the species recovery trust

2022 Project Update

# Archaeophytes project

## Darnel and Upright Goosefoot

This project is part funded by Natural England

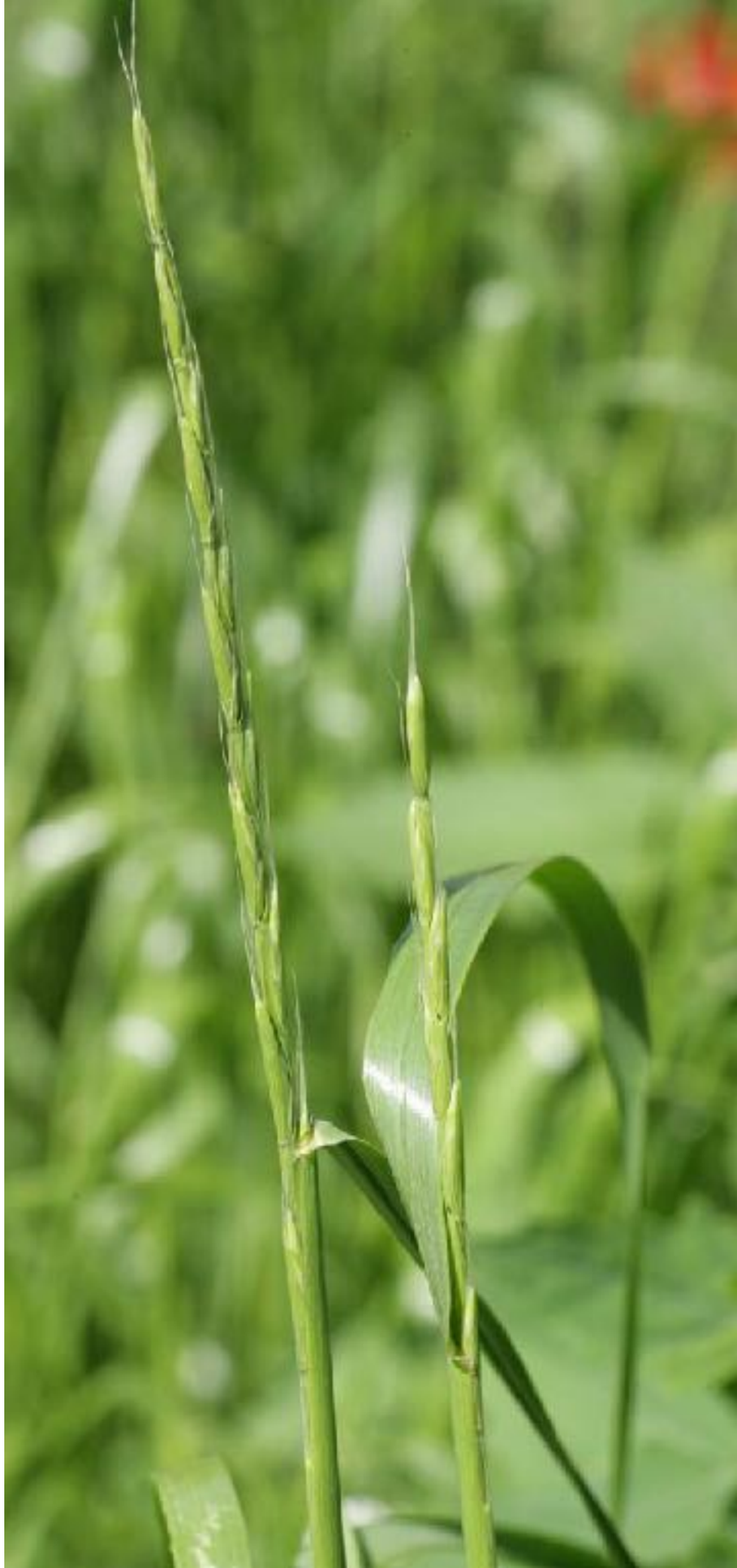
# Summary

Darnel trials were undertaken at a number of sites. Early conclusions suggest it cannot regenerate without human intervention

Upright Goosefoot remains elusive both *in* and *ex situ*, with continuing difficulties cultivating plants, and an unpredictable pattern of emergence at wild sites

Data from 2022 experiments confirmed Darnel does not cope well with drought conditions, nor with high levels of competition from other species; implying it is more likely to succeed on light, relatively nutrient-poor soils

Work continues to establish a self-regenerating population of Darnel in an crop environment



# Project Overview

This project aims to re-introduce Darnel (Lolium temulentum) and Upright Goosefoot (Oxybasis urbicum) back to a range of sites across England. This project so far has obtained seed for both species and bulked it up to viable quantities in the Millennium Seed Bank, researched the growth of plants in different mediums and established populations in nine field sites and three test beds (Kew, Salisbury and Send, Surrey).

