Contribution ID: **21** Type: **Invited Oral**

Pros and Cons of Plasma Agriculture: A Current View

Thursday, 21 September 2023 13:45 (30 minutes)

Plasma agriculture is an emerging research field that involves the use of low-temperature plasma to enhance agricultural productivities [1-4]. Based on some examples, we discuss some potential pros and cons associated with plasma agriculture.
Seven Pros of Plasma Agriculture:
1. Increased crop yields: Plasma agriculture has the potential to enhance plant growth and increase crop yields. Plasma treatments can stimulate seed germination, improve nutrient absorption, and enhance photosynthesis, leading to healthier and more productive plants.
2. Pest and disease control: Plasma can be effective in eliminating pests, pathogens, and weeds. Plasma treatments can help reduce the reliance on chemical pesticides and herbicides, potentially resulting in reduced environmental contamination and lower health risks for farmers and consumers.
3. Water and soil improvement: Plasma treatments have the potential to improve water and soil quality. Plasma can remove contaminants and toxins from water, making it safer for irrigation. It can also break down organic matter and improve nutrient availability in the soil.
4. Reduced chemical inputs: Plasma agriculture has the potential to reduce the need for synthetic fertilizers and pesticides. This can lead to lower costs for farmers and reduced environmental impact, including less pollution of water bodies and reduced soil degradation.
5. Extended shelf life: Plasma treatments can help extend the shelf life of fruits and vegetables. By reducing the growth of spoilage-causing microorganisms, plasma can help preserve the freshness and quality of produce, reducing food waste.
6. Cost and infrastructure: Implementing plasma agriculture can be inexpensive,. The rental or co-ownership of the plasma equipments may be cost-effective for many farmers even in developing regions.
7. Energy consumption: Plasma generation requires energy, and the energy consumption associated with plasma agriculture is evaluated below 3% of the energy of whole agricultural processes. The use of electricity from on-site renewable energy sources may contribute to sustain plasma.
Three Cons of Plasma Agriculture:
1. Lack of long-term studies: Plasma agriculture is still a relatively new field, and there is limited long-term research on its effects. More studies are needed to fully understand the potential environmental and health impacts associated with plasma treatments.
2. Potential unintended consequences: While plasma treatments can target pests and pathogens, there is a risk of unintended effects on beneficial organisms. It is crucial to study and minimize any potential harm to beneficial insects, pollinators, and other organisms in the ecosystem.
3. Regulatory challenges: The adoption of plasma agriculture may face regulatory hurdles, as the technology is still emerging and may not fit within existing regulatory frameworks. This could slow down its widespread implementation and commercialization.
It's important to note that plasma agriculture is an evolving field, and further research and development are necessary to fully understand its potential benefits and drawbacks.
[1] I. Adamovich, et al., J. Phys. D, 55 (2022) 373001.
[2] T. Okumura, et al., Sci. Rep., 12 (2022) 12525.
[3] P. Attri, et al., Processes, 8 (2020) 1002.

Speaker's Affiliation

Kyushu University, Fukuoka

Member State or IGO/NGO

IGO/NGO

Primary author: SHIRATANI, Masaharu (Kyushu University)

Co-authors: Prof. KOGA, Kazunori (Kyushu University); Prof. OKUMURA, Masataka (Kyushu University); Prof. ATTRI, Pankaj (Kyushu University)

Presenter: SHIRATANI, Masaharu (Kyushu University)

Session Classification: Agriculture

Track Classification: Agriculture