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Weed vegetation in fields of post-harvest green manure crops and their use as green fertilisers

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Abstract. Perennial weed species predominate in the fields sown with post-harvest green manure crops, surpassing the number of annual weeds. These are mainly represented by persistent and difficult-to-eradicate rhizomatous and root-sprouting noxious weeds. This study aimed to analyse the significance of the agroclimatic potential of the central part of the Chüy Valley in Kyrgyzstan, along with the provision of uninterrupted irrigation of fields during the introduction of post-harvest green manure crops into agricultural production, under conditions where weed growth and development are stimulated on irrigated arable land. The study examined weed vegetation in fields sown with intermediate post-harvest green manure crops (white mustard, oilseed radish, white sweet clover, spring barley, and lacy phacelia) following the harvest of spring wheat. The subsequent incorporation of phytomass into the soil was carried out to serve as a green fertiliser and to analyse its effect on the phytosanitary condition of the soil. The findings confirmed that when green manure crops are incorporated as green fertiliser, weed plants are destroyed in masse; that is, the green biomass of weeds undergoes mineralisation in the arable layer and thereby serves as a source of green fertiliser. The agrotechnological approach of suppressing weed growth in agricultural crop fields through the integration of intermediate post-harvest green manure agrocenoses – white mustard, oilseed radish, white sweet clover, spring barley, and lacy phacelia – into the cropping structure, without the need for additional arable land, reflects a high level of cultivation practice in the irrigated farming systems of the Kyrgyz Republic. These green manure crops are sown after the harvest of spring wheat (the first ten-day period of July) on irrigated fields with typical sierozem soils. This practice fully meets the key principles of environmentally sustainable organic farming. The targeted use of plant phytomass (both intermediate post-harvest green manure crops and weed vegetation) as green fertiliser possesses significant biological potential for reducing greenhouse gas emissions from agricultural production. It also supports carbon sequestration (CO2 capture) in the organic matter of soils and contributes to the resilience of agroecosystems in the face of climate change, thus playing a crucial role in climate change mitigation

Keywords: green manure crops; weeds; damage; climate; soil fertility; arable land

Introduction

Despite the long-standing efforts of farmers to control weed infestation in agricultural crop fields, a high degree of weed contamination persists. Weeds are natural competitors of cultivated plants, and their

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presence negatively affects the development conditions of agrocenoses. Weeds not only reduce crop yields and increase production costs but also diminish the quality of agricultural produce. As noted by S. Shevchenko *et al*. (2023), protecting agrocenoses from weed invasion, reducing their density, and eliminating them altogether represent significant untapped potential for increasing agricultural output. Weeds compete with crops for essential resources such as water, light, nutrients, and space, resulting in lower yields and poorer quality of produce. This competition is especially critical under conditions of limited resources in irrigated arable land and the need to ensure sustainable food production. Losses caused by weed overgrowth directly affect the income of farming enterprises and the availability of food on the domestic market. Furthermore, they have a detrimental impact on the socio-economic well-being of rural populations (Junaid & Gokce, 2024). Thus, weed control remains a key agrotechnological component in ensuring national food security.

Existing methods of weed control – preventive, agrotechnical, and chemical – each offer certain benefits, and their combined application enhances both the cost-effectiveness and efficiency of weed management (Gao & Su, 2024). However, as noted by I. Shuvar & H. Korpita (2023), excessive use of herbicides can lead to significant environmental pollution, changes in the species composition of weed flora, and reduced sensitivity of many species to chemical treatments. This highlights the relevance of ongoing research into weed vegetation, shifts in species composition, and the use of both traditional and environmentally sustainable methods of weed control. According to M. Vasileiou *et al.* (2024), the scientific justification and adoption of new, ecologically safe technologies and methods for controlling weed vegetation – aimed at reducing weed infestation and ensuring the production of environmentally friendly crops – represent an important scientific and practical challenge with considerable national economic significance. This issue is particularly pressing in the context of growing concern over environmental quality and the resilience of agriculture in the face of global climate change.

Scientific research has demonstrated that the use of green manure crops as fertilisers – when combined with technogenic factors for soil fertility restoration and the latest advances in agricultural production – has a multifaceted positive impact on the agroecosystem. This includes improvements in agroecological, phytosanitary, energy-efficient, and economic aspects of crop production (Lei *et al.*, 2022).