This project forms part of the Government's Biodiversity 2020 strategy which contains the following targets:

**Darnel**

- Identify suitable source material for re-introduction/translocation and maintain ex-situ material as seed source for an introduction programme.

**Upright Goosefoot**

- At key sites ensure appropriate management is in place (e.g. disturbance regimes, times of disturbance etc.).
- Research the availability of potential new nutrient-rich disturbed habitats (e.g. outdoor pig and poultry farms) and measures to establish populations, if considered necessary.
- Surveillance programme: monitor extant site and translocation/re-introduction sites. locations

# Upright Goosefoot - *in situ*

## Henley; Little Duxmore; Porlock

Due to uncertainty over funding of the project, these sites, (where casual populations had been discovered in 2021), were not re-surveyed in 2022. Liaison later in the year at Henley (North Dorset) revealed that the dungheap that had supported the large populations had been used up and the land returned to arable crops. A late season survey at Little Duxmore once again failed to find any plants where they had been recorded in 2020.

# Trial Sites

Butser Ancient Farm

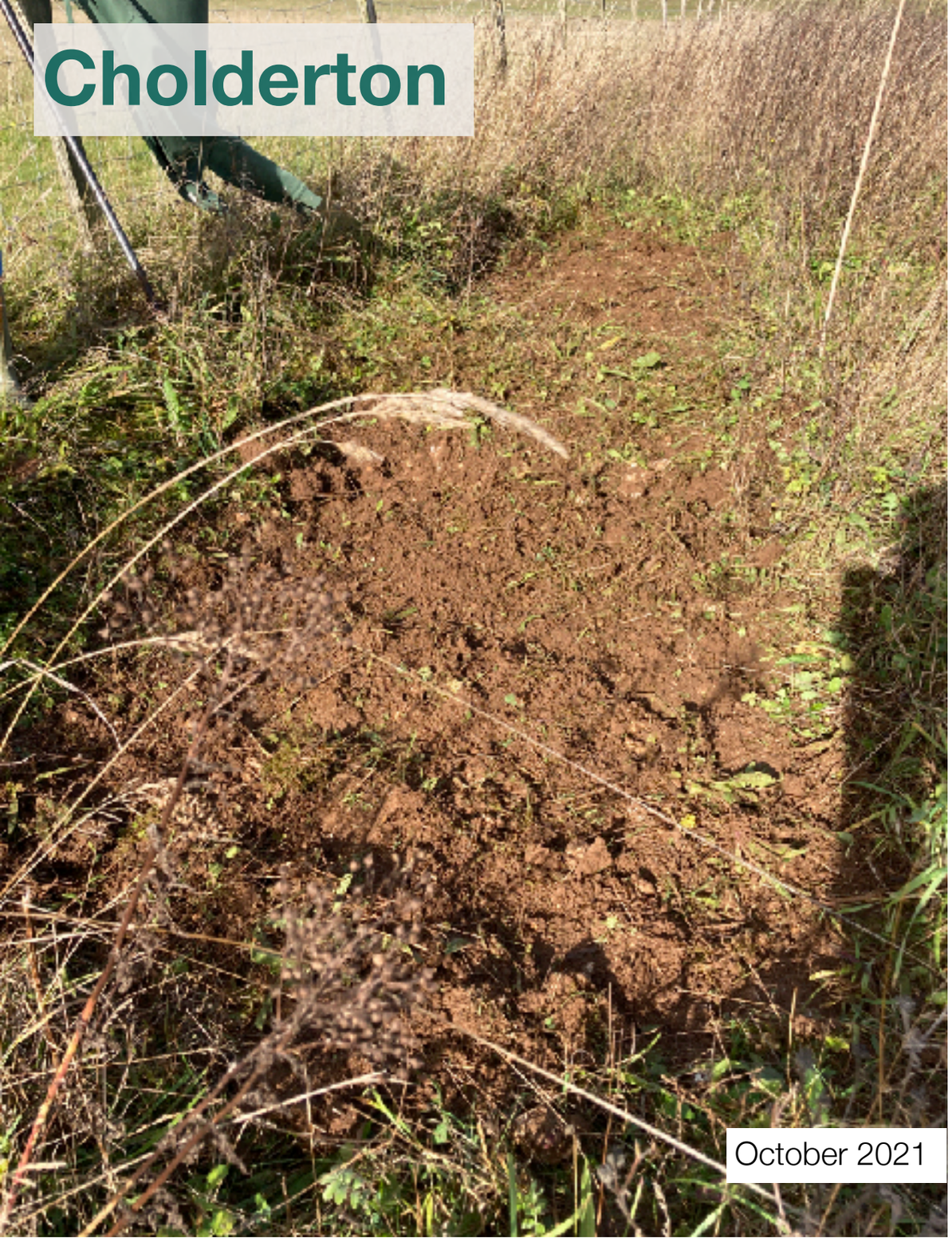
# Butser Ancient Farm

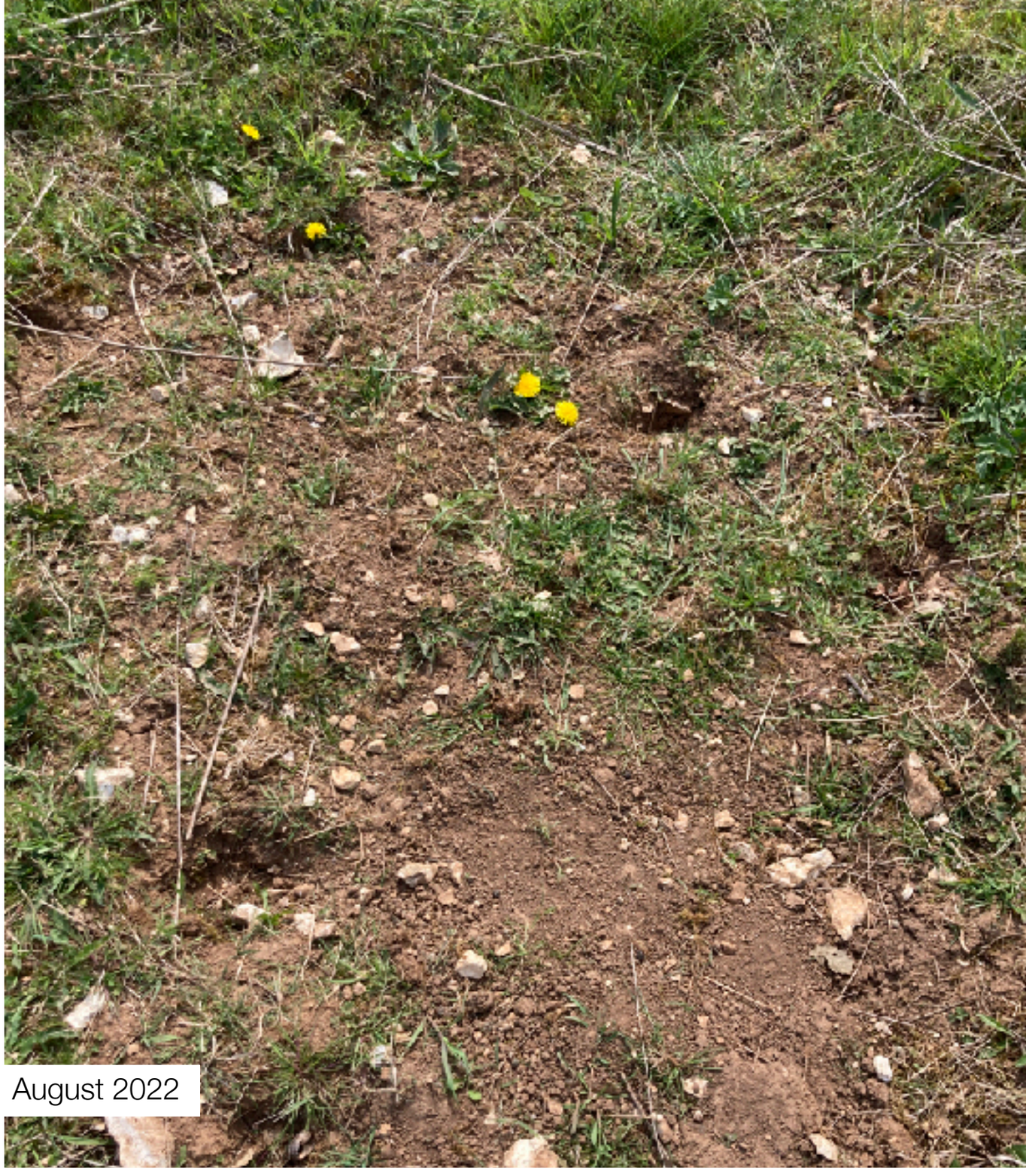
In 2021, the trial site suffered from repeated raids from the resident herd of Old English goats (ironically an endangered species in themselves). While this taught us that Darnel and Goosefoot are both palatable and seem to cause no ill-effects in grazing animals (although defining whether these goats were on an Ergot high would be hard), it was a frustration to the conservation programme.

