

# Assessment of cyanobacteria biomass recourse potential in Ukrainian internal waters for environmentally friendly target production

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**Abstract – Assessment of perspective in using Ukrainian internal waters cyanobacteria biomass for multi-target production was conducted.**

Keywords – biomass, cyanobacteria, environmental threat, biotechnology, resource potential.

Searching for alternative energy sources under conditions of Ukrainian energy market alteration is specifically relevant. Among renewable energy sources that are used in world practice, prominent place takes biomass – wastes from wood processing, agricultural products, special forestry and agricultural energy plantings. In some regions cultivating and using plants as a source for energy carriers production has taken to such extent, that it led to reduction to agricultural production critical level and caused civil protests in some countries (Mexico, Latin America). This is why scientific efforts have been recently directed to searches for cultivating technologies and applying for energy producing biomass types, using of which wouldn't affect reduction of agricultural production potential opportunities and environmentally hazardous impact. Set of studies (Israel – Seambiotic company, Japan – Gas and NEDO companies, USA - GreenFuel Technologies) have shown that algae can be the required biomass - both cultivated on special farms and harvested from hydrosphere surface objects. Such perspective for Ukraine is cyanobacteria (blue-green algae) that have been recently causing environmental threats due to progressive water blooming. Water «blooming», dominant agents of which for Dnieper reservoirs are representatives of *Microcystis*, *Phormidium*, *Aphanizomenon*, *Anabeana* and *Oscillatoria* genera is a biological signal of troubles in hydro-ecosystems. Among numerous mechanical, physical – chemical, biological and environmental methods for massive cyanobacteria development warning, the most effective are the last two, since they enable to avoid the cause, but not the consequences of water «blooming» [1]. Concerning perspectives for using them to obtain energy, then the most perspective solar energy utilizers appeared to be microalgae: maximum photosynthesis Energy conversion efficiency ratio gains 20%. Energy that is contained in 1 m<sup>3</sup> of biogas is equivalent to 0,6 m<sup>3</sup> of natural gas or 0,7 dm<sup>3</sup> of crude oil or 0,6 dm<sup>3</sup> of diesel fuel. That is why using cyanobacteria during their massive development (so called «blooming») in Dnieper reservoirs water area to obtain biogas will enable to receive not only additional energy source but will lead to improvement of sanitary-hygienic water level and coastal areas. Problem for such biogas production technology is cyanobacteria harvest, that can be carried out with the help of special barge-harvesters [2].

Additionally cyanobacteria biomass processing aiming to obtain products of different purpose can be relevant for such industry fields as medicine, pharmacology, cosmetology and perfume industry, as well as for agriculture (obtaining of organic-mineral fertilizers and organic pesticides) [3, 4].

## Main part

In our opinion in order to assess perspective biotechnologies of target products from Ukrainian internal water cyanobacteria biomass production it is necessary to conduct range of complex studies. First of all it is important to evaluate perspective of using cyanobacteria



depending on uptake), including phycobiliproteins (red and blue pigments). Hemoproteins, flavoproteins and phycobilins are also present in this biomass. Pigments that are added to cosmetic mixtures improve skin tissue breathing hence facilitate rejuvenation.

Hyaluronic and glucuronic acids are of special interest. Their synthesis under production conditions is very complicated, that's why cyanobacteria biomass is valuable resource material for receiving these compounds. They are easily extracted from residual dry biomass via hydroalcohol extraction with further recrystallization under temperature above (40–50)°C. Under higher temperatures molecules of these multibasis organic acids lose biological activity since they become racemates or dycarboxylate.

### Conclusion

Conducted analysis claims about perspective from using cyanobacteria biomass of resource material for production of variety products that are valuable in many industry fields and both agriculture. Important is that using this biomass as raw material it is possible simultaneously to reduce environmental threat from uncontrolled development of cyanobacteria in water areas of Ukrainian internal waters. Suggested algorithm of studies concerning identification of the most perspective types of cyanobacteria to concrete innovative technologies for target production.

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