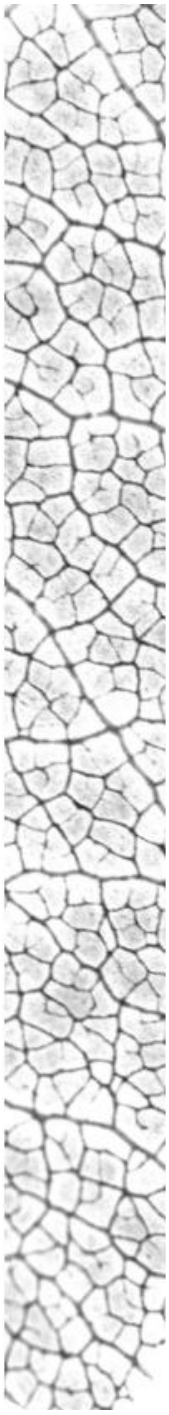

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# Investigations of primary grain and sorghum materials in the South Kazakhstan region and development of methods for selecting their new varieties and hybrids

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**Abstract**
In this article. Sorghum is a widely used crop in the world land cultivation since ancient times. It is cultivated in over 50 million hectares in 85 countries in the dry, semi-dry and insufficiently irrigated world. In our country is used as a food and feed crop, which is produced as a vegetable and nutrient and green mass of straw, sugar syrup, nutritional wheat.
The purpose and objectives of the study are to study the primary materials of succulent and sucrose and to obtain high quality, drought-resistant, high-quality, varieties and hybrids that are resistant to diseases and pests.
Scientific novelty. For the first time, a new sugar material was obtained from 400 different types of specimens as the starting material. 480 hybrids were extracted between grains and sugar species.
Selected hybrids and sampling varieties with valuable features and properties have been selected for the sampling work. One of the varieties of sugar sampling and one of the suction samples was extracted and sent to the state sample with the participation of the author.
Result of the research. The fertilization of the seeds is largely due to the fact that their ripening, harvesting and storage are the case. Maturity period depends largely on sowing time. The danger of early sowing is that the seeds may bleed and die at low soil temperatures, if the weather conditions are favorable for vegetable growing, the late maturing collection varieties are well matured. The late sowing provides quick growth of sprouts and facilitates the fight against weed grass, but the late moisture seeds that come late in early September are at risk of damaging ice crystals and endosperms, which significantly reduces fertilization.

**Keywords:** sorghum, sugar, corn, variety, hybrid, seeds, beet, agro-industrial complex, agronomist

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## INTRODUCTION

Sorghum has been a widespread culture in world agriculture since ancient times. It is being developed over 50 million hectares in 85 countries of the world where it is dry, semi-dry and not sufficiently irrigated. In our country, sorghum is used as a food and feed crop, produced as a sorghum crop, sugar syrup, feed wheat (grain), green mass for silage and in feed and straw.

The high yield of Sorghum culture, resistance to aridity, and salt resistance make it possible to master widely in arid regions. But, despite this, they are not widespread enough. The main constraints to the growth of sown areas of Sorghum crops are the lack of new varieties and hybrids with intensive resistance and primary emergence to diseases and lesions. In the practice of sorting practice, we see the possibility of applying several valuable traits of other related species and varieties of crops to crop plants. For many crops, hybridization yielded varieties that are flexible in the ecological situation, resistant to diseases, pests and adverse environmental influences, highly productive, and also possessing other properties and qualities.

Therefore, the study of the great potential of sorghum raw materials in different countries of the world and their

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involvement in sorting processes is an urgent problem and has great theoretical and practical value.

The goals and objectives of the study are the development of the source materials of grain and sugar varieties and obtaining, on their basis, highly productive, drought tolerant, disease, and pest resistant species, varieties and hybrids.

To achieve the goal, the following tasks:

- Development of varieties of various types of sorghum from collections received on morphological characteristics from VIRA, ICRISAT, VNII Sorghum (now VSHISZK) and other scientific institutions and the selection of donors and sources of economically valuable traits of sorghum.

- Selection of dry resistant forms for use in crossing and assessing the resistance of samples to diseases, pests, adverse weather conditions.

- Mutual hybridization of the most qualitative forms of sorghum and determining the nature of the inheritance of qualitative and quantitative traits.

- Isolation from the obtained hybrids of permanent, clean material to patients and pests, including a set of economically valuable traits for practical sorting.

- Creation of new varieties and hybrids of sorghum.

