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PROSPECTS FOR THE USE OF A NEW NON-TRADITIONAL CULTURE SPRING TRITICAL IN THE PRECISE AGRICULTURE SYSTEM IN THE NORTH-KAZAKHSTAN REGION

A.K. [1] ***Kurishbayev,*** *Dr. Agr. Sc., professor*
B.K. [2]***Kanafin,*** *Cand. Agr. Sc.*
N.A [1] ***Shestakova****, Cand. Agr. Sc.*
S.A. [1]***Nukusheva****, Cand. Tech. Sc.*
V.S. Kiyan [1]*, PhD*
V.K. [1] ***Shvidchenko****, Cand. Agr. Sc., docent*
[1]*NC JSC «S.Seifullin KATU», , Kazakhstan, 010011 Nur-Sultan city, Zhenis av., 62,* *shvidchenko50@mail.ru*
[2]*LLP "North Kazakhstan Agricultural Experimental Station", North Kazakhstan region, Akkayynsky district, Shagalaly village, 150311, Kazakhstan.*

Abstract.

The article presents a comparative assessment of the productivity of spring triticale varieties and spring common wheat varieties. It has been shown that spring triticale varieties are significantly more productive than spring soft wheat varieties. It has been established that during the cultivation of spring triticale varieties with growth stimulants - White Pearls and Atonik plus, a positive trend is seen in increasing yields. During the research period, spring triticale varieties showed high resistance to stem and brown rust. In addition to using for feed purposes, spring triticale culture can be successfully used in the field of increasing the nutritional value of products in the bakery, confectionery and animal feed industries.

Key words: culture, variety, spring triticale, productivity, crop area structure, precision farming system, bakery and confectionery products, dietetic, medicinal and therapeutic and prophylactic food products.

Introduction.

The implementation of the precision farming system in the agricultural practice of the North Kazakhstan region requires the need for diversification as part of the cultivation of crops. It is necessary to include new high-yielding and plastic crops capable of realizing their productivity potential in the structure of sown areas of farms in this region, while ensuring high yields with minimal labor and material costs. It is known that the structure of sown areas is adapted to specific soil and climatic conditions and is determined by the set of crops, considering the

technology of cultivation, it can vary depending on economic feasibility. For each crop, technologies of varying degrees of intensity corresponding to the potential of varieties, as well as the potential of soil and climatic conditions in which it is cultivated, are used in the structure of cultivated areas. The range of cultivation of grain crops in Northern Kazakhstan is very limited - wheat, barley, oats. Over the entire history of the development of agriculture in this region, not a single variety of new grain crop has been introduced into production. Currently, agriculture in Northern Kazakhstan in order to stabilize the production of grain and feed needs to reassess the structure of sown areas. In the system of precision farming, the solution of this issue is possible by introducing new crops into production. In this regard, spring triticale culture is of great interest. According to statistics from the international organization FAO, the global cultivation area of triticale is increasing. This indicates an increase in the interest of the agricultural producer in this crop. [1]. Spring triticale is a multi-use culture. For producers of Northern Kazakhstan, it is of interest, first of all, as a forage crop. Spring triticale can be used for the preparation of succulent feed, in the compound feed industry, technology of rolled grain. Its grain contains essential amino acids that increase the nutritional value of protein. The use of triticale in compound feeds allows replacing wheat and corn, along with balancing them according to the digestible protein, amino acid composition and metabolic energy. The optimal sugar-protein ratio in the green mass makes it possible to prepare valuable hay grain from triticale. The inclusion of triticale in the diet of animals and birds increases their productivity, allows to save feed[2].

Source material, methods and conditions for research.

