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## Article

# Community structure and stock of phytomass of fallow abandoned arable lands in the Turano-Uyuk basin (Republic of Tyva)

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**Abstract.** The features of overgrowing of abandoned arable land in the steppe intermountain Turano-Uyuk basin in the Republic of Tyva, the floral composition of communities, the structure of plant matter, the stages of healing and their duration are studied. The work was based on 608 samples of phytomass of fallow communities and virgin steppes, which were selected in the period from 1994 to 2023. For the first time, quantitative characteristics of reserves of living above-ground, dead above-ground and below-ground phytomass at each stage of the regenerative succession of the fallow land were obtained. It has been established that currently most of the former arable land is occupied by fallow communities located at the third stage of fallow demutation, where a new association of *Artemisio scopariae-Elytrigietum repentis* ass. nov. obtained only between the initial (stages 1 and 2) and terminal (stages 3 and 4) stages of demutation. Significant age differences were found only between the initial (stages 1 and 2) and terminal (stages 3 and 4) stages of demutation. It is confirmed that the below-ground phytomass of the virgin steppe is higher than the communities of the terminal stages of the fallow succession.

**Keywords:** *Agropyretalia intermedio-repentis*, association, restorative succession, syntaxonomy

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*Научная статья*

## Структура сообщества и запасы фитомассы залежей Турано-Уюкской котловины (Республика Тыва)

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**Аннотация.** Исследованы особенности зарастания заброшенной пашни в степной межгорной Турано-Уюкской котловине в Республике Тыва, флористический состав сообществ, структура растительного вещества, стадии зацелинения и их длительность. Основой для работы послужили 608 образцов фитомассы залежных сообществ и целинных степей, которые были отобраны в период с 1994 г. по 2023 г. Впервые получены количественные характеристики запасов живой надземной, мертвой надземной и подземной фитомассы на каждой стадии восстановительной сукцессии залежей. Установлено, что в настоящее время большая часть бывших пашен занята залежными сообществами, находящимися на третьей, разнотравно-злаковой стадии залежной демутации, где выявлена новая ассоциация *Artemisio scopariae-Elytrigietum repentis* ass. nov. Значимые отличия возраста залежей получены только между начальными (стадии 1 и 2) и терминальными (стадии 3 и 4) стадиями демутации. Подтверждено, что подземная фитомасса целинной степи выше, чем сообществ терминальных стадий залежной сукцессии.

**Ключевые слова:** *Agropyretalia intermedio-repentis*, ассоциация, восстановительная сукцессия, синтаксономия

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## Introduction

There are three main stages in the land use of the Republic of Tyva:

1) The first one lasted until the middle of the 20th century. At that time, animal husbandry prevailed, which had developed in the steppes of Tuva since ancient times.

2) The second stage is connected with the implementation of the All-Union project for the development of virgin steppes: in the 1960s, significant areas of the steppes were plowed.

3) The third stage in the history of agriculture throughout Russia and neighboring states occurred in the early 1990s. Within a few years, huge areas of arable land were abandoned; a large-scale natural experiment was launched to restore vegetation on them. Its interim results have been published (Henebry, 2009; Ioffe et al., 2004; Kamp, 2014; Kraemer et al., 2015; Lesiv et al., 2018; Makunina et al., 2007). By the early 2000s, most of the fallow land had been re-plowed.

The processes of vegetation restoration in Tuva fallow land are studied by A.D. Sambuu from the initial stage of succession, which allows for an accurate chronology, and the vast territory of the fallow land makes it possible to obtain reliable results. For example, since the 1990s, work has been carried out to study the productivity of fallow communities, floral and geobotanical surveys (Sambuu, 2014; Titlyanova and Sambuu, 2013, 2016; Titlyanova et al., 2002).

The purpose of this study is to study vegetation restoration in the fallow land of the Turan–Uyuk basin. To do this, we have set the following tasks:

1. To assess the degree of plowing of the basin during the fallow period.
2. To characterize the past stages of regenerative succession in the fallow land.
3. To trace the dynamics of plant matter reserves in the process of succession in fallow land.
4. Describe the current state of the vegetation of the fallow land, identify their background plant communities, and determine the syntaxonomic position of these communities in the system of floral classification.
5. Compare fallow and virgin grass communities.

