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Preliminary Results of Evaluation of Collection Samples of Meadow Timothy as a Valuable Source Material for Breeding

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Abstract. Meadow Timothy is one of the most common perennial forage grasses for haymaking and pasture use, as well as one of the components of legume-cereal grass mixtures. High productivity of Meadow Timothy can only be provided by new modern varieties, for the creation of which it is of foremost importance to use source material of various ecological and geographical origin in breeding programmes. For this, it is necessary to evaluate it for a complex of economic and breeding-valuable characteristics, which was the purpose of this study. The methodological framework included field and laboratory methods of research, which was conducted during 2020-2021 in the experimental field of the pre-Carpathian Department of Scientific Research of the Institute of Agriculture of the Carpathian Region of the National Academy of Sciences. The study investigated 16 collection samples of local selection obtained as a result of individual and mass selection, as well as one hybrid population. Standard – Daryna variety. According to two-year data, the highest plant height was found in samples MS 1496 – 116.0 cm and IS 1612 – 114.6 cm, foliage – MS 1510 – 68.2%, IS 1512 – 60.4%, IS 1612 – 65.0%, MS 1816 – 61.3 %, green mass yield – IS 1512 – 4.05 kg/m^2, IS 1612 – 4.10 kg/m^2, MS 1816 – 4.07 kg/m^2, MS 1510 – 4.00 kg/m^2, dry matter – IS 1612 – 0.888 kg/m^2, MS 1816 – 0.861 kg/m^2, seed productivity – IS 1512 – 28.0 g/m^2, IS 1608 – 27.0 g/m^2, HP – 26.5 g/m^2, IS 1506 – 26.0 g/m^2, panicle length – IS 1608 – 15.0 cm, HP – 15.1 cm, number and weight of seeds from one panicle – IS 1608, IS 1509, IS 1506, IS 1610, weight of 1,000 seeds – IS 1512 – 0.68 g, IS 1608 – 0.65 g, IS 1509 – 0.63 g, crude protein content – IS 1612 – 14.4%, IS 1512, IS 1954 – 14.1%, HP – 14.0%, fibre – IS 1512 – 30.0%, MS 1823, IS 1612 – 29.8%, MS 1602 – 29.6%. All samples had high winter hardiness and resistance to diseases. The study will continue in 2022. Based on three-year data, the best source material will be used in the further scheme of the breeding process

Keywords: variety, attribute, collection nursery, productivity, feed value

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INTRODUCTION

The main prerequisite for strengthening the feed base of animal husbandry is to improve and expand the area of cultivated pastures and hayfields by increasing the efficiency of field grass sowing. In the herbage of natural hayfields and pastures of the western regions of Ukraine, especially in the Carpathians and the Eastern Carpathian Foothills, the most common are grasses. They make up 60-70 % of the total herbage, often forming pure groupings. Perennial grasses have a high feed value. In highly productive natural and sown meadows, they predominate in the herbage and produce high yields of hay and pasture feed from early spring to late autumn, are resistant to trampling, and grow well after mowing and grazing (Tarariko *et al.*, 2018; Petrychenko *et al.*, 2020). Among the many common types of perennial grasses (shive, Bromus inermis, orchard grass, perennial ryegrass, bulbous oat grass), Meadow Timothy occupies a prominent place.

Meadow Timothy *(Phleum pratense* L.) is a plant from the family of cereals (Poaceae) with a height of 80-100 cm or more. It was introduced into culture from natural flora at the beginning of the 18th century. This is one of the key top-soil, non-dense, medium-life grasses of meadow and field grass sowing in the forest-steppe and polissia zones of Ukraine. As a crop, the plant is grown in Europe, introduced to North America and Australia.