Agrotechnologies involving the introduction of intermediate green manuring, which make full use of the region's bioclimatic potential and renewable carbon sources, not only reduce anthropogenic pressure on arable land but also support the controlled germination of weed vegetation. This, in turn, creates favourable conditions for targeted and effective weed control at early stages of development. In developed countries, green manuring is widely used as an agrotechnical practice to restore soil fertility, improve the phytosanitary condition of arable land, and accelerate the growth of the agricultural sector. This contributes to an increase in the production of environmentally friendly food through the implementation of organic farming systems. Therefore, among the range of agrotechnical measures for controlling both perennial and annual weed species, one of the most pressing tasks in the protection of agricultural crops is the integration of intermediate post-harvest green manure crops into irrigated farming systems. This approach has proven effective in reducing weed populations on irrigated arable land (Chicouène, 2020). This has become possible with the advancement of the agroecosystem-based approach to biological farming, which promotes integrated and sustainable management of the crop production sector. It places emphasis on natural mechanisms for regulating biodiversity and restoring soil fertility. One of the key tools in this progressive direction is the agrotechnology of green manuring, which involves cultivating specific crops for incorporation into the soil with the aim of comprehensive improvement – including phytosanitary conditions and weed suppression (Karabaev *et al.*, 2023). The present research aimed to study weed vegetation in fields sown with intermediate post-harvest green manure crops under irrigated conditions on typical sierozem soils in the central part of the Chüy Valley, Kyrgyz Republic.

Materials and Methods

The research focused on the study of weed vegetation in fields sown with intermediate post-harvest green manure crops – white mustard, oilseed radish, white sweet clover, spring barley, and lacy phacelia following the harvest of spring wheat. These green manure crops were sown after the harvest of spring wheat on irrigated typical sierozem soils in the central part of the Chüy Valley, Kyrgyz Republic, and were used as green fertilisers. Field experiments examining weed presence in plots with post-harvest green manure crops, sown following spring wheat, were conducted during the growing seasons of 2019-2021. Observations were made from the third ten-day period of July to the second ten-day period of October. The experimental design was as follows:

1*. Control + Potato – 50% NPK

2*. Green manure (annual white sweet clover) + Potato – 50% NPK

3*. Green manure (white mustard) + Potato – 50% NPK

4*. Green manure (oilseed radish) + Potato – 50% NPK

5*. Green manure (lacy phacelia) + Potato – 50% NPK

6*. Green manure (barley) + Potato – 50% NPK,

where * is the control and all treatment variants were conducted against an agrochemical background of

50% NPK, equivalent to N = 120 kg/ha of active substance, P = 90 kg/ha, and K = 90 kg/ha.

The study was conducted following the research of H. Vetter (1959), E. Schieder & W. Breunig (1978), and A. Berdnikov (1990), who noted that the combined application of green and mineral fertilisers is more effective than their separate use. Furthermore, research by B. Sotnikov (2004) demonstrated that incorporating green manure crops together with straw, against a background of mineral fertilisation (ranging from 50 to 200 kg/ha of active substance), within a crop rotation involving green manure fallow, increased the nutritional value of maize silage by 0.02-0.03 feed units compared with conventional fallow systems. In the present experiment, the preceding crop was spring wheat, harvested in the third ten-day period of July. The agroclimatic potential of the central part of the Chüy Valley allows for the successful sowing of post-harvest green manure crops under conditions of irrigation using sprinkler systems.

The methodology for fieldwork on the experimental plot, as well as laboratory analysis of plant and soil samples, was based on standard procedures accepted in the Kyrgyz Republic (Kachinsky, 1925; Grishina & Samoilova, 1971; Levin, 1973). Weed infestation levels and species composition in the post-harvest green manure crop plots were assessed in late September, prior to the incorporation of the green manure crops. A quantitative method was used, employing a 1 m^2 frame with four replications for each treatment (Samsonov *et al.*, 2006; Fetyukhin *et al.*, 2018). All weed species present within the plots were recorded and identified. In cases where species identification proved difficult, herbarium specimens were collected and later identified under appropriate conditions using specialised literature (Fetyukhin *et al.*, 2018). The study was carried out by ethical standards for plant research and complied with international bioethics regulations (Convention on Biological Diversity, 1992). The species composition and biological groups of the weeds were also determined concurrently.

