

## PROGRAM PROPOSAL

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Since 2002 I have been working in the field of environmental engineering in the Institute of Environmental Engineering at the Faculty of Environmental Protection and Engineering, Czestochowa University of Technology, Poland. During that time I developed a special interest in organic waste and by-products management in agri-food industry with my primary focus on the application of biological methods for utilization of biodegradable waste. Till now, I was involved in developing strategies for organic waste management for small and medium sized agri-food companies and applying biological methods for utilization of biodegradable waste. My research has shown that the successful approach towards the problem of efficient utilization of organic waste and by-products from agriculture and food processing requires the integration of specialized disciplines including food processing, environmental engineering and management. For my PhD dissertation I investigated composting as an on-site method for management of fruit processing waste. Other research included bioremediation of soil contaminated with hydraulic fluid by food waste composting.

In 2005 I was granted a one year Junior Research Fulbright Fellowship at the Agricultural and Biological Engineering Department, Pennsylvania State University. Within this fellowship under Dr Tom L. Richard's supervision I conducted the research project *The impact of physical properties of composting matrices on biodegradation during composting* and participated in several others. Also, during this fellowship I had the opportunity to learn about the importance of biofuels derived from lignocellulosic biomass. Although my research work did not include any experiments for production of biofuels I was a member of the biomass conversion research group led by Dr Richard and followed his classes on biomass conversion. At that time I was exposed to many discussions on the possible ways of bioethanol production from lignocellulosic biomass (e.g. corn stover) and its potential as a sustainable transportation fuel worldwide which decreases both dependency on fossil fuels and gas emissions. This encouraged me to pursue my interests towards bioeconomy and bioenergy with special interest in production of bioethanol from agricultural residues, by-products and food processing waste. Nowadays, the most common feedstock for bioethanol production are corn grain and sugar cane. Expected limitations on these materials in future resulted in the increased interest in other feedstocks from agriculture such as lignocellulosic biomass including agricultural residues, wood and energy crop or even food processing waste. Currently, laboratory research on bioethanol production from lignocellulosic material is in progress but possible scenario for bioethanol production would allow for displacement of current fossil fuel usage and could be an alternative recycling method in sustainable management of by-products and waste from agriculture and food processing.

Suggested program of this training would include literature studies and research work on (1) fuel economy in the USA, (2) bioethanol production regulations and incentives in the USA, (3) potential feedstock for bioethanol production, (4) characterization of available enzymes for bioethanol production, (5) bioethanol production with special focus on pretreatment technologies, enzymatic hydrolysis and fermentation, water reuse, by-product utilization, (6) cost-effectiveness of bioethanol production, as well as participating in any available research projects and visiting laboratory and pilot scale facilities for bioethanol production.

The USA has the world-leading experience in production of biofuels, and the opportunity of training in cellulose-based biomass for biofuels offered by the Borlaug Fellows Program would be of great benefit for my academic career as well as for my home university. The benefits of this training would be manifold with primary goal of introducing available technologies for production of bioethanol from lignocellulosic material to the Biomass Centre at the Faculty of Environmental Protection and Engineering, Czestochowa University of Technology. This new approach would allow for expanding the range of biomass conversion processes applied for energy generation from diverse feedstock investigated in the Biomass Centre.

I strongly believe that my academic background in food technology and environmental engineering will not only allow for successful completion of this training but also will benefit in transferring knowledge to my home university and establishing mutual cooperation with the selected organization in the field of biomass conversion processes.