It belongs to cereals of temperate cold climate, has high winter hardiness, is quite moisture-loving, and tolerates high acidity of the soil solution. It grows in most types of soils, except sandy ones (Kokhan *et al.*, 2018; Jorgensen *et al.*, 2020). This is a plant of spring and spring-winter development type. In spring, it develops rapidly, but blooms later than other forage grasses. The duration of the vegetating season of Meadow Timothy is 85-130 days. Its first hay harvest is formed in 40-45 days, and the second — in 50-60 days. Inflorescence — spike-shaped panicle (sultan) of cylindrical shape with a length of 10-20 cm. The weight of 1,000 seeds is 0.4-0.8 g. The plant is high yielding. Among all cereals, it occupies one of the first places in terms of yield and nutritional value. Thus, the yield of its green mass is 330-380 cwt/ha, hay — 60-120 cwt/ha, dry matter — 80-90 cwt/ha. Seed productivity is 4-6 cwt/ha. 100 kg of Timothy hay contains 3 kg of digested protein and corresponds to 45 feed units, while 100 kg of green mass — 1.5-1.7 kg and 20-25 feed units, respectively. The most foliose Timothy species have the best feed value (the mass of leaves is 60-65% of the total mass). It grows well after mowing and grazing, so it is used for hay and grazing, and is well eaten by all animals. It is best to mow it for hay in the end-earing–beginning of flowering phase. After flowering, the stems of Timothy begin to quickly become rough, resulting in a decrease in its feed value. Thus, during spring regrowth, the protein content in the green mass is 15.5%, in the phase of the early earing — 13.9%, at the beginning of flowering — 9.3%, and at full flowering — 8.1%. When used for hay, two mowing operations are obtained per year. The herbage lasts 3-5 years or more but gives the highest yield in the second or third year of use (Shtakal, 2020; Khomyak *et al.*, 2020).

Meadow Timothy is a plant of haymaking and pasture use. It is used as decorative and lawn grass, but its main purpose is forage. This is one of the most valuable components in the grass mixture with meadow clover, burclover, sainfoins, birdsfoot deervetch. According to studies, the stands of these Timothy grasses are 20-25% more productive than their pure crops (Figurin & Kislitsyna, 2020; Pomerleau-Lacasse *et al.*, 2019; Lauzon *et al.*, 2019). In field crop rotations mixed with clover, it is used for 2-3 years, and in haymaking and pasture — 5-6 years (Kapsamun *et al.*, 2021). Thus, it is one of the main components of grass mixtures in improving meadows and creating long-term cultivated pastures in Ukraine.

According to O.V. Zakharchuk *et al.* (2020), in modern technologies of crop production, namely in feed production, the greatest increase in yield is provided by the variety. The role of the variety in shaping the size and quality of the crop is constantly growing and currently ranges from 20% to 40% or more. A modern variety should be focused not only on a certain level of provision, but also on ensuring that its main adaptability parameters correspond to a wide range of environmental factors of a particular agroclimatic growing zone (Demydas *et al.*, 2018). The State Register of Plant Varieties Suitable for Distribution in Ukraine for 2022 (as of January 27, 2022) includes 11 varieties of Meadow Timothy: Vytava, Summergrass, Presto, ATURO, Charivna horianka, Lishka, FRVL-1, Vyshhorodska, Pidhyrianka, Milena, Daryna (Ministry of Agrarian Policy…, 2022).

Highly productive varieties of Meadow Timothy were created in Poland (Brudzinska), France (Alpade), Lithuania (Jauniai, Dainai, Obeliai). In Ukraine, this crop is bred by such scientific institutions as the Scientific Research Centre "Institute of Agriculture of the National Academy of Sciences" (Chabany village), the Institute of Fodder and Agriculture of the National Academy of Sciences of Podillia (Vinnytsia), the Sarnen Research Station of the Institute of Water Problems and Land Reclamation of the National Academy of Sciences (Rivne Oblast). In the west of Ukraine, the leading role belongs to scientists of the Institute of Agriculture of the Carpathian Region of the National Academy of Sciences (Institute of Water Problems and Reclamation, n.d.; Perehrym, 2021).