In 2022 the trial plot was moved to a secure location by the Roman villa, which has goat-proof fencing. Darnel seeds were sown in amongst Emmer wheat, in a repeated attempt to observe them behaving as a natural crop contaminant.

Unfortunately the nutrient levels and weed burden in the soil turned out to both be dramatically high, and by June the plot was dominated by an impenetrably dense sward of Wild Oats, with little Emmer to be seen. Repeated surveys failed to find any Darnel plants. As with most years during the Butser trials there is always something to be learnt from each ‘failure’, and in this case it highlighted the relatively low competitive vigour of Darnel, and its inability to grow in a densely swarded crop.

# Cholderton




At Cholderton we hoped to re-create the natural regeneration that had occurred (albeit on a very small scale) in 2021. No seeds were added to the plot, and the site was dug over by hand in October. Monitoring in April revealed several young plants which we were fairly sure were Darnel (they are very hard to tell apart from *Lolium perenne* when vegetative).

Unfortunately as the year went on the site because drier and drier, and it appeared that all these young plants suffered from mortality related to the heatwave. By August the bare soil on the plot had attracted the attention of the local population of rabbits, who had dug scrapes over most of the soil, and a later visit, when the rains returned in late September, failed to find any more living Darnel plants.

# College Lake

**Darnel**

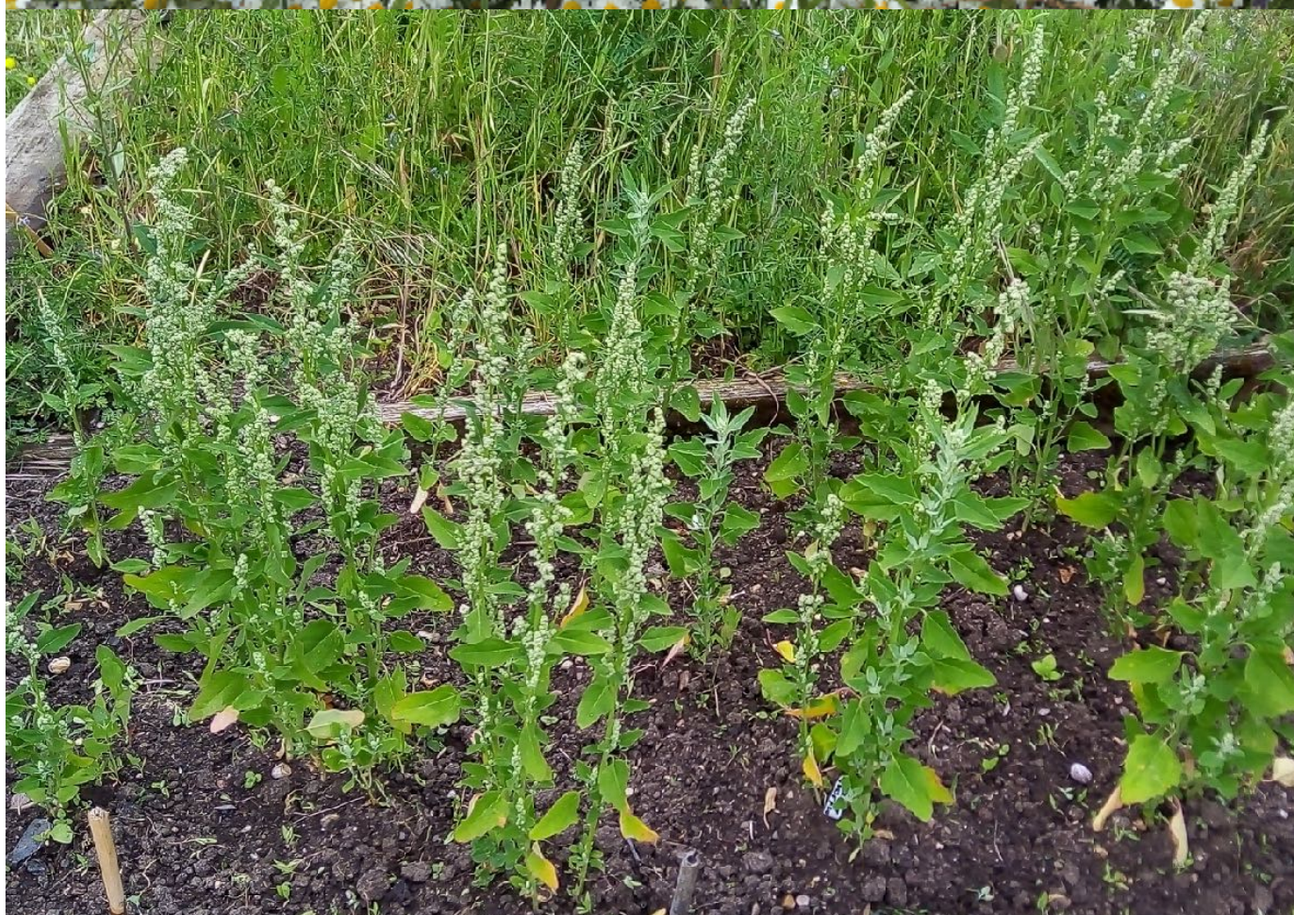
There was mixed results for Darnel at College Lake in 2022. The autumn 2021 sowings did mostly very well, the seed survived the winter and by July 2022 had flowered and produced seed.  In October, some of the seed in the cornfield was harvested (to ensure seed was available for future sowings), and the rest was cut and left for 6 weeks. It didn't appear that the plants readily gave up their seeds. The field was then ploughed and harrowed in November, and we are awaiting germination if any. No regeneration is yet to be seen from these trials.

