

Retaining water with healthy soils

Following the bad winter flooding, Peter Thompson discusses how to stop water run-off and soil loss

In the last issue of *Gamewise* I wrote about the drying out of farmland and how important it is that we better manage and conserve our water, only for the magazine to drop through your letter box following the wettest winter on record.

However, as the scientists that study global climate change are frequently telling us, not only is there a high probability that we will get more extremes in our weather patterns in the form of heavy periods of rainfall, but also more times of drought. I believe that the way we manage water, controlling flooding while also conserving it for times of need, is quickly becoming a key part of managing our countryside.

Three quarters of our countryside is farmed, so it makes sense to look at what can be done here first. The way we manage our soils makes an enormous difference to what happens to a rain drop when it lands in a field. Any soil's structure is affected by tillage, cropping, rotations, texture, organic matter and compaction, all of which combine to affect the drainage capabilities of that particular soil.

We know that by maintaining a good, stable soil structure we can increase the water holding capacity of the soil, allowing water to slowly percolate down through the ground. Where the structure is poor however, the water runs across the surface, eroding the field as it goes and depositing the earth, much of it containing fertilisers and pesticides, into the nearby stream. This not only pollutes watercourses, but also clogs up the important gravel breeding grounds used by many species such as salmon and trout.

A poor soil has little or no gaps and those that are present tend to run horizontally as a result of past cultivations. Some soils can smell really quite nasty; starved of oxygen and any sign of life, they smell of stagnation.

Interestingly, many farmers concentrate solely on their arable fields when it comes to thinking of water running off the land, but in fact many grass fields have over the years become extremely compacted with cattle and vehicles constantly running across them. During heavy rainfall, water finds it difficult to penetrate the soil and simply flows off down the slope.

However, a good soil structure is one where the gaps between the soil particles and the tubes made by numerous earthworms run vertically up and down, leaving a fresh, sweet smelling, crumbly soil. Earthworms will pull down organic matter such as straw from the surface, 'feeding' the soil, and deep-rooted crops such as oilseed rape also help to open soils up with their tap roots. In times of drought, the roots of crops simply follow these vertical lines deep down into the soil, chasing the lowering water table.

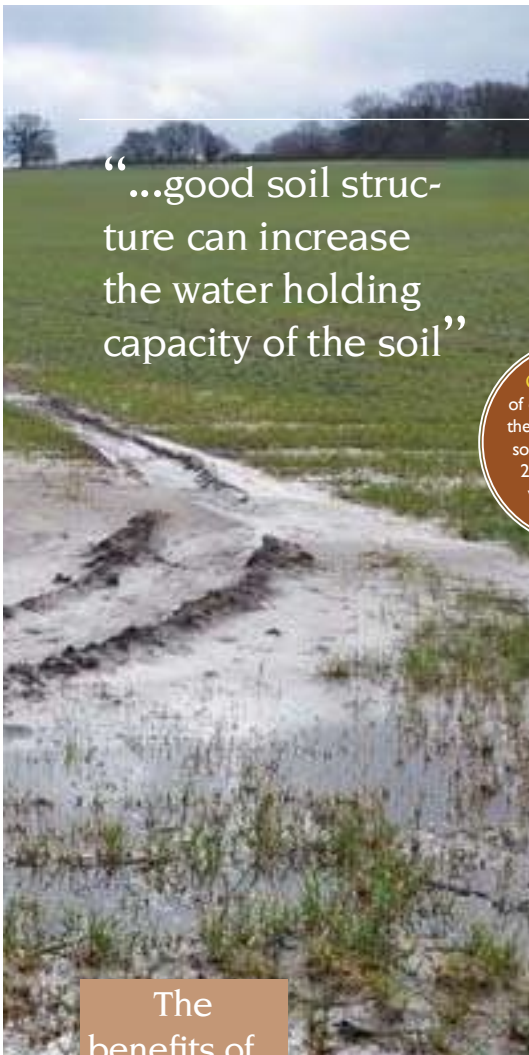
By concentrating efforts on achieving improved soil management, much of the research work being carried out on our Allerton Project farm at Loddington is showing that the extremes of weather can have much less of an effect on farmland, with both soils and surrounding watercourses benefiting hugely. We also believe that in the longer term both crop yields and wildlife will also respond positively, making farmland altogether much more resilient and better able to cope with the predicted changes to our weather patterns.



Peter Thompson is our biodiversity advisor and an expert on farmland habitat and wildlife. In 2013 he was a finalist in the *Farmers Weekly* advisor awards.

“...good soil structure can increase the water holding capacity of the soil”

One percent of organic matter in the top six inches of soil can hold about 27,000 gallons of water per acre



The benefits of... healthy soil

There can be up to a million earthworms in just one acre of soil – the equivalent of fitting the entire human population of this country into a 70-acre field.



Each 'acre' of worms can eat 10 tonnes of dead material such as leaves and roots a year, and turn over 40 tonnes of soil.



One gramme of old, unploughed grassland soil can contain 10 billion bacteria and two kilometres of fungal hyphae.



Above: The cracking of soil can be a natural way of restructuring its profile.

How to improve your soil

Dig a hole and look at the soil structure – ideally you want to see vertical lines running down through the soil rather than horizontal lines running across the profile.

Consider moving to a minimal tillage regime – ploughing destroys worms so by reducing cultivation you will see an enormous growth in earthworm numbers, which will help your soil gain a vertical profile.



Minimise compaction by choosing low-pressure tyres.

Consider running tramlines across the slope. Our research showed that one of the major causes of water run-off was compacted tramlines.



Check grassland for compaction problems.

Plant winter cover crops to help protect soil – they will also add organic matter and create root structure.

