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**INFLUENCE OF FUNGICIDES ON ELEMENTS
OF THE YIELD STRUCTURE OF SPRING WHEAT**

Grain crops are the source of the initially necessary raw materials for most bakery products, as well as a food product for livestock farming. Grain is of inherent strategic importance to the country or is considered as a factor in the state's food reserves. The problem of increasing grain production remains relevant to this day; the reason is the high value of grain products with the subsequent demand for these products. There are many factors reducing wheat productivity, the most significant being diseases. The main weapon in the fight against wheat diseases are fungicides of various spectrums of action, including Soligor. Research has shown that with the use of the Soligor fungicide at a consumption rate of 0.4 l/ha to 0.6 l/ha, the percentage of leaf rust development decreased to 0.7 %. Biological effectiveness was 92.5 %. At a consumption rate of 0.5 l/ha of the Soligor preparation, the development of leaf rust is reduced to

0.9 %, with biological efficiency – 82.5 %. By the number of grains in an ear – 23.2 pcs. – and the weight of 1000 seeds is 33 g. – the indicators were higher at a consumption rate of 0.4 l/ha. The number of productive stems was higher at a consumption rate of 0.6 l/ha with an indicator of 261 pcs/m². On wheat crops with an application rate of 0.6 l/ha, the biological yield was higher by 1.2 c/ha than at a rate of 0.4 l/ha, 18.1 c/ha and 16.9 c/ha, respectively.

Keywords: fungicide, application rates, yield, Soligor, efficiency.

Introduction

Wheat occupies one of the leading places in the grain balance of Northern Kazakhstan, favorably differing from other grain crops in various ripeness, drought resistance and yield [1]. Up to 40 quintals of grain can be obtained from one hectare of wheat crops.

However, the real yield of this valuable crop remains at a fairly low level, which is explained by the negative impact on the phytosanitary situation in the structure of crop rotations and the shortcomings of agricultural technology [2-4]. The widespread use of new agricultural technologies and techniques that are not provided with appropriate scientifically based zonal plant protection systems also leads to the accumulation of a significant number of pathogens in the soil and on plant residues, increased pest activity, and increased weed infestation [5-7].

The harmfulness of weeds and diseases caused by brown rust in the competition between them is multifaceted. This is evidenced by studies on the allelopathy of cultivated plants, the reaction of weeds to soil (edaphic) factors, and the phytocenotic assessment of the role of cultivated and weeds in the field community [1-3, 5, 8-9].

Diseases are among the most significant factors depressing the yield of grain crops. Among the diseases of grain crops, widespread smut diseases, root rot, septoria and brown rust cause the most damage [2, 3, 7, 9, 10]. It is possible to increase the yield of grain crops to a very significant extent, based on scientific and production results when using various methods aimed at combating diseases [3, 6, 8].

Agriculture is reaching an advanced level of development due to a wide range of chemical plant protection products, while paying attention to the health of the plant.

The aim is to study the effectiveness of the fungicide Soligor on spring wheat crops.

The objectives of the study included:

1. To determine the biological effectiveness of different consumption rates of fungicide for spring wheat;
2. To study the effect of different consumption rates of fungicide on the elements of the structure of the spring wheat crop.

Materials and methods

The experience was laid down in the farm of LLP «SHP «NAN» of the Akmola region, the main activity of which is the cultivation of grain crops, namely spring wheat. In 2022 years, for the first time, brown rust was detected on spring wheat crops, namely the «Omsk-28» variety. On the territory of the district, ordinary chernozems are common in most of the areas, in some farms it is complemented by southern chernozems in combination with chestnut soils.

In 2022 years, the effectiveness of the fungicide Soligor was studied (Fig. 1), against brown rust on spring wheat crops, with a total area of 600 hectares (200 hectares for each consumption rate of the fungicide), grade «Omsk-28». The sowing period is May 15-20, the grain seeding rate is 140 kg/ ha, the seed depth is 7 cm. The sowing was carried out by the Horsch – Agro-Soyuz sowing complex + Buhler Versatile tractor.

The complex of agrotechnical measures in the field was carried out in full and did not differ from other fields with wheat on the farm.

The treatment of crops was carried out in the period from entering the tube to earing. The consumption rate of fungicides was Soligor, K.E. – 0.4 l/ha, Soligor, K.E. – 0.5 l/ha and Soligor, K.E. – 0.6 l/ha.



Figure 1 – Fungicide Soligor for the protection of grain crops of preventive and curative value

Despite the snow retention carried out by «SHP NAN» LLP, the moisture reserve was insufficient before sowing.

Later, in the summer period: from June to August, the amount of precipitation varied between 20–30 mm. By the harvest season, the amount of precipitation increased, which affected the harvest and the timing of harvesting. If by the beginning of sowing, in May, the air temperature was only 13°C, then in June this indicator was at the level of 20.6 °C, and in July the air temperature was 22 °C, which contributed to friendly shoots, normal development of wheat crops.