Breeding is a complex biotechnological process. It is based on the use of the available and new methods for creating genetic diversity, evaluating it and selecting the desired genotypes, which combine as many traits, qualities, and properties as possible that should be inherent in the future new variety. To search for such genotypes, large volumes of source material are studied and analysed, and the selected samples are included in the further breeding process. The correct choice of source material and its use in breeding is of significant importance. This is the critical stage of the

breeding process, which determines the final result of the breeder's work.

The source material in breeding is samples that the breeder uses in their practical work to create new varieties. These can be wild forms, local varieties, populations, and samples of the world collection, hybrid populations, self-pollinating lines, artificial mutants and polyploid forms, introduced samples. When mobilising the source material, preference should be given to local samples and populations. They are adapted to the climatic conditions of the growing region and are characterised by high yields (Mazur *et al.*, 2020; Baystruk-Hlodan *et al.*, 2020).

Proceeding from the above, the main task of this study is to investigate the collection samples of Meadow Timothy to select the best numbers, which, according to a complex of economically valuable characteristics, can be included in the further breeding process as a source material for creating new varieties.

MATERIALS AND METHODS

To evaluate the source material, a collection nursery of Meadow Timothy was laid in 2019. The size of the registered land area is 1 m^2. The material for the study was 16 samples originating from Ukraine. These are samples of local selection, bred as a result of individual and mass selection, as well as one hybrid population. As a standard, the Daryna variety of Meadow Timothy is taken. This is a variety selected by the Institute of Agriculture of the Carpathian Region of the National Academy of Sciences, which in 2018 was listed in the State Register of Plant Varieties Suitable for Distribution in Ukraine. The standard was seeded every four samples (Table 1).

Table 1. *The samples of Meadow Timothy under study in the collection nursery (sowing in 2019)*

No. national catalogue	Institution registration No.	Sample name	Country origin
UJ 1100101 (standard)	PFZ 00906	Daryna	UKR, LVV
	PFZ 02089	IS 1506 (individual selection from No. 1506)	UKR, LVV
	PFZ 02090	IS 1509 (individual selection from No. 1509)	UKR, LVV
	PFZ 02092	IS 1512 (individual selection from No. 1512)	UKR, LVV
	PFZ 02094	MS 1602 (mass selection from No. 1602)	UKR, LVV
	PFZ 02177	IS 1610 (individual selection from No. 1610)	UKR, LVV
	PFZ 02178	IS 1608 (individual selection from No. 1608)	UKR, LVV
	PFZ 02179	IS 1602 (individual selection from No. 1602)	UKR, LVV
	PFZ 02180	IS 1612 (individual selection from No. 1612)	UKR, LVV
	PFZ 02181	MS 1816 (mass selection from No. 1816)	UKR, LVV
	PFZ 02182	MS 1954 (mass selection from No. 1954)	UKR, LVV
	PFZ 02183	MS 1510 (mass selection from No. 1510)	UKR, LVV
	PFZ 02184	HP (hybrid population No. 1954 × No. 1942)	UKR, LVV
	PFZ 02185	MS 1823 (mass selection from No. 1823)	UKR, LVV
	PFZ 02096	IS 1814 (individual selection from No. 1814)	UKR, LVV
	PFZ 02085	MS 1496 (mass selection from No. 1496)	UKR, LVV
	PFZ 02091	IS 1511 (individual selection from No. 1511)	UKR, LVV

Note: *UKR — Ukraine; LVV — Lviv Oblast.*

The study was conducted on the experimental basis of the pre-Carpathian Department of Scientific Research of the Institute of Agriculture of the Carpathian Region of the National Academy of Sciences in the sub-region of the middle Eastern Carpathian Foothills (200-400 m a.s.l.) of the Drohobych District of the Lviv Oblast (village of Lishnia) on on soddy medium-podzolic surface-gleyed medium-acid loamy soils formed on diluvial deposits with the following main agrochemical indicators of fertility: humus content in the arable (0-20cm) layer (according to Tiurin) — 1.22%, pH of salt extract (Potentiometric method) — 4.6, hydrolytic acidity (according to Kappen-Gilkowitz) — 4.23 mg-eq per 100 g of soil, Hr (sum of absorbed bases) — 11.8 mg-eq per 100 g of soil, mobile forms of phosphorus (according to Kirsanov) — 118 mg, exchange potassium (according to Kirsanov) — 82 mg, easily hydrolysed nitrogen (according to Cornfield) — 108 mg per 1 kg of soil.