In autumn 2022, two plots dedicated to Darnel were created and an autumn sowing resulted in two very vigorous crops. Unfortunately there was quite severe frost damage, and we are yet to understand if they have survived. If they fail, a spring sowing will be undertaken, and once seed has been produced, one of the plots will be left to die back, and the other will be cut and left on the soil. This will attempt to observe regeneration with minimal human interaction.

**Upright Goosefoot**

Upright goosefoot was sown in the cornfield and greenhouse in autumn 2021, however all seedlings died from frost damage.

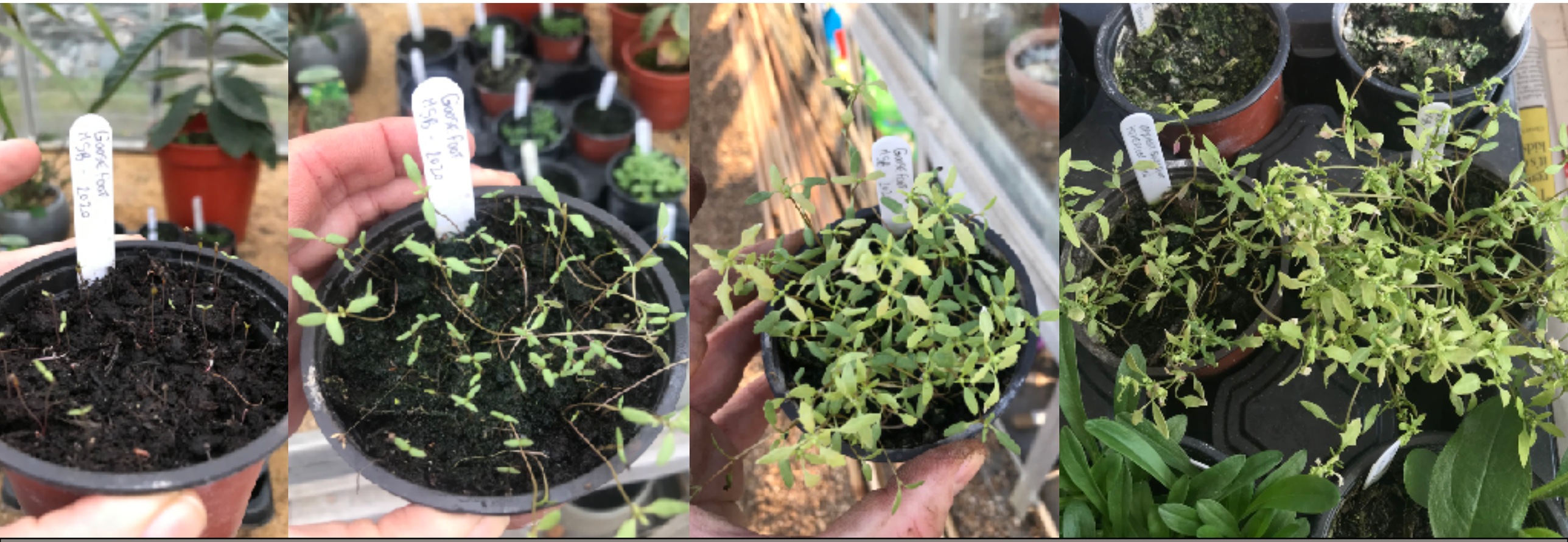
At College Lake, this species tends to germinate very late on, usually late April to early May. This tends to be the case for both autumn and spring sown plants.