Results and discussion

The manifestation of brown rust on spring wheat crops in the conditions of «SPH «NAN» LLP in 2022 years was detected for the first time, and therefore emergency measures were taken to treat crops with chemicals. The fungicide Soligor, K.E., was recommended to the farm.

The first manifestations of brown rust have been noted on the middle and upper tiers of wheat leaves since July 9. Isolated brownish – orange pustules were identified. Before the treatment of crops with a fungicide, the total percentage of brown rust development in the crops of «Omsk-28» was 32.9 % (Table 1).

Table 1 – Biological efficacy of fungicides during the growing season of spring wheat

Experience options	Consumption rate, l/ha	Degree of lesion, %	Biological efficiency, %
Soligor, k.e.	0,4	5,1	92,5
	0,5	7,5	82,5
	0,6	3,9	92,5

With the use of the fungicide Soligor, brown rust decreased to 0.7 %, with a consumption rate of 0.4 l/ha, biological efficiency was 92.5 %; to 0.9 % with a consumption rate of 0.5 l/ha, biological efficiency was 82.5 %; to 0.7 % with a consumption rate of 0.6 l/ha, biological efficiency was 92.5 %.

Figure 2 below shows the results of determining the height of wheat or the length of the stem of spring wheat of the «Omsk-28» variety in the conditions of LLP «SHP «NAN».

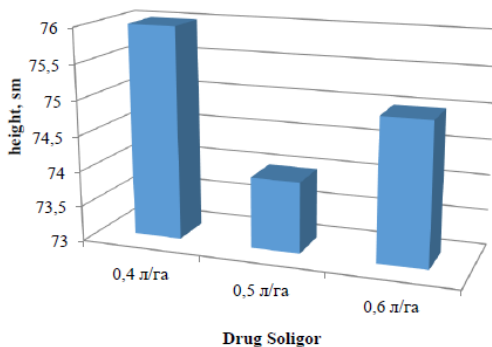


Figure 2 – Height of wheat plants depending on the dose of the fungicide Soligor

As noted above, the height of the plant depends on the genetic origin. In our case, the difference in height of «Omsk-28» was insignificant – 1–2 cm, that is, environmental factors were not significant for this variety.

The optimal seeding rate influenced the formation of crop density and the number of productive stems. During the «tubulation-earing» period, the first signs of brown rust were noted in plants. A positive effect after treatment with the drug was noted in the productive stem. And as can be seen from Figure 3, the higher the consumption rate of the fungicide, the more productive stems were formed.

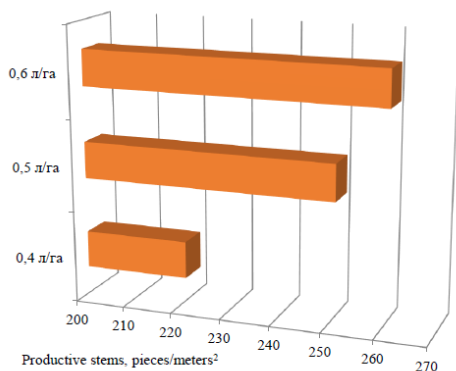


Figure 3 – Effect of the consumption rate of the fungicide Soligor on the number of productive stems, pcs/m²

With a consumption rate of 0.4 l/ha of fungicide, productive stems become 221 pcs/m², with a consumption rate of 0.5 l/ha it reaches 251 pcs/m², with a rate of 0.6 l/ha, the largest amount was obtained – 261 pcs/m².

The data on ear graininess show that there was no significant difference between the indicators. The water graininess of the «Omsk-28» ear of spring wheat was in the range of 21.1–23.2 pieces.

Other elements of the yield structure also differ at a significant level. The number of grains in an ear usually does not change by more than 2.0–3.5 times, and the mass of 1000 grains usually does not change by more than 1.5 times. Hence, it is clear why there is a close relationship between plant density and yield. The latter decreases at the highest seeding rate, since in one case there is an insufficient supply of moisture and nutrients to plants, and in the other case it leads to lodging of plants in the field.

Figure 4 shows the indicators of biological yield of spring wheat of the «Omsk-28» variety, depending on the indicators of the elements of the yield structure.

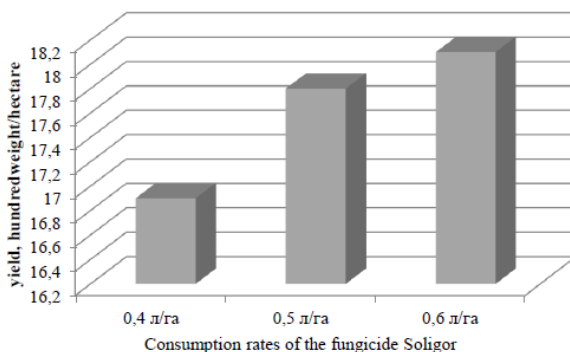


Figure 4 – Effect of the consumption rate of the fungicide Soligor on biological yield, c/ha

A low biological yield was in crops where treatment was carried out with the fungicide Soligor with a consumption rate of 0.4 l/ha – 16.9 c/ha.

