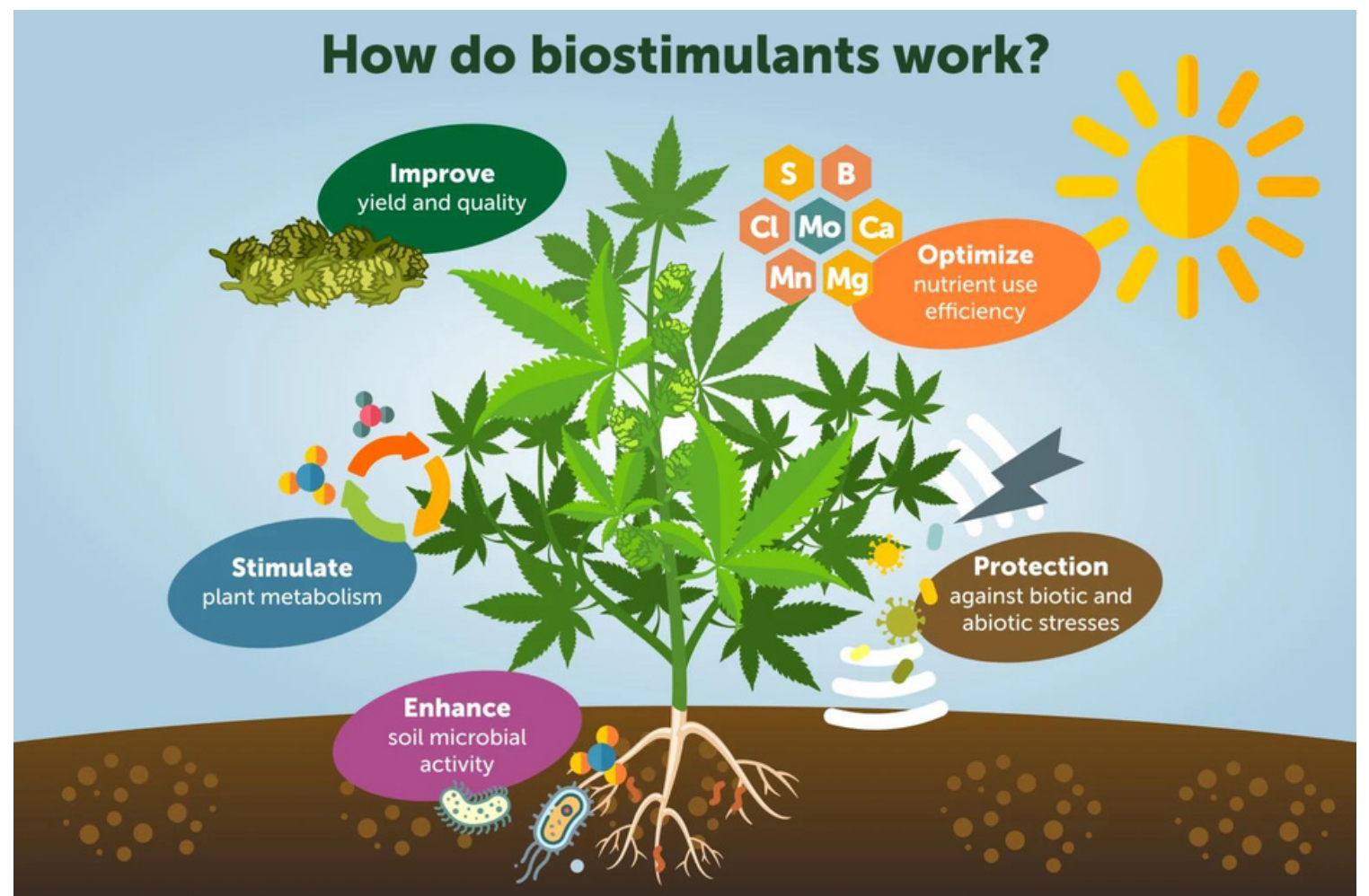


Biostimulants in Agriculture

Introduction:

There are an increasing range of inputs, being used in primary production to improve plant growth outcomes, that do not fall into the established categories used to classify common agricultural or horticultural products. These have been broadly termed biostimulants.

