

Benefits of a catch crop



What is the background?

The UK agricultural industry is at the precipice of huge change. Sustainable farming that balances gross margin with environmental protection is key for farms to be resilient and survive in the next 25 years. Soil health is key to sustainable farming, and sowing catch or cover crops is one way to improve soil health.

Project objective:

An Innovative Farmers Field Lab was run in conjunction with Alex Jasinski of Jasinski Farms, Iain Gould, Researcher & Soil Scientist at the University of Lincoln and Rebecca Carter, Catchment Advisor at Anglian Water.

The aim of the trial was to:

- Assess the benefits of sowing a catch crop
- See if broadcasting vs drilling the catch crop had any difference on soil health and crop biomass

Method

The trial comprised of 3 x 36m strips across a field with each strip representing a different catch crop establishment treatment: (1) Broadcast catch crop; (2) Drilled catch crop; (3) Control (no catch crop). Data collected included soil health metrics and N status between broadcast catch crop plot, drilled catch crop plot, Control (no catch crop). A nearby cover crop field with the same soil type was also monitored and used as a comparison to the catch

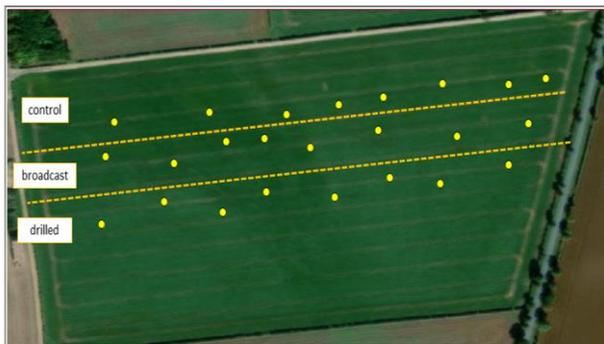


Figure 1- Field set up showing Control (no catch crop), broadcast and drilled catch crop locations. Yellow dots indicate sample points where some measures occurred (e.g. tea bags, soil respiration)

Catch crop establishment

The broadcast catch crop was broadcast into a standing vining pea crop on 29 July 2020 and the drilled catch crop treatment was drilled on 20 August 2020. The catch crop was sprayed off and drilled with winter wheat on by the end of September 2020.

The catch crop mix chosen was a 4 way mix of phacelia, linseed, buckwheat and oil radish.

There was a difference in the ground cover and biomass provided by the broadcast and drilled catch crop mix, with the broadcast catch crop showing higher ground cover (Figure 2).



Figure 2- Image showing the drilled catch crop cover (left) and broadcast catch crop ground cover (right)

Soil Health impacts:

Soil health can be assessed via looking at biological soil health, chemical soil health and physical soil health. Soil physical assessment via VESS scoring did not show any significant differences in the VESS scores between treatments. Soil health as assessed by VESS stayed consistently good, scoring either a 1 or 2 in the VESS assessment.

Soil biological health as assessed via earthworm numbers also did not vary significantly between treatments and were generally low (less than 7 per pit). This suggests, there is scope to improve the number of earthworms in this field. These findings of low earthworm numbers were mirrored by project results from Anglian Water in autumn 2018 where earthworm counts were carried out on 180 ha in Lincolnshire. The results showed just 46% of fields passed (excellent distribution & an adult earthworm from each ecological group). The lowest number of earthworms per pit in the 2018 Lincolnshire study was 1 and the highest was 12 in a field that had a history of cover crop use.

It must be noted that this trial ran over just one year, so it could be that it was too soon to see any significant soil health impacts. Alex agrees, saying *'I believe longer term that catch crops will make a noticeable difference to the soils on the farm but we could be looking at more like 10years, I basically want to get to a point where the soil doesn't have anything growing on it for any longer than 2 weeks in the whole year'*.



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Biological impacts:

Unexpectedly, at the end of the trial, the broadcast and drilled catch crop plots had much lower rates of soil respiration and lower levels of microbial biomass than the control. This is surprising, given that in the baseline the two areas were yielding much more similar results. Furthermore, one of the original hypothesis of the work was that introducing catch crops may stimulate or encourage more biological activity in a soil.