# Surrey - Upright Goosefoot

Seed was sown in Autumn 2021 to test how Upright Goosefoot survives over winter. Seed collected from 2016 and 2020 was planted in late October 2021, and germination was noted in December. Both 2016 and 2020 seed germinated in roughly the same frequency and the plants went on to grow well through the winter and spring. By April, flowers had started to be produced, and a few of the plants were potted on, however these didn't survive. As tested previously, moving the plants through repotting has always resulted in failure.

As with 2021, plants regenerated in the propagator on sand, and went on to produce seed. These plants were left in situ, so we can test if these go on to self generate again in 2022. No autumn germination from these plants has occurred on the sand substrate.



Photos: Upright Goosefoot seedlings from Dec 2021, Feb 2021, March & April. By April, the plants has started to produce flowers.

# Surrey - Darnel

In autumn 2021, a dedicated plot was created for Darnel. An autumn sowing was undertaken using seed collected in 2017, 2019 and 2021. All germinated, but unfortunately it was entirely eaten by mice (clearly palatable to many species!).

In spring 2022, Darnel seed collected in 2021 was again sown and it successfully germinated. With use of sturdy mesh fencing, and a lot of watering, the Darnel went on to flower in July, and was then left to its own devices until it was cut, thrashed and removed in September. The soil was ploughed, and a new generation then germinated fairly quickly in October. This unfortunately failed in the frosts later in the year.

In the spring of 2023, this plot will be sown again with Darnel and left completely to its own devices to see if regeneration with no human intervention is possible.