Results and Discussion

Prerequisites for improving the phytosanitary condition of arable land

The irrigated arable land of northern typical sierozem soils at the experimental site is considered fertile, characterised by a high standard of irrigated farming practices. In the 1960s, large-scale land reclamation was carried out in this area, and a reliable irrigation system using sprinkler units has since been operating effectively to support agricultural crop production. Under such favourable agrotechnical conditions, and when following recommended cultivation practices, it is possible to achieve target yields within agrocenoses. However, even under these conditions, weed infestation remains a significant issue in irrigated fields. This presents one of the most serious agrotechnical and economic challenges for agricultural production, as weeds reduce crop yields, may act as vectors for pests and diseases, and diminish the quality of crop products (Borodin & Tarushkin, 1987).

As a result of non-compliance with recommended farming systems in Kyrgyzstan, agricultural crops are often affected by moderate to severe weed infestation, posing a serious risk of widespread proliferation of persistent perennial rhizomatous and root-suckering weeds. However, the current level of scientific research addressing the phytosanitary challenges of farming systems does not fully meet the requirements of ecologically balanced, soil-conserving and energy-efficient agriculture, nor does it align with the realities of a diverse agricultural sector. The phytosanitary condition of irrigated arable land plays a crucial role in determining the overall effectiveness of agricultural production and the resilience of agroecosystems to the challenges of global climate change. In turn, this directly affects the health of agrocenoses, animals, and humans. Therefore, a comprehensive approach to agricultural management is essential in order to control weed infestation. In this context, the development of new environmentally friendly weed control methods is of increasing importance. Among these, the agrotechnical practice of using post-harvest green manure crops (intermediate green manuring) represents a highly relevant and sustainable strategy for the protection of irrigated farmland.

Intermediate post-harvest green manuring within the framework of innovative irrigated farming represents a promising agrotechnical approach based on the rational use of bioclimatic potential and land resources. This method enables the production of an additional yield of green phytomass from each hectare of irrigated arable land during the second half of summer and early autumn. The phytomass of green manure crops is used as a green fertiliser, meaning that the cultivation of intermediate post-harvest green manures does not require the allocation of additional irrigated land – a critical advantage in the context of limited agricultural land resources. These crops serve as an additional renewable source of "green" organic fertilisers, helping to replenish the reserves of organic matter in irrigated soils, which are often depleted due to excessive exploitation and the neglect of scientifically based agricultural practices.

Currently, the use of irrigated arable land in the Kyrgyz Republic is largely driven by the intensive exploitation of the soil's fertility potential, frequently in violation of scientifically recommended farming systems. This has led to a decline in soil fertility and reduced crop yields (Karabaev *et al.*, 2024). Over the years, the consistent removal of large quantities of nutrients from the soil with crop harvests, without adequate replenishment, has resulted in a noticeable decline in organic matter levels and the loss of valuable agrophysical and agrochemical properties of arable land.

The loss of soil fertility in irrigated agriculture poses a serious threat to the food security of the Kyrgyz Republic, which is directly linked to the rational and careful management of soil resources. This challenge has become increasingly pressing, as numerous issues have accumulated in the country's agricultural sector in this regard. Addressing these problems requires the support of innovative scientific research focused on the nation's land resources. A key priority is the collection of data and materials concerning the current state of soil fertility, using an agro-soil information system tailored to agricultural land (Golozubov *et al.*, 2024). In the near future, this information is expected to be used strategically in the development of policy measures aimed at strengthening food security and improving nutritional outcomes for the population. It will also serve the needs of all stakeholders within the agricultural sector of the national economy.

Influence of agroclimatic potential on plant development

The meteorological conditions of the region, along with anthropogenic factors, can significantly influence the spread of weeds on arable land by altering their distribution, population density, and competition with cultivated crops. Table 1 presents the average long-term meteorological indicators for the central part of the Chüy Valley in the Kyrgyz Republic.

