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O.M. VERGUN, D.B. RAKHMETOV, S.O. RAKHMETOVA, V.V. FISHCHENKO

M.M. Gryshko National Botanical Garden, National Academy of Sciences of Ukraine
Ukraine, 01014 Kyiv, Timiryazevska str., 1

THE CONTENT OF NUTRIENTS AND ENERGETIC VALUE OF THE PLANT RAW MATERIAL OF SWITCHGRASS (*PANICUM VIRGATUM* L.) GENOTYPES

Objective *— to investigate biochemical properties of plant raw material of 1 cultivar and 14 varieties of Panicum virgatum L. in conditions of M.M. Gryshko National Botanical Garden of the NAS of Ukraine.*

Material and methods. *Investigated plants were 1 cultivar and 14 varieties of Panicum virgatum collected in an experimental collection of Cultural Flora Department of National Botanical Garden of the NAS of Ukraine: Panicum virgatum f. DB (PVDB), P. virgatum f. DN (PVDN), P. virgatum f. PL (PVPL), P. virgatum f. PN-1 (PVPN1), P. virgatum f. PN-2 (PVPN2), P. virgatum f. PN-3 (PVPN3), P. virgatum f. PB (PVPB), P. virgatum f. PP (PVPP), P. virgatum f. RL (PVRL), P. virgatum f. RR (PVRR), P. virgatum f. SL-1 (PVSL1), P. virgatum f. SL-2 (PVSL2), P. virgatum f. VP (PVVP), P. virgatum f. VR (PVVR), P. virgatum cv. Zoriane (PVZ).*

The content of dry matter was determined according to A.I. Yermakov, the total content of sugars, monosaccharides and ascorbic acid concentration — according to V.P. Krishchenko, the content of carotene — according to B.P. Pleshkov, the content of ash — according to Z.M. Hrycaenko. Energetic value of dry plant raw material measured on calorimeter IKA-200. The content of photosynthetic pigments in leaves detected according to M.M. Musienko on spectrophotometer Unico UV 2800.

Results. *In the period of anthesis the plant raw material of Panicum virgatum accumulated dry matter from 34.05 % (PVZ) to 48.21 % (PVPL), monosaccharides — from 2.68 % (PVSL2) to 5.92 % (PVPN2), ascorbic acid — from 14.39 mg% (PVRL) to 79.50 mg% (PVSL1), carotene — from 0.277 mg% (PVPB) to 1.407 mg% (PVSL2), ash — from 1.88 % (PVVR) to 4.63 % (PVPN1) and total content of sugars — from 4.11 % (PVSL2) to 10.49 % (PVPN2). The calorific value of dry raw was from 3588.18 cal/g (PVVR) to 3719.22 cal/g (PVPN1). The ratio of photosynthetic pigments content was 1.09 (PVPN3)—5.01 (PVPP), the ratio of the sum of chlorophylls to carotenoids content — from 2.47 (PVSL2) to 9.30 (PVPD).*

Conclusions. *Obtained data demonstrated that in conditions of M.M. Gryshko National Botanical Garden of the NAS of Ukraine cultivar and varieties of Panicum virgatum are the valuable source of nutrients in the period of anthesis. Among investigated plants the PVPL genotype characterized by the most content of dry matter and chlorophyll b, PVPN2 — total content of sugars and monosaccharides, PVSL1 — ascorbic acid, PVSL2 — carotene, PVPN1 — ash and calorific value, PVPP — chlorophyll a and ratio of chlorophylls, PVPN3 — carotenoids.*

Key words: *Panicum virgatum*, genotypes, plant raw material, biochemical properties.

