# New Gizda variety of winter common wheat*

**Zlatina Uhr & Ginka Rachovska**

Institute of Plant Genetic Resources "K. Malkov", 2 Druzhba str. 4122 Sadovo, Plovdiv Distr. Bulgaria; e-mail: zlatinapg@abv.bg (corresponding author)

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**Abstract.** Variety is one of the main components in technological solutions to each crop. Depending on the specific agroecological conditions of the region, selection of the correct varietal structure can significantly increase yields and product quality, and counteract climate change. The new Gizda variety of winter common wheat was approved in 2013 by the Executive Agency for Variety Testing Field Inspection and Seed Control. Gizda was obtained by means of chemical mutagenesis by treating with a chemical mutagen sodium azide the dry seeds of Pobeda variety, in a concentration of 1 mM. The new variety possesses ecological plasticity, thanks to its resistance to cold and its drought tolerance. It is not demanding in respect to growing conditions and monoculture, without lowering its yields. Gizda is economically efficient variety. The average grain yield of Gizda is 7.47 t/ha, as a result of a six-year testing period. The quality of grain belongs to group V – wheat with average power. Considering the fact that the standard of quality in group V is Sadovo 1 variety, it could be maintained that Gizda variety is suitable for bread baking alone.

**Key words:** breeding, climate changes, experimental mutagenesis, winter common wheat, yield

## Introduction

Global climate change, which in the 1990s has seemed like a distant chimera, unfortunately, has become a fact in our everyday life. Agriculture is one of the most important sectors of Bulgarian economy. The most vulnerable crops because of climatic changes occurring in Bulgaria are the crops grown without irrigation. Variety is one of the main components in technological solutions to every culture. It provides the correct varietal structure and, depending on the specific agroecological conditions of the region, can significantly increase yields and quality of the production, and counteract climate change.

In the breeding program of the Institute of Plant Genetic Research (IPGR) – Sadovo, intervariety hybridization (Boyadjieva 2003), remote hybridization (Stankov 1996) and experimental mutagenesis (Rachovska & al. 2002, 2003) are systematically applied. The aim of this study is to describe the biological and economic characteristics of the Gizda new winter wheat variety

## Material and methods

The variety was bred in 1997, by way of experimental mutagenesis, by exposure of dry seeds of the Pobeda variety to the chemical mutagen sodium azide, at a concentration of 1 mM. The baseline MH 178/1 defense in the second mutant plant generation was as amended. In the period 2003/2004, the new variety was tested in comparative variety trials. Biological and economic properties of the Gizda candidate va-

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riety have been studied at the Executive Agency for Variety and Seed. Analyses of cold and drought tolerance and disease resistance were conducted in the Laboratory of Plant Pathology and Physiology at IPGR Sadovo. Statistical analyzes were carried out with Statistica 7.

## Results and discussion

Gizda variety is whitespike wheat. It was recognized by IASAS in 2013. The author of the new high-yielding Gizda winter wheat variety is Assoc. Prof. Ginka Rachovska.

### Morphological peculiarities

***Stem***: about 95 cm high as measured, and the length of the ear stem of Gizda variety is lower by 15 cm in comparison to the starting Pobeda variety. It has a thicker straw and, therefore, an increased resistance to lodging. ***Leaves***: sprout with colorless koleoptil with semijack. ***Spikeless***: 3–4 flowered forms form an average of 3. The spike has a pyramidal shape, it is relatively long (8–12 cm) and its medium density color is white to straw-yellow (Fig. 1). ***Kernel*** is medium in size. The absolute weight is about 38.4 g. The number of kernels in the main ear are about 60. Weight of grain from the main ear is 2.45 g. Weight of grains of 1 plant is 7.1 g. Number of grains in one plant are 175. ***Resistance to lodging***: Gizda variety has a shorter stem than its parental variety. The core of the trunk is average, as recorded at the top interknot. ***Resistance to shattering***: Gizda variety has a very good to excellent resistance.


**Fig. 1.** Gizda variety - Spikelles and Kernels.

Growing season: data from the perennial phenological observations show that Gizda variety is heading and ripens two days earlier than Sadovo 1= mutaginez.

