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5s4b: : Waste reduction and novel resources for sustainable production of safe food or feed

THE ROLE OF CROP PROTECTION PRODUCTS IN CIRCULAR AGRICULTURE

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When talking about circular agriculture the use of crop protection products may not be the first thing to come to mind. Still, its use is a prerequisite to achieve the objectives of circular agriculture. In this paper we provide three reasons why sound and proper use of CPPs is an essential part of circular agriculture.

(1) Worldwide, approximately 20-40% of crop production is lost because of diseases, pests and competition with weeds. Without the use of crop protection products this figure would surge to levels up to 80%1.

Circular agriculture aims to reduce the environmental impact of agriculture by closing water and nutrient cycles and thereby minimize (or avoid) losses of resources to soil, air and water. Apart from the challenge of achieving full circularity, crop failure is a severe threat to the sustainability of circular practices. In case of crop failure, all previous inputs are wasted and circularity is broken. As an example, this year (2021) 75% of the biological potato production in The Netherlands failed because of phytophthera2. Consequently, nearly 2000 hectares of potatoes were burned resulting in equivalent losses of about 4 million seed potatoes, 50.000 tonnes of organic fertilizers and an unknown amount of biological crop protection products, with corresponding environmental implications.

(2) The vast majority of synthetic crop protection products are organic molecules that eventually originate from mineral oil. Yet, alternatives to these products (if existing) almost always require more fuel consumption, resulting in equivalent CO2 emissions. For instance, the fuel consumption to manage weeds by mechanical weeding equals about 10 fold the amount required to do the same using herbicides3. At the same time, soil disturbance for mechanical weed control releases CO2 from the soil carbon pool4,5.

(3) Yet, although the use of crop protection products is instrumental to reach the objectives of circular agriculture, the only product not desired in circularity is the crop protection product itself. Therefore, selective, effective, and degradable products are

required. Studies show that modern CPPs have less environmental impact compared to generic (often older) products6.

Continued innovation is required to further improve integrated crop management, especially focusing on agronomic challenges, monitoring, prediction and decision-making, and support the responsible use and development of improved crop protection products together with precision application technologies to make sure the products are only there where and when they are needed and to achieve circular agriculture.

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