Panicum virgatum L. (switchgrass) belongs to one of the largest families in the world (*Poaceae* Barnhart) with over 10.000 species widely distributed. This is a model bioenergy species with a high biomass production from which renewable sources of fuel and electricity can be generated [12]. Switchgrass can be identified as significant sources of feedstock for cellulosic biofuel. High-yielding and efficient nutrient-use attributes give perennial grasses potential to provide environmental, economic, and societal benefits as bioenergy sources if managed properly [11; 27]. The interest in using of this plant in this branch of biological and economic science is rapidly grown [1; 9]. Plants of switchgrass don't require annual establishment, requires fewer chemical inputs (pesticide and fertilizer) than traditional row crop, produce large quantities of biomass and provides important ecosystem service [13]. The main components of the switchgrass biomass are cellulose (35 %), hemicellulose (29 %), and lignin (26 %) [6; 23]. A single harvest of switchgrass increased the cellulose and lignin content of the biomass compared with twice harvesting which are desirable characteristics based on the method used to produce energy from biomass [14].

In the M.M. Gryshko National Botanical Garden of the NAS of Ukraine (Department of Cultural Flora) the study with some representatives of *Poaceae* family has been conducted since the 1970s. Nowadays biochemical investigations of genus *Agrostis* L., *Miscanthus* Andersson, *Sorghum* Moench, *Panicum* L. continues. Results of these study showed that this group of plants is very interesting and promising for further researches. Plant raw material of investigated plants was characterized by the accumulation of nutrients such as vitamins, dry matter, carbohydrates, ash etc. [20; 21; 24; 25.]. Also, was determined that methanol and water extracts of *P. virgatum* f. PB in the previous study showed a high antioxidant capacity [26].

The aim of this study was to evaluate plant raw material of *P. virgatum* L. Moench cultivars and varieties by biochemical characteristics.

Material and methods

Plant material was collected from the experimental collection of Department of Cultural Flora of M.M. Gryshko National Botanical Garden of the NAS of Ukraine in the flowering stage: *Panicum virgatum* f. DB (PVDB), *P. virgatum* f. DN (PVDN), *P. virgatum* f. PL (PVPL), *P. virgatum* f. PN-1 (PVPN1), *P. virgatum* f. PN-2 (PVPN2), *P. virgatum* f. PN-3 (PVPN3), *P. virgatum* f. PB (PVPB), *P. virgatum* f. PP (PVPP), *P. virgatum* f. RL (PVRL), *P. virgatum* f. RR (PVRR), *P. virgatum* f. SL-1 (PVSL1), *P. virgatum* f. SL-2 (PVSL2), *P. virgatum* f. VP (PVVP), *P. virgatum* f. VR (PVVR), *P. virgatum* cv. Zoriane (PVZ).

All biochemical analyses were conducted using above-ground part of plants at the anthesis period. The determination of absolutely dry matter was done by drying to constant weight at 100—105 °C according to A.I. Yermakov [29]. The total content of sugars and monosaccharides were investigated by Bertrand method in water extracts. The concentration of ascorbic acid (AA) of the acid extracts was determined by a 2.6-dichlorophenol-indophenol method that based on the reduction properties of AA. Both analyses carried out according to V.P. Krishchenko [8]. The concentration of total carotene determined according to B.P. Pleshkov. The procedure carried out in petrol extracts by spectrophotometric method using 2800 UV/VIS Spectrophotometer, Unico. Mixtures were left in a shaker for 2 hours and their absorbance was measured at the wavelength of 440 nm [18]. The level of total ash was determined using the method of combustion in muffle-oven (SNOL 7.2-1100, Termolab) at 300—800 °C until

Table 1. **The content of dry matter, the total content of sugars, monosaccharides and ascorbic acid in plant raw material of *Panicum virgatum* L. in the stage of anthesis**

