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Taraxacum officinale in meadow fodder production

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Abstract. The relevance of this study lies in the fact that the value of *Taraxacum officinale* for fodder production is extremely limited, although it is one of the most common species on natural and sown fodder lands. The purpose of this study was to experimentally establish the biological value and possibilities of introducing

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Taraxacum officinale into the culture, its technological suitability for cultivation in pure sowings and mixtures with cereal-legumes. The study employed the following methods: field, laboratory, analytical, and statistical. The study found possibilities of sowing *Taraxacum officinale* in the grass stand and ways of using it with green and roughage, best sowing methods and productivity, content of biologically active substances, etc. It was proved that sowing of *Taraxacum officinale* in the grass stand ensures its content in green and roughage at 2-4%, which is an insufficient amount of active ingredient for use as fodder additives. It is more promising to sow *Taraxacum officinale* in pure crops. The yield of dry mass and roots of *Taraxacum officinale* without irrigation was 1.5-2.4 t/ha. Under irrigation, the yield of dry weight of its leaves increased. The best method of sowing is wide-row sowing with row spacing of 25-35 cm. The main biologically active substances are flavonoids, polysaccharides, bitters, vitamins, pectin substances, and hemicellulose. *Taraxacum officinale* contains nutrients that are typical for fodder and are fully analysed for zootechnical purposes. Specifically, it has a high crude protein content (22.3% in leaves and 18.4% in leaves and roots). According to other indicators of the full zootechnical analysis, the feed from *Taraxacum officinale* meets the zootechnical requirements. The inclusion of *Taraxacum officinale* in the feeding ration can ensure the production of organic livestock products that meet the current requirements of the European Green Deal strategy

Keywords: yield; chemical composition; irrigation; sowing methods; phytomixtures; biologically active substances; feed nutrition

INTRODUCTION

When producing organic livestock products, it is important to exclude fodder additives (premixes) containing artificial antibiotics, probiotics, hormones, etc. from the feed rations. When used in fodder, even in small quantities, they have a positive physiological effect. However, it soon became clear that these premixes also have negative effects on the animal and human body. Thus, a need occurred to replace artificial growth stimulants with natural ones. One of these types of medicinal and fodder herbs is *Taraxacum officinale*. Therefore, there was a need for an in-depth investigation of its biological value, productivity on different types of soil and moisture conditions, and the need to introduce it into culture in pure sowings or as part of sown grass stands. For fodder production, this is important when used as a biological growth stimulant for animals.

In recent publications on the value of *Taraxacum officinale* for fodder production, some authors have noted its presence in sown and natural grasses. Specifically, I. Slusar *et al*. (2017) indicate that its presence in grass stands in an amount not exceeding 5%, without reducing productivity, increases the consumption of green mass. V. Kurhak *et al*. (2023) note that under conditions of surface improvement of meadows, *Taraxacum officinale* appears in the grass stand by self-seeding and plays a positive role as an exporter in the formation of grass stands and contains biologically active substances. Professors A. Bogovin and M. Ptashnik (2020) have repeatedly noted that the presence of *Taraxacum officinale* in sown and natural meadows as a forage increases the appetite of cattle and sheep on pasture and has a high feed value score.

Taraxacum officinale is one of the most common plant species in natural and sown meadows and pastures, in gardens, forest edges, and green park areas of Polissia and Forest-Steppe settlements. In agriculture, this species is considered by A. Bogovin and M. Ptashnik (2020), while P. Zaiats *et al*. (2023) consider it a weed in crops, especially in gardens and perennial fodder crops. In hayfields and pastures, it is regarded as an unseeded forb in mountain meadows (Karbivska *et al*., 2021), and in drained peatlands (Shtakal & Shtakal, 2020). *Taraxacum officinale* plays the role of a grass stand stabiliser in succession changes during its long-term use, when some sown grass species fall out of the stand. According to I. Komarova (2018) and T. Antosyak *et al*. (2023), official and folk medicine consider *Taraxacum officinale* as a means to stimulate kidney and liver function, a sedative, in diseases of the gastrointestinal tract, in the diet of patients with diabetes mellitus and other diseases. V.V. Moisiienko (2020) recommends using *Taraxacum officinale* for the treatment of farm animals. Specifically, in the treatment of animals, *Taraxacum officinale* extracts, infusions, and decoctions are made from leaves and roots to increase the secretory function of the glands of the stomach and intestines of farm animals.