On crops where the treatment was carried out with a fungicide with a consumption rate of 0.5 l/ha, the biological yield index was 17.8 c/ha. With an increase in the consumption of the drug to 0.6 l/ha, respectively, the biological yield of grain increases to 18.1 c/ha.

Analyzing the indicators of the elements of the yield structure and the biological yield of wheat, we note that the differences in the elements of the yield structure depending on the consumption rate of the fungicide did not significantly affect the biological yield.

Conclusion

On crops treated with a fungicide with a consumption rate of 0.4 l/ha, the values of the number of grains in the ear and the weight of 1000 seeds increased than on crops with consumption rates of 0.5 l/ha and 0.6 l/ha, therefore, the biological yield should have been higher. But at the same time, the productive bushiness on crops with a consumption rate of 0.4 l/ha was 30 pcs lower than at a consumption rate of 0.5 l/ha and 40 pcs lower than at a rate of 0.6 l/ha.

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ФУНГИЦИДТЕРДІҢ ЖАЗДЫҚ БИДАЙ ӨНІМДІЛІГІ ҚҰРЫЛЫМЫНЫҢ ЭЛЕМЕНТТЕРІНЕ ӘСЕРІ

Дәнді дақылдар көптеген нан-тоқаш өнімдері үшін бастапқы қажетті шикізат көзі, сондай-ақ мал шаруашылығының азықтық өнімі болып табылады. Астықтың стратегиялық маңызы бар, ол мемлекеттің азық-түлік резервтерінің факторы ретінде қарастырылады. Астық өндірісін ұлғайту мәселесі бүгінгі күнге дейін өзектілігін жоғалтпайды, себебі нан өнімдерінің жоғары құндылығы, содан кейін осы өнімге деген сұраныстың жоғары болуы.

Бидай өнімділігінің төмендеуінің көптеген факторлары бар, ең маңыздыларына өсімдіктің аурулары жатады. Бидайдың ауруларына қарсы күрестің негізгі құралы – әртүрлі спектрлі фунгицидтер, соның ішінде Солигор.

Зерттеулер көрсеткендей, тұтыну нормасы гектарына 0,4 литрден 0,6 л/га-ға дейінгі Солигор фунгицидін қолдану арқылы қоңыр таттың дамуы 0,7 %-ға дейін төмендеп, биологиялық тиімділік 92,5% деңгейінде болды. Осы препараттың 0,5 л/га тұтыну нормасын пайдаланғанда қоңыр таттың қарқыны 0,9 %-ға дейін

томендеп, биологиялық тиімділік 82,5 % деңгейінде болды. Осы көрсеткіштер, масақтағы дәндердің саны бойынша – 23,2 дана және 1000 тұқымның салмағы бойынша – 33 г 0,4 л/га нормасын қолданғанда алынды. Солигор препаратын тұтыну нормасы 0,6 л/га болған кезде өсімдіктің өнімді сабақтарының тығыздығы (261 дана/м²) құрады. Егістікте тұтыну нормасы 0,6 л/га болғанда бидай дақылдарындағы биологиялық өнімділік 0,4 л/га тұтыну нормасына қарағанда 1,2 ц/га жоғары болып, тиісінше 18,1 ц / га және 16,9 ц/га құрады.

Кілтті сөздер: фунгицид, тұтыну нормалары, өнімділік, Солигор, тиімділік.

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ВЛИЯНИЕ ФУНГИЦИДОВ НА ЭЛЕМЕНТЫ СТРУКТУРЫ УРОЖАЙНОСТИ ЯРОВОЙ ПШЕНИЦЫ

Зерновые культуры являются источником первоначально необходимого сырья для большинства хлебобулочных изделий, а также продуктом питания животноводства. Зерну присуще стратегическое значение, оно рассматривается как фактор продовольственных резервов государства. Проблема увеличения

производства зерна не теряет актуальности и по сегодняшний день, причиной является высокая ценность хлебных продуктов с последующим спросом на данную продукцию.

Существует много факторов снижения продуктивности пшеницы, к наиболее значимым, относятся болезни. Основным средством борьбы против болезней пшеницы являются фунгициды различного спектра действия, в том числе Солигор.

Исследования показали, что с применением фунгицида Солигор с нормой расхода от 0,4 л/га до 0,6 л/га развитие бурой ржавчины снизилось до 0,7 %. Биологическая эффективность была на уровне 92,5 %. При норме расхода 0,5 л/га данного препарата темп бурой ржавчины опустился до 0,9 % при биологической эффективности – 82,5 %. Настоящие показатели, по количеству зерен в колосе – 23,2 шт и массе 1000 семян – 33 г получены при норме расхода 0,4 л/га. Густой продуктивный стеблестой (261 шт/м²) был сформирован при норме расхода препарата 0,6 л/га. Биологическая урожайность на посевах пшеницы с нормой расхода 0,6 л/га была выше на 1,2 ц/га, чем при норме 0,4 л/га, соответственно, 18,1 ц/га и 16,9 ц/га.

Ключевые слова: фунгицид, нормы расхода, урожайность, Солигор, эффективность.

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