Sample	Dry matter, %	The total content of sugars, %	The total content of monosaccharides, %	Ascorbic acid, mg%
PVDB	36.33 ± 0.05	6.52 ± 0.14	4.31 ± 0.10	18.17 ± 1.52
PVDN	38.67 ± 0.27	6.64 ± 0.26	4.11 ± 0.17	34.14 ± 1.42
PVPB	38.74 ± 0.29	6.68 ± 0.29	5.69 ± 0.04	24.76 ± 0.84
PVPL	48.21 ± 0.78	5.41 ± 0.13	3.42 ± 0.06	49.47 ± 1.93
PVPN1	39.11 ± 0.25	7.77 ± 0.64	4.92 ± 0.12	65.34 ± 1.41
PVPN2	37.40 ± 0.02	10.49 ± 0.88	5.92 ± 0.05	53.44 ± 1.85
PVPN3	38.48 ± 0.52	5.16 ± 0.33	3.35 ± 0.16	44.31 ± 1.43
PVPP	37.32 ± 0.10	6.19 ± 0.18	3.93 ± 0.07	26.75 ± 1.16
PVRL	38.21 ± 0.50	8.06 ± 0.17	4.61 ± 0.06	14.39 ± 1.44
PVRR	35.52 ± 1.01	5.07 ± 0.13	3.02 ± 0.06	39.27 ± 3.57
PVSL1	39.69 ± 0.03	6.22 ± 0.13	4.18 ± 0.04	22.17 ± 1.39
PVSL2	38.21 ± 0.36	4.11 ± 0.13	2.68 ± 0.07	79.50 ± 2.68
PVVP	39.38 ± 0.41	6.73 ± 0.13	3.80 ± 0.08	48.88 ± 1.40
PVVR	43.86 ± 1.23	7.21 ± 0.16	4.76 ± 0.33	49.54 ± 0.63
PVZ	34.05 ± 0.55	6.86 ± 0.66	4.20 ± 0.43	26.65 ± 0.81

the samples turned into white ash to constant weight according to Z.M. Hrycajenko et al. [4]. The procedure of detection of energetic value was measured on calorimeter IKA-200. I this case, dry plant raw material was burned in an oxygen bomb. Measurement of every sample was 15 minutes approximately and expressed in cal/g. Photosynthetic pigments identified in plant extracts at 662 nm (chlorophyll *a*), 644 nm (chlorophyll *b*) and 440 nm (carotenoids) using spectrophotometer Unico UV 2800 according to M.M. Musienko [16].

Experimental data were evaluated using Excel 2010. Mean values of three replicates and standard deviation are given in Tables 1—3.

Results and discussion

Our previous study about biochemical composition of P. *virgatum* genotypes showed that plant raw material accumulated high content of dry matter, calories, vitamins and the total content of saccharides in the stage of seed ripening [20; 24]. The present study includes more quantity of varieties of *P. virgatum* and gives the possibility to evaluate raw by biochemical parameters for more samples.

The content of dry matter among investigated plants in the period of flowering was in the range from 34.05 % (PVZ) to 48.21 % (PVPL) (Table 1). Accumulation of total content of sugars in plant raw material of *P. virgatum* plants was in the range from 4.11 % (PVSL2) to 10.49 % (PVPN2). Also, we determined the content of monosaccharides that was in the range from 2.68 % (PVSL2) to 5.92 % (PVPN2). The concentration of ascorbic acid was from 14.39 mg% (PVPL) to 79.50 mg% (PVSL2).

Comparing results Vergun et al. (2017), dry matter of investigated samples was 41.96—65.28 %, total content of sugars — 3.11—8.69 %, monosaccharides — 1.50—6.94 %, ash — 3.04—5.27 %, ascorbic acid — 11.80—61.94 mg%, carotene — 0.05—1.06 mg%. On the whole, among investigated plants in the stage of anthesis all parameters maximum signs higher besides dry matter and ash content. As resulted in Hu et al. (2010), the composition of carbohydrates in the above-ground part of *P. virgatum* plants was arabinose, galactose, glucose, and xylose. Likewise, according to this study, the most content of lignin accumulated in leaves [5].

