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INFLUENCE OF SOWING DATES AND PREDECESSORS ON THE PRODUCTIVITY OF WINTER WHEAT DURING THE AUTUMN VEGETATION PERIOD

Wheat is the most valuable food crop in the world and in Ukraine. Products made from wheat contain protein and many other important and beneficial components that complement human nutrition.

To achieve consistently high yields of winter cereal crops, it is essential to continuously study and adhere to optimal sowing dates. Numerous studies indicate that the sowing period has a significant impact on plant development, survival, frost resistance, cold tolerance, stem density, yield, and, importantly, product quality. The optimal sowing period is relatively short, and deviations from it lead to reduced yields [1-3].

The natural and climatic conditions and soils of the northern part of the Ukrainian Steppe are suitable for growing winter wheat, which produces high-quality products with high yields. However, due to rapid climate changes on the planet, including in Ukraine, the northern steppe is now an agricultural zone where plants are most exposed to environmental stress factors. Among the natural factors, precipitation and temperature have the greatest impact on the productivity of cultivated plants [4].

Among the main factors influencing winter wheat yield, preceding crops play an important role. Predecessors affect the water, air, and nutrient regimes of the soil, which, in turn, influence plant growth intensity. They affect the yield and biological indicators of winter wheat differently. Given the ongoing trend of reducing areas under fallow, leguminous crops, and perennial pastures, it is essential to focus on finding predecessors that provide favorable conditions for the growth of winter wheat [5].

Long-term studies indicate that the best productivity of winter wheat varieties in the Steppe is achieved after fallow predecessors. However, as the share of black fallow in modern agricultural production continues to decrease and the areas sown with crops such as sunflower, corn, and soybeans expand, it becomes relevant to study the peculiarities of winter wheat vegetation after these predecessors. The importance of determining optimal sowing dates for winter wheat has significantly increased due to global climate changes. Furthermore, this agronomic practice is considered the most cost-effective way to enhance plant productivity without additional expenses [6].

Recommended optimal sowing dates for winter crops are continuously developed based on aggregated data from research institutions. However, sowing dates are adjusted according to agronomic and soil conditions and should be clearly defined for each natural-agricultural zone or even for individual farms.

The territory of the farm where the research was conducted is located in the black soil zone of the northern Steppe of the Right Bank of Ukraine, in the subzone of ordinary black soils transitioning to deep ones. A two-factor experiment was established in field conditions, where factor A represented sowing dates and factor B represented predecessors.

In our experiments, when sowing on September 25, winter wheat plants formed an average of 1.9 shoots per plant after soybean and 1.6 shoots after sunflower. Considering that the smallest significant difference for the predecessor factor is 0.19 shoots, we obtained a significant difference in plant productivity for this factor of 0.3 shoots.

However, the most tillered plants in the experiment were those sown on September 10. After soybean, the wheat plants formed up to 3.0 shoots, while after sunflower they formed slightly fewer – 2.7 shoots. The difference between these variants, as well as for sowing at the optimal time, was also significant at 0.3 shoots. It should be noted that the sowing date had a greater influence on plant productivity, with a significant difference of LSD_{05} = 0.30 shoots. For early sowing, the number of stems increased by 1.1 shoots compared to the optimal date for both predecessors.

At the optimally early sowing date (September 17), the increase in the number of shoots was also significant: +0.7 shoots after soybean (totaling 2.6 shoots per plant) and +0.6 shoots after sunflower (2.2 shoots). It is also worth mentioning that at a sowing date of September 17, the difference in tillering of winter wheat plants across different predecessors was the largest, equal to 0.4 shoots with LSD_{05} = 0.19 shoots.

Sowing winter wheat after September 25, that is, at the optimally late and late dates, negatively affected shoot formation and plant tillering. For instance, when sown on October 2, plants had only 1.2 shoots; moreover, the predecessor factor did not influence plant productivity, with equal numbers recorded after both soybean and sunflower. However, growth and development processes were more intensely reduced in the variant where wheat was sown after soybean, with plants having 0.7 fewer shoots (0.4 fewer after sunflower).