Table 1. Average long-term meteorological indicators for the central part of the Chüy Valley in the Kyrgyz Republic

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Annual average
Air temperature, °C												
-5.1	-2.8	3.8	11.5	16.9	20.3	23.9	21.9	16.7	9.9	1.4	-4.1	9.5
Soil surface temperature, °C												
-8.5	-4.7	4.0	13.7	21.0	26.5	30.2	27.2	19.5	10.2	1.0	-5.0	11.2
Precipitation, mm												
22.2	25.0	49.0	64.0	59.5	37.2	17.7	11.7	14.7	35.7	37.2	25.7	400.0
Relative air humidity, %												
75.2	76.7	74.7	65.0	60.0	55.0	51.2	51.7	54.0	62.2	72.7	75.7	64.5

Source: developed by the authors

The agroclimatic potential of the study region, following the harvest of spring wheat in the third ten-day period of July, enables the cultivation of post-harvest green manure crops under irrigation (via sprinkler systems). These conditions also promote the emergence of weed vegetation. This is evidenced by the climatic data of the central Chüy Valley, where both air temperature and soil thermal regime are favourable for the development of post-harvest green manure crops as well as weed species (Table 1).

During the growing season of post-harvest green manure crops, the weather remains relatively dry. Air humidity averages 51.7% in August and 54.0% in September, while precipitation levels are low – only 11.7 mm in August and 14.7 mm in September. A notable increase is observed only in October, reaching 35.7 mm. The above-mentioned air temperature indicators contribute to soil drying: in August, absolute soil moisture is 13.1 mm, in September it drops to 9.5 mm, and by October falls further to 6.8 mm. Even the higher rainfall in October does not significantly improve soil moisture levels. These meteorological data, along with anthropogenic influences, indicate that the successful cultivation of post-harvest green manure crops is not feasible without regular irrigation.

The key method for optimising the water regime in the hot summer climate of the Chüy Valley is scheduled irrigation, which ensures an optimal soil moisture balance and enables the cultivation of post-harvest green manure crops. Given the high daytime air temperatures during the summer, irrigation of such crops plays an important agrotechnical role in supporting sustainable and productive farming practices. Changes in soil temperature regimes under the influence of irrigation have a positive effect on both soil formation processes and plant development, including the emergence of weed vegetation. Optimal regulation of the water regime – through sprinkler irrigation – on fields sown with post-harvest green manure crops enhances the solubility of soil nutrients by acting as a solvent for chemical compounds, thereby increasing nutrient availability for plants. It also stimulates soil microbiological activity. This process promotes the mineralisation of crop residues from the preceding spring wheat (straw and roots), which in turn improves the nutrient status of the soil. The freshwater used by sprinkler systems is characterised by a neutral pH of 7.

Against this background of favourable agrometeorological conditions and the introduction of innovative agrotechnical practices in irrigated farming, an optimal balance of water, nutrients, and air in the soil is achieved in the experimental plots. This creates a sound basis for the advanced cultivation of post-harvest green manure crops. Such a combination of natural and anthropogenic factors in the cultivation of intermediate green manures is essential for achieving the desired outcomes in the adoption of green fertiliser practices in agricultural production.

Components of weed vegetation in green manure crop stands

As noted in the articles of B. Sotnikov (2004), K. Dovban (2009), and L. Frolova & M. Novikov (2018), the introduction of intermediate green manure crops into agricultural production is one of the key ecologically sound agrotechnical practices for restoring soil organic matter. These crops also serve a phytosanitary function on arable land. Although intermediate post-harvest green manures are effective in suppressing weed growth and development, weed species are still found within these stands. The important question is how these weeds may affect the phytosanitary condition of the fields for subsequent crops in the rotation. The species composition of the weed vegetation recorded in the authors' third-year trial is presented in Table 2.

Table 2. Species composition of weed vegetation by treatment (third year of the trial)

Weeds	Treatments of post-harvest green manure crops					
	Control	White mustard	White sweet clover	Spring barley	Pacy phacelia	Oilseed radish
Volunteer wheat						
	7	2	3	3	2	3
Perennial weeds						
Couch grass	4	3	3	2	3	2
Field bindweed	5	2	2	3	2	3
Field sow-thistle	6	3	3	2	3	2
Bermuda grass	4	1	2	3	2	1
Russian knapweed	5	2	3	3	3	3
Wintercress	3	1	1	2	2	2
Annual weeds						
White goosefoot	5	1	2	3	2	1
Bristle grasses	7	1	1	2	1	1
Redroot pigweed	8	2	3	3	2	2
Field pennycress	5	1	1	2	1	1
Cockspur	4	1	2	2	2	2
Corncockles	3	1	1	2	1	1

Source: developed by the authors

As shown in Table 2, the fields under intermediate post-harvest green manure crops are predominantly infested with persistent and aggressive rhizomatous and root-sprouting perennial weeds. These are among the most harmful species in agriculture, as their ability to reproduce vegetatively enables them to spread rapidly and regenerate even after partial removal of the above ground biomass. Such weeds cause substantial damage to agricultural production by reducing yields, impairing crop quality, and negatively affecting the overall economic efficiency of farming. Managing rhizomatous and root-sprouting weeds requires additional investment in herbicides, mechanical cultivation, and other agrotechnical measures.

