



## AGRONOMY TECHNICAL NOTE – AUGUST 2015 BASIC PAYMENT SCHEME SOIL MANAGEMENT REQUIREMENTS JOHN MORGAN – MGA OFFICE

January 1<sup>st</sup> 2015 signalled a significant change in Basic payment rules associated with soil management. The new 2015 rules also apply to all agri-environment schemes and the payments received by them.

### Changes

The key change is that the Soil Protection Review (SPR) publication required since the introduction of the Single Payment Scheme has been replaced by a set of new “Outcome” based rules. The new rules require no paper work, focusing on the state of the land instead. Inspection in future will be based on actual field issues, rather than clipboard review.

There are three Good Agricultural and Environmental Conditions (GAEC’s) to consider. One is focused on maintaining soil cover (GAEC 4), one minimising soil erosion (GAEC 5), and one on maintaining soil organic matter (GAEC 6).

### Maintain a minimum soil cover (GAEC 4)

The new GAEC 4 rule requires a farmer to take reasonable steps to protect soil on their farm, by maintaining minimum soil cover via the following covers.

- vegetative cover from all types of crop, grass and herbaceous forage.
- cover crops and leguminous and nitrogen fixing crops (green manures).
- game cover and crops planted for biodiversity.
- trees, coppice, fruit crops, hops, nursery crops, vines.
- overwintered stubble from combinable crops.
- other stubbles and crop residues, such as vegetable, maize and sugar beet.

The available options above cover most of the likely scenarios, however in addition to the above list, there are additional exemptions to this rule, if agronomic justification can be made to argue that establishing a cover would conflict with the requirement to minimise soil

erosion (GAEC 5 More of which later). The agreed exemptions are listed in *Guide to Cross Compliance in England 2015*. And the *Cross Compliance in England: Soil Protection Standards 2015*.

You may also apply for a derogation from all the cover options, by writing to the Rural Payments Agency (RPA). You should get the derogation in writing before proceeding.

### Minimise erosion (GAEC 5)

The second new rule and arguably most serious in terms of maize growing is GAEC 5. GAEC 5 states that you must put measures in place to limit soil and bank side erosion on your holding. The guidance helpfully points out that the practices that could lead to erosion if not managed correctly are:

- cropping practices and cropping structures.
- livestock management, including outdoor pigs and poultry, causing overgrazing and poaching.
- Wind.
- vehicles, trailers and machinery.

In effect, you are to manage your land in a way that minimises and ideally avoids the above issues. Examples of measures that will go some way to limit erosion can be found in the *Cross Compliance in England: Soil Protection Standards 2015*.

Clear guidance is given, that where compaction caused during harvest and or other machinery work on land has the potential to cause soil erosion, you should cultivate land to avoid soil or water runoff.

If you are unlucky enough to be inspected, the RPA inspector will view all of your land and reductions to your basic payment and stewardship scheme payments will occur if:

- Erosion has occurred over a single area of more than 1 ha. This area is continuous and can include/bridge field boundaries, meaning that the limit is not individual field specific.

- Bankside erosion, caused by livestock trampling, along a continuous stretch of more than 20 meters long and 2 meters wide, of a watercourse.

While if you have non compliant soil erosion on your holding, some of your payment will be cut, the rate of payment deduction will be linked to the severity of the erosion.

**It is particularly important to note that even if you have put in place measures recognised to reduced the risk of erosion and erosion still occurs, you will not be exempt for penalty reduction.**

It is therefore vital to avoid soil erosion of the type outlined above and or not get inspected if you are to retain all your BSP and stewardship money.

### **Maintain good levels of soil organic matter (GAEC 6)**

The third and final soil focused Cross Compliance rule focuses on soil organic matter and states that a farmer should maintain soil OM levels by sticking to the following rules. This maintenance of soil Organic matter rule is unchanged from those pre 2015 and for this reason should not be too much of a surprise for members. As way of a reminder,

#### **You must:**

- not burn crop stubble, except for plant health reasons. Where burning is needed for plant health reasons, it must comply with the Crop Residues Regulations.
- not burn bales and stacks where it will burn stubble.
- not burn for education and research purposes.
- comply with the Heather and Grass Burning Regulations.
- comply with the Environmental Impact Assessment Regulations which

state that you should not plough, cultivate or intensify species-rich and semi-natural habitats, so as to conserve organic matter and carbon levels in soils. An environmental impact assessment (EIA) may be required if the land has not been cultivated within 15 years, or if it is semi-natural.