Soil Mineral N Results

Laboratory analysis for Nitrate and Ammonium N showed similar levels in the topsoil (0-30cm) across the broadcast catch crop, drilled catch crop, control and also the nearby cover crop field. However, when the deeper subsoil (30-60cm) was analysed, it revealed higher N levels, both Nitrate and Ammonium, in the subsoils of the broadcast catch crop in comparison to the other treatments (Figure 3) In addition, broadcast establishment producing more catch crop biomass than drilling a catch crop, and thus there was more plant N in the broadcast system (Fig 4). As such, increased plant N (organic N) during catch crop growth period may manifest later in the calendar year as soil N once roots have grown and the crop is incorporated into the soil.

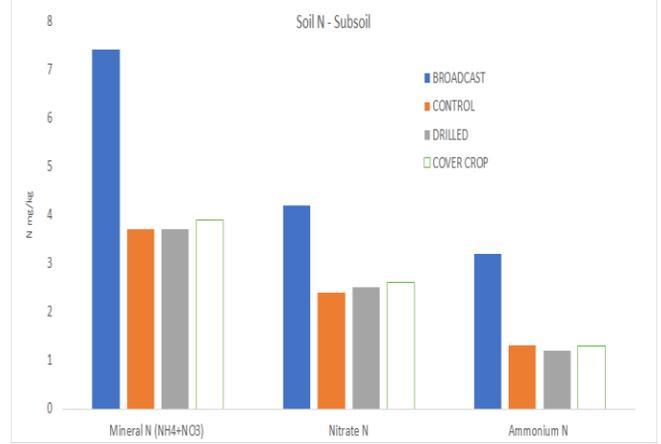


Figure 3: Soil N results for topsoil and subsoil under broadcast catch crop, drilled catch crop, control (no catch crop), and the nearby cover crop field as comparison

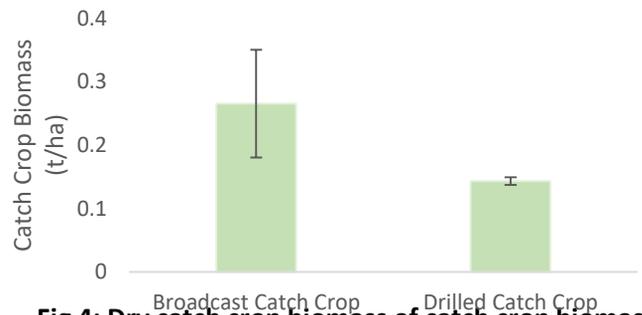


Fig 4: Dry catch crop biomass of catch crop biomass in the broadcast and drilled catch crops.

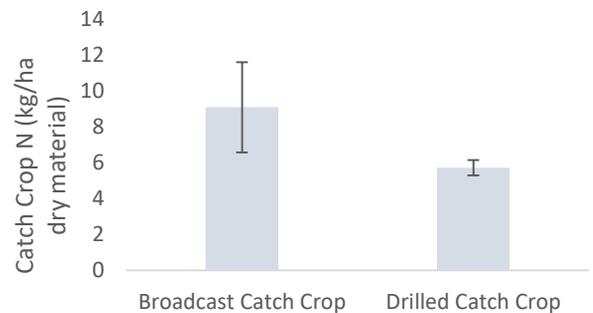


Fig 5: Crop N of the catch crop biomass in the broadcast and drilled catch crops.

Farmer Comments

To Alex Jasinski, the host farmer, catch crops will form a useful part of his rotation going forward: *'I will be oversowing them in again as I feel the fact they could be in much earlier helps hugely to get a decent cover growing before desiccation at drilling time. Obviously the over sowing is hugely dependent upon weather really, if it doesn't rain it simply won't grow which is another reason to keep the mixes as cheap as possible but still choose species carefully to get the best from them.'*

In terms of catch crop mix species, his comments are: *'I may play about a little more with seed mixes, I really like the buckwheat element to the mix so may push that up to a higher rate'*.

In terms of the benefits of catch crops Alex sees that *'the cover they provide is very useful when it comes to direct drilling with a disc drill as the soil just seems to have more "life" in it and the drill generally seems to do a better job'*.

Seed choice for the catch crop is important; Alex says: *'I feel catch crops need to stay fairly cheap on the seed mix in relation to cover crops as the cover crop certainly shows better results on structure etc where as catch crops only have a short window to do any good'*.

Key takeaway findings

- Drilling a catch crop earlier into a standing cash crop has benefits in terms of increased crop biomass and Soil Mineral N.
- Soil health indicators did not vary between treatments-highlighting the fact that any measures to improve soil health need to be done for more than one season.

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