Varieties of spring triticale - Rossika and Dauren were used as the starting material in the research. Spring soft wheat in the research was represented by varieties - Astana, Karagandinskaya 30, Karagandinskaya 60. Astana spring wheat variety was used as a standard for productivity. The experiments were laid on the steam predecessor. Varieties of triticale and spring wheat were sown according to generally accepted agricultural techniques at the optimum sowing dates - May 15-25. Sowing was carried out with the SSFK-7 seeder. Sowing rate of 3.0 million viable seeds per 1 ha. The accounting area of the plot is 100 square meters. m. The repetition in the experiment is 4-fold. During the growing season, counts and phenological observations were carried out. The density of plant standing after germination and before harvesting was determined, the date of onset and duration of the phases of ontogenesis — seedlings, tillering, flowering, heading, ripening, were noted. The samples were evaluated for resistance to drought, lodging, and susceptibility to diseases and pests. Harvest was taken into account in the phase of full ripeness of grain. Plants

from accounting sites underwent structural analysis, assessed the physical quality of the grain - fineness (weight of 1000 seeds), performance, nature and vitreous grain. The study of varieties of spring soft wheat and spring triticale was carried out according to the methodology of the state variety testing of crops [3,4]. Mathematical processing of crop data was carried out according to B.A. Dospekhov [5]. Weather conditions during the research period can be characterized as relatively favorable for the cultivation of spring triticale varieties and spring common wheat varieties.

Research results.

Comparative evaluation of the productivity of spring triticale with varieties of spring soft wheat. In our research, spring triticale varieties significantly exceeded the standard spring wheat variety Astana by + 12.75 and + 7.6 centners per ha in productivity (table 1). It has been established that growth stimulants can have a significant effect on the productivity of spring triticale. When processing varieties of spring triticale with growth stimulants - White Pearl and Atonik plus, a positive reaction to an increase in productivity ranging from 2.69 to 6.47 kg/ha was observed in all variants of the use of growth stimulants (table 2).

Table 1 - Comparative evaluation of the productivity of spring soft wheat varieties and spring triticale varieties (North Kazakhstan Agricultural Experimental Station LLP, North Kazakhstan Region, steam precursor, 2019)

Variety name	Productivity actual c/ha	The humidity content of the grain during the harvest, %	Productivity, c/ ha at standard humidity, 14%,	± from standard
Spring soft wheat				
St. Astana	22,8	14,8	21,57	-
Karagandinskaya 30	25,42	15,2	23,41	+ 1,84
Karagandinskaya 60	23,80	16,0	20,83	- 0,74
Spring triticale				
Rossika	38,50	15,7	34,30	+ 12,75
Dauren	32,73	15,7	29,19	+ 7,62