As shown in Table 2 the content of carotene was determined in the range from 0.277 mg% (PVPB) to 1.407 mg% (PVSL2). Accumulation of ash in plant raw material was from 1.88 % (PVVR) to 4.63 % (PVPN1). Results of Hu et al. (2010) showed that content of ash in the whole plant were 3.5—3.8 % [5]. In our study this parameter more

Table 2. **Calorific value, the content of carotene and ash in plant raw material of *Panicum virgatum* L. in the stage of anthesis**

Sample	Carotene, mg%	Ash, %	Calorific value, cal/g
PVDB	1.000 ± 0.036	4.40 ± 0.02	3665.73 ± 114.53
PVDN	0.430 ± 0.026	3.72 ± 0.14	3651.73 ± 115.16
PVPB	0.277 ± 0.025	3.99 ± 0.29	3657.00 ± 110.18
PVPL	0.747 ± 0.021	3.58 ± 0.09	3590.77 ± 110.00
PVPN1	0.617 ± 0.025	4.63 ± 0.10	3719.22 ± 148.33
PVPN2	1.140 ± 0.040	4.61 ± 0.25	3655.45 ± 121.35
PVPN3	0.430 ± 0.020	4.30 ± 0.32	3625.25 ± 133.57
PVPP	0.710 ± 0.020	3.46 ± 0.10	3654.00 ± 133.73
PVRL	0.650 ± 0.020	3.39 ± 0.21	3658.23 ± 120.64
PVRR	0.657 ± 0.025	3.07 ± 0.26	3590.25 ± 101.23
PVSL1	0.717 ± 0.040	3.90 ± 0.13	3634.13 ± 110.67
PVSL2	1.407 ± 0.058	3.67 ± 0.24	3674.18 ± 111.73
PVVP	0.413 ± 0.015	3.09 ± 0.28	3671.27 ± 123.12
PVVR	0.950 ± 0.040	1.88 ± 0.02	3588.18 ± 115.27
PVZ	0.400 ± 0.020	2.67 ± 0.28	3693.33 ± 107.70

tiveness of conversion plants and decreasing the heating value. Heating values has been negatively related to ash content, with every 1 % increase in ash concentration decreasing the heating value by 0.2 MJ/kg [15].

As described by Prochnow et al. (2009), the main physical fuel properties are calorific value, moisture content, particle size, bulk density, ash melting behaviour. The calorific value, first of all, depends on moisture content, decreasing linearly with rising moisture content [19]. Energetic value of dry plant raw material of investigated plants was from 3588.18 cal/g (PVVR) to 3719.22 cal/g (PVPN1). We also expressed the calorific value of investigated plant genotypes of *P. virgatum* in MJ/kg to compare with other reports. According to Zhuo et al. (2015), this parameter was from 16.84 to 17.48 MJ/kg [30]. Florine et al. (2006) obtained data for switchgrass from 18.2 to 18.6 MJ/kg [3]. We obtained results slightly less than described in the aforesaid report and it was from 15.02 to 15.57 MJ/kg. Regarding our data between samples wasn't significant deference.

Panicum virgatum is a C_4 species using the photosynthetic pathways that have higher photosynthetic, water, and nitrogen use efficiencies and greater tolerance to heat, nitrogen, and water stresses. These physiological attributes lead to high biomass productivity in switchgrass, especially underwater- and nutrient-limited conditions [17; 28]. Although the plant growth is controlled by a multitude of physiological, biochemical, and molecular processes, photosynthesis is a key phenomenon, which contributes substantially to the plant growth and development. C_4 and CAM plants are the best adapted to arid environments because they have higher water-use efficiency than that of C_3 plants [2].

An accumulation of chlorophylls has been proposed as one of the potential biochemical indicators of salt tolerance [22]. Leaves of investigated plants accumulated different concentrations of photosynthetic pigments (Table 3).

