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FACULTY OF AGROBIOTECHNOLOGY

Department of Genetics, Breeding and Seed Production of Crops

CROPS VARIETY SCIENCE

Methodical instructions for practical classes and independent work in the discipline «Field crops breeding and seed production» for applicants for the first (bachelor's) level of higher education in speciality H1 «Agronomy»

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The methodological guidelines provide varietal traits and economically valuable indicators of the main crops included in the State Register of Plant Varieties Suitable for Distribution in Ukraine, necessary for practical classes and independent work, test questions for verification, and a list of recommended literature. The proposed methodological guidelines will help to master theoretical material and practical skills in the study of field crops breeding and seed production.

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PREFACE

The introduction of plant varieties included in the State Register of Plant Varieties suitable for distribution in Ukraine in the soil and climatic zones recommended for them ensures high and sustainable yields with the expected high-quality characteristics. In order to realise the potential of varieties and hybrids in production conditions, a specialist must know their morphological (varietal), economic and biological characteristics in order to properly organise their cultivation and seed production technology.

The experience of the Department of Crop Genetics, Breeding and Seed Production shows that for the sustainable assimilation of varietal traits, economic and biological characteristics of varieties and hybrids, students need to have specific knowledges. The methodological guidelines are compiled in accordance with the programme of the discipline «Field Crops Breeding and Seed Production» and include materials on new varieties included in the State Register of Plant Varieties Suitable for Distribution in Ukraine (hereinafter referred to as the State Register). They are a complement to the existing educational literature and will contribute to the effective organisation of the educational process and a deeper understanding of the knowledge and skills of the discipline

The main objective of the discipline «Field Crops Breeding and Seed Production» is to develop students' knowledge and skills in the scientific basis of breeding and seed production of varieties, hybrids, as well as in the varietal control of crops to obtain high yields in farms with modern cultivation technologies.

WHEAT

(Triticum L.)

There are three types of wheat producing in Ukraine: *Triticum aestivum* L., *Triticum durum* Dest., *Triticum spelta* L. The main sown areas (about 5 million hectares) are planted with winter soft wheat varieties, which are listed in the State Register of Plant Varieties Suitable for Distribution in Ukraine for 2024 in all growing zones at 738 names. The yield potential of modern varieties is over 10 tons per hectare. About 190 thousand hectares are covered by spring wheat varieties, which are listed in the State Register as of 2024 with 67 names. Mostly durum winter and spring wheat varieties are sown in the eastern and central Forest-Steppe and Steppe regions, with 36 and 31 varieties listed in the State Register as of 2024, respectively. Since 2012, the State Register of Plant Varieties has included spelt, which includes eight varieties.

In modern conditions, agrophytocenoses are focused on growing genetically diverse varieties and creating an agroecological specialised system that expands the adaptive potential of the crop. To increase the stability of grain yields with good quality indicators, it is necessary to cultivate groups of varieties with different interphase periods and total vegetation periods that are resistant to shattering and germination of grain during the overstay of mature breads. Each of these groups should be differentiated into subgroups: short and medium-sized genotypes. High-intensity varieties should be cultivated on high agricultural backgrounds. In conditions of medium NPK supply, the most adapted to unfavourable growing conditions, including low natural fertility, including those tolerant of late sowing, with high winter and frost resistance (including ice crust resistance), able to tolerate flooding and soil salinity, soaking, and to form economically viable yields on soils with low mineral nutrient content, etc. A common requirement for all varieties is resistance to or tolerance of a complex of phytopathogens and high-quality products. Therefore, every agricultural enterprise, regardless of the area of arable land, should grow 3–5 different varieties that will ensure sustainable grain production.

Characteristic / variety	**Bulat Kharkivskiy**	**Vuyko**	**Landar**
Awns: intensity of anthocyanin colouration	moderate	absent or very weak	absent or very weak
Awns: length relative to the ear	average	short	
Spikelet: intensity of wax coating	moderate	strong	moderate
Spikelet: arrangement of awns	along the entire length		
Spikelet: colouration	white	grey-smoky	
Spikelet: density	medium	medium	medium
Spikelet: length (without awns and teeth)	medium		long
Spikelet: by width (side view)	medium		
Spikelet: by shape	pyramidal		
Spikelet: awns	present		
Spikelet: position in space	semi-drooping		
Spike axis: by strength	flexible		
Lower spikelet scales: first keel tooth by length (on spikelets from the middle third of the ear)	short	medium	long
Lower spikelet scale: second keel tooth by size (on spikelets from the middle third of the ear)	absent or very small	little	medium
Lower spikelet scales: pubescence of the outer surface	missing		
Grain: colour in phenol	absent or very light	the characteristic is not defined	dark
Spikelet: number of flowers	medium	small	medium
Spikelet: flower fertility	prolific		
Grain: by shape	elongated		
Grain: by colour	light brown	brown	
Grain: by surface character	slightly wrinkled	deformed	
Grain: by size	medium		

Appendix K

Morphological characteristics of oat varieties

Characteristic	**Azamat**	**Amar**	**Radonit**
Plant: habit	semi-upright	straightforward	semi-direct
Plants: by height	tall	medium-sized	
Plant: frequency of plants with twisted flag leaves	absent or very rare	average	rarely
Lowest leaves: pubescence of the blade	absent or very weak		
Leaf blade: pubescence of leaf margins	absent or very weak		
Stem: pubescence of the highest node	absent or very weak		
Stem: intensity of pubescence of the highest node	very weak		
Panicle ejection time (first secondary spikelet visible on 50 % of panicles)	average		
Panicle: by length	medium		
Panicle: orientation of branches	single mane	spreading	single mane

Characteristic	**Azamat**	**Amar**	**Radonit**
Panicle: position of branches	drooping	horizontal	drooping
Panicle: position of secondary spikelets	drooping		
Spikelet scales: greyishness	weak		
Spikelet scales: by length	medium		
Primary grain: greyishness of lower flower scales	absent		naiavna
Primary grain: intensity of greyishness of the lower flower scales	very weak		weak
Primary grain: tendency to become spinous	absent or very weak	weak	absent or very weak
Primary grain: lower floral scales in length	average		long
Primary grain: pubescence of the back of the lower flower scales	missing		
Primary grain: pubescence of the base	absent or very weak		
Primary grain: basal hairs by length	short		the characteristic was not determined
Primary grain: shaft of the second grain by length	average		long
Grain: film	available		absent
Grain: colour of the lower floral scales	white	yellow	white

Crops variety science

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by applicants for the first (bachelor's) level of higher education in speciality H1 «Agronomy»

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