

Enhancing Apple Orchard Resilience

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Climate change is making extreme weather more frequent in the UK, creating challenging conditions for farmers. Mr Nigel Jenner is Chief Technical Advisor at Avalon Fresh Limited and has a long history of advising farmers on how to get the best from their crops. He is leading a project to explore how novel microbial treatments can increase resilience in apple crops in an effort to reduce the substantial losses faced by the apple growers in Kent and Medway in the UK.

An Apple a Day...

We all know that apples are good for us. In providing an easy and palatable source of key nutrients, including fibre, vitamin C, and antioxidants, apples provide many health benefits. These range from helping maintain healthy digestion to potentially warding off chronic diseases, such as type 2 diabetes and even cancer.

According to the National Institute of Agricultural Botany (based in Cambridge, UK), the last twenty years have seen a dramatic increase in the worldwide production of apples. The upshot of this is that, in the UK, the value of home-grown apples has decreased, directly impacting the profitability of apple-growing. To survive in such a competitive market, farmers need to ensure a consistent and reliable apple crop year after year. But this isn't as easy as it might sound.

Threats to Apple Production

Apple trees, like all plants, need the right conditions to grow. In the wrong conditions, plants become stressed, with consequences including reduced growth rates, reduced resilience to disease, and possibly even death. These results can be catastrophic for farmers and financial losses can run into the hundreds of thousands of pounds.

For apple farmers in Kent and Medway, South East England, recent seasons have been particularly challenging. Long periods of drought during heatwaves and increased rainfall in winter are creating adverse conditions in which to grow apples. These environmental stresses make apple trees more susceptible to apple canker disease, a fungal infection that impacts both tree and fruit, and can significantly reduce yields.

Young trees are particularly susceptible, and the combination of extreme weather and canker kills up to 30% of young apple trees in Kent and Medway every year – a massive loss for apple farmers in the area.

Microscopic Lifelines

Apple farmers faced with a struggling crop have little to no options to mitigate losses. In recent years, beneficial microbes and their role in supporting crop health have gained more attention as potential solutions. The most important of these microbes are arbuscular mycorrhizal fungi (AMF), microscopic organisms that live in the soil and form symbiotic relationships with plant roots. These fungi and similar beneficial microbes have been developed into commercial products that aim to improve crop performance by increasing the plant's resilience to environmental stressors, including heat and drought.

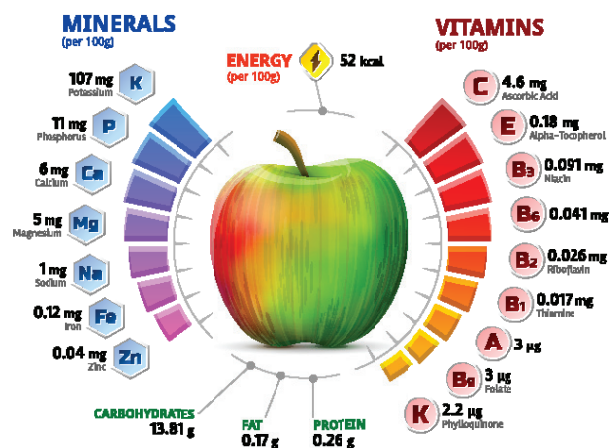
Mr Nigel Jenner, Chief Technical Advisor at Avalon Fresh Limited, saw an opportunity to use government funding to trial the use of AMF in apple trees. Mr Jenner hopes the project will develop a sustainable management strategy for apple canker related to challenging growing conditions, safeguarding the livelihoods of farmers in the area.



Testing Delivery Mechanisms

One challenge to the successful use of AMF in an established orchard is reliably translocating the organisms onto the tree roots. Mr Jenner's team set out to trial AMF delivery methods in existing orchards. The study trialled two approaches for transferring AMF to established trees, one using an adapted root pruner to directly deliver the AMF and another where wildflowers inoculated with AMF were planted between the rows.

The project is ongoing and is due to finish in September 2024. Whilst results have only been collected for one of two test sites, Mr Jenner is excited to report that the wildflower method resulted in an increase in AMF across the site. This initial result is progress towards a sustainable management option for apple farmers.



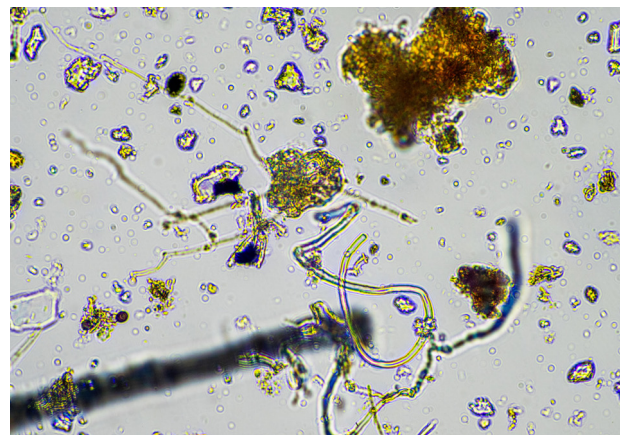
^ Apples provide many key nutrients for human health.

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Implications for Global Warming

Using numerical modelling, Dr Katsman has investigated how methane gas bubbles escape aquatic sediments. She has demonstrated that methane gas bubbles will escape the gas horizon in a dynamic manner (fracturing surrounding host sediment) under taller (high amplitude) waves with short time periods (time between waves) in shallower water environments. Further, her results suggest that sea level drops over longer timescales (hundreds to thousands of years) would lead to gas bubble ascent in a stable manner and control the location of the gas horizon within the aquatic sediment.

Being able to understand the behaviour and control of the ascent of methane gas bubbles from aquatic sediments will allow for a better understanding of the flux of this potent greenhouse gas to Earth's atmosphere, which could help with tackling our warming planet.



^ Soil microorganisms.

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MEET THE RESEARCHERS

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Nigel Jenner is Chief Technical Officer at Avalon Fresh Limited with 30 years' experience as a BASIS, IASIS, and FACTS trained agronomist. He is a technical adviser to British Apple & Pears and also specialises in controlled atmosphere storage of fruit products. He previously studied at Hadlow College, Kent, and trained with the ADAS Fruit Team in the early 1990s. He lives in Kent on his family farm, which he is also actively involved in running.

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Growing Kent & Medway



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