to introduce differentiated approach to their disposition in agroclimatic zones, subzones, micro-zones and geographical points according to demands of selection-and-biological properties of grades.

**Key words:** winter soft wheat, grades, genetic potential, productivity, ecological ability, agroclimatic zones, subzones, micro-zones.

**Formulation of the problem.** In our country, winter wheat is a strategic, most valuable cereal crop that serves as a source of food for humans and animals, is always liquid and forms the basis of the food base and the security of the state. Modern varieties of winter wheat have a fairly high genetic potential of productivity and quality [1 - 10]. This is evidenced by the results of researches obtained at the Institute of Plant Physiology and Genetics of the National Academy of Sciences of Ukraine, research institutes of the National Academy of Agrarian Sciences of Ukraine, institutions of the state system of examination of plant varieties and of many agribusinesses and farms, where the yields reach 11.0-12.4 tons/ha [3, 6, 8].

In implementing the genetic potential of the newly registered varieties of winter wheat, there are a number of problematic issues. Quite important among them is the question of selecting winter wheat varieties that are best suited for cultivation in different agro-ecological conditions, soil-climatic zones, sub-regions and micro-regions [2, 11]. Nowadays, considering certain circumstances and, first of all, the termination of post-registration variety studies, the agrarian sector is not able to provide their scientifically based placement in agro-climatic regions, taking into account the characteristics of environmental capacity, plasticity, stability and adaptability potential.

More scientists believe that plants with almost identical biological properties may vary according to the requirements of the environment, that is, according to the ecological characteristics [2, 4, 11]. Since the adaptive capacity of a certain variety to change the environmental factors is genetically determined, its detection is possible only on the basis of experimental studies and the evaluation of new varieties in a wide

range of different cultivation conditions [11]. Based on such studies, taking into account the ecological principle of evaluation, it is necessary to select the most valuable ones for specific soil-climatic zones, subzone, micro zone, regions. Therefore, the study of agro ecological capacity of new varieties, the study of their plasticity and stability, which is estimated by the potential of adaptability, is relevant for ensuring food security and economic independence of Ukraine. The purpose of the research is to study the environmental capacity and the response of the newly registered varieties of winter wheat to the agro-ecological conditions at the places of their cultivation, the effect of the ecologically-adaptive factor on the level of productivity and the implementation of their genetic potential and the definition of varieties for the respective zones.

Research methodology. The research was carried out during 3 years (2011-2013) in the fields of research crop rotation of the state expert appraisal of plant varieties of various agro-climatic zones by methods of state examination and variety testing of cereals, cereals and leguminous cultures [9].

Results of research and discussion. The studied varieties differ significantly in morphoagrobiological properties and grain yield, depending on the varietal characteristics and micro zone. The yield varied in the steppe zone from 2.93 in Krasnogvardeyskiy to 7.12 in the Kirovograd grade plants; in the forest-steppe zone - from 3.88 in Chernivtsi to 8.73 in Mankovsky sort plants; in Polissya - from 3.69 in the Lviv Regional Center for Plant Varieties Expertise up to 6.40 t / ha in the Andrushevsky State Plant. The average yield of the studied varieties for 3 years was in the zone of Steppe 4.59, forest-steppe - 6.19, Polissya - 5.44 tons / ha. It has been established that newly registered varieties of winter wheat in different soil-climatic zones, ecological and variegated weather conditions, and for different stress loads, realize their natural yield potential unevenly. The ecological conditions of the steppe zone are better adapted and provide the highest productivity of sorts Boria, Gilea, Konka, Farmerka, Zhadana, Melody of Odessa, the generosity of Odessa, Sorrial. At the same time, in each subzone, the microzone and the geographical point of such a zone, the hydrothermal conditions are different, which, in turn, causes the unequal level of provision of plants with heat, light and moisture. This leads to a shift in the onset and duration of phenophases and stages of organogenesis, changes in the intensity of growth and reproduction processes, the formation of stem density, plant survival, changes in the reaction of varieties to agrotechnological conditions, which ultimately affects the productivity of crops. Therefore, the studied varieties in different ecological conditions of individual sortstations formed unequal yield (table).