For the first time, a new material was studied for sorghum, obtained as a starting material for 400 samples of sorghum of various kinds. Among grain and sugar-sorted species, 480 hybrids were obtained. For use in sorting, hybrids and sorghum species with valuable traits and properties were selected. With the participation of the author, one variety of sugar variety and one variety of grain sorghum were selected and sent to the State sample.

**World production and use of sorghum**

In our country, in a continental climate, more than half of the territory is episodically arid, a strong change in crop yields is observed over the years. In some areas, large areas of soil with high sauce are found, especially in the Volga region.

From crops with high resistance to drought and salinity, sorghum can be obtained, since over the years it ensures the stability of its productivity. In world agriculture, sorghum discharges more than 50 million ha after wheat, rice, corn, and barley (FAO, 2020). The main regions of sorghum processing include Africa, South and East Asia, the USA. Currently, the CIS allocates 850 thousand hectares of land for sowing this valuable crop. Its main territories are located in the North Caucasus, Ukraine, the Volga region, Central Asia, Kazakhstan and Moldova. Depending on the nature of the application, sorghum is divided into grain, sugar (strength), broom and grassy.

Cereal sorghum is grown in order to obtain grain, as it is a good feed for the artificial breeding of livestock and poultry. In several African countries, as well as in the United States and India, sorghum is used in Kazakhstan in the Turkestan region for the preparation of flour, cereals, beer and the necessary starch for the production of alcohol. Scientific institutions, state-owned enterprises-researchers of sorghum and leading farms reveal that sorghum gives high yields of grain, green parts and silage in the same agricultural technology and when using effective doses of fertilizers.

According to the data of 1976-1980 (GSU), on average over 5 years, the yield of this crop in Ukraine was 4.5 t / ha, in Central Asia - 3.6 t / ha, in the Rostov region - 5.6 t / ha [Herde 2006].

In our country, the sugar variety is mainly used for the preparation of silage and green feed in feed production. A valuable crop used in world agriculture to produce syrup and molasses. The main value of the sugar variety can be attributed to a sweet stem with un-crystallized sugar up to 18-24%. Sugar sorghum is grown in large volumes and sown from the subtropical regions of Central Asia to the southwestern regions of Ukraine. The ability to meet large amounts of soluble sugar in the stems of a sugar sorghum plant increases the potential of this culture as a raw material for the production of food and edible sugar. In the USA, sorghum with sugar is the main raw material for the production of syrup and molasses, used in the confectionery industry. The maximum amount of sugar on the stalks is observed during drought and during the maturation of grain wax. B.M. P. Malinovsky, etc. According to research [Sorghum 2017], varieties and varieties of sugar varieties are very different from each other in sugar content (10-24%). Sorghum sugar contains disaccharides (sucrose) and monosaccharides (glucose and fructose). According to calculations, sugar in sugar juices in the North Caucasus allows you to get 4-5 t / ha of edible sugar with an amount of 15-17%.

Sudan grass is a valuable fodder plant, which allows you to mow 2-3 times in the summer. Gives good growth during winding and chopping.

Sorghum broom is a widespread technical stain, brush, broom and various knitted household items.

Thus, sorghum drought is a promising culture of our country in a continental climate, where droughts are often observed and areas with high salinity of soils prevail. In addition, the full use of all the possibilities of Asa culture requires its comprehensive study.

**Sorghum Moench Species Classification**

Type Sorghum (Sorghum Moench) Monocotiledones - belongs to the single-row class, to the Roasea family - to the groats, the Androgoneae tribe - to the bearers. This is an ancient, widespread culture. Its classification is complex depending on the ecological-geographical and variety of varieties.

Pliny (obtained from Historiae Naturalis) was the first to write a description of sorghum. On the topic: “Michels Sorghum (1729g.) Used. Karl Linney first described two types: Holcus glumis glabris and Holcus glumis villosus

(1937), and in 1753 in his work" Species Plantaram "described three more types of sorghum: Holcus sorghum, H. Saccaratus and H. Bicolor. In 1866, Alefeld and 1985, Kernike proposed to consider all types of sorghum crops as one variety of the Andropogon sorghum species. It consists of two species - halepeenes and sativum, the first includes all wild species, and the other – crops [Sanjana et al. 2017].

In the 20th century, the classification of sorghum was expanded and refined. Chiowenda (1912) divided the Sorghum type into four species. Stapf O. (1934) Sorghum singled out the type as a separate group, and the group closest to it examined Cleistachne. This author described the Sorghum type in two sections: eu-sorghum (Eu-Sorghum) - true sorghum and sorghastrum (Sorghastrum) [Sorghum 2014].