Preparation and cultivation of the soil for sowing the collection of Meadow Timothy was generally accepted for the zone of the Eastern Carpathian Foothills of Ukraine. Its predecessor is perennial legumes. Laying of experimental plots was carried out manually, in the summer period of sowing in a coverless way. In spring, Meadow Timothy plants were fed with mineral fertiliser in the form of ammonium nitrate, row spacing was loosened, and weeds were cleared. Laying of the collection nursery and research in it was carried out according to the generally accepted requirements for the methodology of field experiment according to B.A. Dospekhov (1985) and methodological guidelines for the selection of perennial grasses (Kosopalpov *et al.*, 2012).

The main characteristics used to evaluate collection samples were plant height and foliage, winter hardiness, productivity, feed value, and resistance to diseases. Structural analysis of plants was performed according to such economically valuable characteristics as the length of the panicle, the number of seeds in the panicle, the mass of seeds from the panicle, and the mass of 1,000 seeds. During the growing season, phenological observations were made on the growth and development of Meadow Timothy plants.

Accounting of the green mass yield was performed in the phase of full earing (two hay harvests) by harvesting and weighing the grass from the entire accounting area of the site. The yield of dry matter was determined by test sheaves weighing 1 kg selected after harvesting and drying to a constant weight.

Seeds were harvested in the full ripeness phase separately from each site by threshing, wiping, cleaning, and weighing it.

To assess the feed value of Meadow Timothy samples, the following factors were determined: crude protein — according to the Keldahl method, crude fibre — according to the Hennenberg-Stoman method.

The study results were mathematically processed according to the method of variance analysis on a personal computer using the Agrostat software and information complex.

RESULTS AND DISCUSSION

Weather conditions of the growing season in the years of research (2020-2021) were typical for the zone of the Eastern Carpathian Foothills and differed from each other, which enabled an objective assessment of collection samples according to the parameters under study (Table 2).

***Table 2**. Meteorological indicators in the years of research (according to the Drohobych weather station)*

Months of the year	Mean monthly air temperature, °C			Amount of precipitation per month, mm		
	Years		Average many-year	Years		Average many-year
	2020	2021		2020	2021	
March	4.9	2.8	1.8	37.9	42.3	38.0
April	8.9	6.6	7.9	22.5	39.8	53.0
May	11.2	13.4	13.2	169.0	52.7	97.0
June	18.4	18.2	16.2	131.5	80.2	119.0
July	19.0	21.5	17.6	87.4	64.4	110.0
August	19.7	17.7	17.0	31.4	128.8	92.0
During the vegetating season (March-August)	13.7	13.4	12.3	479.3	408.2	509.0

In the conditions of the Eastern Carpathian Foothills region, the vegetation of Meadow Timothy, depending on weather conditions, begins from the middle of the second to the end of the third decade of March. Thus, in 2020, spring regrowth of Timothy plants began on March 16, in 2021 — on March 29. At the end of the winter period, a density of 220-460 plants/m^2 was observed in the crops of Meadow Timothy (first year of use), 231-505 plants/m^2 (second year of use).