It is important to emphasise that the last point on the above list is often misunderstood, being incorrectly thought to prohibit the improvement of Permanent Pasture (as coded on the Single Payment and now Basic Payment schemes). For sake of clarity, there is only the obligation to conduct an Environmental Impact Assessment (EIA) if the land in question has not been mechanically or chemically cultivated within the last 15 years. While mechanical cultivation includes practices such as ploughing, discing and tined cultivation, chemical cultivation includes the application of lime, fertiliser and other agrochemicals. So, if a field has been in grass for many years but has received lime or fertiliser in the last 15, there is no automatic requirement for an EIA to be completed or "permission" gained before its improvement. If on the other hand a field has not been "farmed" in any sense of the word for 15 years or more, then the need for an EIA should be considered.

### **Summary**

Compliance with the soil management rules of Basic Payment Scheme and other stewardship schemes just got a lot tougher, with soil erosion in particular not being tolerated. We would urge growers to seriously consider their management practices post harvest this autumn. We would remind growers that no maize stubble should be left unmanaged in terms of soil and nutrient loss over the autumn and winter months.



# Growers responses to erosion in Maize

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**Agnese Mancini and Alexandra Cooke, Cranfield University**

Maize production continues to raise concerns in the press, not least with respect to its links with soil erosion. However, as a consequence, ways of reducing the impact of maize production on the wider environment has and continues to be investigated. This has led to a growing body of advice targeted at maize growers. A recent survey of members of the Maize Growers Association (MGA), by Cranfield University, has highlighted that 55% of the survey respondents had, at some point, noticed soil erosion occurring on their maize fields.

In 2014, 183,000 ha of maize was grown in England alone, equating to 3% of its arable area. Approximately 17% of this was for Anaerobic Digestion (AD) biogas production, with the remaining 83% cultivated as a forage and grain crop. Due to the high potential for maize as a biogas crop, DEFRA and the NFU are expecting the area of Maize production in the UK to continue to increase.

## Survey Results

Of these respondents, 95% had implemented some form of soil erosion mitigation measure, and the remaining 5% were actively looking at different options.

This survey also highlighted the positive contribution that targeted advice seems to be having. In Catchment Sensitive Farming (CSF) areas, 100% of the respondents had implemented some form of soil erosion mitigation measure.

The survey also revealed that maize growers often implement a combined approach to manage soil erosion. The most popular combinations included cover cropping with changes to the ploughing regime and use of end-of-pipe solutions, such as buffer strips. Cover crop preference was influenced by local climate, with farmers preferring to sow cover crops post maize harvest instead of undersowing them post-emergence. Survey results indicate that ryegrass was the preferred cover crop overall, followed by forage rye, vetch and clover. The least preferred cover crops were linseed, millet, oats and barley, which were considered either to compete with the maize, were not appropriate for the local conditions or didn't have any advantages over the use of a grass.

Post maize harvest, ryegrass and forage rye were favoured due to their value as forage crops, with the additional benefit of soil erosion protection through dissipating the energy associated with raindrops, and disruption of surface runoff. The longer term benefits of these cover crops, such as increasing soil organic matter, improving soil structure and adding nitrogen, were also valued. Clearly maize growers are implementing both short-term fixes to soil erosion and longer term solutions to soil quality.



In the UK conventional maize cultivation, even on gentle slopes, can produce serious erosion issues due to:

- Drip-tip lines from the Maize leaves resulting in concentrated flow paths;
- Post-harvest over wintered maize stubble, leaving bare soil and;
- Late harvest in often wet soil conditions, increasing compaction and runoff risk.
- <80% surface cover even at maturity

Survey respondents, who did not implement end-of-pipe soil erosion control options instead of or in addition to agronomic solutions, did not do so due to concerns about the costs of the sediment control technology. However, they were found to be the most concerned about the off-site impacts of soil erosion, and therefore these respondents are those most likely to implement filter socks as part of their soil erosion management. The preferred fill media for the filter socks were jointly woodchip, and compost with nutrient sorbing bacteria, whilst compost with a seedbank, and silica sand were the joint second preferred fill media. The majority of these respondents were based in the south west where soil erosion risk and associated off-site impacts are high.