In a study of the Sorghum type, he worked a lot from Snowden [Sorghum 2015] (Snowden, 1936, 1955). He divided sorghum into sections of Eu-Sorghum and Para-Sorghum, respectively divided into such as true sorghum and sorghum, and considered the Sorghastrum section as an independent species, which is far from these species. The Eu-Sorghum type (2n-20 or 40) includes most of the wild and cultivated species. The most common center can be attributed to Africa, where most of the species are found and many types of crops are found here.

Cultivars belong to the Sativa series, which are divided into six sub-series: Bicoloria, Guineensia, Caffra, Durra, Nervos, Drummondii. The Spontanea series includes 17 species of sorghum-Polyakov and wild annual species. Four-year-old vascular tetraploid species include a Halepensia subsection. Section Para-Sorghum (2n-10) includes 8-10 annual or perennial wild species that are distributed from the Republic of South Africa through India and China, through Malaysia and Australia to the Sudanese zone.

Snowden J.D. compiled a species classification of ears and grains according to morphological characteristics. He accepted here as a factor determining the shape of the fruit, the size and texture of the ears of corn, the presence and absence of hanging, the design features of the lower floral film. In this work, references to typical materials and information on the geographical relationship of the species under study are valuable.

Indian researchers J.D. In a monograph by Snowden, 46 populations representing 22 species were examined on ten grounds, and using centuries-old analysis, Sorghum divided into nine free complexes, their names: S.roxburghi, S.conspicuum, S.arundinaceum, S. nervosum, S.durra, S.subglabrascens, S.sudanense, S.halepense, and S.virgatum [Williams-Alanis 2008].

De Wet J. and Huckabey J. Among the 52 taxa separated from Snowden, the degree of kinship was determined by 38 signs [Maunder 2008]. They revised the Snowden system, proposed all types of its classification, and on the basis of the absence of genetic barriers for crossbreeding all S. bicolor (L.) proposed combining it into the Moench type, which some authors did not agree with [Giorda 2008].

Harlan J. and Vet J. Sorghon (Sorghum bicolor L. Moench) are divided into two colors, S. bicolor ssp.bicolor and S. bicolor ssp.arundinaceum were divided into two types [Rooney 2018]. The first includes 5 cultivated species and 10 hybrid species, taking into account all combinations of the main species, and the second - 6 wild species. Then Vet changes his vision, and in the Eu-Sorghum-S. bicolor, S. halepense (2n = 40) and S.propinquum (2n = 20) sections recognized three species.

Ivanyukovich L.P. [Storozhyk 2019] believes that these classifications of sorghum require improvement, came to the conclusion that, taking into account the history, origin, evolution of culture, it is necessary to supplement and change the systems of the genus Sorghum Moench, studying various world collections of sorghum species from literary sources large monographs collected in VIR and sent from world herbarium storage facilities.

The monograph attributes Snowden's ten (1936) [Maunder 2008], the constant presence of lower polytomous keys, the color of conifers, the color of the fruit shell, the color of the flower shell, the color of red-yellow-purple, and so on. ear scales. p. don't say any signs. Analyzing all the data, he got the opportunity to describe the system of the Sorghum Moench surname and allowed to provide dichotomous keys for detecting taxa. All 70 species of sorghum l. P. Ivanyukovich considered in seven sections and in five series.

The initiative of practical classification was launched by American breeders, who at the beginning of the 20th century were divided into four economic groups according to the methods of using sorghum varieties: cereals, sugar, panicle-shaped and grassy, of which ecological and geographical groups (Kholan, durra, kafir, milo, etc.). ) and varietal types.

Classification of sorghum by signs of economic use E. S. Founded Yanushevsky (1967-1969). As a result of studying the world collection, she identified the following species and varieties from the United Groups according to the nature of their use in production [Taylor et al. 2019].

In the group of grain sorghum, he S.guinense (Guinean), S.caffroram (Kafrin), S.bantuoram (Negro), S.durra (bread), S.chinense (Chinese or Gaolan) - a variety [Cereals 2013].

Sorghum saccharatum sugar variety divided it into two main groups according to the density of anthrax: effuzum or shrub varieties (S.saccharatum convar.effusum Jarusch) and contractum or compressed varieties (S, saccharatum convar.contractum Jakusch).