The duration of the growing season of the samples of Meadow Timothy under study from the beginning of spring regrowth to full seed ripeness differed in two years of study and amounted to 135-140 days in 2020, 128-131 days in 2021. On average, for two years, it took 62-75 days for plants to form the first hay harvest (the period from the beginning of spring regrowth to the beginning of earing). Based on the obtained data on the duration of the growing season, all samples of the collection nursery were conditionally divided into three ripeness groups: early-maturing, medium-maturing, and late-maturing. The early-maturing group (the period from the beginning of spring regrowth to full ripeness of seeds is 125-128 days) includes 5 samples, medium-maturing (129-133 days) — 8 samples, and late-maturing (134-140 days) — 3 samples.

To identify the most promising collection samples, they were studied according to indicators that mainly affect the formation of fodder and seed productivity of plants.

In all collection samples under study, plant growth occurred intensively before the earing phase — the beginning of flowering, and later almost stopped. The study of the height of plants of perennial grasses, including Meadow Timothy, is of immense importance in breeding work, as it is one of the indirect indicators of the yield of green mass. Furthermore, the height of plants is one of the criteria for determining the timing of hay harvesting. In the studies conducted by the author, the height of plants of the first mowing in the phase of full earing on average for two years of use ranged from 94.0 to 116.0 cm, with a height of the standard variety of 104.7 cm. According to the height of plants, the collection samples were conditionally divided into low-growing samples with a plant height of 94.0 to 98.5 cm (25%), medium-sized — 100.8-109.4 cm (50%), and tall — 110.0-116.0 cm (25%). The tallest samples in the first and second years of use were MS 1496-116. 0 cm and IS 1612-114.6 cm.

An important breeding feature that determines the quality and nutritional value of the feed mass is the foliage of plants. Meadow Timothy is a foliose cereal. The

yield of the green mass of perennial grasses depends on the degree of foliage: the higher the foliage, the higher the yield.

According to two-year data, samples of Meadow Timothy MS 1510-68.2%, IS 1512-60.4%, IS 1612-65.0%, MS 1816-61.3% had the best foliage. According to this feature, the collection of Meadow Timothy was divided into samples with a low level of foliage — 30.5-38.6% (four samples), samples with an average level of foliage — 41.4-55.1% (six samples) and samples with high foliage — 58.8-68.2% (six samples).

The yield of green mass is the feature that is of key practical importance and towards which the perennial grasses are bred. This is one of the crucial criteria for sampling in productivity breeding. The size of the crop depends on various indicators (the ratio of the number of vegetative and generative shoots, plant height, foliage, etc.). The results of the conducted studies show that on average for two years of study (2020-2021), the yield of green mass for two hay harvests ranges from 3.05 to 4.10 kg/m^2 (at the LSD_{05} (least significant difference) 0.21-0.28 kg m^2). The yield of green mass of the standard was 3.51 kg/m^2. Therewith, 11 samples exceeded the standard by 0.23-0.59 kg/m^2, or by 8-17%. Samples of IS 1512-4.05 kg/m^2 had the highest yield of green mass, IS 1612-4.10 kg/m^2, MS 1816-4.07 kg/m^2, MS 1510-4.00 kg/m^2. They exceeded the Daryna variety standard by 14-17% (Table 3).

Table 3. *Productivity and its structural elements of Meadow Timothy samples in the collection nursery (average for 2020-2021)*

Sample name	Plant height, cm	Foliage, %	Green mass harvest			Duration of the vegetation period, days:
			kg/m^2	% to St	± to St	
Daryna (St)	104.7	47.7	3.51	100	–	128
IS 1506	108.3	41.4	3.05	87	-0.46	129
IS 1509	105.2	58.8	3.82	109	+0.31	129
IS 1512	107.8	60.4	4.05	115	+0.54	140
MS 1602	110.0	55.1	3.92	112	+0.41	126
IS 1610	96.2	30.5	3.31	94	-0.20	128
IS 1608	102.2	45.5	3.80	108	+0.29	132
IS 1602	94.0	38.6	3.25	92	-0.26	138
IS 1612	114.6	65.0	4.10	117	+0.59	133
MS 1816	111.8	61.3	4.07	116	+0.56	125
MS 1954	100.8	42.6	3.74	106	+0.23	134
MS 1510	108.0	68.2	4.00	114	+0.49	129
GP	104.2	56.0	3.90	111	+0.39	126
MS 1823	109.4	50.1	3.83	109	+0.32	133
IS 1814	98.5	35.5	3.21	91	-0.30	133
MS 1496	116.0	42.0	3.79	108	+0.28	125
IS 1511	94.3	38.1	3.15	89	-0.36	130
LSD_{05} 2020			0.21			
2021			0.28			