It was found that concentration of chlorophyll *a* in the flowering stage was from 0.247 mg/g (PVPN1) to 1.224 mg/g (PVPP). Chlorophyll *b* was determined in range from 0.172 mg/g (PVVR) to 0.447 mg/g (PVPL) and carotenoids — from 0.050 mg/g (PVDN) to 1.092 (PVPN3) mg/g. We determined that the ratio of chlorophylls accumulation was in the range from 1.09 (PVPN3) to 5.01 (PVPP). The ratio of the sum of chlorophylls to carotenoids was in the range from 2.47 (PVSL2) to 9.30 (PVDN). According to Liatukas et al.

Table 3. **The content of photosynthetic pigments in leaves of plants of *Panicum virgatum* L. depending on cultivars and varieties, mg/g (fresh weight)**

Sample	Chlorophyll *a*	Chlorophyll *b*	Carotenoids	Chlorophyll *a* / chlorophyll *b*	(Chlorophyll *a*+*b*)/ carotenoids
PVDB	0.942 ± 0.053	0.208 ± 0.030	0.365 ± 0.047	4.58 ± 0.41	3.16 ± 0.19
PVDN	0.262 ± 0.012	0.198 ± 0.014	0.050 ± 0.002	1.33 ± 0.14	9.30 ± 0.16
PVPB	0.287 ± 0.004	0.244 ± 0.012	0.075 ± 0.001	1.18 ± 0.05	7.06 ± 0.11
PVPL	0.998 ± 0.026	0.447 ± 0.062	0.544 ± 0.028	2.31 ± 0.47	2.66 ± 0.06
PVPN1	0.247 ± 0.008	0.194 ± 0.015	0.053 ± 0.001	1.28 ± 0.14	8.28 ± 0.11
PVPN2	0.421 ± 0.011	0.191 ± 0.011	0.076 ± 0.004	2.21 ± 0.12	8.12 ± 0.59
PVPN3	0.249 ± 0.009	0.228 ± 0.005	1.092 ± 0.029	1.09 ± 0.03	6.62 ± 0.37
PVPP	1.224 ± 0.048	0.254 ± 0.063	0.557 ± 0.058	5.01 ± 0.70	2.66 ± 0.09
PVRL	0.662 ± 0.030	0.177 ± 0.021	0.241 ± 0.021	3.76 ± 0.27	3.49 ± 0.10
PVRR	0.271 ± 0.009	0.179 ± 0.019	0.064 ± 0.002	1.52 ± 0.15	7.07 ± 0.52
PVSL1	0.675 ± 0.019	0.234 ± 0.044	0.263 ± 0.014	2.94 ± 0.43	3.46 ± 0.06
PVSL2	0.976 ± 0.019	0.315 ± 0.060	0.522 ± 0.017	3.16 ± 0.51	2.47 ± 0.07
PVVP	0.929 ± 0.026	0.335 ± 0.059	0.489 ± 0.022	2.83 ± 0.44	2.59 ± 0.06
PVVR	0.340 ± 0.010	0.172 ± 0.014	0.071 ± 0.002	1.99 ± 0.21	7.27 ± 0.16
PVZ	0.294 ± 0.013	0.225 ± 0.010	0.075 ± 0.002	1.31 ± 0.06	6.96 ± 0.36

(2015), accumulation of chlorophylls during vegetation periods for *P. virgatum* showed the maximum chlorophyll values at the anthesis [10].

Conclusions

Based on obtained data, it can be concluded that in conditions of M.M. Gryshko National Botanical Garden of the NAS of Ukraine the biochemical composition of plant raw material of *Panicum virgatum* depends on the genotype. Plants of *P. virgatum* accumulated nutrients in the stage of anthesis such as dry matter, vitamins, the total content of sugars, monosaccharides etc. Comparing analyse showed that in the stage of anthesis maximal content of dry matter had plants PVPL, sugars and monosaccharides — PVPN2, carotene — PVSL2, ash and calorific value — PVPN1. Plants of this important group of *Poaceae* are promising for further deep investigations in biochemical branch of plant biology.