**Table 1.** General Provisions Classification and geographical distribution of species in the genus Sorghum Moench

| Plant | Species | Number of species | Number of chromosomes | Place of growth |
|---|---|---|---|---|
| Sorghum | Sorghum | 6 | 20 | Europa, Asia, Africa, America, Australia |
| | Nervosa | 6 | 20 | Africa, Southeast Asia |
| | Guineensia | 7 | 20 | Central and South Africa |
| | Caffra | 5 | 20 | Africa, Europa, America |
| | Durra | 4 | 20 | Africa, India |
| Arundinacea | | 18 | 20 | Africa |
| Blumenbachia | | 7 | 20,40 | Africa, Asia, America |
| Chaetosorghum | | 1 | 40 | Australia |
| Heterosorghum | | 1 | 40 | Australia, New Guinea |
| Drammondii | | 3 | 20 | West Africa, North America |
| Parasorghum | | 12 | 10,20 | Africa, Asia, America |
| Sorghum | Sorghum | 6 | 20 | Kazakhstan, Turkestan region, Saryagash |

Courtesy of S.techmcum is characterized by a rodless or very shortened panicle stem.

Grass sorghum is characterized mainly by a number of annual and perennial species. Of these, two species are classified as cultures: Sudanese grass (S. SudanenseStapf) and sorghum (S.almumParodi), they have 40 chromosomes and the roots will be short. And also E. S. Yanushevsky in West Africa, an annual wild sorghum - troetetian sorghum (S.arundinaceumStapf), which is a close relative of Guinean sorghum [Naseeruddin et al. 2016].

Botanical and geographical characteristics of sorghum species. The Sorghum surname includes annual and perennial plants that disperse shoots on or without the surface of the earth. Straight stems reach 0.5-6m, diameter based on d = 0.5-3cm; most often the stomach is full, sometimes only free; stems weak or hard, strong; usually green and naked, but sometimes with black dark gray spots and thin layers of silver wax; often curtailed; sometimes knotted, knots naked or whistling. Leaves are arranged alternately. The vagina is naked and uniform, but at the junction with the leaf blade most often have a woolen, thin wax layer; close interstitial or short from them; plates with a membrane length of 0.5-3 mm. Leaf plates have a length of up to 1 m or more, a width of up to 10 cm, color from light green to saturated green, dark pigment spots are sometimes found; broadleaf or linearly oblique, with narrowing and pointed ends; smooth, sometimes wavy. The empty fiber of the leaves is wide, from white to gray-green.

Flower bunches are very noticeable in shape and size, on average, 4-5 cm long, 2-20 cm wide; the axis of the flower is vertical or curved, sharply noticeable or short, sometimes does not happen, mostly deep mobile, simple or rigid, sometimes naked. The main branches of anthrax are combed or not combed, rise or hang from above; often form a false ash and secrete 1-6 branches from a node.

On the branches, the ears are a pair (except for the head): one sessile (cousin) and the other with the foot (male or without gender). At the ends of the branches, there are three ears of corn, one settles, and two with a foot. Settled ears are in dorsoventral compression. In each ear there are two flowers, from the bottom of which it usually decreases to a floral scale, and from above there is a cousin, i.e. it consists of a settled grate and a male ear with a leg. The length of the spikelet scales is the same, bluish, small crust, like paper, colorless or colored in different colors. The lower floral membrane (lemma) is colorless, ciliary, coniferous, without coniferous or burnt. The upper floral film (palea) is colorless, mostly compact. Lodicle-two, usually eyelashes, male-three. With long-haired eggs mated on very long columnar bases. Spikelets with legs are often similar to sessile spikelets, but their trunks are small and thin, usually without a tail. Grain up to 2.7-6 mm, clearly visible from the ears of corn or completely hidden inside; ellipsoidal or spherical; the bulge or back and the inner side are constricted [Bavei et al. 2011].

The Sorghum surname is most common in tropical and subtropical countries of the two hemispheres, and is also common in countries with a temperate climate. Of the seventy species, 28 species have been cultivated for a long time, weed-field-3, have already been introduced into breeding-3, all the rest are wild. Most species are fodder and nutritious.

Currently, the oldest representative of the genus Sorghum is a variety of the Parasorghum section with the chromosome number 2n = 10, 20, 30; in other sections of the species, type 2n = 10 was not found. Perennial and annual wild plant, consisting of rootless, fringe nodes, fragile and basic unrooted branches of the panicle.

Ripe grains are shorter than the ears of corn that were next to the ears of corn. In the ear, males are sometimes shortened. Species of these sections are common in areas spanning Africa, Southeast Asia, Australia, and Central America.

Representatives of the Blumenbachia section are a wild perennial plant located on early stems with common roots, bare nodules that break up into segments. Lodicles are bitter. Ripe grains are shorter than the ears of corn that were next to the ears of corn. In the ear, males are sometimes shortened. Tetraploid species of this section are vascular diploid S. from the species propinquum and Arundinacea. From the representatives of the section.

