



No soil and minimal water; the new technology that will spark the next agricultural revolution

An award-winning British company is about to radically change the way food crops are grown, resulting in greater yields at lower cost, which will bring profound benefits to farmers, growers and consumers in the developed world and to those in the developing world struggling to grow their own food.

2 018 Rushlight Award winner, Airponix, has developed a ground-breaking new food production system which requires no arable land, or even soil, and typically 85 per cent less water than conventional agriculture. Instead, crops can be grown in protective polythene film tunnels, which can easily and cheaply be scaled up from small, home-use chambers through to giant commercial enclosures. Inside, a nutrient-rich water 'fog' is created, by purpose-modified inkjet printheads, which propagates down the long tunnels, feeding the growing plants without the need for soil. This process means crops can be grown in almost any environment since they are protected from the vagaries of the weather and climate change.

According to Michael Ruggier, CEO & Co-founder of Airponix: "Trials of our breakthrough technology means that we can produce crops, such as potatoes, with lower production costs and higher quality, competing strongly against conventionally grown new baby potatoes. Additionally, based on results from our small-scale trials, the yields are typically far higher - about 50 times greater per acre per year than those being achieved by commercial growers in the UK and elsewhere". "The potential cost of the system is very low and requires little energy to operate. Manual labour is also greatly reduced because harvesting is a simple clean process and root crops don't need washing. This means that everyone can benefit from our technology and has the potential to guarantee high-yield high quality food production

independent of external environmental conditions", added Michael. Agriculture has not changed fundamentally since the 'Green Revolution', in the pre- and post-second World War periods which saw the introduction of large scale mechanisation, and the extensive use of agri-chemicals such as herbicides, fungicides and pesticides - none of which are needed to control growing conditions in the Airponix system. Growers today are facing many new risk factors; mainly resulting from climate change and its related side effects, which mean they require far greater control over growing conditions than was possible in the past. This, combined with global population growth, means that by 2030 it is estimated we will need 35 per cent more food, 40 per cent more water and 50 per cent more energy. If

there is no new and better technology, or methods for growing crops, food prices and availability will soon become critical in both the developed and developing areas of the world. Radical new thinking was needed and so, in 2016, Airponix was established by a group of seasoned engineers and horticulturists with the aim of improving and commercialising 'aeroponics'; invented and patented over 40 years ago by the company's Technical Director and co-founder, John Prewer. Conventional hydroponic and aeroponics systems rely on nutrient-containing mists or sprays to grow crops but, because their droplet sizes are so much larger than those in fogs they tend to coalesce, precipitate out of the air and form large droplets on the roots which inhibit well-oxygenated



nutrition uptake, and encourage the growth of wastefully long roots. The technical and economic limitations of aeroponic systems, based on mists and sprays, mean they are only suitable for growing leafy greens, such as lettuces, or herbs whereas the unique Airponix fog technology is suitable for

growing staple food crops including rice, wheat and potatoes. Key to the development of the Airponix system is the company's collaboration with a world-leading developer of piezoelectric drop-on-demand inkjet technology. By employing their printheads to deliver the nutrient-rich fogs to the



plants, droplet sizes can be substantially reduced and controlled. So, instead of a mist, an engineered 'fog' is created to suit the different needs of roots and leaves which play a major role in optimising plant growth rates and yields. The printheads require less energy to operate than other fog making methods, are highly reliable and easy to install or replace under field conditions. Airponix has recently received a £485k convertible loan from Centrica Innovations*. This is allowing Airponix to equip a 1,000 m2 glasshouse in Norfolk with growing units for system development, testing and demonstration. This includes the addition of growth-enhancement

techniques, such as electro-culture and RNAi - unique to Airponix - which promise to further increase growth rates and crop yields significantly. Selling this produce should also generate some early income/revenue with the harvest of unique baby potatoes expected from July 2018. Interest is running high in the potential of the Airponix system and the company has recently won a number of high-profile awards including the overall Rushlight Award and the Rushlight Energy Reduction Award in January 2018 and the Bio-technology of the Year Award at the Business Green Technology Awards in December 2017.