As for the possibility and effectiveness of using *Taraxacum officinale* as an organic additive for fodder, there have been almost no such studies. Therefore, there is a need for a more in-depth investigation of the technological suitability, yield, chemical composition, and biologically active substances of this species to explain its value in fodder production and the need for its introduction into the culture. Therefore, the purpose of this study was to investigate the biological value of *Taraxacum officinale* for organic fodder production, its technological suitability, and the possibility of introducing it into culture.

MATERIALS AND METHODS

Field research on the effectiveness of including *Taraxacum officinale* in grass stands on typical chernozem and drained peatlands, productivity and quality of fodder on chernozem under irrigation and without it, and the best

methods of sowing under irrigation were conducted in a stationary experiment on typical chernozem at the Panfilska Research Station of the National Research Centre "Institute of Agriculture of the National Academy of Agrarian Sciences" in 1992-1995 and 2020-2023. The agrophysical and agrochemical indicators of soil fertility are presented in Table 1. The analysis methods were chosen considering that they are suitable for chernozem soils with an acid solution reaction close to neutral.

Table 1. *Agrophysical and agrochemical indicators of black soil fertility of a typical experimental plot in the layer 0-30 cm*

Indicators	Parameters and units of measurement	
	Panfilska Research Station "IA NAAS"	Experimental station of medicinal plants of the IAEM NAAS
Humus content, %	3.08-3.15	2.43
Lightly hydrolysed nitrogen content, mg/kg	125.8	103.6
Mobile phosphorus content, mg/kg	237-270	384.4
Exchangeable potassium content, mg/kg	80-100	103.6
Degree of saturation of the dressing complex with bases, %	85-99	75-87
Hydrolytic acidity, mg-EQ per 100 g soil	2.1	2.9
pH_{salt}	5.7	5.0
Folding density	1.18	1.25

Source: *compiled by the authors of this study*

Typical chernozems on light loams have the following physical and agrochemical properties in the arable layer:

- humus content (according to Tyurin) was determined following DSTU 4289:2004 (2005);
- the content of easily hydrolysable nitrogen (according to Cornfield) was determined titrimetrically in Conway cups following DSTU 7863:2015 (2016) using a ST-150C thermostat (Ukraine);
- The content of mobile phosphorus was determined according to DSTU 4115:2002 (2002) using a photocolourimetric KFC-3 photoelectrophotometer;
- The content of mobile potassium (Chirikov) was determined using a FLAFO-4 half-beam photometer (Germany);
- The pH_{salt} was determined potentiometrically using an ionometer I-160 MI following DSTU ISO 10390:2007 (2009);
- The degree of saturation of the dressing complex with bases was determined by calculation;
- hydrolytic acidity was determined potentiometrically using the ionometer I-160MI according to DSTU 7537:2014;
- The density of the compaction was determined using a Wile Soil penetrometer.

The productivity of the aboveground mass of *Taraxacum officinale* depending on the sowing methods (row spacing 25 cm, 35 cm, 45 cm, 55 cm, and 65 cm) under drip irrigation was studied on typical black soils of the Experimental Station of Medicinal Plants of the Institute of Agroecology and Environmental Management of the National Academy of Agrarian Sciences of Ukraine, Lubny district, Poltava region in 2020-2022. During the experiments, a drip irrigation system was installed to maintain the moisture content of the root layer of the soil during the growing season at 80% of the lowest moisture (LM) to increase seed germination.

Taraxacum officinale officinalis is officially authorised in the EU under Regulation 1831/2003 on fodder additives for use in animal feeding (European Union, 2003). The plot area in the experiments of the Panfilska Research Station was 10-20 m^2, fourfold replication. Seeding rates for wide-row sowing with 45 cm row spacing of *Taraxacum officinale* were 7 kg/ha of germinating seeds. Sowing was carried out with a hand seeder in the first decade of April. For the inclusion of *Taraxacum officinale* in the composition of grass mixtures, cereal-legume mixtures with a sowing rate of 25 kg/ha were used on typical black soil and cereal mixtures with a sowing rate of 28 kg/ha on drained peat soils.