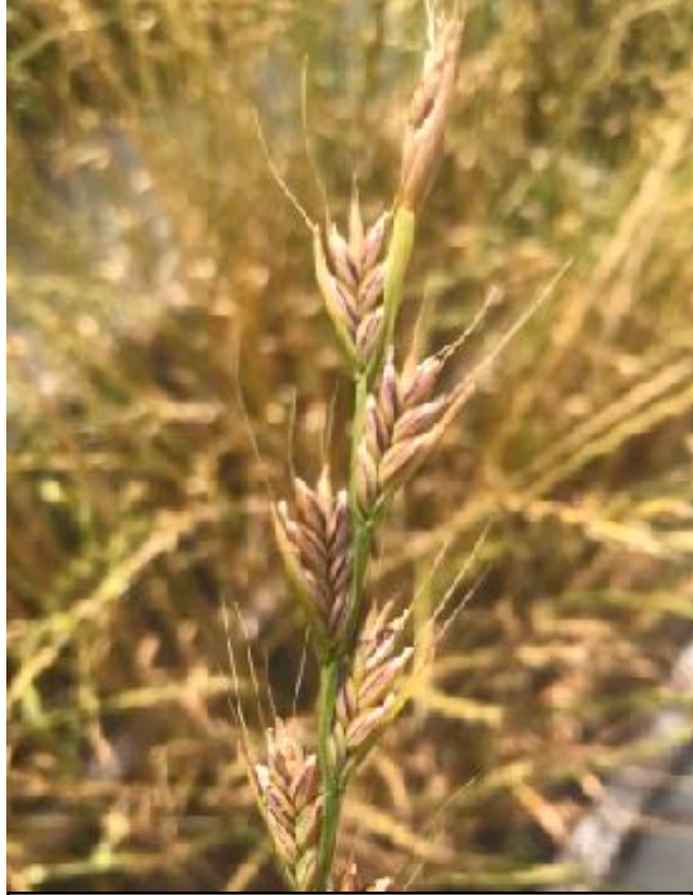
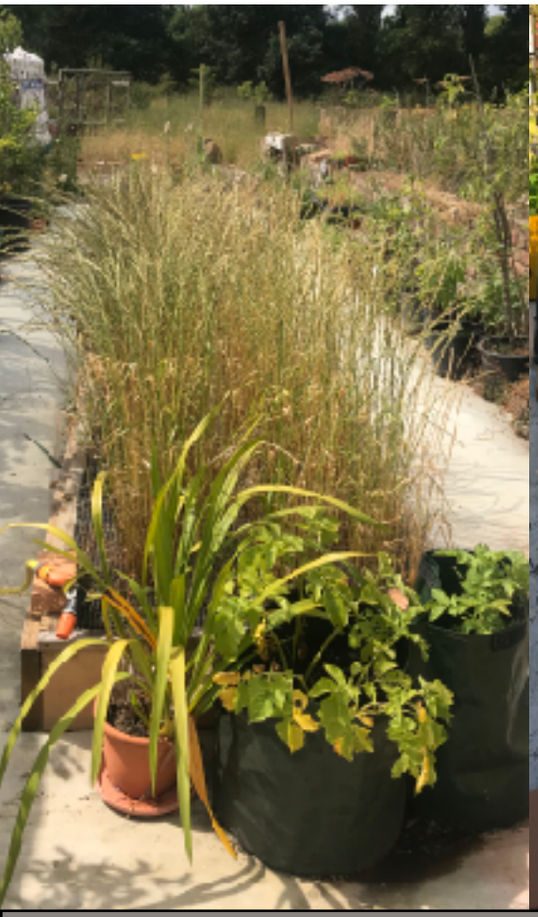
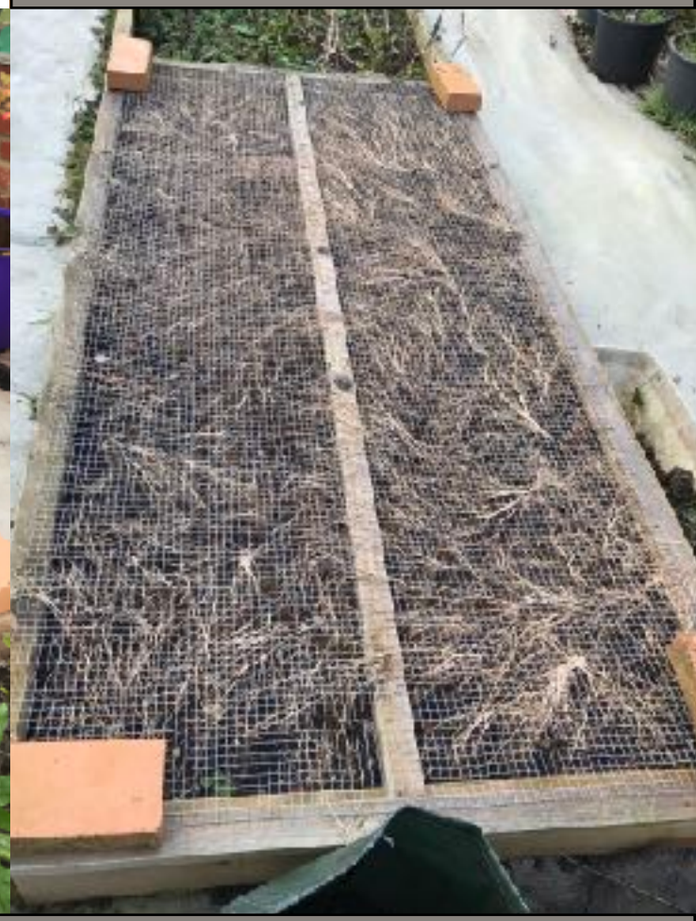


Photo: mature, ripe seed heads





Photos (from left to right): Darnel crop in July 2022, harvested crop in Sep 2022, regeneration from seed dropped in Oct 2022, darnel succumbed to frost in Dec 2022.

# Project Summary

Darnel and Upright Goosefoot remain incredibly challenging species to study.

Further work should be carried out to look at the occurrence of Upright Goosefoot in the wild, with a possible view of updating its extinct status.

The Darnel trials have again been variable in their results, with an equally amount of progress and set-backs.

Our conclusions are:

- It is partially susceptible to frost;
- Seed is viable for at least 5 years;
- It is intolerant of drought conditions; and
- It is a poor competitor, so more likely to survive in lighter, nutrient-poor soils (as was observed on Inish Meain where the original seeds were collected)