## Material and methods

The natural potential of the republic is not being fully exploited due to the urbanization of the population. The agricultural land area of the Republic of Tyva, as of 2023, amounted to 3367.3 thousand hectares, or 19.9% of the total land area of the republic. Of these, 2657 thous. ha are agricultural land and 710 thous. ha are non-agricultural. As part of agricultural land, the area of arable land is 135 thous. ha, fallow land – 61.4 thous. ha, hayfields – 54.8 thous. ha, pastures – 2,405.2 thous. ha, perennial plantings – 0.2thous. ha (Doklad o sostoyanii..., 2023).

The Turan-Uyuk basin is located in Southern Siberia in the Republic of Tuva at latitude N 51.5°–52°, in the longitude range E 93°–94.5°. In terms of the basin, it is a triangle stretching 120 km from west to east and 50 km from north to south. In the south, the basin is bounded by the Uyuksky range, in the northwest and northeast by the Kurtushibinsky range and its spurs. The bottom of the basin is located at an altitude of 800–1000 m, from the side of the mountain structures, separate hill ridges protrude into the basin, the peaks of which reach 1100–1300 m. The Uyuk River cuts through the basin from west to east. The western part of the basin is occupied by the valleys of the Uyuk and its tributaries flowing down from the Uyuk Ridge are swampy.

The climate of the Turan-Uyuk basin is sharply continental: according to world climate data<sup>1</sup>, the average annual air temperature is  $-3\text{ }^{\circ}\text{C}$ , July  $+24\text{ }^{\circ}\text{C}$ , January  $-34\text{ }^{\circ}\text{C}$  (Fick and Hijmans, 2017), the annual precipitation reaches 350 mm. In the drained part of the basin, chernozems predominate, meadow steppes are the indigenous vegetation; within the framework of the floral classification, they are described in the *Pulsatillo patentis-Caricetum pediformis* association (Makunina et al., 2007).

Since the territory of Tuva was used in agriculture for a short time, the abandoned arable lands are in the process of fallow succession. To assess the degree of plowing, we selected the eastern part of the basin within the village of Sush. The fallow land area (on the initially meadow steppe) on ordinary chernozem is located on the gently sloping upland plain of the northeastern part of the Uyuk Range in the Turan-Uyuk basin. The relief is typical: hill massifs alternate with leveled areas.

A.D. Sambuu collected and processed materials on plant matter reserves in 1996–2023. These materials describe 27 years of regenerative succession of abandoned arable land, which was sown with wheat until 1994. The supply of plant matter was measured for 4, 7, 11, 17 and 27 years after the arable land was abandoned. The standard for estimating the stock and characteristics of the distribution of plant matter were those in the virgin meadow steppe. Standard methods were used (Titlyanova and Sambuu, 2016; Titlyanova et al., 1996a, b). So, to determine the reserves of above-ground phytomass, a series of ten small  $50\times 50\text{ cm}$  squares was randomly laid on the experimental site. In all ten squares, the above-ground phytomass was cut at the soil level, and litter was collected from the soil. The standing dead plant biomass were taken from the green mass, the latter was sorted by type. The litter was washed from the soil on sieves with a diameter of 0.5 mm. All above-ground phytomass was dried at  $80\text{ }^{\circ}\text{C}$  and weighed.

Cubic soil monoliths with a volume of  $1\text{ dm}^3$  were selected in the middle of each square. The depth of monolith selection was up to 20 cm. The below-ground plant material was washed on soil sieves with a diameter of 0.3 mm. The samples were dried and dispersed on sieves to divide the roots into fractions: large (more than 2 cm long), medium (2–0.5 cm) and small ( $< 0.5\text{ cm}$ ). All samples were weighed. The sample of a large fraction was divided into living and dead parts, after which the living roots were sorted by species. The proportion of live roots of the medium and small fractions was visually assessed by the color and density of the sample: the more dead particles, the darker and looser the sample. Stocks of all components were expressed in  $\text{g/m}^2$  for a certain soil layer.

When presenting the research materials, the terms and designations proposed by A.A. Titlyanova (1977) were used: G – above-ground green biomass; D – standing dead plant biomass (attached dead); L – litter; B – living below-ground organs; V – dead below-ground plant biomass; G+D+L – above-ground plant matter; B+V – total below-ground plant biomass; D+L+V – dead vegetable matter (mortmass).

The work uses 35 complete geobotanical descriptions of fallow land and virgin meadow steppes made in the period from 1996 to 2018 by A.D. Sambuu, as well as in 2019–2021 by N.I. Makunina and O.S. Zhironova. The new association is described in accordance with the "Code of Phytosociological Nomenclature" (Weber et al., 2000). The names of units of the highest rank are given in accordance with the "Prodromus of the highest units of vegetation of Russia" (Mirkin and Naumova, 2012). The data on the projective coverage of the views are presented as a percentage.