One of the elements of seed productivity of Meadow Timothy plants is the length of the panicle. On average, for two years it was the largest in the IS 1608 sample — 15.0 cm and the hybrid population sample — 15.1 cm, while in the standard Daryna variety — 12.7 cm. According to the number of seeds in one panicle, samples of IS 1512 were distinguished — 608 pcs, IS 1608-615 pcs, hybrid population — 603 pcs, IS 1509-620 pcs. The mass of seeds from one panicle was the highest in the following samples: IS 1506-0.70 g, IS 1610-0.68 g, MS 1823-0.63 g, IS 1509-0.62 g. Samples IS 1506, IS 1509, IS 1512, IS 1608, hybrid population, MS 1496 had the largest seeds with a weight of 1,000 seeds of 0.60-0.70 g.

In terms of seed productivity, on average, 11 collection samples exceeded the standard by 1-28 % over two years of use. The highest seed yield was provided by samples of IS 1512-28.0 g/m^2, IS 1608-27.0 g/m^2, hybrid population — 26.5 g/m^2, IS 1506-26.0 g/m^2, which is 4.2-6.2 g/m^2, or 19-28 % more than the standard (Table 4).

***Table 4**. Seed productivity and crop structure of Meadow Timothy samples in the collection nursery (average for 2020-2021)*

Sample name	Panicle length, cm	Number of seeds in a panicle, pcs	Mass of seeds from panicles, g	Weight of 1000 seeds, g	Seed harvest		
					g/m²	% to St	± to St
Daryna (St)	12.7	529	0.35	0.47	21.8	100	–
IS 1506	12.5	564	0.70	0.60	26.0	119	+4.2
IS 1509	13.5	620	0.62	0.63	25.0	115	+3.2
IS 1512	14.4	608	0.54	0.68	28.0	128	+6.2
MS 1602	13.3	548	0.48	0.55	23.7	109	+1.9
IS 1610	10.6	524	0.68	0.58	22.4	103	+0.6
IS 1608	15.0	615	0.60	0.65	27.0	124	+5.2
IS 1602	10.8	508	0.28	0.42	20.0	92	-1.8
IS 1612	11.2	510	0.30	0.44	21.6	99	-0.2
MS 1816	11.8	528	0.33	0.43	22.1	101	+0.3
MS 1954	12.6	530	0.51	0.55	23.0	105	+1.2
MS 1510	9.5	502	0.32	0.41	20.8	95	-1.0
GP	15.1	603	0.58	0.70	26.5	121	+4.7
MS 1823	11.8	560	0.63	0.50	24.6	113	+2.8
IS 1814	10.2	520	0.24	0.42	20.2	93	-1.6
MS 1496	13.1	575	0.58	0.61	25.1	115	+3.3
IS 1511	10.0	505	0.38	0.46	21.1	97	-0.7
LSD_{05} 2020					0.16		
2021					1.12		

In terms of dry matter yield, on average, 10 collection samples exceeded the standard by 0.066-0.174 kg/m² over two years of use, or by 9-24%. The highest yield of dry matter — 0.888 kg/m² was provided by sample ID 1612, which is 0.174 kg/m² more than the standard. Such collectible samples that exceeded the standard for dry matter yield also deserve attention: MS 1816 — by 0.147 kg/m², or by 20%, MS 1510 — by 0.134 kg/m², or by 19%, IS 1512, MS 1823 — by 0.120 and 0.125 kg/m², or by 17%.