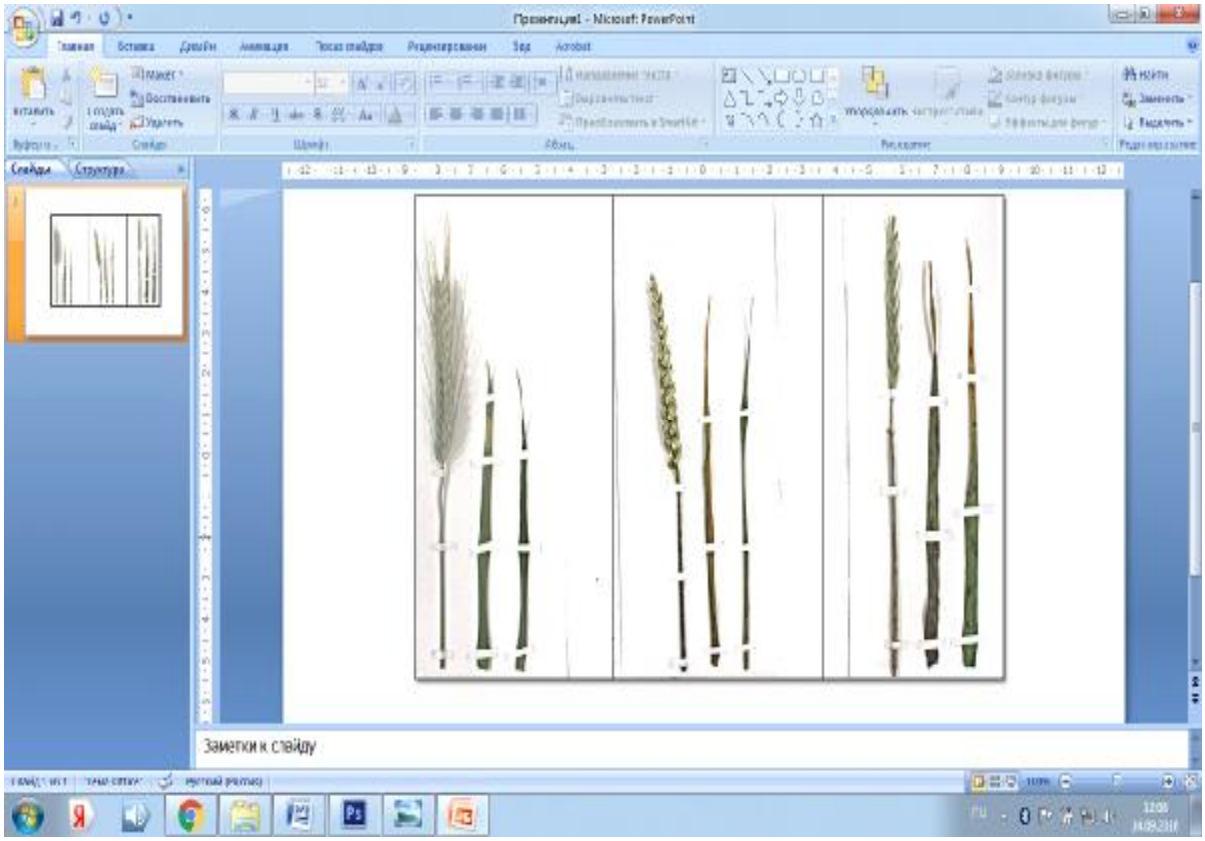
Resistance to fungal diseases. Spring triticale, containing the genetic material of rye, is immune to the most common diseases of cereals that adversely affect yield and grain quality. Due to their resistance to brown and stem rust, powdery mildew, hard and dusty smut, grain of spring triticale varieties are not pickled before sowing, which avoids large production costs and maintains the ecological balance of soils. When

studying varieties and promising lines, spring triticale in the production crops of North Kazakhstan Agricultural Experimental Station LLP, the defeat of this crop with brown and stem rust, both at the earliest stages of plant development and at later ones, was not noted. Spring triticale varieties showed high resistance to stem and brown rust against an artificial provocative background,. A similar pattern was observed against a natural field background. This is clearly evident in the climatic conditions of 2016. This year, very favorable prerequisites were formed for the development of stem and brown rust on grain crops - spring soft wheat and spring barley plants were very much affected by brown and stem rust. It should be noted that even in this year - the year of severe damage to crops by stem and brown rust, spring triticale showed high resistance to these types of disease. (picture 1).

Table 2 - Effect of growth stimulants on the productivity of spring triticale varieties (North Kazakhstan Agricultural Experimental Station LLP, North Kazakhstan Region, steam precursor, 2019)

Experience options		Productivity actual c/ha	The humidity content of the grain during the harvest, %	Productivity, c/ha at standard humidity, 14%,	± from standard
Variety	Growth stimulator				
Dauren	Standard	32,73	15,7	29,19	-
	White pearl	39,23	16,0	34,32	+ 5,13
	Atonik plus	41,26	16,2	35,66	+ 6,47
Rossika	Standard	38,50	15,7	34,39	-
	White pearl	42,28	15,4	38,44	+ 4,14
	Atonik plus	39,90	15,0	36,99	+ 2,69

Spring triticale is not susceptible to smut diseases, but can be affected by ergot. Propensity to this disease is a varietal symptom. Ergot is especially pronounced under stressful growing conditions, when the plant, in an effort to maintain its appearance, increases the percentage of cross-pollination. Spring triticale is prone to damage to the roots by fusarium and helminthosporiasis, and the spike - septoria. The degree of damage depends on weather conditions, the predecessor, the resistance of the variety. In this case, a particularly relevant



1 2 3

Image 1 – Damage to crops by pathogens: 1 - spring triticale (fusarium), 2 - spring soft wheat (brown and stem rust), 3 - spring barley (brown and stem rust)

method of control is seed Pretreatment. For these purposes, it is possible to use preparations recommended for spring wheat or other cereals, which work effectively against seed mold, root rot pathogens, and for problematic varieties, also against ergot and septoria. For example, you can use the fungicides Vitavax 200FF, Sumi-8, Vincit at 1.5 kg/t, Raxil, 0.4 kg/t. Pretreatment is done before sowing or in advance, with moisturizing, a flow rate of 10 l/t.