### Ongoing research

The effectiveness, at reducing soil erosion, of some of the soil management solutions suggested above and new emerging techniques remains untested. To address this there are ongoing investigations,

including two projects from Cranfield University (Co-funded by Douglas Bomford Trust, The Wye and Usk Foundation, and the EA), looking at soil erosion control techniques in the Lugg Catchment, Herefordshire. The River Lugg Catchment is currently failing its water quality targets due to sediment and phosphorus arising from soil erosion, mainly under Maize cropping. The two Cranfield projects are looking at different components of the erosion issue. The first considers how to prevent erosion in-field, while the second considers how to prevent unavoidable erosion from creating off-site impacts.

### Project 1: Cover crops as erosion control

The purpose of growing a cover crop is to protect the surface of the soil from the erosive energy associated with raindrop impacts, to encourage infiltration and reduce the volume and erosivity of any runoff. How effective a crop is at providing this protection depends on a number of factors including how quickly it grows and covers the soil surface, how disruptive it is to surface water flow and how effective it is at improving the soil structure thus promoting infiltration.





Project 1<sup>1</sup> based in the River Lugg Catchment is investigating how effective different undersown cover cropping regimes are. The combinations being tested are italian ryegrass, italian ryegrass and clover mixture, and italian ryegrass and vetch mixture. The project will monitor and capture runoff and soil loss from field plots until April 2016. Cover crop growth will be monitored as well as maize cover crop response (dry yield). Importantly this project will also consider the impact of these management choices on the soil microbial community and its role in improving soil health thus promoting sustainable soil management.

### Project 2: Filter socks as an end-of-pipe solution

Project 2<sup>2</sup>, currently based in the River Lugg Catchment, is looking into the use of



filter socks as an end-of-pipe solution to mitigate runoff, soil and nutrient losses from maize. Currently the filter socks are filled with woodchip; compost; woodchip plus an industry recognised nutrient sorbing material, Nutriloxx; and compost plus Nutriloxx. These and other fill media will be tested under current (in-field) and extreme rainfall intensities (laboratory based rainfall simulators). The best

performing fill media will then be tested in-field, and a best management practice (BMP) established. The results of the initial survey has shown that maize growers will consider filter socks as an erosion/runoff control measure, providing they are economical and natural fill media could be used effectively.

A free demonstration event regarding the use of filter socks is being held in Lyde, Herefordshire, on 25<sup>th</sup> September. For more details contact [alexandra.cooke@cranfield.ac.uk](mailto:alexandra.cooke@cranfield.ac.uk)

Both projects are utilising options which were found to be favoured by the respondents to the MGA survey and therefore should be options which growers are likely to put into practice. It is hoped that the results from these projects will contribute to BMPs and lead to a reduction in soil erosion associated with UK maize production.

### Final remarks

According to the Cranfield survey, Maize growers recognise soil erosion is an issue, which the majority of respondents were dealing with. However over the 2013/14 winter, 375 million litres of runoff were generated per 10 ha<sup>2</sup> of Maize production, impacting on the rivers water quality. This highlights that the issues surrounding soil erosion are still prevalent and more effort needs to be put into making Maize production more sustainable. CSF areas have had the most targeted erosion management training, however to continue to reduce soil erosion from Maize across the UK, these messages also need to be rigorously tested as well as targeted over a wider area.

<sup>1</sup> Supervised by Dr Mark Pawlett and Dr Lynda Deeks

<sup>2</sup> Supervised by Dr Robert Simmons and Prof. Jane Rickson





## Our friends in the Netherlands

Attendance at a recent Dairy Co/Eblex silage conference near Coventry, at which Dutch Ruminant Researcher, Ronald Zom, from the Wageningen UK Livestock Research Institute spoke to delegates about minimising losses during the silage making process (more of which in a future mailing) brought to my attention the presence of a comprehensive Maize Growing Handbook produced by his colleagues.

The online Maize Handbook is in Dutch, so much use has been made of Google translate to try and dig out the interesting nuggets. Dutch maize growing is well established and over the years the MGA have made and lost contacts in the country, as people move jobs etc. It is pleasing to have re established relations and we will do all we can to maintain them in the coming months and years.