Wild African species of the Anmdinacia section (2n = 20) - perennial or annual plants without roots, naked knots, brooms brittle, decaying with fruits into settled cousins sedentary ears. Ripe grains are shorter than the ears of corn that were next to the ears of corn. In Africa, there are tropical rainforests and savannahs. In Russia, of these types of sections, such as many other types of sorghum, are widely introduced into the culture as feed, which give 2-3 places in the summer. It refers to the type of Sudanensis.

Species of the Drummondii section, resulting from the hybridization of wild species of the Anmdinacia section by cultural species, are related to weed-field species. These are naked nodes, brooms do not break, ears of bisexual plants. Ripe grains are shorter than the ears of corn that were next to the ears of corn. These species are found mainly in West tropical Africa, in the high Nile regions, as well as in North America.

The sections Chaetosorghum (2n = 40) and Heterosorghum (2n = 40) are each represented as an annual plant, are found in Australia and can spread from African species of the Anmdinacia section. Sorghum belonging to the Chaetosorghum section. A species of laxiflorum is an annual wild plant with a bare knot, a stem from the main stems. Ripe grains are shorter than the ears of corn that were next to the ears of corn. In the ears on the legs, the males have a shortened and floral film, the same length with ears of corn.

Section Heterosorghum Sorghum species of macrospermum are similar to the previous species, but unlike the stalks of the main broom, lodicles have different lengths of exposed and spikelet scales.

Cultural Sorghum (2p = 20) is divided into five series: Sorghum, Nervosa, Guineensia, Caffira and Durra. These species have nodules, brooms do not break, bisexual grate, cultivated annual grasses. Lodicles are bitter. Ripe grains are long or equal in length from the ears of corn that were next to the ears of corn. In ears on the legs, males sometimes contract.

The distribution region of many cultured species of sorghum-Africa, the Mediterranean, Central Asia, India, China, Japan, the Malaysian archipelago, the CIS. Most often they are concentrated in tropical Africa, close to the equator, and stretch north of it to 15 degrees. Sorghum species are mainly grown in dry areas with a rainfall of 75-100 mm and less than one very strong dry season.

The brooms of the Sorghum series will be rare stems, sometimes the stems are crushed, having fun. Ears of flakes tightly wrap the grain, fully covered with a film, both skin and return eggs. The main species of this series are S. bicolor and S. saccharatum.

Sorghum bicolor plant with a stagnant broom 8-40 cm long, 5-10 cm wide. The length of two sexual ears is 4-6 mm, the width of 4-5 mm varies from egg to spherical.

Sorghum the broom from the saccaratum plant will be stagnant or slightly hardened. Its shape is from elliptical to oval up to 70 cm or wind form. The stems of many forms are sweet and juicy.

There are six types of nerve series, a typical representative of S.chinense refers. The length of this species averages 10-27 cm, the width is 7.7 -10 cm ellipsoidal or wind brooms from very thick to stagnation. The length of the bisexual ellipsoid spikelets is 4-5 mm, and the width is 3-3.5 mm. The scales of the bisexual ears are heterogeneous in uniformity, consistency and color.

The Guineensia series consists of six species, the most common of them being S. is guineense. The vegetation of this species is folded, oval-long or broom-shaped (lanceolate) zigzag-flexible and holistic branch. The length of the two ears of corn is 5-8 mm, the width is 4 mm, and the oval egg is glossy. Ears of scales have the same length of filamentous fibers, in the form of clay, with invisible filiform edges folded inward. Seeds are open, length 4-7 mm, width 3 mm, identical with very long or long ears of corn, strongly compressed from the sides.

The Caffra series has five species, the most important of which are S.caffrorum and S.bantuorum. Sorghum the broom of the caffrorum plant is a vertically growing plant with a compressed or loose compressed layer 17-30 cm long, 5-9 cm wide. Ears of flakes have a shape from straw-yellow to black. Lower floral scales without a brush or bristles 5 mm long. The length of the seeds is 4-5 mm, the width is 3.5, -4.5 mm, white, yellow, pink, red or brown, egg-shaped, ellipsoidal, spherical, covered with spiky scales to crack their length.

Sorghum bantuorum is a bit similar to the previous species. Its broom has a dense or very thick vertical stalk 17-31 cm long, 5.5-8.5 cm wide. The shape of the broom is oval, windy or umbrella-shaped. The bisexual ears are elliptical long. Ears of flakes range from straw yellow to black. Bottom-floral scales with rare features without hairline. The grain length is 4.4–5.5 mm, width is 3.6–5.1 mm, and its shape is broadly inverse egg, wide ellipsoidal, spherical, covered with a film ear.

