

# PLANTS QUALITY AND ADAPTION TO THE PRODUCTION OF BIOPRODUCTS

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Plastic product production is very high in the world. Last year it was made about 448 million tons of plastic. This product is very useful in our daily life, but also makes many problems for the environment. Most of the products are not recyclable and usually discarded in landfills. Plastic pollution grows up it is very fast. Therefore it is important to find a solution to protect the world and find a substitute. There are few main solutions for reducing the damage of non-degradable materials: reduce the use of them, increase the recycling or make the bio-degradable materials which could change or at least reduce the quantity of plastics in the world. One of such bio-resources for different purposes could be biomass of agricultural crops.

The aim of this investigation is to evaluate the chemical composition, structure and suitability of herbaceous plants for the development of bio-products. The object of this study was *Artimisia dubia*, Virginia mallow (*Sida hermaphrodita* L. Rusby), Miscanthus (*Miscanthus x giganteus*), and wheat straw. All energy crops and wheat were grown at the Institute of Agriculture in Akademija, Kėdainiai district (55° 24'N) on an *Apicalcari – Endohypoglevic Cambisol*, light loam. Nitrogen (N) fertilization at one rate (90 kg ha<sup>-1</sup>) was applied in spring. Grasses and wheat were fertilized with mineral fertilizer. The main parameters for analyzing crop biomass as a source for bio-product is their structural composition. For this reason, according to the van Soest method, the samples were subjected to the fiber component analyses: acid detergent fiber (ADF), neutral detergent fiber (NDF) and acid detergent lignin (ADL). The content of cell wall structure carbohydrates hemicellulose and cellulose was calculated:

$$\text{cellulose} = \text{ADF} - \text{ADL} \quad (1)$$

$$\text{hemicellulose} = \text{NDF} - \text{ADF} \quad (2)$$

The highest cellulose content was in biomass of *Artimisia dubia* 54,43 % , which shows that this crop could be a repository suitable for bio-plastic production, then other plants whose cellulose was lower. The content of hemicellulose is different in all plants. The highest quantity of hemicellulose had Virginia mallow 28,05 % , a little smaller miscanthus 24,07 % , *Artimisia dubia* had 15,95 % and least had wheat straw 8,86 % . However, lignin content in *Artimisia dubia* (10,25 % ) was higher than Virginia mallow (7,38%), but lower in wheat straw (10,70%) which presented the highest lignin content. The lowest amount of lignin is better to reduce the energy for breaking the plant cell wall. Also was measured ash content in biomass. The results suggest that - miscanthus had the lowest – 2,18 % and wheat straw had the highest ash content – 5,39 % .

No less important is crop productivity, which guarantees the economic benefit of the processing technologies. In 2018 dry matter (DM) yield of five years harvesting miscanthus was 18,55 t ha<sup>-1</sup> – very high compared to Virginia mallow (3,99 t ha<sup>-1</sup>), *Artimisia dubia* (3,82 t ha<sup>-1</sup>) and wheat straw ( 1,79 t ha<sup>-1</sup>).

The first results suggest that the most appropriate for bio-products is *Artimisia dubia*, which had high cellulose content, but on the other hand miscanthus had highest biomass yield which could play the significant role in economic benefit of biomass processing. Therefore more research will be conducted for the analysis of fiber content and fiber parameters as well as chemical composition of biomass.