The least tillered plants in our experiments were those sown at the late date of October 9. The number of shoots did not exceed 1.0 for both predecessors. The decrease in plant productivity at this sowing date was greatest after soybean, with 0.9 fewer shoots recorded, while after sunflower there were 0.6 fewer shoots; this difference was significant at LSD_{05} = 0.19 shoots.

The number of winter wheat plants per unit area at the stage of cessation of autumn vegetation was also determined by sowing dates and predecessors. At the early sowing date, we counted 1288 plants/m² after soybean and 1189 plants/m² after sunflower. Compared to the optimal sowing date, the plant density increased by 498 plants/m² and 549 plants/m², respectively. With an LSD_{05} for the sowing date factor of 68.97 plants/m², this difference was the largest in the experiment. Moreover, the predecessor also significantly influenced stem productivity, with a difference of 99 plants/m² for predecessors being significant at LSD05 = 43.62 plants/m².

A delay in sowing dates by one week, that is, already on September 17, led to a decrease in stem density to 1092 plants/m² and 945 plants/m² for soybean and sunflower, respectively. However, these figures were significantly higher than in the variant where winter wheat was sown at the optimal time (September 25), with increases of +302 plants/m² for soybean and +305 plants/m² for sunflower. Interestingly, at the optimally early sowing date, the difference in stem density between predecessors was the same as at the optimal sowing date.

At the optimally recommended sowing date of September 25, stem density was at 790 plants/m² for soybean and 640 plants/m² for sunflower. The predecessor factor in this variant had the most effective influence on stem density indicators.

With later sowing dates for winter wheat after September 25, the number of plants per unit area before winter significantly decreased. At a sowing date of October 2, we counted 520 plants/m² and 521 plants/m² for soybean and sunflower, respectively. Stem density decreased by 270 plants/m² and 219 plants/m², respectively, with the most negative impact observed after soybean.

At a sowing date of October 9, the productivity indicators of winter wheat in terms of the number of stems per unit area were the lowest in the experiment – 435 plants/m² for soybean and 431 plants/m² for sunflower. The effect of the sowing date factor had the most negative impact, with stem density decreasing by 355 plants/m² and 219 plants/m², respectively. The greatest decrease in plant productivity was observed after soybean. It should be noted that at optimally late and late sowing dates, the predecessor factor lost its effectiveness in influencing the growth and development of winter wheat plants, with differences between indicators falling within a significant range – from 1 to 14 plants/m² at LSD_{05} = 43.62 plants/m².

Thus, it can be concluded that sowing dates and predecessors significantly influenced the productivity formation of winter wheat plants of the Bohdana variety, specifically:

1. The shift in sowing dates from early to late resulted in a decrease in the number of shoots per plant and stem density.

2. Higher tillering rates were recorded at the end of autumn vegetation for winter wheat sown on early (September 10) and optimally early (September 17) dates – 2.0-3.0 shoots – compared to the optimal sowing date, where the increase was significant, +0.6-1.1 shoots with an LSD for the sowing date factor of 0.3 shoots. Late sowing of winter wheat beyond the optimal date resulted in a significant decrease in tillering by 0.4-0.9 shoots.

3. With soybean as a predecessor, the productivity indicators of winter wheat were significantly higher than when grown after sunflower. However, delays in sowing dates (from September 25 to October 2) had a more negative impact on productivity reduction compared to the sunflower predecessor, thereby contributing to an extended duration of winter wheat sowing specifically after sunflower.

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ЕНТОМОФАГИ В СИСТЕМІ УПРАВЛІННЯ ШКІДЛИВІСТЮ ФІТОФАГІВ СМОРОДИНИ ЧОРНОЇ

Для того, щоб докорінно покращити екологічну ситуацію в Україні та виробляти якісну ягідну продукцію, слід постійно шукати заходи для зменшення пестицидного навантаження на біоценози та підвищення екологічної безпеки [1].

Інтенсивне і не продумане використання хімічних засобів захисту рослин смородини чорної продовжує домінувати в наших інтенсивних технологіях вирощування ягід спричиняючи забруднення навколишнього середовища, знищення корисної фауни комах, сприяння формування резистентності у популяцій шкідників збільшення складності технологій вирощування [2].

Зрештою, хімічні засоби захисту зберігаються в навколишньому середовищі і мають кумулятивний ефект після потрапляння в біологічну екосистему та ягідну продукцію [3].