Feed value is of significant importance, since the quality of feed determines its overall suitability. Analysis of feed value data from Meadow Timothy samples shows that over an average of two years, the sample IS 1612 had the highest content of crude protein in dry matter — 14.4%, the hybrid population — 14.0%, IS 1512 and MS 1954-14.1%. The highest fibre content was found in samples IS 1512-30.1%, MS 1602-29.6%, IS 1612, MS 1823-29.8%. The feed value of Meadow Timothy, as well as other perennial grasses, is explained by the fact that it has many vegetative shoots. These shoots contain more leaves than generative shoots. In addition, the leaves contain more nutrients (Table 5).

***Table 5**. Nutritional value of Meadow Timothy samples in the collection nursery (first harvest of the haymaking method of use, average for 2020-2021)*

Sample name	Dry matter yield			Content in dry matter, %	
	kg/m²	% to St	± to St	Crude protein	Fibre
Daryna (St)	0.714	100	–	10.8	28.4
IS 1506	0.602	84	-0.112	10.1	26.4
IS 1509	0.704	98	-0.010	13.6	28.0
IS 1512	0.834	117	+0.120	14.1	30.1
MS 1602	0.810	113	+0.096	13.8	29.6
IS 1610	0.662	93	-0.052	10.2	28.3
IS 1608	0.814	114	+0.100	10.4	27.6
IS 1602	0.637	89	-0.077	10.8	27.7
IS 1612	0.888	124	+0.174	14.4	29.8

Table 5, Continued

Sample name	Dry matter yield			Content in dry matter, %	
	kg/m²	% to St	± to St	Crude protein	Fibre
MS 1954	0.824	115	+0.110	14.1	29.1
MS 1510	0.848	119	+0.134	13.2	29.4
GP	0.801	112	+0.087	14.0	28.1
MS 1823	0.839	117	+0.125	12.4	29.8
IS 1814	0.629	88	-0.085	10.6	28.4
MS 1496	0.780	109	+0.066	11.7	27.2
IS 1511	0.631	88	-0.083	10.0	26.8
LSD_{05} 2020	0.04				
2021	0.06				

Meadow Timothy is a winter-resistant and cold-resistant crop. According to winter hardiness, the collection samples under study were divided into three groups: high winter resistance (85-98% of plants survived), medium winter resistance (71-84%), and low winter resistance (45-70%). Samples of MS 1602-96%, IS 1608-94%, IS 1612-98%, MS 1496-90%, IS 1814-92% had high winter resistance of plants (9 points) for two years of use.

The most harmful and widespread diseases of Meadow Timothy are stem and leaf rust, powdery mildew. Due to unstable weather conditions, the yield of crops in some years from diseases can decrease by up to 80%. Therefore, it is essential in breeding to evaluate samples for the most common diseases. According to the author's observations, no damage to collection samples by these diseases was observed during the years of research. The resistance of Meadow Timothy plants to major diseases was 9 points.

Evaluation of collectible samples of Meadow Timothy will also continue in 2022. Based on the results of three-year studies, the best samples in terms of economically valuable characteristics will be selected for further breeding work.

The expediency of using raw materials of various ecological and geographical origin in the breeding of Meadow Timothy is evidenced by the data of other researchers. Thus, during 2019-2020, 28 collectible samples of Meadow Timothy originating from Ukraine, Russia, Belarus, and Estonia were investigated at the Ustimovska Experimental Crop Production Station in the southern part of the forest-steppe of Ukraine. Promising samples were selected, which exceeded the yield standard, were distinguished by economically valuable features (plant height, foliage, weight of 1,000 seeds, duration of the growing season) and can later be used as a starting material in the selection of varieties of this crop. It was found that the best source material for breeding Meadow Timothy is wild forms, as well as individual breeding varieties (Kocherha & Rohovyi, 2020).

