

CONDITION OF WINTER CROPS IN THE KHARKIVSKA OBLAST ON JANUARY 20, 2022

The weather in the 2021/2022 winter, like in most recent years, was characterized by elevated and instable temperatures. According to the Kharkiv Regional Meteorological Center's data, in the first half of January, due to a series of cyclones and anticyclones that moved on the territory of the Oblast, there were significant air temperature contrasts, snow, sleet, and blizzard on the territory of the Oblast. The average air temperature was 5.3–7.1°C or by 1.2–1.8°C higher than the multi-year average. The minimum air temperature dropped to - 13 – - 16°C; the snow surface cooled to - 15 – - 21°C.

The precipitation amount in most parts of the Oblast was 20-27 mm or 140-175% of the multi-year average. The average thickness of snow cover ranged from 10 cm to 15 cm. The snow density was 0.20–0.35 g/cm³. On January 20, the depth of soil freezing ranged from 5 cm to 27 cm. Under the influence of warm air masses on the majority, there was no solid snow cover in most of the fields; in the northern and north-western parts of the Oblast, a ground ice crust formed in the fields, mainly in the depressions. Its average thickness was 1 - 2 mm.

The maximum wind speed was 15 - 17 m/s, sometimes up to 20 m/s, which made snow cover thickness in the fields various.

No threatening phenomena for overwintering of winter crops have been observed so far.

The minimum soil temperature at the winter crop tillering depth (3 cm) ranged within - 1 – 4°C, which is much higher than the calculated critical freezing point (- 14 – - 16°C for normally tillered plants and - 12 – -13 ° C for non-tillered (1-3 leaves) ones and freeze-susceptible varieties).

Scientists of the Sector of Resistance to Abiotic Factors of the Laboratory of Wheat Breeding and Physiology of the Plant Production Institute named after V.Ya. Yuriev of NAAS conducted a survey of winter crops. As of January 20, 2022, the initial inspection of selected plants found no significant damage; leaf blades of plants that were under snow cover looked undamaged and turgor; only tips 1.2-1.5 cm long were locally damaged and dried. Most of lower leaves, especially on well-tillered plants, turned yellow and macerated due to natural reutilization of nutrients into young organs and tillering nodes. Plant samples selected from winter crops regrew well; they actively formed new leaf blades and secondary roots in a greenhouse (Figs. 1, 2).

Winter cereal plants are winter dormant. The apical domes of the main shoots in winter wheat varieties are at the 1st -2nd stages of organogenesis; plants mainly have formed secondary root systems. Winter triticale and winter rye varieties are in the tillering phase; their secondary root systems are well-developed. The apical domes of the main shoots in triticale and rye are at the 2nd stage of organogenesis.

As of January 15, 33.0-38.2% of soluble carbohydrates (related to dry weight) were accumulated in tillering nodes of the winter wheat varieties recommended for cultivation in the Kharkivska Oblast. The content of soluble

carbohydrates was 33.2% in winter triticale tillering nodes; 31.4% - in alternate triticale; and 30.0% - in winter rye. Compared to the data for December 2, 2021, there was a slight decrease in the content of soluble carbohydrates in tillering nodes, because, according to the Kharkiv Regional Meteorological Center's data, December 2021 was warmer than usual, and a steady below-zero temperature in the Kharkivska Oblast only set in from 12 to 21 December (meteorological winter onset). The average monthly air temperature was -0.9 – - 2.7°C and it was by 1.0 - 1.5°C higher than the multi-year average and by 0.7 - 1.9°C higher than last year's value. The maximum the air temperature rose to 10 - 12°C. Under such conditions, sugar reserves were slowly consumed due to weak metabolic processes, although plants did not vegetate (Table).

Table. Soluble carbohydrate content dynamics in the winter cereal tillering nodes in the 2021/2022 winter

Crop	Variety	Soluble carbohydrate content, % related to dry weight	
		December 2, 2021	January 10, 2022
Winter bread wheat	Doskonala	39.0	38.2
	Zapashna	36.7	36.0
	Dagmar	34.0	33.0
Winter triticale	Rarytet	35.7	33.2
Alternate triticale	Pidzymok	34.4	31.4
Winter rye	Stoir	30.2	30.0

In the future, under unstable weather, the ice crust threat remains. In this regard, agricultural crops on farms in the Oblast should be monitored. The next deadline for cutting out ground monoliths and sampling plants for express-analysis is January 20-25, but in case of significant temperature shifts, formation of ice crusts or other adverse weather factors, unscheduled crop surveys should be conducted on an extraordinary basis.