No mineral fertilisers were applied to the pure grass crops, as this would contradict organic farming. Crop care consisted of manual weeding and 2-3 inter-row treatments to control weeds. The weather conditions of the vegetation periods over the years of research were characterised by air temperature 0.9-1.3°C higher than the long-term average and precipitation 35-70 mm higher than normal, which was observed mainly in the second half of the growing season.

Leaves were harvested during the flowering phase and roots in autumn. All records and observations of the growth and development of medicinal and fodder herbs were carried out following the methods of the Institute of Forage and Podillia of the National Academy of Agrarian Sciences of Ukraine (Babych, 1994; Babych, 1998). The dry matter content in the green mass was determined by the thermostat-weight method with drying of samples at 105°C, while the complete zootechnical analysis of *Taraxacum officinale* and in vitro digestibility and mineral element content were

determined following DSTU 4117:2007(2007) by infrared spectrometry with computer software. The content of biologically active substances in air-dried raw materials was determined according to the methods given in the State Pharmacopoeia of Ukraine and the European Pharmacopoeia (European pharmacopeia: 7.0., 2010; State Pharmacopoeia of Ukraine, 2015). According to the regulatory documents of Ukraine and the EU, which are presented in the above pharmacopoeias, the content of biologically active substances in *Taraxacum officinale* plants in the flowering phase should be 20% for extractives. The statistical processing of the obtained results of field experiments was carried out by the method of analysis of variance using modern Microsoft Excel application packages according to B.A. Dospekhov. Experimental studies of *Taraxacum officinale* plants, including the collection of plant material, complied with national and international guidelines. The authors of the study followed the standards of the Convention on Biological Diversity (1992) and the Convention on Trade in Endangered Species of Wild Fauna and Flora (1979).

RESULTS AND DISCUSSION

There are two ways to solve the problem of producing fodder containing biologically active substances: to include medicinal and fodder herbs in cereal-legume mixtures, or to sow them in pure crops and then add them to animal diets. Subject to the inclusion of *Taraxacum officinale* in the composition of grass mixtures, the study was conducted in 1993-1995 and 2021-2023 on the drained deep peat bogs of the Supii River floodplain in plot No. 3, and on typical chernozems of field No. 10 of the first field crop rotation of the Panfilska Research Station of the IA NAAS. Grassland yield data show that on peat soils it was 7.1-7.5 t/ha of dry weight in 1992-1995 and 8.4-8.5 t/ha of dry weight in 2021-2023, respectively (Table 2). In both cases, yield increases from the inclusion of *Taraxacum officinale* in the grass mixture were not significant, although there was a tendency for yields to increase. Analogous results were obtained on typical chernozems, with the difference that the yields were slightly lower at 5.1-6.3 t/ha and the *Taraxacum officinale* content in the grass stand was slightly lower (2%).

Table 2. *Dry weight yield of grasses, t/ha, and content of Taraxacum officinale in it on peat soils and typical chernozems, %*

Types of herbs	Years of research			
	Average for 1992-1995	*Taraxacum officinale* content in the grass stand, %	Average for 2021-2023	*Taraxacum officinale* content in the grass stand, %
	On peat soils			
Bromus L., *Phalaris* plants, *Phleum* L. – control	7.1		8.4	
Control + 7% *Taraxacum officinale*	7.5	4	8.5	3
LSD_{05}	0.89		0.59	
	On typical chernozems			
Bromus L., *Phleum* L., *Trifolium* plants – control	5.7		5.1	
Control + 7% *Taraxacum officinale*	6.3	2	5.3	2
LSD_{05}	0.74		0.68	

Notes*: LSD – least significant difference at the 5% level of significance*
Source*: compiled by the authors of this study*