In many sub-regions and micro-regions of most regions of the steppe zone, the productivity of varieties varies. In the micro-zone of Slavyanoserbskoyi sort-station the best crop forms the varieties of Zvytyag, Era Odessa, Niva Odessa, Malinovka, Transnistria; Nikopolskaya - Konka, Gilea, Dagmar, Verdun, Zvitiga; Krasnogvardeyskaya - Okhtyrchanka jubilee, Sorrial, the generosity of Odessa, Dagmar, Pridnestrovskaya; Kherson OCESR - Zhadana, Farmer, Zvytyag, Zisk, Sofiika. Separate sorts of yield were allocated only in one geographical point out of 9, where the research was conducted. The Zhadana variety is in the Kherson OCESR, Okhynchanka Jubilee - in the Krasnogvardeyskiy Shirostantsy, Zapashna - in the Vilnyansky, Era Odessa - in Slavyanoserbskaya, Kolonia - in Kirovograd, Brion - in the Pervomayskoyi sort plant. During 3 years due to severe droughts and insufficient rainfall, the most severe ecological situation in the steppe zone has developed in the Berezivskiy Sortop Station and the Kherson Experimental Center. The crops were low-mature and underdeveloped, their height at the first station was 48-74, and in the second - 56-84 cm, which became the main reason for low yields. However, under these conditions, the influence of the ecological factor on the formation of the productivity of the wheat field is also high, differentiation of varieties by yield. In the micro-zone of the Berezivka sort-station, Zisk, Boria, Generosity, Odesa, Midas and Verdens produced higher yields, although their yield was 0.42 - 0.54 t / ha less than the average in the zone. In the subzone of the Kherson Center the yield was higher in the varieties of Zhadana, Farmer, Zvytyag, Zisk and

Sofiika. Pervomayskoy sort station Mykolaiv region. and Kirovograd sort-station of the Kirovograd region. are located in the northern part of the steppe, relatively close to each other, they are separated by a distance of only 60 km. However, in terms of yield, diametrically opposed varieties are distinguished in them: in the first one - Malinovka, Astarta, Melody Odesa, Brion, SHTRU 061884 and Sorrial, and in the second - Boriya, Coloniya, Balaton and Sorrial. As we can see, only one variety Sorrial has a high yield in both sub-regions. However, some of the newly-registered varieties are not adapted to the soil-climatic conditions of the steppe zone, especially on the basis of winter and drought resistance, resistance to stress factors and variation of weather conditions. Lower productivity in the steppe zone forms the grades of Miheletsya, Stan, SHTRU 061884, Sofiika, Chernobrova, Midas, Lucullus and some others. Thus, the 1st grade had a yield of 0.39 t / ha lower than in the whole zone, while in the Berezivska sorting plant the reduction was 2.49 t / ha.

The highest tolerance and adaptation to the soil-climatic conditions of the forest-steppe zone are characteristic of the Gilea, Boriya, Astarta, Niva, Odessa, Odessa generosity, Melody of Odesa, Transnistria, Sorrial, Dagmar and others. Among them, the highest potential of productivity are sorts of generosity Odessa, Boriya, Malinovka, Gilea, Sorrial. For 3 years, their yield in Mankovsky grading station and Vinnytsia regional center ranged from 8.66 to 9.76 t / ha. In the part of the subzone and microzone of many regions, high yields had other varieties. In the subzone of the Ternopil and Sumy centers, the Oberih Myronivsky variety was distinguished by yield; Khmelnytskyi Center and Ovchansky Classroom - Zhadana; Chernivtsi Center - Lukulus, Shtru 061884 and Toulouse. The best ecological plasticity in this area is with Boriya, Gilea and Sorrior varieties that are capable of producing high yields under different environmental conditions in many sub-regions and micro-regions. The first of them - in the Vinnitsa center, Mankovsky and Mirgorodsky sort stations; the second one - in Khmelnytsky, Ternopil centers and Mirgorodsky sort station. The Sorrior variety has a wider ecological plasticity, the highest yields are noted in Mankovsky, Bila Tserkva, Mirgorodskaya, Vovchansky sort plants and Chernivtsi center. At the same time, the conditions of the forest-steppe zone for the varieties Mihultsa, Status, Sofiika, Chernobrova and Biliavka are not fully consistent with their biological properties, which led to the formation of lower yields. The Oberig Myronivsky variety in the Sumy and Ternopil centers ranked first in terms of yield, and in medieval centers in the Bila Tserkva and Mirgorodskaya stations and Khmelnytsky and Chernivtsi centers. The Kolonia variety in the Mankovsky grading plant has yielded a yield of 9.57, and in Khmelnytsky center - only 3.77 tons / ha. Lack of yield is more than weighty. This indicates that the Oberig Mironovsky variety in the subzone of the Khmelnytsky and Chernivtsi centers, as well as the Coloniya variety in the microclimate of the Khmelnytsky Center, is ineffective. Agro-ecological conditions of the Polissya zone contribute to the fuller realization of the natural potential of varieties Boriya, Gilea, Colonia, Midas, Sorrial. Their yield on average in the zone is 5.69 - 6.18 t / ha, at all points of research on productivity, they took the first places. In the subzone of the Andrushevsky sort station, the first two varieties cultivated yields of 7.15 to 7.19 t / ha. In the subzone of the Lviv center, except for the genus Colonia, distinguished varieties of Zhadana, Zvytyag, Lucullus; in the micro-zone of Transcarpathian center - Bilyava and Oberih; Pryluky sort plant - Zisk, Boriya, Balaton and Transnistria.

