logical backgrounds. Therefore, the most effective breeding strategy is not to search for one universally best genotype, but to assemble a differentiated set of varieties suited to different zones and production scenarios.

When genotypes were compared by mean productivity, the leading varieties were Pamiati Horlacha, ZU Willem, BHV20GV0009, ZU Shamal, and Slava Unavy. However, the picture changed when stability was considered. According to the stability criterion, HIATSYNT was clearly the strongest genotype. This contrast demonstrates that varietal evaluation should not be based on yield alone. A reliable assessment requires the joint consideration of mean performance, ASV, YSI, and the graphical interpretation provided by AMMI biplots.

Additional evidence from the ranking structure and the genotype positions relative to the ideal type suggests that STK21G, Kvitoslava, and Dnistrianka Odeska should be regarded among the most balanced forms in the dataset. At the same time, HIMALAYA, STK21G, Dnistrianka Odeska, and ZU Willem expressed pronounced specific adaptation and may therefore be more suitable for targeted zonal use than for indiscriminate wide deployment. In this respect, STK21G appears particularly interesting, because it combines a strong ability to exploit favorable environments with relatively moderate variation in response, which supports its interpretation as one of the most versatile genotypes in the studied set.

Overall, the combined analysis of varietal ranking, productivity background, environmental representativeness, and discriminating ability provides an integrated picture of the adaptive structure of the tested material. The results clearly show that a well-designed testing system must include environments that differ not only in average productivity but also in their capacity to reveal genotype contrasts. Likewise, recommendations for varietal deployment should not rely solely on mean yield values. They must also account for the specific way in which each genotype interacts with ecological conditions, because it is this interaction that ultimately determines whether a variety will be broadly reliable or only locally superior.

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**Nazarenko, M. M.**[*], Doctor of Agricultural Sciences, Head of the Department of Plant Breeding and Seedfarming
**Okselenko, O. M.**, PhD of Agricultural Sciences, As. Professor of the Department of Plant Production
Dnipro State Agrarian and Economic University
[*]e-mail: nazarenko.m.m@dsau.dp.ua

## ASSESSMENT OF POSITIVE VARIATION IN WINTER WHEAT VARIETIES INDUCED BY DAB

Agricultural crops are increasingly exposed to unstable and frequently adverse environmental conditions, which makes adaptive capacity a central requirement for modern breeding. Ongoing climate change has intensified this challenge by altering precipitation patterns, increasing air temperatures, raising the frequency of extreme weather events, and modifying the epidemiological background of pests and diseases. Under such circumstances, the creation of plant material capable of maintaining useful agronomic performance under stress has become one of the major priorities of crop improvement programs.

The present study was undertaken to characterize the patterns of induced hereditary variability in winter wheat and to determine how genotype × mutagen interaction influences the frequency and diversity of useful mutations. Particular attention was given to the occurrence of favorable changes that may be of value for breeding practice.

Eight winter wheat genotypes (*Triticum aestivum* L.) were used as source material: Perspektyva Odeska, Sonata Poltavska, Shpalivka, MIP Lada, Farell, NE 12443, Ronin, and Seilor. For each treatment variant, 1000 seeds with a moisture content of 14% were exposed to DAB (1,4-bisdiazoacetylbutane) at concentrations of 0.1, 0.2, and 0.3%.

Induced changes were evaluated in the $M_2$ and $M_3$ generations, where visible mutations were recorded and inheritance patterns were followed. Depending on the year of the study, plot area varied from 5 to 10 m², and the field experiments were conducted with one or two replications. Standard control varieties were inserted after every twentieth plot. Grain protein content was measured using a Spektra RT device. Glutenin and gliadin fractions were quantified by reverse-phase high-performance liquid chromatography (RP-HPLC). The concentrations of essential microelements in grain, namely Mg, Mn, Zn, Mo, Co, and Cu, were determined using an Agilent 5110 inductively coupled plasma atomic emission spectrometer (ICP-AES), with wavelength calibration based on Agilent multi-element standard solutions.

Treatment effects were assessed statistically by analysis of variance (ANOVA). To broaden interpretation of the data structure, discriminant analysis and cluster analysis were also applied, using Euclidean distance and the single-linkage method. Mean comparisons between treatments were carried out using Tukey's HSD test at a significance threshold of $P < 0.05$.

