



A clear solution for farmers

CATCHMENT SENSITIVE FARMING



Catchment Sensitive Farming (CSF) in partnership with the Maize Growers Association (MGA)

Case study 4: Maize drilling date based on soil temperature, soil conditions and weather forecast

What is the impact of drilling date on crop harvest date? - The MGA with the support of Catchment Sensitive Farming (CSF) established a demonstration site at Metcombe, Tipton St John in East Devon in 2010. The performance and maturity of maize drilled one month apart was compared.



Fig 1 Thermometer measuring soil temperature at sowing depth

Why? – Later drilling date leads to later harvest. The later the harvest date of maize the greater likelihood that soils will be wet and structurally less able to support harvest equipment without being squashed and compacted. Compacted fields, where water, rather than soaking in, runs across the surface can lead to soil wash and or erosion. A relatively late harvest makes it more difficult to establish a following or break crop and as a consequence nutrient leaching and soil loss may be higher as retention via growing crop roots is compromised. Potential yield of the following

crop is reduced by late harvest and soil compaction.

Why temperature? Maize requires a set amount of solar energy in order to develop from a seed to mature plant. This solar energy is typically measured in Ontario Heat Units (OHU's) which start to accumulate once daytime soil temperatures rise above 10°C. Higher yielding varieties require more heat units and vice versa. The sooner a maize plant starts accumulating OHUs the sooner the crop will reach maturity and be fit for harvest. The sooner the crop is harvested the lower the risk of harvested related soil compaction and earlier a post maize crop can be established.

When to drill? The decision to sow maize should be based on a combination of soil temperature, soil conditions and the weather forecast.

Soil conditions Maize root development struggles to deal with poorly structured (compacted soils) and as a consequence nutrient and moisture uptake are restricted. Spring field work and sowing should be delayed until soils can take machinery without its structure being compromised.

Soil temperature: Maize seed germinate when soil temperatures are consistently at or above 8-10°C. Crop growth rates improve with rising soil temperatures.

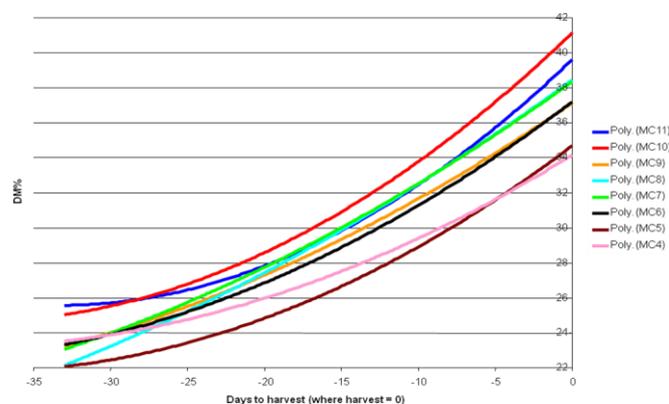
Weather forecast: the short/medium term weather forecast should be considered. Cold and or wet weather predictions will cool soil and slow down germination.

What was done? – Joint CSF/MGA demonstration trials have been located at several locations to illustrate the impact of drilling date (assuming soil conditions and weather are favourable) on eventual harvest date. One particular demonstration, near Tipton St John in Devon, saw 5 different varieties drilled one month apart with the first plots being established on the 10th of April and the second being drilled on the 10th of May. Crops from both treatments were cut on the same day in the autumn when the April sown crops reached target maturity. Crop yield, maturity (Dry Matter %), dry yield, starch % and starch yield data was recorded.

Crop DM%, combined with Starch % are seen as indicators of crop maturity and it is generally recognised that crops 'dry down' at a rate in

the region of 2% per week as maize approaches the optimum 32-34% DM%. (Fig 2)

Figure 2 -DM% increase over time leading up to harvest (5 sites, 2006)



Using these guides it is realistic to assume that the May drilled maize would have been fit to harvest three weeks later than that sown in April.

The results from the demonstration are shown in the table below.

Table 1 - Impact on the yield, maturity and quality of maize drilled one month apart at Metacombe, East Devon during 2010 on CSF/MGA Demonstration site.

Drilling Date	Fresh wt (t/ha)	DM %	Dry wt (t/ha)	Starch %	Starch yield (t/ha)
10 th April 2010	51.65	31.22	16.05	29.24	4.69
10 th May 2010	53.6	25.1	13.3	23.6	3.1

What next? – Maize growers should make use of soil thermometers from early April onwards to assess soil temperature at drilling depth. Temperatures should be monitored in the morning (9.00 am), (the coldest time of the day). From mid-April onwards, once soil temperatures hit 8°C and soil conditions are suitable to develop a good maize seedbed,

sowing of crops should be considered when the weather forecast is favourable. If cold wet weather is forecast hold off with drilling to avoid maize sitting in the soil doing nothing.

Several web sites, including www.kws-uk.com offer local soil temperature guides which also prove useful.