An analysis of the weed composition across the experimental variants revealed the presence of highly persistent perennial weeds, such as couch grass (*Elytrígia répens*), field bindweed (*Convolvulus arvensis*), field sow-thistle (*Sonchus arvensis*), Bermuda grass (*Cýnodon dáctylon*), Russian knapweed (*Rhaponticum repens*), wintercress (*Barbaréa vulgáris*). Among these, rootsprouting perennials – field sow-thistle (*Sónchus arvénsis*), field bindweed (*Convōlvulus arvēnsis*), Russian knapweed (*Rhaponticum repens*) – were found alongside rhizomatous species such as couch grass (*Elytrígia répen*) and Bermuda grass (*Cýnodon dáctylon*). Wintercress (*Barbaréa vulgáris*) reproduces both by seed and root suckers. These species belong to a category of particularly difficult-to-eradicate weeds. Root-sprouting weeds are capable of propagating not only by seed but also through root suckers or underground shoots. They spread rapidly across irrigated arable land, forming dense infestations and competing aggressively with cultivated crops for essential resources.

The cultivation of agricultural crops presents significant challenges in controlling perennial weeds that propagate via root suckers and rhizomes. The resilience of these weeds is largely due to their extensive and well-developed root systems. These species are particularly problematic because they spread underground, often to considerable depths, and can remain viable in the soil for many years (Samsonov *et al*., 2006; Mazirov & Korchagin, 2009). Under adverse environmental conditions, their vitality is maintained in a dormant state – an important biological characteristic of these weeds. Their vegetative propagation organs include reproductive roots, root suckers, rhizomes, bulbs, tubers, and surface runners. Even within a single growing season, these structures can produce several, or even dozens, of new daughter plants.

During weed control measures and root pruning, the above-ground parts of the plants may die off, yet a vast number of vertical and horizontal roots and rhizomes remain in the soil, retaining their viability for many years. Under favourable conditions, these weeds can regenerate even after remaining dormant in the soil for three to four years. Furthermore, they are capable of both vegetative reproduction and propagation by seed, with seeds remaining viable in the soil for five years or more and germinating when conditions become favourable (Spiridonov, 1997). These hardy and persistent species germinate en masse on irrigated arable land, depriving crops of essential nutrients, suppressing seedlings, and blocking access to sunlight, thereby reducing the productivity of agrocenoses. Their control requires significant labour and financial resources, ultimately increasing the cost of agricultural production.

The harmfulness of perennial weeds is determined not only by their abundance and species composition but also by the sensitivity of cultivated plants to their presence, which varies depending on the crop's growth stage. In the studies by Yu. Fadeev & K. Novozhilov (1984) and M. Sokolov & E. Litvishko (1993), particular attention is given to biological methods of weed control among agronomic practices. In this context, the introduction of intermediate post-harvest green manure crops into the cropping systems of agrocenoses can provoke a mass emergence of weed vegetation. However, intermediate green manures such as white mustard, oilseed radish, white sweet clover, spring barley, and lacy phacelia exhibit vigorous growth during the summer months, forming a dense above-ground phytomass that effectively suppresses weed growth and development.

Phenological observations of weed growth and development under different green manure crop treatments revealed that these plants can successfully suppress even the most persistent perennial weeds. This occurs due to several factors:

- the green manure crops actively utilise both anthropogenic and natural resources – irrigation water, sunlight, and soil nutrients – which reduces the availability of these essential growth factors for weeds;
- the green manures rapidly develop under the favourable meteorological conditions of the study region, forming dense cover that shades the soil and limits light penetration, thereby inhibiting the germination and growth of light-dependent weed species.