The potential area was built in the MaxEnt program, the input data were the coordinates of the descriptions from this work and the set of rasters described in the article by N.I. Makunina et al. (Makunina et al., 2020).

## Results and their discussion

### *Stages of regenerative succession*

Over the 27 years of regenerative succession, the fallow land of the Turan-Uyuk basin have overcome two stages and are on the third:

1) The weedy stage (the period from 1 to 7 years). In the 4th year of succession, a weedy community was formed, consisting of one- to two-year-old *Artemisia* (*Artemisia scoparia*, *A. sieversiana*) and *Chenopodium* (*Chenopodium album*); in the 7th year, the proportion of weedy plants decreased, the participation of the rhizomatous grass *Elytrigia repens* increased, single specimens of weeds and steppe grass appeared (*Convolvulus arvensis*, *Heteropappus altaicus*, *Nonea rossica*).

<sup>1</sup> WorldClim. Global climate and weather data. Web page. URL: <https://www.worldclim.org/> (accessed: 15.01.2024).

2) Rhizomatous-grass (from 7 to 17 years old). In the 11th year of succession, rhizomatous species (*Elytrigia repens*, *Bromopsis inermis*) dominated among the grasses, and single loose-leaf and turf species (*Leymus dasystachys*, *Stipa capillata*) appeared.

3) Herbal-grass (from 17 years old to the present day). By the 27th year of regenerative succession, the cereals are equally represented by loose-leaf (*Poa angustifolia*, *Phleum phleoides*), rhizomatous (*Elytrigia repens*) and turf (*Poa transbaikalica*, *Stipa capillata*) species (Fig. 1). A few weeds (*Artemisia scoparia*) and steppe species (*Medicago falcata*, *Scabiosa ochroleuca*, *Heteropappus altaicus*, *Galium verum*).



**Fig. 1.** The fallow land at the Sush site for the 27th year of succession.

**Table 1.** Characteristics of the stages of succession on the Sush site.

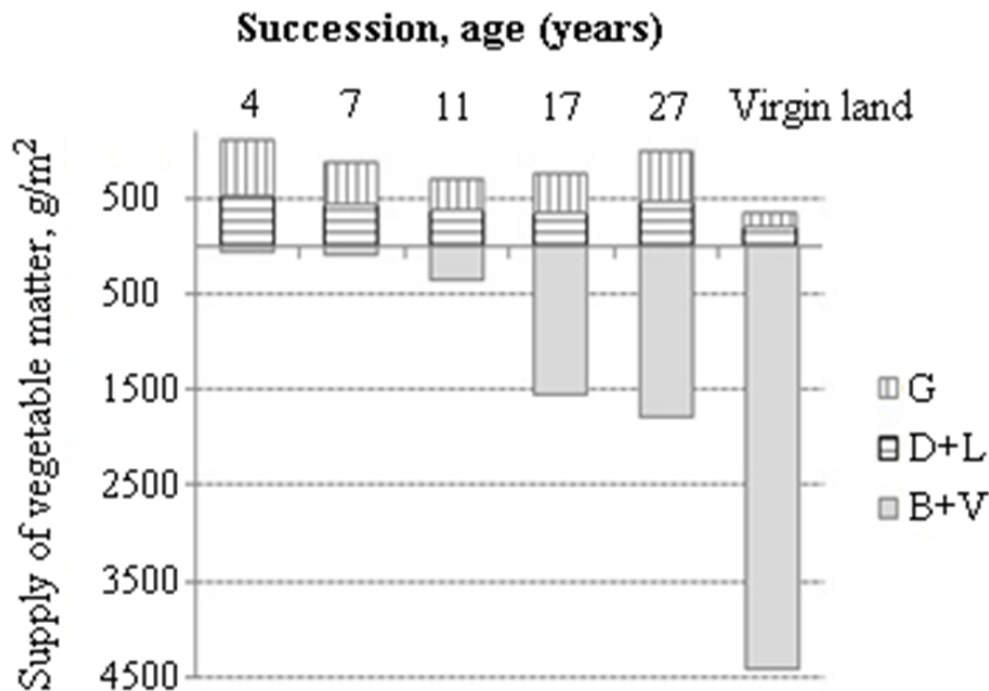
Indicators	Age of succession, years			
	4	7–17	27	Virgin land
Projective cover, %	20–30	60–70	70	80–95
Total number of species per 500 m <sup>2</sup>	18	48	58	69
Of these, in %:				
ruderal	56	21	12	9
meadow	28	26	24	23
meadow-steppe	11	27	33	38
steppe	5	26	27	26
petrophytes, xerohygrophytes	–	–	4	4

