"The supply and over-supply of water is a critical limiting factor in yields."

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DRAINAGE

Rob Burtonshaw explores the history of drainage and how model technology is helping to increase its cost effectiveness and making it more affordable.

Ever since we started farming we have moved water to and from our crops and such efforts have proven to be essential. Dealing with the weather, and the rain in particular, is difficult and can make working on the land near impossible and what's more important, farming axle-deep is unprofitable. To cope with this, British fields are covered by a network of drains, slowly moving

water. Working whenever it rains, this hidden infrastructure is often the hardest working and most underappreciated tool on the farm.

There is evidence of what is believed to be drainage ditches which date back to the birth of agriculture. From that point we have buried pipe and dug ditches, but the start of modern drainage was in 1865 when Thomas Scragg invented a method of mass producing clay tiles. Scragg's method of production reduced the cost of drainage tiles by over 70% and made the practice economically viable. Clay tiles had been used for many centuries but the cost of pipe had held back the industry and made it a rare practice. The late nineteenth century saw a massive surge in drainage and many of the drains installed then are still working today. Mile after mile of pipe was laid, all by hand, all on a grade. It was a massive effort and yields leaped upward on this toil. Drainage became embedded into farming practice, and despite peaks and troughs it has never gone away. The reason why drainage is still being installed? Its effect on yield.

The supply and over supply of water is a critical limiting factor in yields. The yield increases with drainage are significant; data from Ontario, Canada, collected over a twenty year period shows a yield increase of 38% in winter wheat. This yield increase does vary greatly from field to field, year to year but modern drainage schemes are one of the few techniques that can completely transform a poorly performing field. In addition this improvement is not just for one year, but many. Drainage schemes installed to a high standard of workmanship can last for generations. However it might not be necessary to install a new system. Great attention should be given to maintenance and care of old schemes. Sometimes new installations can be avoided by simple actions which do not take long – although they might involve getting wet. Ditch maintenance is vital; if outlets are covered by sediment, water cannot escape and the whole scheme backs up.

Pays for itself in 8 years

Drainage is an investment for the long term, and one which has a proven track record. But that does not stop drainage from being overlooked and many fields would benefit from further investment which often is not made. Let's be honest; drainage is not a sexy subject. Mud, ruts and more mud is not a glamorous combination. It is easy to overlook something which in buried a metre underground, totally out of sight and which solves a problem before it becomes apparent. However at least here in the UK this is changing. Interest in soils is increasing, problems are no longer being solved by more horsepower and the benefits of healthy, productive soils are being realised. Land drainage is part of this movement. Soils cannot reach their potential if saturated, and more and more farmers are investing in drainage. It is the job of drainage contractors like myself to meet this demand and to listen to what our clients need.

In the future costs must be kept to a minimum without affecting accuracy or performance. Luckily technology can help. GPS grade control is now possible and offers great advantages; not only is it quicker to set up and use but due to the increased number of measurements the amount of permeable backfill used is reduced. GPS grade control is just as accurate as laser guidance but allows depth and grade to be recorded constantly, leaving a documented trail to prove accuracy. Recycled aggregates can

also be used and can offer good cost savings if a good supply can be sourced. I'm also a keen advocate of using a drainage plough to install pipework. Ploughs install the vast majority of the pipe throughout the world, with the UK proving to be an exception. A plough installs drains at a greater speed than a chain trencher, often twice as fast. Such additional speed allows more to be done in a day and reduces costs. The disadvantage of a plough is the inability to see into the trench and pick up existing drains – this is vital if you are laying a single drain across a field which you suspect has existing drains already installed. If it is unlikely that drains are present or if you are draining the whole field then seeing into the trench is not necessary. It is a case of using the right tool for the right job and I'm proud to say that I have just taken ownership of the first drainage plough to be built and operated in the UK for over thirty years to work alongside our chain trenchers.

Conservation drainage

Of course the environment now plays a major part in farming and this is affecting drainage too. The conservation drainage movement is strong in the United States, and growing in the UK. By using techniques such as de-nitrifying bioreactors, controlled drainage and buffer zones, drainage can be used to improve water quality. Whilst drainage does provide a conduit of excess nutrients to leave the field, it reduces run off and provides an opportunity to deal with the issue, in one place. There are issues to overcome before such things become commonplace, but it is possible to see a future in which conservation drainage becomes widespread.

Drainage is an age-old technique with an exciting future. Modern technology is being harnessed in ways unimaginable to my grandfather when he first started draining in the 1950s. With this technology we need to reduce costs, maintain accuracy and produce positive environmental outcomes. All of which is very much attainable.

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