## The Handbook

The Handbook is a considerable volume, covering all aspects growing the crop and utilising the silage produced. Chapters contained include:

- Soil, Seedbed requirements and water availability.
- Manures and nutrient requirements.
- Weed control.
- Pest and disease control.
- Harvesting and storage – an area in which the Dutch continue to excel.
- Feeding maize.
- Costs of maize production.

As previously noted the handbook is only available in Dutch on the web at the following web address. [www.handboeksnijmais.nl](http://www.handboeksnijmais.nl) We have used Google Translate to make sense of it. If you wish to take a look at the handbook we would urge you to, in the first instance, follow this link to a translated version. The translation is far from perfect; however the key messages are very clear to see. <http://bit.ly/1WPz16l>

## Green manures

Of particular interest when reviewing the manual was the harvest guidance where:

- Relatively small chop lengths of 6-8 mm are recommended, to encourage intake and reduced clamp losses.
- The breaking of all grain into at least four parts is encouraged.
- Dry matters of 36% for optimum yield and ensiling are being targeted.
- A detailed and full breakdown of the DM% of the different elements of the plant approaching harvest, are given as are external appearances of the crop at different Dry Matter.

## Green Manures

Also of note was the section on the role of green manures in maize growing. I have attempted to summarise some of the key messages from the handbook in the hope that it provides some interesting reading for members. I have little doubt we will be back to the handbook in future mailings, to catch up with the Dutch way of thinking.

## *Light soils and the need for Organic Matter*

An issue faced in the Netherlands, where the soil is predominantly light, is soil drainage. Farmers face the contradictory requirements of:

- Needing fields to drain well in the spring to help soils warm up and be ready for drilling as early as practical. (wet soils tend to lie wet and warm up more slowly).
- Ensuring sufficient moisture during the warmer drier summer months, so that plant development and potential is not held back due to lack of moisture. Plants can suffer in these drought conditions, as their roots cannot penetrate deep enough to reach water.





**Maize plants taken from different parts of the same field, illustrating the impact of limited soil rooting zone on plant development, both below and above ground.**

### Increased rooting zone.

Applications of organic matter (OM) aid water retention and can help alleviate soil compaction. The handbook states that a low OM soil will allow roots to penetrate 8mm in every 10 cm of soil, compared to loamy soils with higher levels of OM, in which roots can reach 18mm per 10cm. Maize roots have been shown to go as deep as 120cm, but rarely achieve this depth, due to soil conditions. The picture (above) illustrates compaction affecting root development and therefore plant growth.

In order to increase soil OM levels, green manures are becoming increasingly popular in the Netherlands. Green manures provide soil cover over the winter, which will retain soil and nutrients and OM when incorporated in the spring. The table below illustrates the volumes of OM provided from different sources.

**Effective organic matter supply from crop residues, cattle slurry green manures**

Source	OM provided
Maize residues (kg/ha/year)	660
Cattle slurry (kg/ton)	33
Italian ryegrass/Westerwold (kg/ha/year) *	1080

**\*The grass is harvested before incorporation.**

### Reduced soil loss

In the north east of the country, the peat is susceptible to wind erosion, where as in the south and east the sandy soils are more at risk of soil erosion due to rainfall. In both instances the use of green manure crops, usually established soon after maize harvest, significantly reduces the risk of erosion as well as reducing the levels of nitrogen leaching.

### Moisture retention

The manual goes on to recognise the key concern with overwintered cover crops, that being the risk that the cover crops take up valuable moisture and nutrients late in the spring pre maize establishment. To avoid this the Dutch recommendation is to incorporate the green manure at least 3 weeks prior to maize drilling.

On the lighter soils, the additional OM from the green manure crops becomes particularly valuable during the drier summers where crops are often irrigated. High OM soils hold on to more of this valuable moisture than low OM soils.

While little mention of oversowing is contained within the manual, the clarification of the benefits of increasing soil organic matter of maize ground further reassures us that the demonstration sites currently being run by the MGA in association with the Catchment Sensitive Farming project across the south of the UK continues to be worthwhile. The three sites are demonstrating the impact of different oversown cover crops on crop performance and soil/nutrient loss.

### Summary

The manual (produced during 2014) contains a considerable amount of well researched information and detail on what is required to grow and harvest a great crop of maize. Studying it confirms we are still relative new comers to the maize crop and should continue to look outside our own farms, regions, circle of advisors and country to pick up knowledge. The MGA will continue to do this on your behalf and will dig out more from the manual in due course.