The use of triticale in food production. In addition to the use for feed purposes, the spring triticale culture is of great interest to the baking industry. In the baking industry, spring triticale grain can be used either with the use of baking using a special technique, or mixed with wheat flour. According to the general baking assessment, bread is inferior to wheat, but surpasses it in nutritional value [6,7]. Triticale as a culture, promising for the confectionery industry, is a valuable culture for alcohol (provides a higher yield of alcohol than spring wheat). Triticale grain is a promising raw material for the production of starch [8]. It is known that in the Republic of Kazakhstan bakery products in comparison with other types of food products are firmly in the lead. In this regard, grain production to meet the needs of the population in high-

quality bread is an important problem of the agricultural sector of the Republic of Kazakhstan. Currently, the promotion of a healthy lifestyle is relevant in Kazakhstan. At the same time, it should be noted that bakery products from triticale flour have the greatest beneficial effect in the field of therapeutic purposes. In this regard, triticale occupies a special place in the preparation of diet bread for people suffering from metabolic disorders.

Research by foreign scientists indicate the promise of using triticale for food purposes. Currently, such studies are most widely carried out in Poland, the USA, Germany, England, Australia, etc. [9]. Polish scientists have developed technologies to produce products from triticale flour without adding wheat. Australia has developed a large number of triticale flour product formulations. Triticale flour is used for baking bread, muffins, cakes, pies, etc., it is great for non-yeast dough, in the preparation of cookies, crackers. In the USA, triticale flour is used for baking sugar, oat, coconut and chocolate cookies, cakes, donuts, cooking fritters, pancakes, waffles, pasta, muffins [10-12]. In the Russian Federation, bread from triticale flour is produced in Kalmykia. In 2014, Kalmyk bread was included in the “100 best goods of Russia” (Pitcure 2). At the same time, the population can purchase flour from triticale in the network of trade organizations (Picture 3). Currently, JSC "S. Seifullin Kazakh Agro Technical University” started to develop production technologies for spring triticale of bakery and confectionery products from flour (Pitcure 4). The use of these developments in the baking industry can contribute to solving one of the most important tasks in Kazakhstan - expanding the assortment of food products for dietary and therapeutic purposes. The production of this type of product may become the basis for the organization of a healthy diet in the Republic of Kazakhstan.

Thus, taking into account the above perspective directions in the field of increasing the nutritional value of products in the bakery, confectionery and animal feed industries, spring triticale, along with traditional grain crops, can successfully participate in solving the food and feed problems of the Republic of Kazakhstan. Currently, spring triticale in Northern Kazakhstan is not cultivated. In the breeding plan for this culture on the basis of scientific research in the framework of the Project MES RK 1353/GF4, 2015-2017: “To create spring triticale varieties with increased yield potential, high

Picture 2 – Kalmyk bread and bakery products from triticale flour

Picture 3 – Triticale flour in the trading network of the Russian Federation





Image 4 – Experimental bakery products from spring triticale Dauren flour

feed value, increased adaptability and stability for climatic conditions of the dry steppe of the North of Kazakhstan to biotic and abiotic stresses ”two spring triticale varieties were created - Dauren and Rossika, of which Dauren was approved for sowing in Akmola and North Kazakhstan in 2020 by the state commission for variety testing of the Ministry of Agriculture of the Republic of Kazakhstan regions. In this regard, the use of this variety in the precision farming system will allow, on the one hand, strengthening the fodder base of agricultural enterprises of the North Kazakhstan region, and, on the other hand, organizing the production of bakery products with increased biological and nutritional value in the region that meet the requirements of therapeutic prophylactic purposes.