Fig. 1. Winter wheat plants sampled to determine the viability by express method, after 1 day

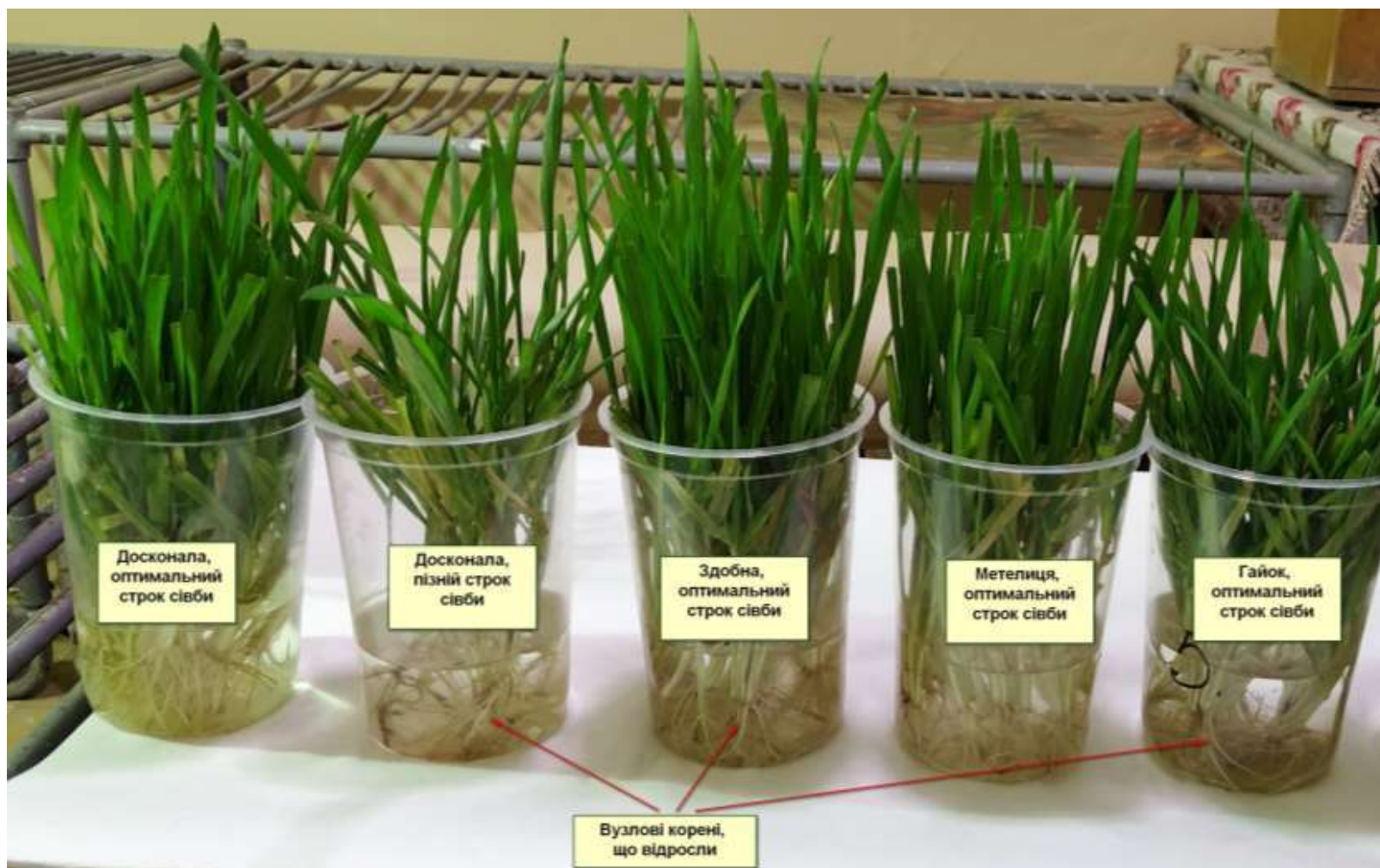


Fig. 2. 7-day regrowth of winter wheat varieties bred at the Plant Production Institute named after V.Ya. Yuriev of NAAS; assessed by express method

Doskonala sown within the optimal timeframe; Late-sown Doskonala; Zdobna sown within the optimal timeframe; Metelytsia sown within the optimal timeframe; Haiok sown within the optimal timeframe; Regrown nodal roots