Under-sowing Maize

Maize is a very useful crop. It is used both for livestock feed and is a key energy source for anaerobic digestion. However, maize has come under intense scrutiny regarding its effect on the environment, namely soil losses through erosion and nutrient losses that both find their way into water particularly from soils left bare over the winter period after the harvest of the maize crop.

To this end, the Wessex Water Catchment Delivery Team as part of their catchment management programme have undertaken a number of on 'farm tramline' trials over a five year period in the Poole Harbour catchment, in order to find more sustainable practices for the growing of maize. One such trial was under sowing maize crops with Italian Rye Grass (IRG) using various establishment techniques.

With a purpose built precision drill

Sown using a modified mounted loader

Mixed with slurry and applied via a dribble bar

All of the under sowing methods demonstrated good potential and provided positive results. Observations from the trials suggest that for the best results;

For the best establishment of the under sown crop;

- The choice of any sprays used for the maize crop and the date of its application can have a considerable affect upon establishment of the under sown crop. (seek advice from an agronomist or Simon Draper at the Maize Growers Association).
- Under sowing of the maize crop should take place at the 6-8 leaf stage (6-10 weeks after the maize has been established).
- For Italian Rye grass use a seed rate of 12-15 kg/ha (10-13 lbs/acre) if seed is placed between the maize, if broadcasting use a seed rate of 30 kg/ha (26 lbs/acre).
- Best establishment rates were seen where the soil was lightly disturbed with a tine (removing weeds) and a consolidation wheel is used to give good soil to seed contact of the under sown seed.

- When grass seed is mixed with slurry; best results were obtained when using a slurry at a rate of 1500l/ha. Poor results were found when using pig slurry at high rates.
- Maize yields increased when applying slurry to the crop at this stage of growth.

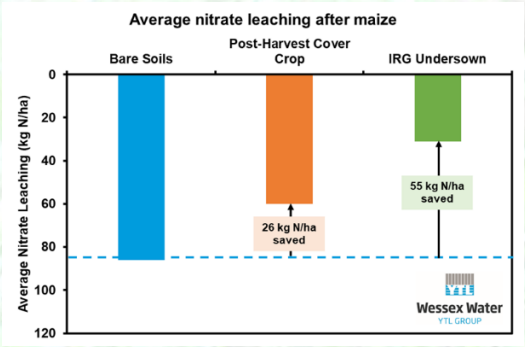
At harvest;

- Under sowing maize had did not have a substantial effect on the Yield, ME or Starch content of the maize crop.
- Helped the travel of machinery during harvest.

Post maize harvest;

- A good under sown maize crop ensured that ground cover was established prior to the start of the drainage and leaching period and the first winter storms:
  - Reducing the need for field operations at a time of year when weather and ground conditions may lead to a damaged soil structure.
  - Preventing the likelihood of soil erosion.
  - Ensuring compliance with legislation.

- A maize crop under sown with IRG substantially reduced N leaching compared to leaving soils bare and sowing a cover crop post maize harvest.
  - Bare soils following maize harvest has an average N leaching of 86 Kg N/ha, one of the highest N leaching of all arable crops.
  - Sowing a cover crop post maize harvest reduced the average N leaching to 60 kg N/ha (26 Kg N/ha savings).
  - Under sowing maize with a cover crop of IRG reduced the average N leaching to 31 kg N/ha (55 Kg N/ha savings).



In the following spring;

- The under sown IRG crop provided considerably more biomass (6t fwt/ha - 2t DM/ha) compared to the IRG crop sown post maize harvest (4t fwt/ha -1.3t DM/ha).

- The under sown IRG contained on average 30kg N, 5kg P & 47kg K per ha. This can be utilised as forage for grazing or a silage cut, or returned to the soils improving soil organic matter, soil health and reducing fertiliser requirements for the following crop.

Costs.

- Contractor costs for under sowing maize range from £55-£85/ha
- Seed costs for under sowing with IRG of £30-40ha, are cheaper than seed costs for post-harvest sowing with IRG at a rate of 30-40kg/ha and a cost of £75-100/ha .

Benefits.

- ✓ Helps the travel of machinery during maize harvest reducing compaction and damage to soils.
- ✓ Reduces the need for field operations in late autumn.
- ✓ Prevents the likelihood of soil erosion and the associated costs.
- ✓ Reduces Nitrate leaching.
- ✓ Stores nutrients in the under sown crop that can provide forage for grazing or a later silage cut, or
- ✓ Returned to the soil increasing soil organic matter and helping soil structure whilst reducing fertiliser inputs and costs to the following crop.
- ✓ Ensures compliance with legislation through sustainable maize growing.

Funding for under sowing maize is available in catchments where Wessex Water Catchment Advisers work and via Wessex Water's cover crop auction for farmers in the Poole Harbour catchment.