During the succession, the number of species and the projective cover in the phytocenosis of the fallow area gradually increases (Table 1). At the initial stage of succession, the largest share in the total list is made up of weed species, the number of which decreases sharply by the 17<sup>th</sup> year. They are replaced by steppe species, the proportion of which reaches 26%, which is close to their occurrence in the indigenous steppe. The overall high proportion of meadow-steppe and steppe species in land which was fallow for 27 years indicates the meadow-steppe orientation of the development of plant communities.

### Structure of the plant matter

The fallow communities at the large weedy stage (year 4) were characterized by maximum reserves of green phytomass (568 g/m<sup>2</sup>) (Fig. 2). Due to a decrease in the role of *Artemisia* and *Chenopodium* by the 11th year of succession, the green phytomass decreased almost twofold. At the third stage of succession (17–27 years), the supply of green phytomass increased again and amounted to 452g/m<sup>2</sup>; this value is three times higher than the phytomass of virgin meadow steppes (140 g/m<sup>2</sup>). During the entire succession, the total stock of standing dead plant biomass and litter was one and a half to two times higher than that in virgin meadow steppes (Table 2). The stock of living below-ground organs and below-ground mortmass in the 0–20 cm soil layer slowly increased until the 17th year of succession, then increased sharply at the third stage of succession (1788 g/m<sup>2</sup> by the 27th year); however, by this time it had not reached the values characteristic of the virgin meadow steppe (4392 g/m<sup>2</sup>).

In terms of the structure of plant matter, communities of stages 1 and 2 of regenerative succession differ fundamentally from those at stage 3: the first two stages are characterized by the predominance of above-ground, and the third by below-ground plant matter; this fact brings the fallow land at stage 3 closer to virgin steppes. The smaller supply of below-ground phytomass in the fallow land is due to the slow growth of below-ground organs, their pool is full to date (27 years of succession) not formed yet.



**Fig. 2.** The supply of plant matter in the fallow land of different ages and in virgin lands. G – above-ground green biomass, D+L – standing dead plant biomass and litter, B+V – living below-ground organs and below-ground mortmass.

**Table 2.** Statistical indicators of Tuva fallow land of different ages. X – the mass of the component, SM – the average error, and CV – the coefficient of variation. G – green phytomass, D+L – standing dead plant biomass and litter, B – living below-ground organs, V – below-ground mortmass.

Succession, age (years)	Large weedy stage, 4			Rhizomatous, 7			Turfgrass, 17			Turfgrass, 27	
	Statistical indicators										
Phytomass component	X	SM	CV	X	SM	CV	X	SM	CV	X	SM
G	5.6	0.48	60.0	4.21	0.82	64.0	3.0	0.57	51.0	4.0	0.53
D+L	5.2	0.21	73.0	4.06	0.28	61.0	3.9	0.17	63.0	0.63	1.2
B	0.5	0.61	95.0	0.71	0.7	52.0	1.5	0.21	72.0	1.12	5.16
V	0.2	0.25	74.0	1.01	0.4	49.0	1.12	0.47	75.0	1.87	5.27

### **Syntaxonomy of fallow land**

The fallow land of the Turan-Uyuk basin are assigned to the order *Agropyretalia intermedio-repentis* (class *Artemisietea vulgaris*), which unites communities representing an advanced stage of regenerative successions. They are described in the rank of the new *Artemisio scopariae-Elytrigietum repentis*.

**Prodromus synthesized the plant class *Artemisietea vulgaris* in the Tuvan-Uyuk basin of Tuva**

Class *Artemisietea vulgaris* Lohmeyer et al. ex von Rochow 1951

Order *Agropyretalia intermedio-repentis* Oberd. et al. ex T. Muller et Gors 1969

