

Hedges from perennial, stemmed, uneaten cattle non-traditional races of plants *Lasiagrostis splendens* Kunth efficient agricultural method of snow retention and soil protection against erosion on arable land, pastures and hayfields.

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Abstract:

Here is given the analysis of the modern use of solid precipitation in crop Russia. Substantiated new reception snow retention and protection of the soil from wind and water erosion, using hedges of brilliant-being - non-traditional plants (wild plants) in the steppe-land cultivation. V. V. Dokuchaev in the book, published in 1892, "Our steppes before and now" recommended: "...in other places of the open steppes to plant rows of hedges...which will contribute to the accumulation at the site of snow, detention and best use, as of spring and rain waters". In the United States in the last century developed measures for snow retention and protection of soils from erosion "vegetative grass barriers", which used long-term, stemmed, non-traditional plants (wild plants), were uneaten by cattle *Elutrigia elongate*, *Panicum virgatum*, *Tripsacum dactiloides* they are grown in native American communities. On the basis of long-term experiments in a steppe zone of Northern Kazakhstan (dark chestnut soils, southern black soils) selected the most suitable non-traditional plant for many years the scenes – chiy brilliant (*Lasiagrostis splendens* Kunth). This plant forms a stemmed, tall (2.0-2.5 meter) scenes uneaten by cattle that can hold up to two annual rates of snow areas of the building and to increase the depth of the spring drenching root zone of the soil up to two times.

Key words: step zone, spring wheat, windstorms, solid precipitation, retention, scenes, Chiy brilliant, pastures, hayfields, runoff, soil washout, snow retention.

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The importance of snow retention on the fields was well known to the Russian peasants, having mastered the Urals and Siberia.

V. V. Dokuchaev in the work "Our steppes before and now" recommended that: "...in other places of the open steppes to plant hedges." In 2017 the Ecology in Russia marks 125 years since the publication of this classic work. Recommendation of V. V. Dokuchaev further were transformed into a number of agricultural practices on snow retention: scenes from the bushes, scenes from annual plants (corn, sunflower, sorghum, mustard etc.).

In Soviet times, the widespread cutting of snow rolls (up to 2 – 3 times per winter) with snowplowing machines, various models of which were produced by agricultural machinery in those years. Solid precipitation in the desert are up to 40 % of the annual amount, but they fall mostly in stormy winds. In winter, the intensity and wind force up to two times higher than in the spring, when there are dust storms[4]. The deflation and ablation of snow from arable land and grassland phenomenon is typical in steppe. Meanwhile, after the collapse of the Soviet state in the period of agrarian reforms due to the rising cost of fuel retention in crop production today the snow retention is almost never used. The main disadvantages of the known methods of snow retention are reduced to the complexity of the implementation, high cost, need of snow monitoring level.

Today it can be argued that in the fields covered with stubble is delayed only 1/3 of the annual rate of solid precipitation. But even worse is the case for natural the pastures – hayfields and pastures. Here, the thickness of the snow cover due to reduced vegetative cover on pastures and permanent mowing on the hayfields is substantially less than in the plowed field covered with stubble. If cultivation of the virgin feather-grass steppe accumulated annual rate of winter precipitation and snow is evenly distributed across the steppe, today 2/3 of the normal annual solid precipitation is concentrated in the hollows, gullies, ravines and other depressions, where the spring formed a powerful flow of the spring runoff of melt water, which lead to the growth of gullies and gully network.

In the United States in the seventies has begun to develop a new application multi-purpose for snow retention and preventing soil erosion), which in essence can be considered a new version of "hedges" according to V. V. Dokuchaev. This technique is called in American agricultural literature as "vegetative grass barriers and the main difference was that as a culture for such, in our understanding, the scenes used perennial, stemmed, tall (1 – 2m), resistant to rain, wind and snow, well maintained over years, not eaten by cattle unconventional grassy plants (wild plants), growing

in U.S. local natural cenoses such as: Wheatgrass (elongated *Elytrigia elongata*); switchgrass (*Panicum virgatum*); tripsacum dioecious (*Tripsacum dactyloides*).

In 1975, the agricultural delegation of scientists from the USSR was demonstrated in Montana, one of the options for use of grass barriers for snow retention and protection of crops of winter wheat, where the control culture was used Wheatgrass two-line elongated in the sowing and the placement of it is 14.6 meters across prevailing winds.