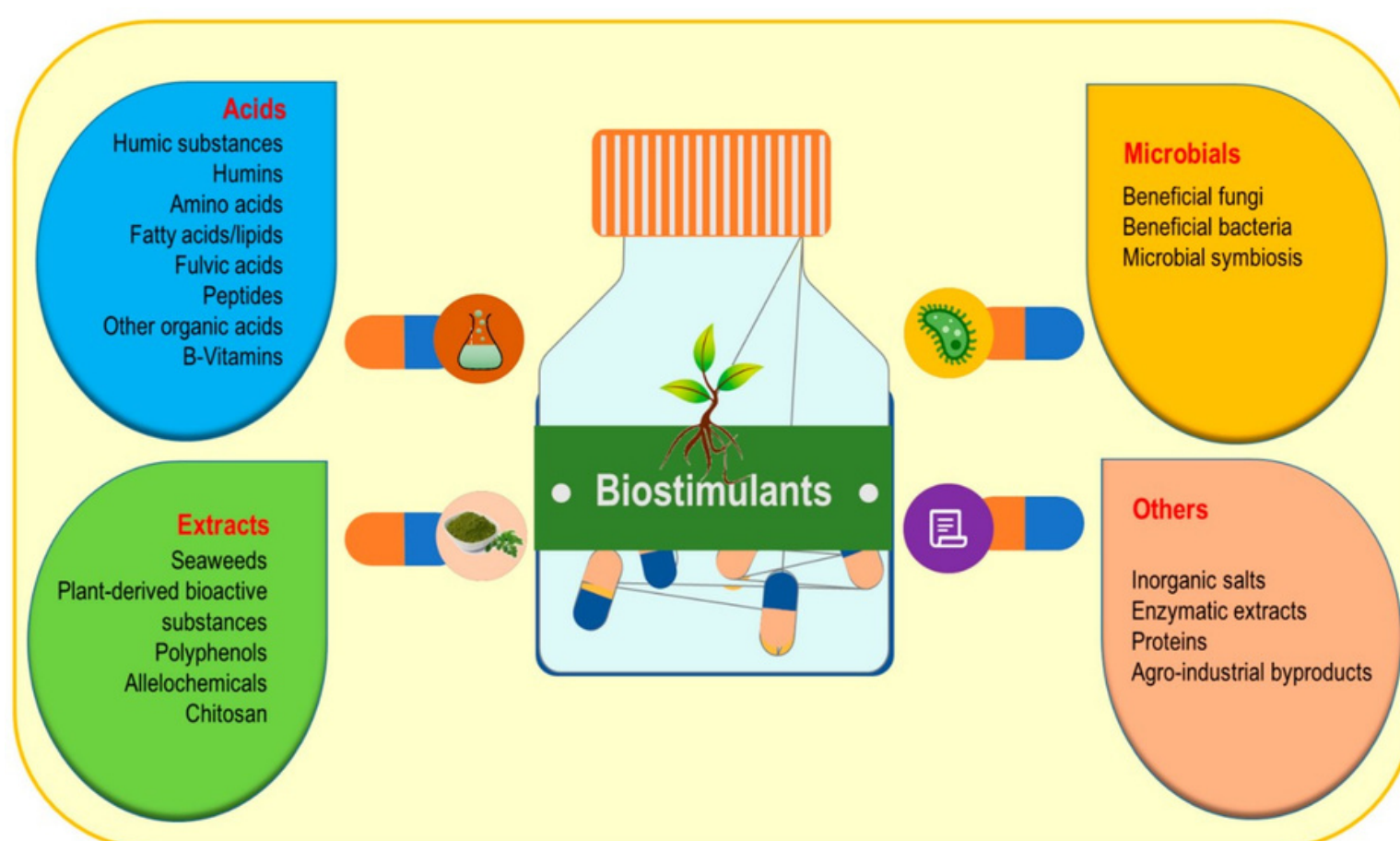
- Bio: relating to life
- Stimulant: an agent that produces a temporary increase in the functional activity or efficiency of an organism or any of its parts



"Put simply, a biostimulant could be any agent, that increases the activity or efficiency of living things."

Biostimulant Formulations

Currently recognised constituents of biostimulants include:



Biostimulant formulations may contain one i.e. seaweed extract, or a combination of these constituents i.e. compost/vermiculture.