Alliance *Convolvulo arvensis-Agropyron repentis* Gors 1966

Association *Artemisio scopariae-Elytrigietum repentis* ass. nov. hoc loco

**Description of the new plant association**

***Artemisio scopariae-Elytrigietum repentis* ass. nov.**

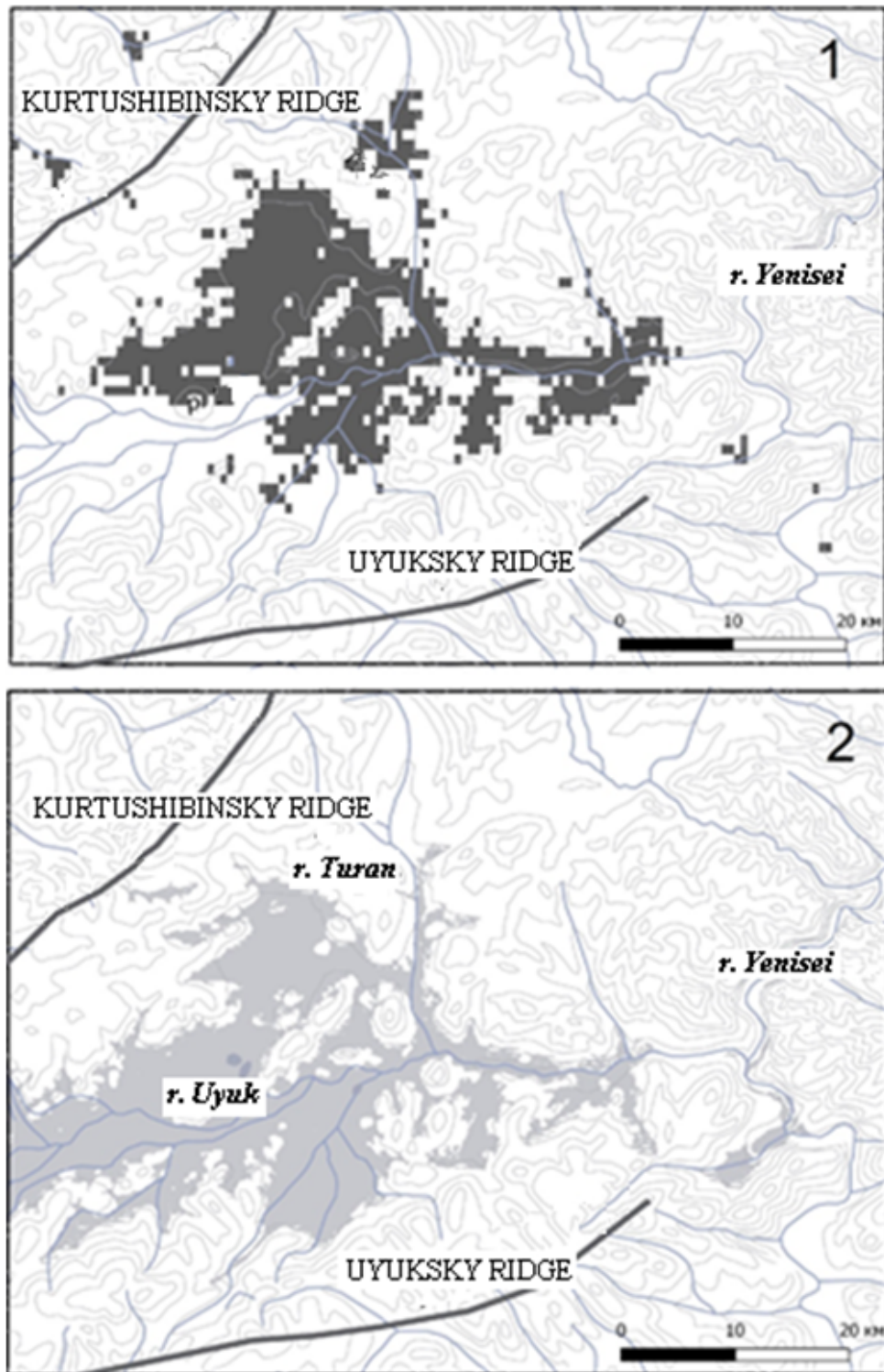
Nomenclatural type (holotypus hoc loco) description 1 (number in the phytocenoteca 8667), Republic of Tyva, Piy-Khem district, near the village of Sush, plain relief, 793 m above sea level, N 52.04819° E 94.15213°, authors – N.I. Makunina, O.S. Zhirova (Appendix, Table S1).

Diagnostic types: *Artemisia scoparia*, *Heteropappus altaicus*, *Medicago falcata*, *Oxytropis pilosa*, *Poa transbaicalica*, *Potentilla longifolia*, *Scabiosa ochroleuca*.

