

## SECTION 2. PLANT PROTECTION AND QUARANTINE

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### WEEDINESS OF LATE WINTER WHEAT CROPS AFTER SOYBEAN FORECROP IN THE CONDITIONS OF THE EASTERN FOREST-STEPPE OF UKRAINE

### ЗАБУР'ЯНЕНІСТЬ ПІЗНІХ ПОСІВІВ ПШЕНИЦІ ОЗИМОЇ ПІСЛЯ ПОПЕРЕДНИКА СОЯ В УМОВАХ СХІДНОГО ЛІСОСТЕПУ УКРАЇНИ

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Winter wheat is the main food crop of Ukraine. The main value of this culture is determined by high nutritional value of the grain, which is processed into flour, peeled grains, starch, etc. Tasty and nutritious bread is baked from wheat flour, many different confectionery products are made [1, p. 17].

Weeds have a negative effect on the cultivation of winter wheat. The most harmful and widespread in crops are dicot wintering weeds. The second place in terms of harmfulness in winter crops is occupied by dicotyledonous perennial weeds, especially root-sprouting species [2, p. 26–27].

Weediness of winter wheat crops depends significantly on the forecrop. It has been established that after clover meadow as forecrop, winter wheat was weeded mainly by annual dicotyledonous weeds, and after corn for grain as forecrop was weeded by monocotyledonous cereal and dicotyledonous root-sprouting species [3, p. 76]. In the conditions of the fallow-grain-row crop rotation, 50 and 45 species of weeds were found on

the fields of winter wheat after black fallow and peas for grain forecrops, respectively, and in the winter wheat monoculture was 41 species [4, p. 3].

According to the temperature regime in the latitude of Kharkiv (Eastern Forest-Steppe of Ukraine), the optimal period for sowing winter wheat is determined between 5–20 September [5, p. 105]. At present, in the conditions of climate changes towards warming, later dates for sowing winter wheat are becoming widespread [6, p. 613]. Therefore, the determination of the species composition of weeds, their number and weight in late sowings of winter wheat after soybeans as forecrop in the conditions of zone is relevant both from a scientific and practical point of view.

The investigation was conducted during 2018–2020 in the conditions of the Eastern Forest-Steppe of Ukraine (Kharkiv region, Kharkiv district). The soil was a typical heavy loamy chernozem. The main fertilizer was not applied. The forecrop was soybean (*Glycine max* (L.) Merrill.). Sowing was carried out with untreated seeds of soft winter wheat (*Triticum aestivum* L.) variety ‘Mulan’: 11 October, 2017; 19 October, 2018; 27 September, 2019. Crop care consisted of early spring feeding of the crops with ammonium nitrate (0.1 t/ha). The plot area was 36 m<sup>2</sup>. Experiments were replicated three times. Counting of weed plants was carried out in control variants (without herbicides, insecticides, fungicides, etc.) before harvesting. To do this, all weeds by species were counted in four places of each plot. The counted weeds were weighed according to the main agrobiological groups: spring late cereal weeds; spring early and late dicotyledonous; wintering dicot; perennial dicot. The area of the accounting frame was 0.25 m<sup>2</sup>.

Pre-harvest counting of weeds in late sowings of winter wheat after soybean forecrop showed that the segetal vegetation was represented by nine families: Poaceae (3 species); Chenopodiaceae (1 species); Amaranthaceae (1 species); Asteraceae (5 species); Polygonaceae (2 species); Lamiaceae (1 species); Fumariaceae (1 species); Convolvulaceae (1 species); Fabaceae (1 species).

In total, 16 species of weeds and contaminants (including soybean windfall) were detected (Table 1). In particular, 3 species were assigned to the group of spring late cereal weed plants: *Echinochloa crus-galli* (L.) Roem. et Schult., *Setaria glauca* (L.) Beauv. and *Setaria viridis* (L.) Beauv. The group of spring early and late dicotyledonous weed plants included 9 species: *Chenopodium album* L., *Amaranthus retroflexus* L., *Fallopia convolvulus* (L.) A. Love, *Stachys annua* L., *Xanthium strumarium* L., *Polygonum aviculare* L., *Fumaria officinalis* L., *Ambrosia artemisiifolia* L., and windfall *Glycine max* (L.) Merrill. The group of dicot wintering weeds was represented by only one species, namely compass lettuce (*Lactuca serriola* L.). The group of perennial dicot weeds included 3 species: *Cirsium arvense* (L.) Scop., *Sonchus arvensis* L., *Convolvulus arvensis* L.

Table 1

**Weediness of late crops of winter bread wheat at the end of the growing season depending on the soybean forecrop, average for 2018–2020**

Species of weed plants	Agrobiological group	Number of weeds, pcs./m <sup>2</sup>	Raw mass of weeds, g/m <sup>2</sup>
<i>Echinochloa crus-galli</i>	spring late cereal	155.2	24.0
<i>Setaria glauca</i>			
<i>Setaria viridis</i>			
<i>Chenopodium album</i>	spring early and late dicotyledonous	117.2	53.2
<i>Amaranthus retroflexus</i>			
<i>Fallopia convolvulus</i>			
<i>Stachys annua</i>			
<i>Xanthium strumarium</i>			
<i>Polygonum aviculare</i>			
<i>Fumaria officinalis</i>			
<i>Ambrosia artemisiifolia</i>			
<i>Glycine max</i> (windfall)			
<i>Lactuca serriola</i>			
<i>Cirsium arvense</i>	perennial dicotyledonous	83.4	839.3
<i>Sonchus arvensis</i>			
<i>Convolvulus arvensis</i>			
Total weed plants		356.1	916.6

The analysis of agrobiological groups of weeds showed that by raw mass there were the most perennial dicotyledonous species, and the least, as well as by number, were wintering dicotyledonous species. So, in terms

of quantity before harvesting winter wheat, spring late cereal species predominated (155.2 units/m<sup>2</sup> or 43.59% of the total number of weeds). The number of spring early and late dicot weed plants was 117.2 pieces/m<sup>2</sup> or 32.91%, wintering dicots was 0.3 pieces/m<sup>2</sup> or 0.08%, perennial dicots was 83.4 pieces/m<sup>2</sup> or 23.42%. Perennial dicotyledonous dominated by raw mass (839.3 g/m<sup>2</sup> or 91.57%). The raw mass of spring late cereal weeds was 24.0 g/m<sup>2</sup> or 2.62%, spring early and late dicotyledonous was 53.2 g/m<sup>2</sup> or 5.80%, wintering dicotyledonous was 0.1 g/m<sup>2</sup> or 0.01%. It is likely that a very low share of wintering dicotyledonous species in crops was related to pre-sowing tillage immediately before sowing winter wheat. This technique effectively destroyed wintering dicotyledonous weeds, as they sprout mainly in autumn.

Therefore, the species composition of weed plants in late sowings of winter wheat after soybean as forecrop was relatively small (only 16 species) with a significant share of perennial dicotyledonous species (91.57%) in the total raw mass of weed plants, which should be taken into account for the development of methods of their control in the conditions of the Eastern Forest-Steppe of Ukraine.

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