However, as shown in Table 2, weed species were still present across the experimental treatments. This can be attributed to their adaptability, reproductive capacity, and resilience to adverse conditions. Such traits allow weeds to compete effectively with cultivated crops, making them a persistent challenge in agricultural production. The primary weed-suppressing function of intermediate post-harvest green manure crops lies in their incorporation into the soil during autumn ploughing, at which point both the green manure and accompanying weeds serve as green fertilisers. Importantly, prior to this ploughing, the weeds do not have time to reach the seeding stage, meaning the seed bank in irrigated fields with ordinary sierozem soils is not replenished. Following autumn ploughing, during the mineralisation process of plant residues (including green manure crops and weeds), the vegetative organs of the most aggressive perennial weeds lose viability in both autumn and spring. These residues are decomposed by soil microorganisms, which actively proliferate in the phytomass of green manure crops and accompanying weed vegetation.

The green phytomass of post-harvest green manure crops, when incorporated into arable soil in its fresh state, contains 77.6%-83.1% moisture. At this stage, it also features a narrow carbon-to-nitrogen ratio, which promotes microbial activity in the soil. In addition, the total biomass of weeds, when combined with the phytomass of the green manure crops, serves as green fertiliser. This contributes to the enrichment of organic matter in irrigated arable soils and improves the soil's nutrient regime. Such targeted use of plant phytomass (both green manure crops and accompanying weeds) as green fertiliser holds significant potential for reducing greenhouse gas emissions associated with agricultural practices. It also supports the sequestration of carbon in the soil's organic matter and enhances the resilience of agroecosystems to climate change.

As demonstrated by the research findings, the cultivation technologies of intermediate postharvest green manure crops – such as white mustard, oilseed radish, white sweet clover, spring barley, and lacy phacelia – on irrigated fields of ordinary sierozem soils in the Chüy Valley of Kyrgyzstan contribute to a reduction in the prevalence of perennial weeds. These ecologically and economically viable agrotechnologies for weed suppression in crop fields, through the introduction of intermediate green manure crops, reflect a high standard of irrigated farming practice. Therefore, the full range of measures and approaches for weed control – including the integration of intermediate post-harvest green manure crops into crop rotation – vegetation remains highly relevant.

Conclusions

The integrated effect of post-harvest green manure crops used as green fertilisers is reflected both in their function as organic fertilisers and in their ability to suppress weed growth during the growing season. Emerging weeds are subsequently destroyed during autumn ploughing while still in their green state. As the plant residues (both green manure crops and weeds) decompose through mineralisation in autumn and spring, the vegetative organs of persistent perennial weeds lose their viability. This contributes to a reduction in weed populations and prevents the replenishment of the soil seed bank. The scientific justification and practical implementation of new, environmentally safe technologies, methods, and means of weed control through the cultivation of post-harvest green manure crops help reduce weed infestation on irrigated arable land in the Kyrgyz Republic. This approach also represents a cost-effective means of producing ecologically clean agricultural yields, which is of significant national economic importance. The use of postharvest green manure crops for weed control in crop fields serves as an indicator of advanced irrigated farming practices, promoting the sustainable use of soil resources and minimising the environmental footprint of agricultural production.

The use of post-harvest green manure crops contributes not only to the improvement of the phytosanitary condition of arable land but also to the enhancement of soil fertility through the enrichment of organic matter and the improvement of agrophysical properties. This is particularly relevant in the context of soil degradation caused by intensive land use, and it supports the longterm sustainability of agroecosystems. The inclusion of post-harvest green manure crops in crop rotation systems also promotes soil carbon sequestration, playing a significant role in mitigating the effects of climate change. This approach aligns with global initiatives aimed at reducing greenhouse gas emissions and strengthening the environmental resilience of the agricultural sector in the Kyrgyz Republic. Further development of weed control methods should be based on an understanding of ecological changes resulting from the characteristics of farming systems, their components, and the pathways of agricultural intensification. This calls for in-depth research into the interaction between green manure crops and weed vegetation under various agroclimatic conditions, as well as the development of adapted agrotechnologies tailored to regional specifics.

