



# **SMART ROTATIONS**

treating crops & soils



**“Healthy soils are the foundation and  
future of sustainable farming”**



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## INTRODUCTION

PlantWorks is a leading horticulture and agriculture research company specialising in the production of soil microbes for application in sustainable crop production. The company has activities embracing the production of Arbuscular Mycorrhizal Fungi (AMF) and Plant Growth Promoting Rhizobacteria (PGPR). Operating from two sites at Kent Science Park and NIAB EMR the company works with many of the UK's leading agronomy and academic partners to refine, demonstrate and ultimately make available to market the very best beneficial soil biology.

As the UK's only mass producer of mycorrhizal fungi our cultures and production are managed by a core group of scientists with expertise in mycology, bacteriology and crop production. For this reason PlantWorks has rapidly become the go to company for agronomists, farmers and growers keen to learn more about this important and evolving aspect of soil management, plant protection and growth.

## UNDERSTANDING SOIL BIOLOGY

An abundance of beneficial soil microbes is a mainstay of balanced soil ecosystems and encompasses valuable micro-organisms such as symbiotic fungi and bacteria.

The services rendered by soil microbes are critical to plant health. They include solubilisation, acquisition and transport of nutrients, protection from stresses such as drought and pathogens, as well as boosting the plants' immune system and water use efficiency.

Arbuscular mycorrhizal fungi (AMF) associate with 90% of all crop plants. By growing into the root, as well as accessing large areas of soil around the plant, the fungus effectively increases the uptake surface area of plant roots up to 700 times. Additionally, plant defence mechanisms are improved by the partnership. Put

simply, plants colonised by AMF are healthier and significantly more efficient at collecting water and nutrients from the soil.

Plant Growth Promoting Rhizobacteria (PGPR) are another group of important soil microorganisms. This type of bacteria has the ability to fix atmospheric Nitrogen and unlock soil bound Phosphorus, allowing subsequent transport to host plants by AMF. Additionally, PGPR further support a robust plant immune system for healthier crops and produce phytohormones such as auxins and cytokinins, aiding growth and development of plants.

## WHAT IS SMART ROTATIONS

Conventional farming techniques can disrupt ecosystem stability and deplete soils of beneficial biological components. Such detrimental techniques include soil disruption (ploughing), fallow periods, over-application of agro-chemicals and cropping with non-mycorrhizal plants or those that act to fumigate the soil.



Smart Rotations is a suite of products that can help to alleviate problems caused by any of the circumstances described above and will act to restore and build the microbial balance in arable soils. In order to gain the most benefits, careful crop management is recommended. Cover crop mixes that include a number of different plant species, and particularly legumes, are most effective at building up and restoring AMF communities. The use of Smart Rotations products in cover crops can help to not only restore soils after fallow periods or non-mycorrhizal crops, but can also serve to build up soil biology for follow-on cash crops.

Soil ecosystems with a large amount of microbial biodiversity are the best foundation for successful and sustainable farming. The use of carefully planned crop rotations and quality inocula can help to maintain and build such balanced ecosystems.

KEY BENEFITS	AMF	PGPR
	Funneliformis, Claroideoglomus, Rhizophagus	Gluconacetobacter, Azospirillum, Bacillus, Rhizobium
	Increased N and P availability and uptake	Nitrogen fixing
	Improved crop quality and yield	Phytohormone production
	Improved systemic resistance of plants	Phosphorous solubilisation
	Increased water use efficiency	Enhanced plant systemic resistance
Enhances soil microbial communities for follow on crops		

## THE TEAM



Dedicated research team sharing expertise with many UK and international Universities and research institutes.

Collaborators include: Sheffield, York, Nottingham, Cambridge and Royal Holloway Universities, JHI and NIAB EMR.

We also support farming related trials with ProCam, AGRII and directly with industry partners including Limagrain and Cotswold Seeds.

“Live as though you’ll die tomorrow, but farm as though you’ll live forever.”

- John Marsden, writer



## **Experts in the production and application of microbial plant inoculants**



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