

Title of the project:**Does biochar affect gut microbiota and sustainability of black soldier fly development?****Competition:** OPUS 28**PI:** Piotr Bulak, PhD

The use of biochar additive for diet of „classic” farm animals is well known for centuries. Additionally, a few insect species, such the black soldier fly (*Hermetia illucens*), have just become (new) farm animals in the European Union. Beneficial effect of biochar on animals is related to the adsorption of various types of toxic and anti-nutritional compounds, as well as endotoxins of gram-negative bacteria inhabiting the digestive tract of animals. In animals raised with the addition of biochar, such as cattle, goats, pigs, chickens, ducks and fish, an increase in body weight and a reduction in feed conversion ratio were observed, which means that higher biomass gain occurred with better utilization of the feed. At last, a reduction in methane and carbon dioxide emission was observed in the case of cattle and goats. So far, there are no studies on the use of biochar in feeding insects bred for the production of feed and food. There are also no studies devoted to the impact of biochar on changes in greenhouse gas (GHG) emissions from such insect farms. However, the facts mentioned earlier allow to assume that this influence will also be observed in the case of this group of animals. Therefore, the outcomes of the project will be very much in the area of interest of many world insect breeders. The research plan is to produce biochar from vegetable and fruit industry waste, and to optimize its dosages in order to find the best in the context of growth and development of this livestock insect. Both physicochemical analyses of the biochar and insect samples will be carried out. The effect of the biochar addition on the greenhouse gas emissions from the breeding will be also evaluated along with its effect on changes in the insect's gut microbiota.

The candidate will participate in the implementation of the following research tasks:

1. Obtaining biochars from various waste biomasses and testing their physicochemical properties,
2. Determining the physicochemical properties of feeds and insect samples,
3. Testing the effect of different doses of biochar addition on the growth and development of black fly larvae,
4. Measuring greenhouse gas emissions from black soldier fly larvae fed with feed supplemented by biochar addition,
5. Development and presentation of research results at national and international conferences, as well as preparation of scientific publications.

Requirements:

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1. Master's degree in agriculture, biology, biotechnology, chemistry, or related sciences.
2. Ability to work with insects.
3. Knowledge of laboratory techniques for instrumental analysis of organic samples.
4. Practical laboratory skills (e.g., microbiological, chemical) required.
5. Communicative knowledge of spoken and written English allowing for comprehensive assistance in scientific research and the preparation of results.
6. Availability, ability to work in a team and cope with stress, soft skills.
7. Participation in student scientific activities (e.g., research clubs, conferences) is welcome.
8. Knowledge of the broadly understood field of bioremediation.