New measures are developed in the USA, was very interesting for steppe conditions of our country in 1976 in "the action Plan of the Ministry of agriculture of the USSR on the topical plan of proposals of experts who went on business trips abroad included the task to develop the application scenes of the long-term, stemmed uneaten by the cattle herbs". The chief Executive was determined by all-Union research Institute of grain farming (Shortandy settlement). Program tasks of the USSR Ministry of agriculture included:

- seeds collection of perennial non-traditional plants for the environmental assessment;
- environmental assessment of the harvested plant material to create the scenes;
- development of technology of the guaranteed germination and rooting herbs;
- the identification or creation of technical means for planting the scenes of non-traditional perennial grasses.

In 1976, were gathered in Pavlodarskom Irtysh seeds of some non traditional plants (a. a giant, Chiy brilliant, etc.). During 1977 – 1981, an ecological evaluation was produced which showed that the specified requirements chii brilliant [5,6,7].

In 1981 – 1983 AUSRIGF (All-Union Scientific Research Institute of Grain Farming, Shortandy) scientific team on the area of 4.5 ha was created the system two-line scenes from Chiy brilliant with the distance between wings 30 – 50 meters. On this site during 1983 – 1996 was carried out the monitoring of the development of the scenes, deposition of snow, the influence of the scenes on the yield of grain and perennial grasses (photo 1).

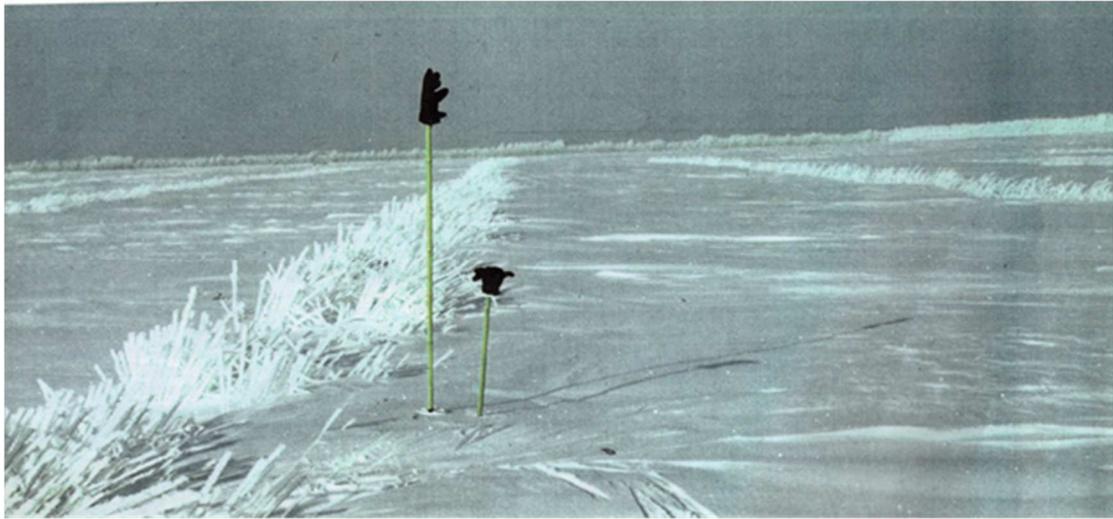


Photo 1 Snow cover in the wings of Chiy brilliant,

AUSRIGF (Shortandy) 1990 February, a layer of snow 80 – 90 cm.

Chiy brilliant (*Lasiagrostis splendens* Kunth), non-traditional, new culture derznovenno perennial-tussock stemmed plant family grasses up to 2 – 2.5 meters, with a powerful root system that penetrates to a depth of more than 2 meters. The growing season starts in late may early June, the inflorescence emerge inflorescence occurs in the third year after sowing, tillering stage, lasts for two years. Steadily generative shoots with paniculate inflorescences are formed in the third year after sowing. Rude generative shoots of the chiy form a flexible aerodynamic grille, making the snow between the scenes at the distance of 20 – 25 elevation scenes is accumulated evenly to 80 – 90 cm (up to two annual rates of solid precipitation). Such quantity of snow can accumulate on the arable land located on the watershed plateau with the most fertile homeservername zonal soils, where runoff is minimum and in the end, to create a highly fertile, provided with moisture agrolandscapes. The moisture reserves nonfallow predecessor will be close to the steam field that will allow with minimal damage through June, the most devastating in the steppe zone of drought. Studies have shown that the accumulation of snow scenes from chiy brilliant allows you to get the grain harvest by 30% or more, at the same time, the productivity of perennial grasses increases by 50 – 100 %, in General agreement with literature data of other authors obtained earlier [3]. Chiy brilliant is extremely drought-resistant plant, the observations showed that in dry years it forms a shrub up to 10 – 12 generative. In 2012, when drought duration was up to 2 months (June – July), the height of generative shoots was about 2 meters, whereas the height of other tall crops in these conditions did not exceed 1 meter (clover, sunflower, perennial winter rye). Chiy brilliant was tested as the control plants on the southern carbonate chernozems (Shortandy, Tselinograd oblast, Kazakhstan) and on leached chernozems (Chelyabinsk region, southern Urals, Russia) (photo 2).



