



A clear solution for farmers

CATCHMENT SENSITIVE FARMING



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

Case Study 5: Optimum seed bed cultivations to encourage rapid establishment and subsequent growth

The Maize Growers Association (MGA) with support from the Catchment Sensitive Farming (CSF) project have set up various field demonstrations to compare options for establishing suitable maize seedbeds.

Where?

Demonstration sites were set up in the Tamar, Axe and Otter catchments in Devon, Fal in Cornwall, the Wye in Herefordshire plus the Win catchment in Dorset. The demo site in the Win catchment was supported by CSF Officer Charlotte Woodford. On this site, the conventional farm system (plough, power harrow, precision drill, roll) was compared with various minimum tillage and direct drilling options for seedbed establishment.

Why?

While maize can be grown successfully on most soil types its potential rooting zone of over 1.5m and vulnerability to compacted soil means that the establishment of an unrestricted rooting zone is vital for the crops success. A good seedbed will enable rapid crop development and optimum nutrient and moisture uptake leading to high crop yields. Achieving high crop yields per unit area of land will enable farmers to reach their target tonnage using the minimum area of ground possible and in so do reduce their requirement to use more marginal ground, in terms of the risk of nutrient and soil loss. Maize sown into optimum seedbeds will germinate and establish quickly providing valuable ground cover to protect soil and reduce spring nutrient leaching.

The maize industry continues to work at achieving the above target seedbed at as a low a cost as possible (man, machine and fuel costs) and work continues to examine the potential of no plough options.

What we did

During the 2009 and 2010 growing season, conventional maize seedbed establishment, where the field was ploughed and power harrowed pre maize drilling using a precision drill and rolled post drilling, was compared with low cost and low soil disturbance alternatives.

Table 1 Seedbed establishment programs demonstrated in the Win catchment during 2009 and 2010 growing seasons.

Plough, power harrow, precision drill, roll (conventional)

Plough Vaderstad drilled (not precision), roll

Plough, Cultipress, precision drill, roll

Subsoil, Xpress, precision drill, roll

Subsoil, Xpress, Vaderstad, roll

Subsoil, Vaderstad drill



Fig 1:
Subsoiler similar to that used at the Win site



Fig 2: (left) Cultipress and Fig 3: Xpress cultivator machines similar to those used at the Win site

Results

Table 2 shows the non-replicated results collected from the demonstration site. The precision drilled crops yielded better (fresh yield) than those drilled with the non-precision Vaderstad drill. The increased yield could be the result the more equal drilling depth, seed spacing within the row and fixed row width (75cm) achieved by the precision drill. Yields were also good where the rooting zone was 'opened up' via plough or subsoiler when drilled with the precision drill suggesting that in this demonstration the use of the precision drill rather than ploughing was the key to success. The lower (fresh) yielding crops reached higher DM% at harvest, indicating perhaps that the cobs were able to receive greater volumes of sunlight to speed up maturity.

What was 'the problem' in this catchment?

The river Win was identified as having relatively high levels of cultivated soil sediment within the river channel. The maize establishment demo site focusing on optimising maize yields should in theory reduce the need to crop marginal land (based on risk of soil loss) and as a consequence reduce the loss of sediment to the river. Evaluation of sediment levels and sources in the Win after 10 years of CSF work indicates significant overall reductions in sediment levels and a 76% reduction in cultivated top soils sediment in the river.

Table 2: Results from demonstration in the Win catchment, Dorset (2008/09)

	Fresh wt t/ha	% DM	DM yield t/ha	Starch %	Starch yield t/ha
Plough, Power harrow, precision drill, roll (conventional)	51.8	27.1	14	19.9	2.8
Plough Vaderstad drilled (not precision), roll	40.4	34.5	13.9	25.5	3.5
Plough, Cultipress, precision drill, roll	53.9	28.1	15.1	25.7	3.9
Subsoil, Xpress, precision drill, roll	50.3	29.7	14.9	29.3	4.4
Subsoil, Xpress, Vaderstad, roll	35	34.5	12	25.4	3.1
Subsoil, Vaderstad drill	38.8	32.6	12.6	26.9	3.4

Looking ahead

This demonstration site results concur with the conclusions gained elsewhere from a significant number of replicated scientific trials indicating that to achieve optimum yield maize should be drilled accurately into an unrestricted rooting zone. It is clearly possible achieve this unrestricted rooting zone via various means as demonstrated at the Win site where good yields were achieved via use of the plough or subsoiler. Growers should set out to remove and not create restricted rooting zones when creating seedbeds.

The vast majority of maize continues to be drilled via specialist drills to achieve the accuracy of spacing needed to achieve optimum yields. The industry continues to explore the possibility of dual use of non-precision drills in order to achieve similar performance levels to precision drilled crops. An increasing, but still relatively small, number of growers are now claiming to be achieving comparable performance.