Composition and structure. The projected coverage of the herbage varies from 30 to 80%, averaging 50%. The uniform appearance of the herbage, determined by grasses, is regularly disrupted by patches of *Artemisia scoparia* and other species of various herbs (*Potentilla bifurca*, *Scabiosa ochroleuca*). The height and structure of the herbage vary greatly. The first sublayer (40–80 cm) is composed of generative shoots of grasses (*Elytrigia repens*, *Phleum phleoides*, *Poa angustifolia*) and *Artemisia scoparia*. The second sublayer (10–40 cm) is formed by vegetative shoots of grasses, with *Medicago falcata* dominating among the various herbals. The third sublayer (3–7 cm) is formed by *Heteropappus altaicus* and other species of steppe and weedy grass; among them there are isolated specimens of turf grasses (*Festuca valesiaca*, *Koeleria cristata*).

Distribution. Turan-Uyuk basin.

The potential area of the association, calculated using MaxEnt, is shown in Fig. 3. The dark gray color indicates the territory where the probability of communities of this type exceeds 70%. This is the main part of the flat territory of the basin with a gradient less than 3°; the area of the association does not include the flat western part of the basin, occupied by the swampy valleys of the Uyuk River and its tributaries.



**Fig. 3.** Potential range of acc. *Artemisio scopariae-Elytrigietum repentis* and its relation to the flat areas of the basin. Dark gray (1) indicates the potential area of the association, light gray (2) indicates the area with slopes less than 3°.

**Table 3.** Dominants and codominants of herbal-grasslands and virgin meadow steppes; dom – dominants, cdom – codominants, + – species are rare.

Species	Herbal-grasslands	Virgin meadow steppes
<i>Elytrigia repens</i>	dom	.
<i>Medicago falcata</i>	dom	.
<i>Artemisia scoparia</i>	dom	.
<i>Potentilla longifolia</i>	cdom	.
<i>Poa angustifolia</i>	cdom	+
<i>Scabiosa ochroleuca</i>	cdom	+
<i>Heteropappus altaicus</i>	cdom	+
<i>Potentilla bifurca</i>	cdom	+
<i>Poa transbaicalica</i>	cdom	cdom
<i>Phleum phleoides</i>	cdom	cdom
<i>Veronica incana</i>	cdom	cdom
<i>Galium verum</i>	cdom	cdom
<i>Caragana pygmaea</i>	.	dom
<i>Carex pediformis</i>	.	dom
<i>Helictotrichon altaicum</i>	.	dom
<i>Stipa capillata</i>	+	dom
<i>Stipa pennata</i>	+	dom
<i>Artemisia glauca</i>	+	cdom
<i>Artemisia tanacetifolia</i>	.	cdom
<i>Aster alpinus</i>	.	cdom
<i>Coluria geoides</i>	.	cdom
<i>Fragaria viridis</i>	.	cdom
<i>Helictotrichon schellianum</i>	+	cdom
<i>Iris ruthenica</i>	.	cdom
<i>Phlomis tuberosa</i>	.	cdom
<i>Polygala comosa</i>	.	cdom
<i>Pulsatilla patens</i>	.	cdom
<i>Pulsatilla turczaninovii</i>	.	cdom
<i>Schizonepeta multifida</i>	+	cdom
<i>Thalictrum petaloideum</i>	.	cdom

Comparison of the floral composition and dominant communities of fallow land at the grass-herbal stage and virgin meadow steppes

In the 27th year of the restoration succession, the floral composition of fallow communities and virgin meadow steppes is still very different. *Elytrigia repens*, *Artemisia scoparia*, and *Medicago falcata* usually prevail in fallow lands, while virgin communities are dominated by the shrub *Caragana pygmaea*, grasses (*Helictotrichon altaicum*, *Stipa pennata*, *Stipa capillata*) and sedge *Carex pediformis* (Table 3). In general, for the fallow land and meadows, this tool can replace all four types: two grasses ((*Phleum phleoides*, *Poa transbaicalica*) and two types of herbals (*Galium verum*, *Veronica incana*). Permanent codominants of the fallow land are *Poa angustifolia* grass and the steppe herbals (*Heteropappus altaicus*, *Potentilla bifurca*), meadow-steppe herbs (*Fragaria viridis*, *Phlomis tuberosa*, *Pulsatilla patens*) are constantly found in the grasslands of meadow steppes with 1–5% coverage.

## Conclusions

By the 1990s, a third of the territory in the Turan-Uyuk basin had been plowed, which is 90% of the territory with a gradient of less than 3°. Currently, most of the former arable land is occupied by fallow communities that are in the third, herbal-grass and cereal stage of regenerative succession.