Photo 2. Hedges from Chiy brilliant, 5 years after sowing. Chelyabinsk research Institute of agriculture 2015, September.

On the basis of these studies 20 January 2004, in accordance with the decision of the State to the Commission of the Russian Federation on test and protection of selection achievements received but copyright certificate № 39571 on the chiy brilliant Irtysh on the applicant institution "Chelyabinsk SRIA " with a priority date from 20.01.2003, which allows the use of this biological object on the territory of the Russian Federation. Authors: Shiyatiy E. I., Abdrashitova R. M., Vrazhnov A.V. Kramarenko V. Y., Chmil, A. N.

The benefits of snow retention by using the hedges from chiy brilliant front of the known techniques are obvious:

- when placing the hedges in 30 to 50 meters can accumulate up to two annual rates of solid precipitation;
- the hedges are not eaten by cattle, are well preserved, which gives the possibility of their use on natural hayfields and pastures;
- the accumulation of snow in hedges is in automatic mode and does not require any human intervention.
- depth spring and drenching the soil in the system backstage reaches 2-2,5 meters, which is two or more times greater than the control (without hedges).
- once created, the hedgess, as shown by observations, maintained over 30 years.

- the estimated consumption of seeds when you create a three-line hedges in 1 hectare is about 20 g (1000 pieces weigh 1.5 – 2.0 g).

In the United States over the period from 1975 measures grass barriers studied in many States and has been widely used [8,9, 10] in the practice of the farmers. As stated in one of publications [10], the use of stemmed vegetative barriers on agricultural territories of the United States, affected by soil erosion is a new practice of soil conservation that reduces soil loss to acceptable values.

We believe that improving the efficiency of use of solid precipitation in the steppes of Russia must be exercised not so much through the implementation of specific agricultural practices, but through "purposeful design of highly productive and environmentally sustainable agricultural landscapes" (A. A. Zhuchenko) [2]

On the watershed plateau with low current conditions creating the hedges from the Chiy will allow you to accumulate a snow cover up to two annual rates and accommodate most responsive to the increased moisture reserves in the soil crops: winter and spring hard wheat, etc. Such agrolandscape can accommodate non-traditional fodder crops such as Galega (*Galega orie talis Zam*), Zabaikalsky knotweed (*Polygonum divaricatum Z.*), sverbiga East (*Bunias orientalis Z.*).

In the US, unlike in the steppe regions of the CIS, the retention for most of the States is not so important here on sloping lands is a threat of soil erosion, water erosion and grass barriers are similar in effect to the terracing of slopes [10].

Long-term studies of the Chelyabinsk research Institute of agriculture specialty crops vetch, Highlander TRANS-Baikal and bunias showed that the collection of fodder units per hectare of arable land here in some years they or are approaching the productivity of corn or even surpass it. Cultivation of forage crops in the system chiy hedges not only enhance their productivity but will make prey more resistant and less expensive.

On the slopes chiy hedges placed across a slope will work the same way as in the US, herbal barriers, its conservation impact will be close to the terracing. Creating the hedges from Chiy on the slopes of the contours of the terrain creates the preconditions for contour soil tillage. Chiy brilliant can be used to mark the boundaries of fields and for effective snow retention on natural hayfields and pastures, which will allow to prevent their degradation and to build greater reserves of moisture in the soil to increase their productivity.

Creating chiy hedges on the land of agricultural enterprises or farms requires proper terracing of land use taking into account characteristics of the landscape (elevation, slope, aspect,

soil cover). Therefore, specialized research and production units at scientific or agricultural training institutions, which will be engaged along with the multiplication of seeds of long-term non-conventional RAST-tions, seeding, cultivation Chiev scenes on the calculated to create a sustainable steppe agricultural landscapes land use-Application-tion scenes of perennial grasses needed basis with land and agricultural enterprises. Therefore, to create a stable steppe agrolandscapes, land use with the use of perennial grasses hedges necessary specialized research and production units during scientific or agricultural training organizations will be engaged along with the proliferation of non-traditional seeds of perennial plants, sowing, cultivation chiy hedges on the calculated basis of land and agricultural enterprises.

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