The deliberate induction and exploitation of genetic variability have become indispensable elements of contemporary breeding. Previous studies have shown that mutation-based variability can be successfully used to generate original breeding material with improved manageability, higher reliability, and more predictable expression of economically important traits. In this respect, mutagenesis

serves not simply as a source of random abnormalities, but as a controlled tool for broadening the genetic base available to breeders.

The results of the present study indicate that DAB is an effective mutagen for both domestic and foreign winter wheat germplasm. At the same time, the material generated after treatment appears to be more valuable as a parental resource for recombinant breeding than as a direct source of ready-to-release cultivars. In other words, DAB treatment primarily expands the pool of useful variation rather than immediately producing finished commercial genotypes.

A particularly important outcome of the study was the observation that several traits usually regarded as genetically conservative or difficult to modify nevertheless showed meaningful variability under DAB treatment, while undesirable side effects remained comparatively limited. Moreover, even with increasing mutagen concentration, the frequency of unfavorable trait combinations remained relatively low. This distinguishes DAB favorably from many traditional mutagens. At the highest tested concentration, 0.3%, negative combinations were still uncommon, which substantially reduced the loss of otherwise promising mutant forms.

Another noteworthy pattern was the close relationship between economically important traits and the overall frequency and spectrum of visually detectable mutations. Under DAB treatment, this association was especially clear and appeared to differ from patterns described earlier for classical chemical supermutagens. This suggests that DAB may induce a somewhat distinct mutational profile, one that may be more favorable for practical breeding when properly matched with suitable source material.

The experimental results also provided insight into the dynamics of mutation induction. In general, greater mutagenic intensity and higher dosage are often associated with reduced site specificity. However, under DAB treatment the situation appeared more complex, indicating that this mutagen may behave differently from many standard chemical agents. Earlier research likewise suggests that DAB-induced mutations can serve as a stable and renewable source of useful local diversity, contributing to the improvement of spike morphology, earliness, and disease resistance. These findings support the view that chemically induced mutants should be considered primarily as breeding resources for further hybridization and recombination, rather than as final products for direct release.

Overall, the study confirms that careful choice of genotype is essential if breeders wish to maximize the frequency of useful changes while limiting the occurrence of undesirable modifications. Despite the unavoidable constraints of mutation breeding, the results strongly support the use of responsive source material in combination with optimized DAB concentrations as an effective means of increasing trait-specific genetic diversity.

Among the varieties included in the experiment, Farell, Ronin, and Seilor proved to be the most valuable as breeding donors. They showed mutation-derived variability in plant architecture, developmental timing, and grain quality, including protein content and microelement composition. The likelihood of obtaining breeding-relevant material was clearly highest when DAB was applied at 0.3%, provided that the source genotype had been selected appropriately. Among the mutant derivatives, lines 89 and 100 were especially promising because they combined consistently high yield with grain quality at or above the target level, making them strong candidates for inclusion in state varietal testing.

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**Nikolić, V.**[1], Ph.D. of technological engineering, senior research associate
**Šimić, M.**[1], Ph.D. of food technology, principal research fellow
**Žilić, S.**[1], Ph.D. of food technology, principal research fellow
**Nešković, B.**[1], M.Sc. of chemistry, research trainee
**Milovanović, D.**[1], Spec. Dr. of veterinary medicine, research trainee
**Kandić, V.**[2], PhD of agronomy and plant breeding, senior research associate
**Perić, V.**[2], PhD of agronomy and plant breeding, senior research associate
[1]Department of Food Technology and Biochemistry,
[2]Department of Plant Breeding,
[1,2]Maize Research Institute, Zemun Polje, 11185 Belgrade, Serbia
e-mail: valentinas@mrizp.rs

## QUALITY PARAMETERS OF LOCAL WHEAT GENOTYPES CULTIVATED IN VARIOUS LOCATIONS IN SERBIA

Wheat (*Triticum aestivum* L.) is an ancient and widely cultivated food source integral to global diets. As whole-grain wheat increasingly features in diets, grain quality, influenced by breeding programs and production practices, becomes critical. Excessive intake of refined wheat products is associated with health risks, including obesity, type 2 diabetes, and coronary diseases. Refined flour's functional properties stem from its protein and starch content, which averages between 7–15% and 54–72%, respectively. In contrast, whole wheat flour retains beneficial minerals, dietary fibers, B vitamins, and phytochemicals, which promote health. The aleurone layer is rich in antioxidants, thereby preserving bioactive compounds as dietary fiber aids in their digestion and colon health. Test weight, protein content, and gluten characteristics are significant indicators of wheat quality, affecting cereal baking performance by influencing