As a result of long-term studies, it was found that if *Taraxacum officinale* is included in the composition of old-growth grass stands in the amount of 7% of the sowing rate, the factual composition in the grass stand is 3-4% on dried peat soils and 2% on typical chernozems, respectively, which is significantly lower than the calculated sowing rate. However, simple calculations confirm that in quantitative terms, this can amount to 0.25-0.3 t/ha of dry mass on peat soils and 0.11-0.13 t/ha of dry mass on typical chernozems over the years. At a feeding rate of 4-5 kg of roughage in cattle diets, no more than 80-150 g of *Taraxacum officinale* can actually be ingested with roughage, which is significantly lower than the doses of feeding medicinal and fodder herbs to obtain a substantial effect. However, these figures may be somewhat overstated, as the bulk of the leaves of *Taraxacum officinale* are located near the root rosette on the soil surface and are not mowed. Furthermore, the content of *Taraxacum officinale* fluctuates over the years and mowing, which makes it impossible to set feeding rates. Therefore, in this case, to meet the need for biologically active substances, it is necessary to additionally add this species or other medicinal and feed grasses to the fodder. A considerable disadvantage of including *Taraxacum officinale* in the grass stand is that in this case it is not possible to harvest the roots as the bulk of the *Taraxacum officinale*.

Therefore, a much more promising way to use *Taraxacum officinale* in fodder production is to sow it

in clean crops with subsequent harvesting of both the aboveground and root mass. Studies have suggested the possibility of growing *Taraxacum officinale* in pure crops. However, on rainfed lands, getting friendly germination is problematic due to low seed germination and frequent moisture deficits. Therefore, on the typical chernozems of the Panfilska Research Station of the IA NAAS in 2020-2022, sparse seedlings of this crop were obtained and, as a result, its yield was not high (Table 3). Thus, the total yield of green mass and roots was 7.3-10.7 t/ha and 1.5-2.4 t/ha of dry mass. Therewith, the share of leaves was 0.5-0.8 t/ha or 33-35% and roots 1.0-1.6 t/ha or 65-67%. That is, the bulk of the *Taraxacum officinale* is the roots.

Table 3. *Yield of Taraxacum officinale by years, t/ha and quality indicators of its fodder, %*

Types of herbs	Yields by year								
	Green leaf mass			Dry mass of leaves			Dry mass of roots		
	2020	2021	2022	2020	2021	2022	2020	2021	2022
Taraxacum officinale	10.7	8	7.3	0.8	0.6	0.5	1.6	1.1	1.0
Fodder quality indicators	Protein	Fat	Fibre	REM	Ash	Digestibility	K_2O	P_2O_5	CaO
Taraxacum officinale Leaves/leaves and root	22.3/18.4	4.9/2.03	22.2/23.1	42.1/48.0	8.5/8.5	67/69	2.33/251	0.86/0.88	1.39/1.34

Source*: compiled by the authors of this study*

As for the data of a complete zootechnical analysis of medicinal and fodder herbs, they are not sufficiently covered in the modern literature. There are separate publications on the quality of *Echinacea pallida*, *Matricaria chamomilla*, *Calendula officinalis*, etc. (Poberezhec *et al.*, 2018; Novakovska *et al.*, 2022). However, there is a lack of data on a complete zootechnical analysis of *Taraxacum officinale*. Studies have shown that *Taraxacum officinale* is a valuable crop for fodder production because it has a high crude protein content (22.3% in leaves and 18.4% in root leaves). In this respect, it even exceeds the protein content of legumes. In terms of the content of other components of the full zootechnical analysis, it has a sufficient amount of crude fat (2.0-4.9%), crude fibre (22-23%) and REM (42-48%) and is well supplied with potassium (2.3-2.5%), phosphorus (0.86-0.88%), and calcium (1.3-1.4%) and has good fodder digestibility (55.5-63%). The nutritional value of the leaves is slightly higher than that of the roots due to the higher content of digestible protein.

Considering that *Taraxacum officinale* has low seed germination and the best methods of sowing have not been established, research aimed at solving these issues was conducted at the Research Station of Medicinal Plants of the IAEM NAAS. Irrigation was used to increase the field germination of seeds. Under drip irrigation, five sowing methods were studied with row spacing of 23 cm, 35 cm, 45 cm, 55 cm, and 65 cm (Fig. 1). As a result, it was found that the best methods of sowing are wide-row with row spacing of 25-35 cm, which provided a yield of dry leaf mass under the condition of threefold mowing during the growing season of 3.45-3.54 t/ha. With a row spacing of 45 cm, the *Taraxacum officinale* yield slightly decreased, and with a row spacing of 55-65 cm, it decreased significantly to 2.14-1.53 t/ha. That is, under irrigation, the yield of leaves of this crop increases significantly. However, irrigation is an additional cost that deteriorates the economic performance of fodder additives.