In some subareas and micro-regions of Polissya part of the varieties yields low yields. This applies to the varieties Mihultsa, Status, Sofiika, Chornobrova. They react extremely negatively on the conditions of this zone, in almost all subzone and microzone form very low yields. Not adapted to the soil-climatic conditions of the Polissya zone are also varieties of Zhadana, Konka, Era Odessa, Bilyava. Consequently, the implementation of genetic potential, the magnitude and stability of yields over the years, and the effectiveness of the use of a particular variety depend to a large extent on the environmental factors and the successful location of varieties in certain climatic zones, sub-regions, micro-zones or geographical locations. This is especially noticeable in unfavorable years, in stressful situations or inadequate resource support for

agrotechnological processes, serious omissions in the techniques of agrotechnics. Consequently, varieties sometimes fall into conditions that do not correspond to their biological properties, which leads to a decrease in productivity. From the results of the conducted research, it follows that for each ecological region it is necessary to select winter wheat varieties with the optimal genetic information program, which would contain the most useful features and properties. And the main requirement for the placement of varieties in soil-climatic zones, sub-zones, micro-zones should be the conformity of the properties of the variety to the conditions of the natural-ecological, agronomic and economic environments in which it is grown, and their adaptive capacity. Assimilation and use of environmental factors is carried out by the plant organism through adaptation. Only a few varieties from the newly registered have good ecological adaptability and adaptive properties and are able to form high productivity in many agroclimatic zones. Varieties of Boria, Gilea, Melody Odesa, Sorrial, Dagmar are noted for broad agroecological adaptability and plasticity. They are able to adapt and form high productivity both in the enlarged zones, and in the subzone, microzone of the steppe, forest-steppe and Polissya zones. Eco-friendly varieties in dry years, under adverse conditions and agro-environmental factors reduce yields to a lesser extent than other types of varieties. Unsatisfactory conditions for the development of winter wheat, formed as a result of soil and air drought during the spring-summer period of 2012, made it possible to determine the adaptability of varieties to drought. The highest drought tolerance was noted by the varieties of Kochenka, Zhadana, Konka, Farmer, Niva, Odessa, Melody of Odessa, Generosity Odesa, Boria, Malinovka, Gileia, Toulouse. Below she was in the varieties Mihultsa, Lukulus, Pannonikus, Stan, Shtru 061884, Sofiika, Dagmar, Midas. Significant differentiation of grades for winter resistance was noted. It was found to be insignificant in the varieties of Mihultsa, Lucullus, Pannonikus, LTRU 061884, Sorrial, Konka, Zvytyag, Ziski, Malinovka, Sofiika, Oberi Mironovsky, Dagmar, Midas, Svitanok Myronivsky. Some of them were sown in 2012, while Sorrial, Pannonikus, Lucullus varieties were slaughtered in the Slaviansoserbsk, Nikopol, Vilnyansky, Krasnogvardeysky sort plants and the Kherson center. Due to reduced winter resistance in some sort plants, previously registered varieties Fidelius, Tonatsia, Arktiz, Matrix, Etelos, Genesi died. Therefore, it is better to pick varieties with a wide homeostasis for their reaction to meteorological and agroecological factors for different ecological regions.

## **Conclusions**

Newly registered varieties of winter soft wheat differ in their ecological ability, revealing deep specific reactions to agro-ecological conditions in the places of their cultivation. The latter have a significant impact on the appearance of adaptability, plasticity and productivity of varieties.

In order to solve the problem of environmental adaptability and disclosure of the productivity of varieties, it is necessary to introduce a differentiated approach to their placement in agroclimatic zones, subzone, microzone and geographical point in accordance with the requirements of breeding and biological properties of varieties.

The complex of indicators of environmental adaptability, plasticity and productivity in the Steppe zone is to place varieties: Melody Odesa, Generosity Odesa, Boria, Gilea, Zvytyag, Konka, Farmerka; Forest-steppe - Boria, Gilea, Astarta, Niva Odesa, Generosity of Odesa; Polissya - Boria, Gilea, Niva, Odessa, Oberig Myronivsky, Colonia, Dagmar, Midas, Sorrial, Balaton. In some sub-regions, micro-regions and geographic regions, other varieties have better grades. Melodies of Odessa, Boria, Gilea, Sorrial, Dagmar are distinguished by wide agroecological adaptability and plasticity and ability to use the genotype to realize their potential and to be resistant to specific environmental conditions.

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