### Economic properties

The results of a six-year study in competitive variety trials have shown that the average grain yield of the new variety is 7.47 t/ha (Table 1). For the same period, the yield obtained from the standard group V of Sadovo 1 is 6.76 t/ha. In parameters, the yield of Gizda variety excels the parental Pobeda variety, as well as Sadovo 1 variety. The increase, as compared to the standard, is 111 %.

Table 2 presents data of the complex biological and economic properties of the Gizda variety. The results of biometric measurements show that the plant forms four tilling plants on the average, which nearly always are productive. The variety has high tilling ability (about 800/$m^2$). It forms dense and leveled crops due to high and stable yields. Values of the technological properties are closer to those of the standard variety of group V and some are higher. Considering the fact that the quality standard in group B is Sadovo 1 variety, we can positively confirm that Gizda variety is suited for baking bread, when used separately. One of the main drawbacks of the new variety is the relatively low weight of 1000 grains. The grain is well filled and leveled. Its hectoliter weight is relatively high.

Gizda resistance to brown stem rust and powdery mildew is similar to the Sadovo 1 variety, i.e fairly tolerant. It possesses ecological plasticity, thanks to its resistance to cold and drought tolerance.

**Table 1. Productivity of Gizda variety.**

| Variety | Yield. t/ha | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | | 2011 | | 2012 | | 2013 | | 2014 | | 2015 | |
| | | % to St. | | % to St. | | % to St. | | % to St. | | % to St. | | % to St. |
| Gizda | 7.35 | 126.3 | 8.20 | 113.7 | 7.20 | 109.4 | 7.41 | 109.3 | 7.54 | 98.6 | 7.12 | 109.5 |
| Pobeda | 5.58 | 96.0 | 6.04 | 83.8 | 6.13 | 93.2 | 5.86 | 86.4 | 6.3 | 82.4 | 6.1 | 93.8 |
| Sadovo 1 | 5.82 | | 7.21 | | 6.58 | | 6.78 | | 7.65 | | 6.5 | |

**Table 2. Agronomic characteristics of the new variety Gizda.**

| N | Parameters | Сортове | | |
|---|---|---|---|---|
| | | Gizda | Sadovo 1 | Yantar |
| 1 | Vegetation period | 227 | 229 | 229 |
| 2 | Nummber of spikestems | 792 | 786 | 696 |
| 3 | Wintersurvived plants. % | 99.5 | 99.6 | 99.9 |
| 4 | Resistance to lodging | 9 | 9 | 9 |
| 5 | Resistance to shattering | 0 | 0 | 0 |
| 6 | 1000-grain weight | 37.2 | 43.1 | 40.1 |
| 7 | Test weight (Hectoliter weight) | 79.4 | 77.0 | 74.8 |
| 8 | Total vitreousness. % | 69.7 | 68 | 63 |
| 9 | Crude protein content. % | 11.25 | 11.4 | 11.83 |
| 10 | Wet gluten content | 33 | 34 | 32.4 |
| 11 | Bread- maiking strength index | 59 | 55 | 54 |
| 12 | Sedimentation value. cm3 | 46 | 57 | 45 |
| 13 | Parameters of the Farinograph | | | |
| 13.1 | Time for the dough formation. min | 2. 52 | 2.55 | 2.58 |
| 13.2 | Durability. stability. min | 5.21 | 4.83 | 5.50 |
| 13.3 | Slack dough. 10 min. | 70 | 56 | 56 |
| 13.4 | Dough consistency. | 100 | 96 | 100 |
| 14 | Indicators of bread | | | |
| 14.1 | Specific volume. cm3/g | 2.90 | 2.84 | 2.82 |
| 14.2 | Form stability | 0.42 | 0.44 | 0.46 |
| 14.3 | Sensory evaluation – shaped rock contingent units | 6.64 | 6.92 | 7.04 |

## Conclusion

The Gizda common winter wheat variety is a complex breeding achievement. It is characterized by high and stable productivity. It has ecological plasticity, thanks to its resistance to cold and drought tolerance. Monoculture is tolerated without lowering the yields. Gizda is an economically efficient variety. Quality grain belongs to group V – wheat with average power. Considering the fact that the standard of quality in group B is Sadovo 1 variety, we can positively confirm that Gizda variety is suited for baking bread, when used separately.

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