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A.K.[1] Kurishbayev, Dr. Agr. Sc., professor
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S.A.[1]Nukusheva, Cand. Tech. Sc.
V.S. Kiyan [1], PhD
V.K.[1] Shvidchenko, Cand. Agr. Sc., docent
[1]NC JSC «S.Seifullin KATU», , Kazakhstan, 010011 Nur-Sultan city, Zhenis av., 62,shvidchenko50@mail.ru
[2]LLP "North Kazakhstan Agricultural Experimental Station", North Kazakhstan region, Akkayynsky district, Shagalaly village, 150311, Kazakhstan.

Summary

The development of technologies for precision farming in the North Kazakhstan region requires diversification in the field of crop cultivation. The structure of

sown areas of farms in this region must include new high-yielding and plastic crops that can realize their productivity potential, while ensuring high yields with minimal labor and material costs. Currently, the range of cultivation of grain crops in production crops of the North Kazakhstan region is very limited - wheat, barley, oats. Agricultural production of the region in order to stabilize the production of grain and fodder needs to reassess the structure of sown areas. In the system of precision farming, the solution of this issue is possible only by introducing new crops into production. In this regard, spring triticale culture is of great interest. The results of the research showed that spring triticale varieties in the soil and climatic conditions of the North Kazakhstan region in productivity significantly exceed spring soft wheat varieties. It has been established that when cultivating spring triticale varieties with growth stimulants, a positive trend is seen in increasing yields. During the studies, spring triticale varieties showed high resistance to stem and brown rust. In addition to the use for feed purposes, the spring triticale culture is of great interest to the baking industry. In this regard, spring triticale, along with traditional crops, can successfully participate in solving food and feed problems of the Republic of Kazakhstan.

Key words: culture, variety, spring triticale, productivity, crop area structure, precision farming system, bakery and confectionery products, dietetic, medicinal and therapeutic and prophylactic food products.

ПЕРСПЕКТИВЫ ИСПОЛЬЗОВАНИЯ НОВОЙ НЕТРАДИЦИОННОЙ КУЛЬТУРЫ ЯРОВОЕ ТРИТИКАЛЕ В СИСТЕМЕ ТОЧНОГО ЗЕМЛЕДЕЛИЯ СЕВЕРО-КАЗАХСТАНСКОЙ ОБЛАСТИ

А.К.[1]Куришбаев, д.с-х.н.,профессор
Б.К.[2]Канафин, к.с-х.н.
Н.А[1]Шестакова, к.с-х.н.
С.А.[1]Нукушева, к.т.н.
В.С. Киян [1], PhD
Швидченко В.К.[1], к.с-х.н.,доцент
[1]НАО «КАТУ им. Сейфуллина», , Казахстан, 010011 г . Нур-Султан, пр.Жеңіс, 62 shvidchenko50@mail.ru
[2]ТОО "Северо-Казахстанская СХОС", Северо-Казахстанская обл., Аккайынский район, с.Шагалалы, 150311, Казахстан.

Резюме

Разработка технологий для точного земледелия Северо-Казахстанской области требует проведения диверсификации в области возделывания сельскохозяйственных культур. В структуру посевных площадей хозяйств данной области необходимо включать новые высокоурожайные и пластичные культуры, способные реализовать свой потенциал продуктивности, обеспечивая при этом получение высоких урожаев при минимальных трудовых и материальных затратах. В настоящее время ассортимент возделывания зерновых культур в производственных посевах

Северо-Казахстанской области весьма ограничен – пшеница, ячмень, овес. Сельскохозяйственное производство области для стабилизации производства зерна и кормов нуждается в переоценки структуры посевных площадей. В системе точного земледелия решение данного вопроса возможно только путем внедрения в производство новых сельскохозяйственных культур. В этом плане большой интерес представляет культура яровое тритикале. Результате проведенных исследований показали, что сорта яровое тритикале в почвенно-климатических условиях Северо-Казахстанской области по продуктивности существенно превышают сорта яровой мягкой пшеницы. Установлено, что при обработке сортов яровое тритикале стимуляторами роста просматривается положительная тенденция на повышение урожайности. В период проведения исследований сорта яровое тритикале показали высокую устойчивость к стеблевой и бурой ржавчине. Кроме использования на кормовые цели культура яровое тритикале представляет большой интерес для хлебопекарной промышленности. В этой связи яровое тритикале наряду с традиционными зерновыми культурами может успешно участвовать в решении продовольственных и кормовых проблем Республики Казахстан.