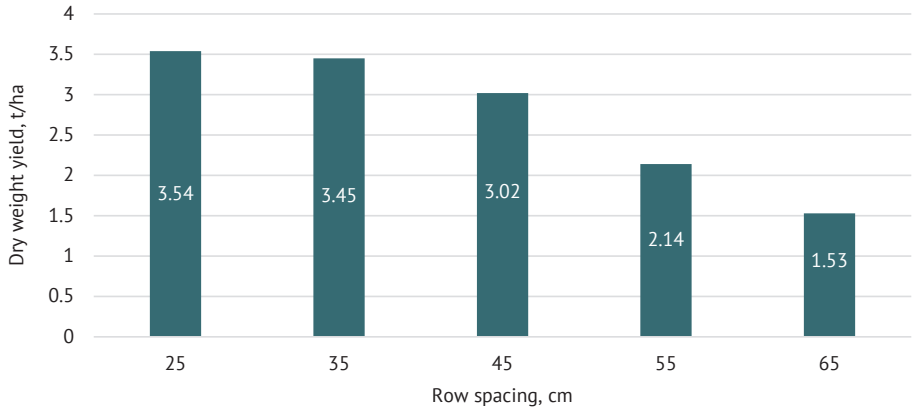

Figure 1. *Effect of row spacing on the yield of dry leaves of Taraxacum officinale, average for 2020-2022*
Source*: compiled by the authors of this study*

When analysing the suitability of *Taraxacum officinale* as an organic fodder additive, the content of biologically active substances in its composition is of significant importance. The study found that the aerial part of the cultivated samples of *Taraxacum officinale* in terms of the content of extractive substances (at least 20%) follows the current regulatory documents of Ukraine and the EU (Table 4).

Table 4. *The content of biologically active substances in the herb of Taraxacum officinale according to the stages of plant development, average for 2020-2022*

Plant development stage	Content of biologically active substances, %				
	extractives	alcohol-soluble carbohydrates	water-soluble carbohydrates	pectin substances	hemicellulose
Budding	21.2±1.6	3.18±0.8	6.45±0.5	4.40±0.9	1.11±0.3
Flowering	24.0±1.4	5.01±1.1	8.57±0.9	4.81±1.5	1.53±0.8
Fruiting	25.5±1.9	4.22±0.9	6.20±0.5	3.45±1.0	3.08±0.9

Source*: compiled by the authors of this study*

The data in the table shows that the cultivated raw materials are characterised by a relatively high content of carbohydrates, the highest amount of which is observed in the phase of mass flowering – 14.92%, which fully meets the requirements of regulatory documents on the timing of harvesting phytopharmaceutical raw materials. The content of extractive substances was slightly higher in samples collected during the fruiting phase. The carbohydrate fraction content was dominated by samples collected during the flowering phase. Moreover, the highest rates were observed in all phases of vegetation in the fraction of water-soluble compounds from 6.20% to 8.57%. The highest levels of hemicellulose content were observed in the fruiting phase, as well as in terms of extractive substances.

One of the key indicators of the content of biologically active substances in *Taraxacum officinale* is the content of other components: essential oils, flavonoids, polysaccharides, bitters, organic acids and vitamins, etc. Studies have shown that the content of essential oils in its composition is low and cannot substantially affect the body of animals. The content of flavonoids in the dry weight of leaves is 0.65%, in roots – 1.08%, polysaccharides in leaves and inflorescences – 5.4% and in roots – 15.8%, bitters in roots and leaves – 7-10%, and vitamins C – 39.8 mg% and PP – 0.82 mg%. That is, the value of *Taraxacum officinale* for the production of organic fodder additives for livestock lies in its high content of polysaccharides (natural probiotics), bitters, flavonoids, vitamins, and nutritional components of fodder inherent in fodder production.