The modern fallow communities of the Turano-Uyuk basin are described within the framework of the new association ***Artemisio scopariae-Elytrigietum repentis*** ass. nov.

According to the structure of plant matter, fallow communities of the third stage are closer to virgin communities than to the fallow land at the first or second stage: the reserve of below-ground biomass is 1.5–2 times less than above-ground. At the same time, the floral composition of modern fallow communities and meadow steppes is very different.

Thus, in comparison with the species composition of communities, the structure of plant matter later approaches the terminal level.

The stages of fallow succession are distinguished by the uniqueness of plant communities due to changing habitat conditions. At stage 3 (year 27), the communities are close to the natural indigenous ones in terms of the number and composition of species, but they have not yet reached their level in terms of the composition of the dominants, the projective coverage, and the ratio of life forms. In addition, regenerating communities differ from virgin ones in the abundance of the weedy species. The main difference lies in the structure of the phytomass: the reserves of the above-ground component are higher in the fallow land and the below-ground component is lower.

In general, the succession of the studied area proceeds naturally towards the restoration of the original steppe phytocenosis.

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**APPENDIX.** Botanical descriptions of plant communities and the *Artemisia scopariae-Elytrigietum repentis* association of the Turan-Uyuk basin of the Republic of Tuva.**Table S1.** Association *Artemisia scopariae-Elytrigietum repentis* ass. nov.

**Single encounters:** *Anemone sylvestris* 2 (2); *Artemisia dracunculus* 1 (2); *A. macrocephala* 3 (1); *A. rupestris* 6 (1); *Astragalus adsurgens* 8 (1); *Bromopsis inermis* 6 (3); *Calamagrostis epigeios* 10 (1); *Crepis tectorum* 2 (1); *Dracocephalum nutans* 5 (1); *Erodium cicutarium* 3 (1); *Galatella macrosciadia* 6 (1); *Galeopsis bifida* 5 (1); *Geum aleppicum* 4 (1); *Hierochloa glabra* 1 (1); *Hylotelephium triphyllum* 2 (1); *Inula salicina* 10 (1); *Iris potaninii* 9 (1); *Kitagawia baicalensis* 4 (1); *Lappula squarrosa* 10 (1); *Lathyrus pannonicus* 10 (1); *Leontopodium ochroleucum* 9 (1); *Medicago sativa* 6 (1); *Nonea rossica* 9 (1); *Potentilla tanacetifolia* 6 (1); *Potentilla tanacetifolia* 5 (1); *Stipa pennata* 9 (1); *Tephrosia integrifolia* 10 (1); *Thermopsis lanceolata* 6 (1); *Valeriana transjensensis* 10 (1); *Youngia tenuifolia* 9 (1).

**Description localities:** Republic of Tyva; Piy-Khem district, vicinity of the village of Sush: 1 – N 52.04819° E 94.15213°; 2 – N 52.03628° E 94.12727°; 3 – N 52.05236° E 94.11384°; 4 – N 52.02015° E 94.02428°; 5 – N 52.02071° E 94.02640°; 6 – N 52.03236° E 94.02151°; 7 – N 52.03461° E 94.12448°; 8 – N 52.02779° E 94.12823°; 9 – N 52.03059° E 94.12670°; 10 – N 52.02655° E 94.12887°.

**Dates of descriptions:** 1–6 – 19.08.2021, 7–10 – 02.07.2018.

**Authors of descriptions:** 1–6 – N.I. Makunina, O.S. Zhironva; 7–10 – N.I. Makunina

Description number	1	2	3	4	5	6	7	8	9	10	Constancy
The number in the database	8667	8670	8675	8672	8671	8673	8272	8270	8271	8269	
Latitude, N	52.04819°	52.03628°	52.05236°	52.02015°	52.02071°	52.03236°	52.03461°	52.02779°	52.03059°	52.02655°	
Longitude, E	94.15213°	94.12727°	94.11384°	94.02428°	94.02640°	94.02151°	94.12448°	94.12823°	94.12670°	94.12887°	
Altitude (m a.s.l.)	793	827	828	840	846	835	835	880	862	886	
Slope exposure	–	–	–	–	3	C-3	C	C	C	C	
Slope steepness (°)	–	–	–	–	5	3	3	3	3	5	
Projective cover, %	35	50	60	50	60	50	35	55	45	60	
Number of species	19	24	18	22	20	26	12	24	17	25	