CONCLUSIONS

The collection of samples of Meadow Timothy is a valuable source of variety of source material for creating new varieties. According to preliminary data of the assessment of samples of Meadow Timothy in the collection nursery during 2020-2021, promising samples were identified that exceed the Daryna variety standard for the main economically valuable characteristics with the following productivity indicators: plant height — 105.2-116.0 cm (9 samples), foliage — 50.1-68.2% (8 samples), green mass yield — 3.74-4.10 kg/m² (11 samples), dry matter yield — 0.780-0.888 kg/m² (11 samples), panicle length — 13.5-15.0 cm (6 samples), number of seeds in the panicle — 530-620 pcs (9 samples), panicle seed weight — 0.38-0.68 g (11 samples), 1,000 seed weight — 0.48-0.70 g (10 samples), seed yield — 22.4-27.0 g/m² (10 samples), crude protein content — 11.7-14.4% (10 samples), fibre content — 29.1-30.1% (6 samples). All the samples under study had high resistance to winter and diseases. The study of the collection material will continue next year. Based on the results of a three-year evaluation, the best samples will be selected to attract them to further breeding work with Meadow Timothy.

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Попередні результати оцінки колекційних зразків тимофіївки лучної як цінного вихідного матеріалу для селекції

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Анотація. Серед найбільш поширених багаторічних кормових трав сінокісно-пасовищного використання, а також одним із компонентів бобово-злакових травосумішок є тимофіївка лучна. Високу продуктивність тимофіївки лучної можуть забезпечити тільки нові сучасні сорти, для створення яких велике значення має використання в селекційних програмах вихідного матеріалу різного еколого-географічного походження. Для цього необхідно провести оцінку його за комплексом господарських та селекційно-цінних ознак, що і було метою нашої роботи. Методологічну основу становили польові та лабораторні методи дослідження, яке проводили протягом 2020–2021 рр. на дослідному полі Передкарпатського відділу наукових досліджень Інституту сільського господарства Карпатського регіону НААН. Вивчалося 16 колекційних зразків місцевої селекції, отриманих в результаті індивідуального та масового добору, а також одна гібридна популяція. Стандарт – сорт Дарина. За дворічними даними найбільшу висоту рослин мали зразки МД 1496 – 116,0 см та ІД 1612 – 114,6 см, облиствленість – МД 1510 – 68,2 %, ІД 1512 – 60,4 %, ІД 1612 – 65,0 %, МД 1816 – 61,3 %, врожай зеленої маси – ІД 1512 – 4,05 кг/м^2, ІД 1612 – 4,10 кг/м^2, МД 1816 – 4,07 кг/м^2, МД 1510 – 4,00 кг/м^2, сухої речовини – ІД 1612 – 0,888 кг/м^2, МД 1816 – 0,861 кг/м^2, насіннєву продуктивність – ІД 1512 – 28,0 г/м^2, ІД 1608 – 27,0 г/м^2, ГП – 26,5 г/м^2, ІД 1506 – 26,0 г/м^2, довжину волоті – ІД 1608 – 15,0 см, ГП – 15,1 см, кількість і маса насіння з однієї волоті – ІД 1608, ІД 1509, ІД 1506, ІД 1610, маса 1000 насінин – ІД 1512 – 0,68 г, ІД 1608 – 0,65г, ІД 1509 – 0,63 г, вміст сирого протеїну – ІД 1612 – 14,4 %, ІД 1512, ІД 1954 – 14,1 %, ГП – 14,0 %, клітковини – ІД 1512 – 30,0 %, МД 1823, ІД 1612 – 29,8 %, МД 1602 – 29,6 %. Всі зразки мали високу зимостійкість, стійкість до захворювань. Дослідження буде продовжено в 2022 році. На основі трирічних даних кращий вихідний матеріал буде залучено в подальшу схему селекційного процесу

Ключові слова: сорт, ознака, колекційний розсадник, продуктивність, кормова цінність