Ключевые слова: культура, сорт, яровое тритикале, продуктивность, структура посевных площадей, система точного земледелия, хлебобулочные и кондитерские изделия, продукты питания диетического, лечебного и лечебно-профилактического назначения.

СОЛТҮСТІК ҚАЗАҚСТАН ОБЛЫСЫНЫҢ ДӘЛ ЕГІНШІЛІК ЖҮЙЕСІНДЕ ЖАҢА ДӘСТҮРЛІ ЕМЕС МӘДЕНИЕТТІ ПАЙДАЛАНУ ПЕРСПЕКТИВАЛАРЫ

[1]А.Қ. Курішбаев, а-ш.ғ.д., профессор
[2] Б.К. Канафин, а-ш.ғ к.
[1]Н.А.Шестакова, а-ш.ғ.к.
[1]С.А. Нукушева, т.ғ.к.
[1]В.С. Киян, PhD
[1]В.К. Швидченко, а-ш.ғ.к., доцент
[1] С.Сейфуллин атындағы Қазақ агротехникалық университеті, Жеңіс даңғылы, 62, Нұр-Сұлтан қ., 010011, Қазақстан, shvidchenko50@mail.ru
[2]«Солтүстік Қазақстан АШТС» ЖШС, Солтүстік Қазақстанобл., Аққайың ауданы, Шағалалы а., 150311, Қазақстан.

Түйін

Солтүстік Қазақстан облысының дәл егіншілік үшін технологияларды әзірлеу ауыл шаруашылығы дақылдарын өсіру саласында әртараптандыруды жүргізуді талап етеді. Осы облыс шаруашылықтарының егіс алқаптарының құрылымына ең төменгі еңбек және материалдық шығындар кезінде жоғары өнім алуды қамтамасыз ете отырып, өзінің өнімділік әлеуетін іске асыруға қабілетті жаңа жоғары өнімді және пластикалық дақылдарды қосу қажет. Қазіргі уақытта Солтүстік Қазақстан облысының өндірістік егістіктерінде бидай, арпа, сұлы секілді дәнді дақылдарды өсірудің ассортименті өте шектеулі. Облыстың ауыл шаруашылығы өндірісі астық пен жемшөп өндірісін тұрақтандыру үшін егіс алқаптарының құрылымын қайта бағалауды қажет етеді. Дәл егіншілік жүйесінде бұл мәселені өндіріске жаңа ауыл шаруашылығы дақылдарын енгізу жолымен шешу мүмкін болады. Бұл тұрғыда көктемгі тритикале мәдениеті үлкен қызығушылық тудырады. Жүргізілген зерттеулер нәтижесінде Солтүстік Қазақстан облысының топырақ-климаттық жағдайларында көктемгі тритикале сұрыптары өнімділігі бойынша жаздық жұмсақ бидай сұрыптарынан едәуір асып түсетінін көрсетті. Сұрыптарды өңдеу кезінде өсу стимуляторларымен көктемгі тритикале өнімділіктің жоғарылауына оң үрдіс байқалатыны анықталды. Зерттеу барысында көктемгі тритикале сұрыпын сабақтар мен қоңыр датқа жоғары төзімділікті көрсетті. Жемдік мақсаттарға пайдаланудан басқа, көктемгі тритикале мәдениеті нан пісіру өнеркәсібі үшін үлкен қызығушылық тудырады. Осыған байланысты көктемгі тритикале дәстүрлі дәнді дақылдармен қатар Қазақстан Республикасының азық-түлік және жем-шөп мәселелерін шешуге ойдағыдай қатыса алады.

Түйінді сөздер: мәдениет, сұрып, көктемгі тритикале, өнімділік, егіс алқаптарының құрылымы, дәл егіншілік жүйесі, нан-тоқаш және кондитерлік өнімдер, диеталық, емдік және емдеу-алдын алу мақсатындағы азық-түлік.