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С.О. Рахметова, В.В. Фіщенко

Національний ботанічний сад
імені М.М. Гришка НАН України,
Україна, м. Київ

ВМІСТ ПОЖИВНИХ РЕЧОВИН ТА ЕНЕРГЕТИЧНА ЦІННІСТЬ РОСЛИННОЇ СИРОВИНИ ГЕНОТИПІВ СВІЧГРАСУ (*PANICUM VIRGATUM* L.)

Мета — дослідити біохімічні особливості сировини рослин 1 сорту та 14 форм *Panicum virgatum L.* в умовах Національного ботанічного саду імені М.М. Гришка НАН України.

Матеріал та методи. Досліджувані рослини — 1 сорт і 14 форм *Panicum virgatum*, зібрані на експериментальних ділянках колекції відділу культурної флори Національного ботанічного саду імені М.М. Гришка НАН України: *Panicum virgatum* f. DB (PVDB), *P. virgatum* f. DN (PVDN), *P. virgatum* f. PL (PVPL), *P. virgatum* f. PN-1 (PVPN1), *P. virgatum* f. PN-2 (PVPN2), *P. virgatum* f. PN-3 (PVPN3), *P. virgatum* f. PB (PVPB), *P. virgatum* f. PP (PVPP), *P. virgatum* f. RL (PVRL), *P. virgatum* f. RR (PVRR), *P. virgatum* f. SL-1 (PVSL1), *P. virgatum* f. SL-2 (PVSL2), *P. virgatum* f. VP (PVVP), *P. virgatum* f. VR (PVVR), *P. virgatum* cv. Zoriane (PVZ). Вміст сухої речовини визначали за А.І. Єрмаковим, загальний вміст цукрів, моносахаридів та аскорбінової кислоти — за В.П. Крищенком, вміст каротину — за Б.П. Плешковим, вміст золи — за З.М. Грицаєнко. Енергетичну цінність рослинної сировини вимірювали на калориметрі. Вміст фотосинтетичних пігментів у листках визначали за М.М. Мусієнком за допомогою спектрофотометра Unico UV 2800.

Результати. В період цвітіння рослинна сировина *Panicum virgatum* накопичувала сухої речовини від 34,05 % (PVZ) до 48,21 % (PVPL), моноцукрів — від 2,68 % (PVSL2) до 5,92 % (PVPN2), аскорбінової кислоти — від 14,39 мг% (PVRL) до 79,50 мг% (PVSL1), каротину — від 0,277 мг% (PVPB) до 1,407 мг% (PVSL2), золи — від 1,88 % (PVVR) до 4,63 % (PVPN1). Загальний вміст цукрів становив від 4,11 % (PVSL2)

до 10,49 % (PVPN2). Калорійна цінність сухої сировини — від 3588,18 кал/г (PVVR) до 3719,22 кал/г (PVPN1). Співвідношення вмісту фотосинтетичних пігментів — від 1,09 (PVPN3) до 5,01 (PVPP), співвідношення суми хлорофілів до вмісту каротиноїдів — від 2,47 (PVSL2) до 9,30 (PVPD).

Висновки. В умовах Національного ботанічного саду імені М.М. Гришка НАН України сорт та форми *Panicum virgatum* є цінним джерелом поживних речовин у період цвітіння. Серед досліджуваних рослин генотип PVPL характеризувався найбільшим вмістом сухої речовини та хлорофілу *b*, PVPN2 — загальним вмістом цукрів і моноцукрів, PVSL1 — аскорбінової кислоти, PVSL2 — каротину, PVPN1 — золи та вмістом калорій, PVPP — хлорофілу *a* та співвідношенням хлорофілів, PVPN3 — каротиноїдів.

Ключові слова: *Panicum virgatum*, генотипи, рослинна сировина, біохімічні особливості.