Description number	1	2	3	4	5	6	7	8	9	10	Constancy
The number in the database	8667	8670	8675	8672	8671	8673	8672	8270	8271	8269	
Diagnostic species (D.s.) of the association <b>Artemisia scopariae-Elytrigietum repentis</b>											
<i>Scabiosa ochroleuca</i>	2	1	5	8	5	1	1	1	1	3	V
<i>Artemisia scoparia</i>	15	20	5	10	3	28	1	4	.	.	V
<i>Heteropappus altaicus</i>	1	1	1	5	2	.	3	1	2	2	V
<i>Medicago falcata</i>	10	5	5	3	10	1	1	1	.	.	V
<i>Potentilla longifolia</i>	1	2	1	2	1	.	5	.	3	3	IV
<i>Oxytropis pilosa</i>	2	1	1	1	1	.	1	.	.	.	IV
<i>Poa transbaicalica</i>	2	15	.	2	.	1	.	.	15	15	III
D.s. of the class <b>Artemisietea vulgaris</b> , order <b>Agropyretalia intermedio-repentis</b> , alliance <b>Convolvulo arvensis-Agropyron repentis</b>											
<i>Elytrigia repens</i>	20	15	10	3	20	5	20	45	15	15	V
<i>Phleum phleoides</i>	2	.	12	15	.	3	3	.	5	5	III
<i>Poa angustifolia</i>	2	1	2	3	5	.	.	.	.	.	III
<i>Taraxacum officinale</i>	.	.	1	.	1	1	1	.	1	1	III
<i>Festuca valesiaca</i>	1	.	.	.	.	.	1	1	2	2	II
<i>Stipa capillata</i>	1	1	.	.	.	1	.	.	.	.	II
<i>Achillea asiatica</i>	.	.	2	.	2	.	2	.	.	.	II
<i>Koeleria cristata</i>	2	.	1	.	.	.	.	.	1	1	II
<i>Linaria acutiloba</i>	1	1	.	.	1	.	.	.	.	.	II
<i>Artemisia vulgaris</i>	.	1	.	.	1	.	.	.	.	.	I
<i>Convolvulus arvensis</i>	.	.	1	.	.	1	.	.	.	.	I
<i>Plantago media</i>	.	.	1	.	1	.	1	.	.	.	I

Description number	1	2	3	4	5	6	7	8	9	10	Constancy
	8667	8670	8675	8672	8671	8673	8672	8270	8271	8269	
<i>Veronica incana</i>	1	1	.	.	1	.	1	8	1	2	IV
<i>Galium verum</i>	2	.	.	.	.	12	10	1	1	5	III
<i>Potentilla bifurca</i>	1	5	1	1	.	.	1	1	.	1	III
<i>Bupleurum scorzonerifolium</i>	1	1	3	1	.	.	2	.	.	.	III
<i>Artemisia glauca</i>	.	2	1	1	.	.	.	.	.	.	II
<i>Picris hieracioides</i>	1	.	.	.	1	.	1	1	.	1	II
<i>Cirsium setosum</i>	.	.	.	.	.	.	1	1	1	1	II
<i>Erigeron acris</i>	1	.	.	.	.	.	1	1	1	.	II
<i>Mellilotus suaveolens</i>	.	.	1	1	1	.	.	.	.	.	II
<i>Androsace septentrionalis</i>	.	.	.	.	.	.	1	1	.	2	I
<i>Artemisia frigida</i>	.	.	.	.	2	.	.	.	.	.	I
<i>Artemisia santolinifolia</i>	.	.	1	3	.	.	.	.	.	.	I
<i>Astragalus danicus</i>	.	.	.	.	1	.	.	.	.	.	I
<i>Helictotrichon schellianum</i>	.	.	.	.	1	.	1	1	.	.	I
<i>Hieracium x robustum</i>	.	.	.	.	.	.	1	1	.	1	I
<i>Hieracium umbellatum</i>	1	.	.	.	1	.	.	.	.	.	I
<i>Schizonepeta multifida</i>	.	.	.	.	.	.	1	1	.	12	I
<i>Senecio ambraceus</i>	.	.	.	.	.	.	.	1	1	3	I
<i>Tragopogon orientalis</i>	.	.	.	.	1	.	.	1	1	.	I
<i>Triticum species</i>	.	.	1	1	1	.	.	.	.	.	I
<i>Vicia cracca</i>	.	.	.	.	1	.	.	.	.	1	I

Other species