THE PERSPECTIVE OF CULTIVATION AND UTILIZATION OF THE SWITCHGRASS, *PANICUM VIRGATUM* IN MOLDOVA

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Introduction

Climate change-associated environmental stresses, such as extreme temperatures, lack of precipitation or erratic rainfall during the growing season will compromise the ability of agriculture to meet the food demands of an increasing global population. Diversifying crop production by including neglected and underused crops, as well as the domestication of new species would provide a solution to many of the problems associated with climate change resilience, food security, forage production, feedstock energy biomass and other industrial needs. The genus *Panicum* L. belongs to the family *Poaceae*, with nearly 450 species of annual or perennial grasses occurring throughout tropical and warm temperate regions of the world, is an important group of plants for agriculture and horticulture due to their economic significance and ornamental value. Switchgrass – *Panicum virgatum* L. is a warm-season perennial and rhizomatous C4 plant, sometimes forming a knotty crown. Natives to North America and is the most abundant in the Great Plains and eastern states of US. It is an important livestock forage, used primarily for warm-season pasture and hay. It has also been introduced as a forage grass to other parts of the world. Switchgrass *Panicum virgatum* has received much attention in recent years and has been a focus of bioenergy research for over a decade, in several countries.

The goal of this research was to evaluate the productivity and quality indices of the harvested green mass and prepared hay from introduced genotypes of switchgrass – *Panicum virgatum.*

MATERIALS AND METHODS

The introduced genotypes of switchgrass *Panicum virgatum:.* genotype with anthocyanin pigmentation and genotype without anthocyanin pigmentation, grown in the experimental plot of the National Botanical Garden (Institute) "Alexandru Ciubotaru" MSU, Chişinău, served as subjects of the research..

The plant samples of *Panicum virgatum* plants were mown in middle flowering stage, in the second year of life. The harvested plants were chopped into 1.5-2.0 cm small pieces, with a laboratory forage chopper, the dry matter content was detected by drying samples up to constant weight at 105° C. The prepared hay was dried directly in the field. For biochemical analysis, the plant samples were dried in a forced air oven at 60° C, milled in a beater mill equipped with a sieve with diameter of openings of 1 mm and some assessments of the main biochemical parameters: crude protein (CP), ash, acid detergent fibre (ADF), neutral detergent fibre (NDF), acid detergent lignin (ADL), total soluble sugars (TSS), digestible dry matter (DDM), digestible organic matter (DOM) have been determined by near infrared spectroscopy (NIRS) technique PERTEN DA 7200. The concentration of hemicellulose (HC), cellulose (Cel), digestible energy (DE), metabolizable energy (ME), net energy for lactation (NEl) and relative feed value (RFV) were calculated according to standard procedures.

The carbon content of the substrates was determined using an empirical equation according to Badger et al., 1979. The biochemical methane potential was calculated according to the equations of Dandikas et al. (2015).

***Panicum virgatum* genotype with anthocyanin pigmentation**

***Panicum virgatum* genotype without anthocyanin pigmentation**

RESULTS AND DISCUSSIONS

Table 1. . **Some agrobiological peculiarities of the studied *Panicum virgatum* genotypes**

Genotypes	Plant height, cm	Yield, kg/m²		Content of leaves and panicles in fodder, %
		fresh mass	dry matter	
Panicum virgatum with anthocyanin pigmentation	127	3.85	1.41	42.0
Panicum virgatum	144	4.45	1.75	44.0

Table 2. **The biochemical composition and nutritional value of fresh mass from studied *Panicum virgatum* genotypes**

Indices	*Panicum virgatum* with anthocyanin pigmentation	*Panicum virgatum*
Crude protein, g/kg DM	61	68
Crude fibre, g/kg DM	419	412
Minerals, g/kg DM	82	93
Acid detergent fibre, g/kg DM	433	422
Neutral detergent fibre, g/kg DM	692	653
Acid detergent lignin, g/kg DM	52	49
Cellulose, g/kg DM	381	373
Hemicellulose, g/kg DM	259	231
Total soluble sugars, g/kg DM	127	124
Digestible dry matter, g/kg DM	552	560
Relative feed value	74	92
Digestible energy, MJ/ kg DM	11.01	11.86
Metabolizable energy, MJ/ kg DM	9.04	9.06
Net energy for lactation, MJ/ kg DM	5.05	5.18

Table 3. **The biochemical composition and nutritional value of hay from studied *Panicum virgatum* genotypes**

Indices	*Panicum virgatum* with anthocyanin pigmentation	*Panicum virgatum*
Crude protein, g/kg DM	56	65
Crude fibre, g/kg DM	420	414
Minerals, g/kg DM	79	100
Acid detergent fibre, g/kg DM	441	426
Neutral detergent fibre, g/kg DM	713	679
Acid detergent lignin, g/kg DM	57	52
Cellulose, g/kg DM	384	374
Hemicellulose, g/kg DM	272	253
Total soluble sugars	109	113
Digestible dry matter, g/kg DM	545	557
Relative feed value	71	76
Digestible energy, MJ/ kg DM	10.89	11.10
Metabolizable energy, MJ/ kg DM	8.94	9.12
Net energy for lactation, MJ/ kg DM	4.96	5.14

Table 4. **The biochemical biomethane production potential of the investigated substrates from *Panicum virgatum* genotypes**

Indices	*Panicum virgatum* with anthocyanin pigmentation		*Panicum virgatum*	
	green mass	hay	green mass	hay
Crude protein, g/kg DM	61.00	56.00	68.00	65.00
Nitrogen, g/kg DM	9.76	8.96	10.88	10.40
Ash, g/kg DM	82.00	79.00	93.00	100.00
Carbon, g/kg DM	510.00	511.67	503.89	500.00
Ratio carbon/nitrogen	52.25	57.11	46.31	48.08
Acid detergent lignin, g/kg DM	52.00	57.00	49.00	52.00
Hemicellulose, g/kg DM	259.00	272.00	231.00	253.00
Biomethane potential, L/kg VS	311.00	302.04	317.11	312.28
Biomethane potential, L/kg DM	285.04	278.06	288.62	281.05

CONCLUSIONS

The studied introduced *Panicum virgatum* genotypes are distinguished by a faster pace of development and optimal dry matter productivity.

The *Panicum virgatum* genotype without anthocyanin pigmentation is characterized by high dry matter productivity, optimal crude protein concentration and lower content of structural carbohydrates, than genotype with anthocyanin pigmentation.

The biochemical methane potential of green mass and hay mass substrates from introduced *Panicum virgatum* genotypes varied from 302 to 317 l/kg VS.

The biomass from studied *Panicum virgatum* genotypes may be use as alternative forage for livestock and feedstock for bio methane production as a source of renewable energy.

The studied genotypes can serve also as initial material for breeding new cultivars of switchgrass, *Panicum virgatum* as multi-purpose crops.

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