Taraxacum officinale, which is included in most pharmacopoeias around the world, is used in traditional medicine for a wide range of diseases. In official medicine, *Taraxacum officinale* roots and leaves are used to stimulate kidney and liver function, as a sedative, in diseases of the gastrointestinal tract, in the diet of patients with diabetes and other diseases, as noted in Ukrainian pharmaceutical encyclopaedias. Notably, when organising the production of organic fodder additives, there is a need to search for medicinal and fodder herbs for feeding farm animals with single-species fodder or forming phyto-mixtures for the same purpose. Therefore, the uniqueness of the present study lies in the need to introduce *Taraxacum officinale* into the culture as one of the most common grass species on hayfields and pastures, which is currently estimated as an unseeded forb of the Polissia and Forest-Steppe zones. Due to a complex of valuable biologically active substances (polysaccharides, flavonoids, vitamins), this species deserves to be spread in fodder production, and because *Taraxacum officinale* is well-eaten by almost all types of farm animals (cattle, horses, sheep, goats, rabbits, chickens, etc.). In recent years, research on the use of fodder and medicinal herbs for the production of organic fodder additives has been considerably expanded. Specifically, for this purpose, R. Chudak *et al.* (2020) used *Echinacea pallida*. According to the results of these studies, the effectiveness of the use of echinacea photobiotic extract on quail productivity was established. Among other publications, T. Padalko *et al.* (2021) established the prospects of using *Matricaria chamomilla* and *Foeniculum vulgare* to produce biologically active substances and presented technologies for their cultivation.

In the review articles by L. Kryzhak *et al.* (2020), the authors point out the prospects of using *Echinacea purpurea*, *Origanum vulgare* L., *Achillea millefolium*, etc. for this purpose, including for feeding pigs. In general, the Research Station of Medicinal Plants of the Institute of Agroecology and Environmental Management of NAAS of Ukraine has introduced dozens of medicinal herbs into culture and developed technologies for growing them, as well as bred their varieties. I. Komarova (2018) suggests the need for widespread use of *Taraxacum officinale* in medicine, and according to O. Ivashchenko *et al.* (2021) – also in the pharmaceutical, food, and other sectors of the national economy. However, these studies did not aim to grow *Taraxacum officinale* on different types of soils with and without irrigation, using it specifically for the formation of phyto-mixtures as fodder additives and establishing their technological suitability for this purpose and the introduction of *Taraxacum officinale* into

culture. For the first time, the effectiveness of including *Taraxacum officinale* in cereal grass stands on drained peat soils and in cereal-legume grass stands on typical chernozems was investigated. The study of the content of biologically active substances in *Taraxacum officinale* leaves and roots was considerably expanded. Therefore, the present study is aimed at solving this problem and is original in this respect.

Current research indicates that *Taraxacum officinale* can be grown for the production of organic fodder additives. Its use in organic phytomixtures has provided a positive effect on the animal body of cattle, which manifested itself in an increase in milk yields and improvement of its quality due to higher fat content. Summarising the literature on solving such an important national economic problem as increasing the productivity of livestock and poultry and obtaining organic livestock products from them, it becomes clear that such data in the modern literature is extremely insufficient. As a result of these studies, it will be possible to introduce *Taraxacum officinale* into production as a single-species raw material and as a component for the formation of phyto-mixtures with the subsequent replacement of existing fodder additives (premixes) in the production of pure organic animal products for the improvement of the nation, as prescribed by the European Green Deal.

CONCLUSIONS

On dried peat soils, the content of *Taraxacum officinale* in grass stands with a dry weight yield of 7.1-8.5 t/ha was 3-4%, and on typical chernozems with a yield of 5.1-6.3 t/ha, respectively, 2%, which is significantly lower than the calculated seeding rate. In this case, the real daily requirement of *Taraxacum officinale* (300-500 g per 1 head of cattle) with roughage is also not met, since no more than 80-150 g are ingested with fodder. The disadvantage of this use is that in this case it is not possible to harvest the roots, which are the main mass of the *Taraxacum officinale*.