- Humic substances
- Nitrogenous substances including amino acids
- Non-essential chemical elements
- Seaweed extracts and other plant botanicals
- Chitin and chitosan derivatives
- Anti-transpirants
- Other complex organic materials
- Beneficial bacteria
- Beneficial fungi
- Other non-pathogenic microbiology

Application of Biostimulants

Biostimulants are designed to stimulate biology. As such, when applying biostimulants it is important to consider what biology we are attempting to stimulate and why?

We can apply biostimulants to the soil or the plants, but the end goal is always to improve plant growth. Chosen biostimulants may directly elicit a favourable plant growth response or indirectly by altering growing conditions through physical, biological, and chemical mechanisms.

Key considerations:

- We may apply a biostimulant that temporarily stimulates plant growth and root exudation. This in turn drives extra microbial activity in the soil, which leads to better nutrient acquisition and delivery to the plant roots, furthering subsequent growth, exudation, and so on.
- Equally, a soil application that stimulates beneficial microbial activity around plant roots, improving nutrient availability, fosters stronger plant growth, an increase in root exudation etc.
- In either case, we get a greater overall response than what could be attributed to the application alone. However, if there wasn't much plant cover, or the soil was in a poor state, or there was a lack of moisture etc, the potential for a beneficial response from a biostimulant application would be limited and short lived.
- We need to ensure that the necessities of life i.e. nutrition, water and air are in place for biostimulants to have any significant and lasting effect.
- Fundamentals like actively growing plants, soil cover, organic matter, good soil structure, moisture, nutrient supply etc... are what ultimately determine our success, and while biostimulants can enhance living processes, they are only effective when used in conjunction with good overall management and limiting factors are addressed first.
- By applying biostimulants at planting or, where we have established perennial plants, at the beginning of the growing season, we can get a compounding of the beneficial flow on effects discussed above. For instance, if we inoculate seed with beneficial bacterial/fungal at planting, we set the scene for a healthy plant microbiome from the start.
- Only small amounts of the biostimulant are needed to get things going, from which point on, the plants and microbes support each other. In this way biostimulants can be used as a catalyst for the establishment of a healthy system
- Mature plants are generally less responsive to biostimulant applications because, larger quantities are required relative to the larger amount of plant mass, older leaf and root tissue is less receptive, competitive microbe populations are already established on and around the plants, and root exudation drops off.



Complimentary Combinations

A final strategy worth considering is combining compatible and complimentary components in biofertiliser applications. With such formulations, we can get a compounding synergistic effect and more bang for our buck, and time, than we would from applications of individual components.

Useful combinations include:

- Applying microbial groups that are known to complement one another (i.e. bacterial and fungal inoculants) together.
- Applying microbes (i.e. compost extract, beneficial bacteria/fungi) with a source of food (i.e. fish hydrolysate, molasses, humic substances) to support microbial activity.
- Applying microbes (compost extract, beneficial bacteria/fungi) with growth promoting hormones and antioxidants (i.e. seaweed extract) to support healthy microbial growth.
- Applying minerals (i.e. rock phosphate) with microbes (compost extract, mycorrhizal inoculant) to improve nutrient availability and delivery.
- Applying nutrients (i.e. trace elements) with a substrate that has nutrient holding capacity and/or chelating properties (humic substances) to improve the retention and/or uptake of nutrients.
- We can use multiple combinations in a formulation, if they meet mixing and application requirements.



This booklet is a compilation of DIY recipes by Mark Tupman from Productive Ecology

BIOFERMENTS

Making them on your farm



This booklet is a compilation of Bio ferment and fertiliser recipes by David Hardwick from Soil Land Food.

Recipes are downloadable from the full online article 'Biostimulants in Agriculture'. To access please go to <https://lower-blackwood.shorthandstories.com/biostimulants-in-agriculture/index.html>

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This document is a downloadable summary of the online article & content hub 'Biostimulants in Agriculture'. The article was produced by 'Talkin' After Hours', the Lower Blackwood Landcare's Online Community & Information Hub, and written & collated by Mark Tupman from Productive Ecology. The aim of the article is to assist land managers to understand the different biostimulants available, how to make their own, and when & how to use them.



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