The Durra series includes four species, among which the most common is S. durra. Sorghum the length of the broom of the durra plant is 5-25 cm, width 4-12 cm. The broom is very thick, egg, ellipsoidal, oval, conical in shape. Elliptical or diamond-shaped grid-irons of two breeds 4.5 - 6 mm long, 2.5 - 6 mm wide. Lower spiky scales ½ or 2/3 of the length of the Hun, Upper grassy, felt. The grain length is 4–6 mm, width 2.5 m, ellipsoidal, almost spherical, almost reverse ovoid, most compressed wedge base, white, yellow, red, brown [Genetic Mapping in Sorghum 2014].

Thus, sorghum is a plant characterized by high drought tolerance and heating, heat lovingness, a wide amplitude of volatility over the growing season, plant and plant energy, grain size and quality.

**Interspecific hybridization.** St. Prasada Rao E. According to (2001), major crops include genetic diversity sufficient to produce highly productive varieties, including sorghum. However, varieties resistant to diseases [Shapalov et al. 2016], pests and stress factors can most often be obtained from wild varieties according to the introgression program.

A study of various sorghum species in the Arundinacea section shows that they have great similarities in the morphology of the chromosome and easily die among themselves [Genetic Mapping in Sorghum 2014, Ratnavathi and 2016, Miller et al. 2015]. In addition, the mädeniettendirgen of the species S.sudanense, S.virgatum, S.lanceolatum, S.vogeliatum, S.aethiopicum, S.arandinaceum, etc., the cross of grass with sorghum was successful. [Bavei et al. 2011, Sorghum Breeding 2014, Ratnavathi and 2016, Miller et al. 2015].

Sorghum halepense and S. wild tetraploid species, such as almum, relatively easily interbreed with 20-chromosome sorghum species [Ratnavathi and 2016, Miller et al. 2015, Storozhyk 2019].

Eu-sorghum has a great possibility of hybridization among other different species due to the absence of a significant barrier to gene exchange between many species and the ability to transfer valuable genes to production varieties from both wild and cultivated species [Stack 2008].

Perennial S., which is a weed in India and other countries. Halepense are resistant to whips and drought. Krishnaswamy N. 20 - chromosomal hybrids that combined the characteristics of both parents. Halepense introduced into the diploid form and between cultural sorghum [Storozhyk 2019].

Simultaneously Bennet H. W. and Hogg P.G. (1995) a cross was made between sugar sorghum and Johnson's grass and found that the plant has 85% fertility. When choosing, they were able to combine and improve the nutritional value of sorghum and Johns' long-term habit. Through cross-hybridization, the introduction of perennial and perennial sorghum varieties is allowed, which ensures a steady supply of feed [Stack 2008].

Dogget N. uses different genome autotetraploids to obtain good grain forms, and S. almum proposed the possibility of obtaining fertile autotetraploidtars of a cultured or sugar variety by secondary crossing. The advantage of autotetraploidy of grain sorghum was an increase in grain size and an increase in the amount of protein, as well as a successful decrease in heterozygosity [Ratnavathi and 2016].

Another species of S.roxburgii is a multi-sheeted, small dose of tannin and good resistance to leaf diseases. It shows a very high heterosis in the green mass at interspecific crossing (up to 200%) [Naseeruddin et al. 2016, Cereals 2013, Genetic Mapping in Sorghum 2014, Bavei et al. 2011, Ratnavathi and 2016, Stack 2008].

Sorghum arundinaceum type is used as a source of high activity photosynthesis in a less bright place in sorghum breeding, S. virgatum - high heat resistance, S. Sudanense - is used due to active combing and good growth after curling [Stack 2008].

Hybridization with other sorghum species is difficult. Only in recent years, much work has been done to find donors in ICRISAT and involve them in hybridization due to the high harmfulness of the stem (Atherigonasoccata) and the unsuccessful transfer of sugar stone stability to it.

In an introgressive project, 340 wild relatives of permanent sorghum were evaluated, belonging to the sections Chaetosorghum, Heterosorghum, Stiposorghum, Parasorghum and Sorghum, [Storozhyk 2019], four models of the Parasorghum section with thick hair and trichomes and a high degree were identified sustainability: three S.versicolor (IS-14262, IS-14275, IS-18938) and one S. dimidiatum (IS-18945). These samples were crossed with cultural sorghum (2n = 20) with the number of chromosomes 2n = 10, as a result of which a small number of hybrids of varying degrees of sterility were obtained.

In the most common hybrid stem population, tough choices were made and 315 permanent areas were identified for further work. Work is also ongoing with other donors, especially S.australiense, and substantial development has also been achieved [Taylor et al. 2019].