A more promising way to use *Taraxacum officinale* in fodder production is to sow it in clean crops and then harvest both the leaves and the root mass. Thus, the total yield of green mass and roots averaged 7.3-10.7 t/ha and 1.5-2.4 t/ha of dry mass in 2020-2022. Therewith, the share of leaves was 0.5-0.8 t/ha or 33-35% and of roots – 1.0-1.6 t/ha or 65-67%. Under irrigation conditions, it was found that the best sowing methods were wide-row with row spacing of 25-35 cm, which provided a yield of dry leaf mass under the condition of threefold mowing during the growing season of 3.45-3.54 t/ha. That is, under irrigation, the yield of leaves of this crop increases significantly. However, irrigation also considerably increases the additional costs of producing fodder additives.

Taraxacum officinale is a valuable crop for feeding animals. Its value lies in the content of the following biologically active substances: 14.92% carbohydrates, 21-25% extractives, 3.45-4.8% pectin, 0.65% flavonoids in the dry mass of leaves and 1.08% in roots, 5.4% polysaccharides in leaves and inflorescences and 15.8% in roots, 7-10% bitters in roots and leaves, and 39.8 mg% vitamins C and 0.82 mg% PP. *Taraxacum officinale* also contains nutrients that are typical for fodder. Specifically, it has a high crude protein content (22.3% in leaves and 18.4% in leaves and roots). In terms of the content of other components of the full zootechnical analysis, it has a sufficient amount of crude fat (2.0-4.9%), crude fibre (22-23%) and REM (42-48%) and is well-supplied with potassium (2.3-2.5%), phosphorus (0.86-0.88%), and calcium (1.3-1.4%), and has good fodder digestibility (55.5-63%).

To increase the production of raw materials containing biologically active substances, it is recommended to introduce *Taraxacum officinale* into the culture by sowing it at a seeding rate of 7 kg/ha in a wide-row method with row spacing of 25-45 cm in spring under irrigation on fertile soils or to include it in cereal-legume mixtures on chernozems and drained peat soils in the amount of 7% of the seeding rate of cereal-legume grasses.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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Кульбаба лікарська у лучному кормовиробництві

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Анотація. Актуальність проведених досліджень полягає в тому, що вивчення цінності кульбаби лікарської для кормовиробництва вкрай обмежені хоча вона є одним з найпоширеніших видів на природних і сіяних кормових угіддях. Метою досліджень було експериментально встановити біологічну цінність та можливості введення в культуру кульбаби лікарської, її технологічну придатність за вирощування в чистих посівах і сумішах зі злаково-бобовими травами. В дослідженнях використані наступні методи – польовий, лабораторний, аналітичний, статистичний. Встановлені можливості підсіву кульбаби в травостої та способи використання її з зеленими і грубими кормами, оптимальні способи посіву та продуктивність, вміст біологічно активних речовин тощо. Доведено, що підсів кульбаби лікарської в травостої забезпечує її вміст в зелених і грубих кормах на рівні 2-4 %, що є недостатньою кількістю діючої речовини для застосування в якості кормових добавок. Перспективнішим є висівання кульбаби лікарської в чистих посівах. При цьому урожайність сухої маси і коренів кульбаби лікарської без зрошення становила 1,5-2,4 т/га. За зрошення урожайність сухої маси її листків підвищувалася. Кращим способом сівби є широкорядний з міжряддями 25-35 см. Основними біологічно активними речовинами є флавоноїди полісахариди, гіркоти, вітаміни, пектинові речовини та геміцелюлоза. Кульбаба лікарська має в своєму складі і притаманні для кормів поживні речовини повного зоотехнічного аналізу. Зокрема, це високий вміст сирого протеїну (22,3 % в листках і 18,4 % в листках і коренях). За іншими показниками повного зоотехнічного аналізу корм з кульбаби лікарської відповідає зоотехнічним вимогам. Включення до раціону годівлі кульбаби лікарської може забезпечувати отримання органічної продукції тваринництва, що відповідає сучасним вимогам стратегії Європейського зеленого курсу

Ключові слова: урожайність; хімічний склад; зрошення; способи посіву; фітосуміші; біологічно активні речовини; поживність кормів