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FERMENTED DPJ (FDPJ), A PROMISING NEW GENERATION OF BIOSTIMULANT AND ORGANIC BIO-FERTILIZER FAMILY FOR SUSTAINABLE AGRICULTURE

Background

The FDPJ (Fermented Deproteinized Plant Juice) represents the latest generation of organic biostimulants and biofertilizers. It can be produced from plant juices on an industrial scale without the addition of chemical substances - by using a deproteinizing technology under patenting process. FDPJ is rich in nutrients, biologically active compounds, pigments, vitamins, enzymes, mineral salts and other useful phytochemicals, thus it can be used for multiple purposes. We have found that FDPJ, produced from green pulp of alfalfa (A-FDPJ), in addition to the various biologically active compounds, has significant B, Ca, K, Mg, Mn, Mo, P, S and Zn content. The application of FDPJ with aim of plant nutrition is primarily related to the remarkable plant nutrient content. In our greenhouse experiments FDPJ applied as foliar, soil and combined treatment, we have observed that it was highly effective in organic feeding of many horticultural plant species. We have concluded that A-FDPJ also contains a significant amount of compounds having antioxidant effect. Based on our preliminary experiments, we have found that FDPJ will be beneficial to develop new technology for bio-based plant protection treatments.

Technology

Researchers at the University of Debrecen have developed a new method of production and storage that makes FDPJ most effective in crop production. Wet fractionation-based leaf protein extraction technology is a new “guided protein coagulation”, so far unknown. The DPJ (plant whey, brown juice) is one of the by-products generated during this new process. The amount of carbohydrates, lipids, micro- and macroelements, etc. of it can be flexibly changed. Thus, the composition of the DPJ can be partially shaped according to the purpose of use, from which new, effective bio-products can be produced.
During the experiments, we used our specially selected native lactic acid bacteria-containing inoculation material to induce significant changes in the ratio of the organic and mineral components of DPJ. The FDPJ obtained by fermentation of such DPJ became stable at room temperature. The lactic acid bacteria strains used in the fermentation experiments have played a key role. Researchers at our university have investigated

- Which varieties are the most suitable for production of FDPJ to use in plant nutrition;
- How the harvest time affects the composition and effect of FDPJ;
- Which application method is most effective for plants to utilize FDPJ;
- Researchers have tested the effect of FDPJ in greenhouse conditions using annual ornamental and spice seedlings planted in soil mixture, in combination of and/or without programmed tigmo-morphogenesis and LED lighting.
- Researchers have tested the effect of FDPJ on arable crops such as maize (*Zea mays*) and sunflower (*Helianthus annuus*) under controlled environmental conditions using hydroponic culture and inert media (perlite).

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During the examinations of different application methods, A-FDPJ (stabilized at room temperature for 5 months) treatments were used in different concentrations.

The following findings and conclusions have been established by the researchers:
The A-FDPJ new biostimulants applied in experimental concentrations chosen in an appropriate way significantly

- Increased the shoot and root weight;
- Increased the total length of shoot and root;
- Increased the volume of shoot and root;
- Increased the number of leaves;
- Increased the content of photosynthetic pigments in older leaves.

Please see *Figure 1* and *Figure 2* on page 3.

Stage of development

1. Researchers have been studying the effect of FDPJ, on different plant species and different physiological and morphological parameters, quantity and quality of yield of horticultural and agricultural plants, which have not been in scope of such studies.
2. An experiment have been carried out by our researchers to produce microalga containing unfermented alfalfa DPJ (A-DPJ). The A-DPJ products can be more effective giving additional value to future bio- and foliar fertilizer products. Microalga containing DPJ/FDPJ products can increase yield, improve resistance against diseases and insects, increase nutrient uptake in case of inhibited nutrient uptake of roots (drought stress, injured root system, temporary anaerobe soil conditions).
3. Our researchers examined the specific native lactic acid producing bacteria strains of DPJ from different sources. By isolation and molecular identification of the strains, development of specific inoculation materials is in process. Specific inoculation materials can contribute to the specific and highly effective production of different FDPJs. In addition, these strains improve the bioactive effect of FDPJ.
4. Researchers are extending A-FDPJ experiments to the research area of bio plant protection using horticultural and agricultural plants.

Benefits

- Bio usage;
- Cheap production;
- It can be easily stored;
- Easy application;
- It contains most of the micronutrients;
- Promote growth;
- Enrich soil;
- Improving nutrient uptake;
- Increasing disease resistance.

IP status

PCT application has been filed and the preparation of the second patent application is in progress.

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Figure 1

Figure 2

1.) distilled water (control 2);
2.) half dose of generally used nutrient solution + 0.05% FDPJ;
3.) half dose of generally used nutrient solution + 0.1% FDPJ;
4.) half dose of generally used nutrient solution (control 1);
5.) normal dose of nutrient solution.

6.) distilled water + 0.05% FDPJ;
7.) distilled water + 0.1% FDPJ;

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