

PROJECT TITLE

Exploring natural carotenoid derivatives and their ability to alleviate stress in crops, using highthroughput non-invasive phenotyping approaches

CONSORTIUM

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SUMMARY OF THE REPORT

Bio-stimulants can foster plant development in various ways throughout the crop life cycle, from seed germination to plant maturity. They are applied to plant, seed, soil or other growing media and may enhance the plant's ability to assimilate nutrients and/or to cope with stress. The mechanisms are usually unclear and claimed mechanisms include the fostering of complementary soil microbes or improving metabolic efficiency, enhancing root development or promoting nutrient delivery. Thus bio-stimulants might increase yield in terms of weight, seed and fruit set, enhance quality, taste, colour and shelf life. Improve water use efficiency. The likely legislative removal of many synthetic chemicals, derived largely from petrochemicals and environmentally persistent, provides a huge driver to find novel bio-degradable but active compounds to aid agriculture. Such compounds should profoundly affect the growth and productivity of crops and/or wild plant species, ideally, utilize existing application technologies and while non-persistent they should be stable enough to avoid overly repetitive field operations.

Micro-alga, rich in carotenoids, are a potentially economic source of bio-active preparations. Crude extracts are already sold by many companies for the alleviation of mild stress, usually drought. This project aims to test the hypothesis that microalgal carotenoids and their derivatives, (obtained using air or enzymatic oxidation will provide products with enhanced potency and/or stability) can have a bioactive effect on plants. We utilized two crop species, tomato and corn, subjected to mild drought treatments combined with high throughput dynamic phenotyping to assess the effectiveness of the potentially bio-active compounds. Destructive sampling for metabolite can also provide indications of potential mechanism. To our knowledge, this work is one of the first large scale screening of carotenoids and derivatives from microalgae.

The results show promising activity as potential growth regulators.