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Conflict of Interest
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Орто мезгилдеги сидераттардын талааларындагы отоо чөптөр жана аларды жашыл жер семирткич катары пайдалануу

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Аннотация. Жаздык буудайдын түшүмү жыйналгандан кийин орто мезгилде өстүрүлгөн жашыл жер семирткич түрүндө өстүрүлгөн сидераттар жайгаштырылган сугат айдоо талааларында көп жылдык отоо чөптөрдүн саны бир жылдык отоо чөптөрдүн санына караганда басымдуулук кылат жана алар өтө зыяндуу отоо чөптөр катары мүнөздөлөт. Изилдөөнүн максаты болуп, Кыргызстандын Чүй өрөөнүнүн Борбордук бөлүгүнүн агроклиматтык потенциалынын орто мезгилде өстүрүлгөн сидераттарды айыл чарба өндүрүшүнө киргизүүдөгү ролун жана антропогендик фактор – талааларды үзгүлтүксүз жамгырлатып сугаруунун маанилүүлүгүн аныктоо каралган. Изилдөө жүргүзүүдө, сугат айдоодо жашыл жер семирткич түрүндө жаздык буудайдан кийин орто мезгилде өстүрүлгөн сидераттардын (ак горчица, майлуу турп, ак таттуу беде, жазгы арпа, фацелия) талаасында отоо чөптөрдүн санынын азайышы тастыкталды жана алардын жашыл массасы сидераттар менен чогуу, күзүндө жерге айдалганда жок кылынып, жашыл жер семирткичтин ролун аткарары аныкталды. Сугат айдоо аянттарынын структурасына орто мезгилде өстүрүлгөн жашыл жер семирткич түрүндө пайдаланган сидераттар жайгаштырылганда отоо чөптөрдү жок кылуунун экологиялык жактан таза агротехнологиясы ишке киргизилет. Өсүмдүк биомассасын (сидерат жана отоо чөптөр) жашыл жер семирткич катары максаттуу пайдалануу багытындагы жүргүзүлгөн иштер айыл чарба өндүрүшүндө парник газдарынын эмиссиясын азайтуу багытында зор потенциалга ээ жана топурактын органикалык заттарында көмүртекти секвестрлөө процессине жардам берүү менен агроэкосистеманын климаттын глобалдуу өзгөрүшүнө туруктуулугун жогорулатып, климаттын глобалдык өзгөрүшүнүн кесепеттерин жумшартат

Негизги сөздөр: сидерат өсүмдүк; отоо чөп; зыян; климат; түшүмдүүлүк; айдоо жер

Сорная растительность на полях пожнивных сидератов и их использование в качестве зеленых удобрений

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Аннотация. Многолетние сорные растения на посевах промежуточных пожнивных сидератов превалируют над численностью малолетних сорняков, и они представлены трудно искореняемыми корневищными и корнеотпрысковыми злостными сорняками. Цель работы состояла в том, чтобы проанализировать значение агроклиматического потенциала Центральной части Чуйской долины Кыргызстана и обеспечение бесперебойного орошения полей при внедрении в аграрное производство пожнивных сидеральных культур, когда на орошаемой пашне провоцируется рост и развитие сорняков. В процессе работы изучалась сорная растительность на посевах промежуточных пожнивных сидератов (горчица белая, редька масличная, донник белый, ячмень яровой, фацелия рябинколистная) после уборки яровой пшеницы, с последующей запашкой фитомассы для использования в качестве зеленых удобрений и анализа их влияния на фитосанитарное состояние почвы. Исследование подтвердило, что при использовании сидератов на зеленое удобрение они массово уничтожаются, т.е. зеленая масса сорняков минерализуются в пашне, тем самым они используются в качестве зеленых удобрений. Агротехнология уничтожения сорных растений на посевах сельскохозяйственных культур внедрением в структуру посевных площадей агроценозов промежуточных пожнивных сидератов – горчицы белой, редьки масличной, донника белого, ячменя ярового, фацелии рябинколистной, которые размещаются после уборки урожая яровой пшеницы (первая декада июля) на орошаемых полях обыкновенных сероземов и не занимают дополнительной площади пашни, является показателем высокой культуры системы орошаемого земледелия Кыргызской Республики и отвечает основным требованиям экологического ведения органического сельского хозяйства. Целенаправленное использование фитомассы растений (промежуточные пожнивные сидераты и сорная растительность) в качестве зеленых удобрений обладает огромным биологическим потенциалом по сокращению атмосферных выбросов парниковых газов в сельскохозяйственном производстве и помогает процессу связывания углерода (секвестрация углекислого газа – CO_2) в составе органического вещества почвы, а также формирует устойчивость агроэкосистемы к изменению климата, соответственно, играет большую роль в смягчении последствий изменения климата

Ключевые слова: сидеральная растительность; сорняки; вред; климат; плодородие; пашня