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The effect of biofuel production on sustainability of agriculture

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During recent years biomass become considered as a resource that should satisfy various needs of human society. The food, construction materials as well as energy are supposed to be harvested from this resource. Obviously not total demand can be covered basing only on biomass, but its contribution is expected to increase. It is worth, therefore, to estimate limits of this growth, as well as factors determining those limits. The present paper is confined to the analysis of biomass as a source of energy. The main task is to estimate energetic efficiency of agricultural processes. The energetic efficiency is understood as the ratio of the amount of energy obtained from biofuels, produced basing on crops from particular region, to energy inputs required to facilitate all subsidiary processes assuring functioning of production processes. Based upon earlier works conducted by the present author, the mathematical model of energy efficiency of biofuel production is extended to more general form aiming to describe the effects of exclusion of a fraction of crops from food production towards biofuel production. The derived model gives quantitative relations between energy efficiency of "energetic plantations", energetic efficiency of industrial biofuel processing plants and energy demand of other types of agricultural production. Investigations are aimed towards determination of the role of biomass as a source of energy and the possibility of assuring energetic self-sufficiency of agriculture, as well as its effect on global energy demand. The potential role of modern biotechnology applied to "energetic" biomass production is also considered.

Biography

Andrzej Wasiak has completed his MS in 1961 in Chemistry (X-ray Crystallography) from Polish Academy of Sciences, PhD in 1974 in Technical Sciences/Polymer Physics, DSc in Materials Science (2000) from the University of Warsaw, Poland. He has also worked at Research Institute of General Chemistry in Warsaw (1964-67), Institute of Fundamental Technological Research (1968-2000). Since 2000, he is a Professor at Bialystok Technical University and Visiting Scientist at the University Massachusetts, USA, Kyoto University, Japan, the University of Duisburg and also a Fellow of the Committee of Production Engineering Polish Academy of Sciences. His scientific interest includes experimental studies and mathematical modeling of transitions occurring in technological processes like energy demand, material's structure formation, etc.

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