Since individual hybridization allows a combination of different genes in one organism, it is a reserve of combination volatility and a source of supply of new forms for selection.

Soil and climatic conditions. Research work 2017-2020 (SUNPP "Sore" held by Sorghum OJSC and AChGAA of the Kazygurt district of Turkestan region).

According to the geomorphological zoning scheme, these territories fall under the acquisition of Dono-Yegorok. By design of the surface layer, this land has a slightly wavy plane with small heights separated by steppe rivers.

Sorghum OJSC and the experimental fields on them are located on the chernozem territory. The soil cover of the selection and seed platform is provided by the simplest powerful carbonate Carat. The soil texture is clayey.

By the reserves of black rot and nutrients, these chernozems belong to the well-provided soils of the region. The humus content in the sowing tier is 4.0-4.2%.

According to the content of absorbing nitrogen, they belong to the soil of high availability (in the field layer-6.5-12.6 mg per 100 g of soil). Nitrophication ability of the soil is high.

Low phosphorus supply with a mobile form (0.8-1.4 mg P2O5 per 100 g of soil), and potassium is

comparatively higher (31.2-42.7 mg K2O per 100 g of soil), rarely the average content (26.8 mg of K2O per 100 g of soil). The pH of the surface horizon of ordinary black soil is close to neutrality of 7.0-7.2.

Thus, the relief and soil-climatic conditions of the experimental steppes of Sorghum OJSC with a total area of 288.8 hectares are favorable for planting sorghum culture.

According to the project of agrochemical zoning, the territory of the experimental steppe of the Turkestan region belongs to a hot region with insufficient humidity (sub-district YÏ-B). The most characteristic signs of climate are: insufficient humidity; strong hot summers and relative cold winters; short-term rainfall typical for summer and relatively spring – autumn; low humidity in the summer months, equal to the minimum value of relative humidity (39%).

In the summer, the number of dry days with relative humidity less than 30% (46 days) and dry wind days between vegetative dates (86 days) during the vegetative days (May-September) increases.

Winter is characterized by a relatively short snow cover and a large number of warm days in December and February (35-40 days).

Most often, frequent winds eastward, a sharp increase in temperature in the spring leads to rapid drainage of the soil. The hydrothermal coefficient is 0.7-0.8, which indicates a lack of productive moisture reserves in the soil in most of the growing season.

Amounts of positive temperature (above + 10 ° C) are equal to + 3238 ° C; the average duration without a frost period is -180 days.

The meteorological situation during the years of the study was favorable for the growth and development of sorghum in general, despite differences in years.

As a starting material, 400 varietal samples from seven species of sorghum VIR (St. Petersburg), ICRISAT (International Research Institute for the Study of the Culture of the Semi-Dry Tropical Zone, India), VNII Sorghum (now VNIISZK) and other scientific institutions, as well as varieties, were obtained origin SUNPP “Sore” [Storozhyk 2019].

Guinean sorghum (S.guineense) was represented by six varieties from France and the United States. This is the first Guinean (K-2974), Shallu (K-9921), etc. models such as.

Kafra Sorghum (S.eaffrorum) was a total of twenty-seven patterns. Basically, they were quickly ripened varieties of local and French selection.

Black sorghum (S. bantuoram) was represented by a sample of twenty-two varieties such as Uganda Hegari and Feterita, Sudan and Nigeria, which have complex resistance to major and bacterioses.

Sorghum bread (S.durra) was studied in sixty varieties and was studied mainly as a stable example for plant bits, plant bits, and butterflies such as Durr and Dzhugara. Some of the variety samples were coarse-grained (weight of 1000 grains up to 93 g) and photosensitive.

From ICRISAT (India) S.guineense x S., 108 breeding groups of large panicled protein varieties were obtained, such as Zera-zera, a hybrid origin of bantuoram and selected from the Gambelian region (South-West Ethiopia) (Indian sorghum).

Chinese sorghum (S.chinense) was represented by a sample of twenty-five varieties of the cold-resistant type of Gaoliang, as well as five samples from Mexico.

Sugar variety (S.saccharatum) Russia, Ukraine, USA, Australia, France, etc. [Giorda 2008]. It was presented in a highly developed form such as Amber, Sumak, Orange with sweet juicy stems.

In addition, 5000 sorting materials have been increased annually. In addition, several sorghum brooms (S. saccharatum var. Technicum) were presented, such as, for example, Deer, for example, which possess cold and plant-resistant properties.

A number of cultured species are also presented in sterile male cytoplasmic form and their strong counterparts to create heterotic commercial hybrids of culture and sugar varieties.

