The Jerusalem Artichoke as a Perspective Renewable Fuel

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Depletion of nonrenewable resources and an increasing need for energy emphasize the importance of nontoxic, renewable biological sources of energy. The aim of this project is to determine objective possibilities of using the Jerusalem artichoke as an alternative fuel. During the experiments, we obtained 40t/ha of Jerusalem artichoke tubers and 100t/ha of green mass. On the basis of the experiments we propose the technology of a complex processing of the Jerusalem artichoke. It includes the following stages: 1. Obtaining of fuel briquettes (green mass shredding, pressing, drying). Their heat capacity reached 15.3-16.6mJ, which is 1.5-2 times as high as that of oil shale or peat. 2. Production of ethanol from Jerusalem artichoke tubers (shredding, saccharification, fermentation, distillation of ethanol). The yield of ethanol was 90 liters per ton of tubers and 60 liters per ton of green mass, which is 2-4 times as high as that from beetroot or potatoes. 1ha of the Jerusalem artichoke will provide about 10 tons of ethanol. At this stage we obtain by-products – carbon dioxide. 3. Deriving of biogas from green mass and spent grain received at the second stage after alcohol stillage. We used Jerusalem artichoke green mass to obtain biogas in a laboratory bioreactor. The biogas yield was 154 L/kg. Valuable protein-vitamin feed supplements are by-products at this stage. Thus, the high productivity of the Jerusalem artichoke makes it a perspective raw material for production of 3 kinds of biofuels: solid, liquid, and gaseous – with minimal costs, reducing consequently human impact on the environment.

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