Е.Н. Вергун, Д.Б. Рахметов,
С.А. Рахметова, В.В. Фищенко

Национальный ботанический сад
имени Н.Н. Гришко НАН Украины,
Украина, г. Киев

СОДЕРЖАНИЕ ПИТАТЕЛЬНЫХ ВЕЩЕСТВ И ЭНЕРГЕТИЧЕСКАЯ ЦЕННОСТЬ РАСТИТЕЛЬНОГО СЫРЬЯ ГЕНОТИПОВ СВИЧГРАСА (*PANICUM VIRGATUM* L.)

Цель — исследовать биохимические особенности сырья растений 1 сорта и 14 форм *Panicum virgatum L.* в условиях Национального ботанического сада имени Н.Н. Гришко НАН Украины.

Материал и методы. Исследуемые растения — 1 сорт и 14 форм *Panicum virgatum*, собранные на экспериментальных участках коллекции отдела культурной флоры Национального ботанического сада имени Н.Н. Гришко НАН Украины: *Panicum virgatum* f. DB (PVDB), *P. virgatum* f. DN (PVDN), *P. virgatum* f. PL (PVPL), *P. virgatum* f. PN-1 (PVPN1), *P. virgatum* f. PN-2 (PVPN2), *P. virgatum* f. PN-3 (PVPN3), *P. virgatum* f. PB (PVPB), *P. virgatum* f. PP (PVPP), *P. virgatum* f. RL (PVRL), *P. virgatum* f. RR (PVRR), *P. virgatum* f. SL-1 (PVSL1), *P. virgatum* f. SL-2 (PVSL2), *P. virgatum* f. VP (PVVP), *P. virgatum* f. VR (PVVR), *P. virgatum* cv. Zoriane (PVZ). Содержание сухого вещества определяли по А.И. Ермакову, общее содержание сахаров, моносахаров и аскорбиновой кислоты — по В.П. Крищенко, содержание каротина — по Б.П. Плешкову, содержание золы — по З.Н. Грицаенко. Энергетическую ценность растительного сырья измеряли на калориметре. Содержание фотосинтетических пигментов в листьях определяли по Н.Н. Мусиенко с помощью спектрофотометра Unico UV 2800.

Результаты. В период цветения растительное сырье *Panicum virgatum* накапливало сухого вещества от 34,05 % (PVZ) до 48,21 % (PVPL), моносахаров — от 2,68 % (PVSL2) до 5,92 % (PVPN2), аскорбиновой кислоты — от 14,39 мг% (PVRL) до 79,50 мг% (PVSL1), каротина — от 0,277 мг% (PVPB) до 1,407 мг% (PVSL2), золы — от 1,88 % (PVVR) до 4,63 % (PVPN1). Общее содержание сахаров составляло от 4,11 % (PVSL2) до 10,49 % (PVPN2). Калорийная ценность сухого сырья — от 3588,18 кал/г (PVVR) до 3719,22 кал/г (PVPN1). Соотношение содержания фотосинтетических пигментов — от 1,09 (PVPN3) до 5,01 (PVPP), соотношение суммы хлорофиллов к содержанию каротиноидов — от 2,47 (PVSL2) до 9,30 (PVPD).

Выводы. В условиях Национального ботанического сада имени Н.Н. Гришко НАН Украины сорт и формы *Panicum virgatum* являются ценным источником питательных веществ в период цветения. Среди исследованных растений генотип PVPL характеризовался наибольшим содержанием сухого вещества и хлорофилла *b*, PVPN2 — общим содержанием сахаров и моносахаров, PVSL1 — аскорбиновой кислоты, PVSL2 — каротина, PVPN1 — золы и содержанием калорий, PVPP — хлорофилла *a* и соотношением хлорофиллов, PVPN3 — каротиноидов.

Ключевые слова: *Panicum virgatum*, генотипы, растительное сырье, биохимические особенности.