Research Methods. The crops of collection and hybrid nurseries were placed on four breeders’ sites. The plot area is 5 square meters. m.m., plots - single-row, every 20 rooms-standard. As standards, zoned and hybrid sorghum varieties were used: Grain 53, Grain amber, sugar 32, granular 35.

The sowing was seeded with SPCh-6 seeders in the second half of May. Sorghum agricultural technology was carried out in accordance with its vaccination characteristics in the Turkestan region [Stack 2008].

To induce flowering, the length of the day was regulated by light transmission cameras [Abdrassulova et al. 2020]. Phenological control, assessment of morphological characteristics and biological properties of plants were carried out according to the unitary Sorghum Moench type and the VIRA method [1982]. The assessment was carried out in points on a ten-point scale.

Plant productivity was carried out according to the method of state varietal assessment of crops. Quantitative characteristics (plant length, number of leaves, branch, length and width of the 4th leaf at height, stem diameter, paniculate internode, forward panicle forward, panicle length and width, number of branches and number of spikelets on the panicle, spikelet length and width, maximum Ostey length, mass of 1000 grains) were measured from 20 plants in the market [Genetic Mapping in Sorghum 2014].

The amount of sugar in the stalk juice of Sorghum was measured in the field using a refractometer.

Biochemical analyzes of grain were carried out in the laboratory of biochemistry and physiology of VNII Sorghum (currently VNIISZK).

Statistical processing of the results of practice by [Herde 2006, Sanjana et al. 2017, Sorghum Genetic Resources, Sorghum 2005, Williams-Alanis 2008, Maunder 2008, Giorda 2008, Rooney 2018, Storozhyk 2019, Taylor et al. 2019, Naseeruddin et al. 2016, Bavei et al. 2011, Sorghum 2014].

## RESULTS AND DISCUSSION

1. General characteristics of the studied species of sorghum.

2. Sowing seeds.

The study of the initial growth phase showed that the variety varieties have a significant difference in the periods of seed longevity and growth rates. Sorghum is a heat-loving culture. The minimum temperature required for growing seeds is from 9 to 10°C. At a soil temperature of 8°C, the grain does not grow, mold and age. The tannin-free holozern form, cultured sorghum, especially cold. Favorable temperature for grain ripening 20-25°C [Ratnavathi and 2016].

Sorghum collection of different types (by year) neoplasms come into force simultaneously with different solid species, the period varied from vaccination to release. When sowing in the early period (for example, April 21-24, 2005) at a low temperature, the period from the moment of sowing to the first growth was 20-26 days.

In the first half of May (2002, 2004, 2006).), Where it decreased by 12 days, and in the case of late vaccination (May 20, 2007), the first sprouts appeared for 8-9 days.

With late sowing, the first adolescents were simultaneous, between the samples of the first and last cultivars, two days. With early sowing, the difference reached 5-7 days. A large difference was observed among the varietal specimens of various species.

(S.chinense) Chinese sorghum, bread (S.durra), brooms and sugars (S.saccharatum) first appeared seedlings of sorghum. Caffres (S. caffroram), Negro (S. bantuorum) and Guinean (S. the most heat-loving species such as guineense) appeared at the very end, and growth was delayed, with the exception of individual samples.

Laboratory assessment of insemination of grain of various samples at low temperatures (12-14°C) showed that significant polymorphism is observed within the limits of different types by the sign of cold resistance.

The samples of dried fruits in China showed the maximum amount (38.5%), medium bread (29.6%), sugar (24.8%) and broom (25.4%), low Negro (13.1%), Guinea (12.5%) and kafrska (10.2 %).

It is proved that fertilization of seeds largely depends on their ripening, collection and storage. Ripening time largely depends on the time of sowing. The danger of early grafting of crops at low soil temperatures, the seeds can cause and die if weather conditions are favorable for sorghum, the growing season increases, and late ripe collection varieties ripen well. Late sowing provides a rapid increase in seedlings and facilitates kuressa with weed, but in the endosperm it significantly reduces the insemination by moisture-seeded seeds, which mature late in the early cold of early September, and the risk of infection with ice crystals increases in the endosperm.

Mid-season samples also have high humidity and require thorough warm drying after wrapping the crops, because after thawing, molds, especially snow-white forms [Ospanova et al. 2020], may appear. During the drying and storage process, the seeds ripen after harvesting the crops, which leaves the dormancy for 200 -40 days, while their fertilization is accelerated. Seeds with a moisture content of 14-15% can be stored for decades at low temperatures.

In fast-growing seed cultures, it ripens well in a panicle and has no rest time. In rainy weather, seeds grow due to plants lying and the panicle touching the soil.

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