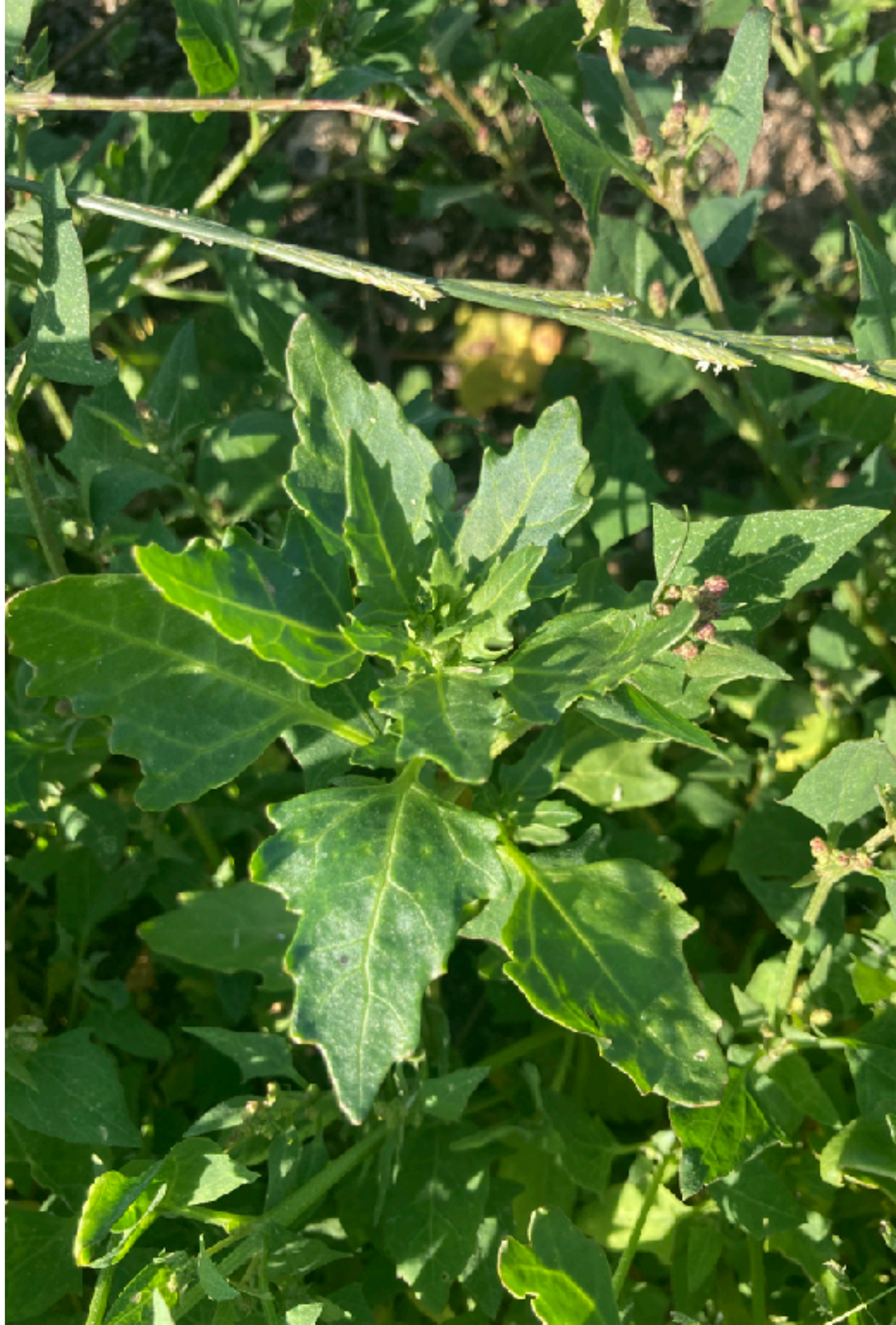
# Looking forward

## Next steps

Darnel trials to continue in Surrey and College Lake, with the aim of achieving natural regeneration within crops

Further investigation into the fate of wild Darnel on the continent

Liaison with the Millenium Seedbank to ensure they have adequate levels of both seeds, and fund bulking up work if not

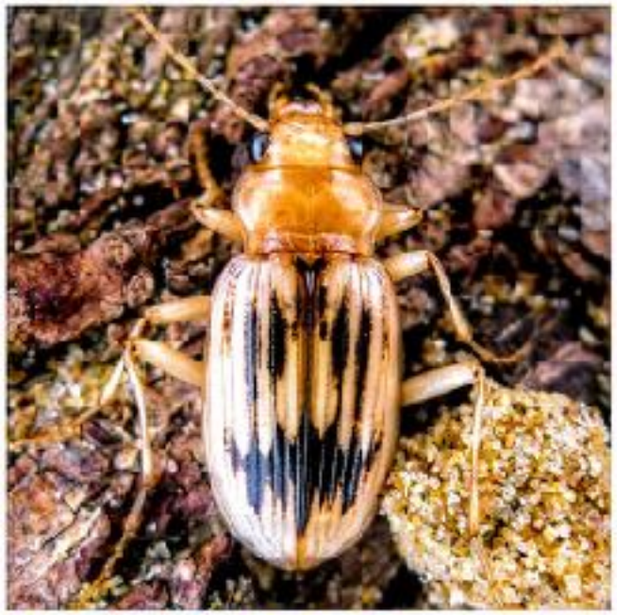
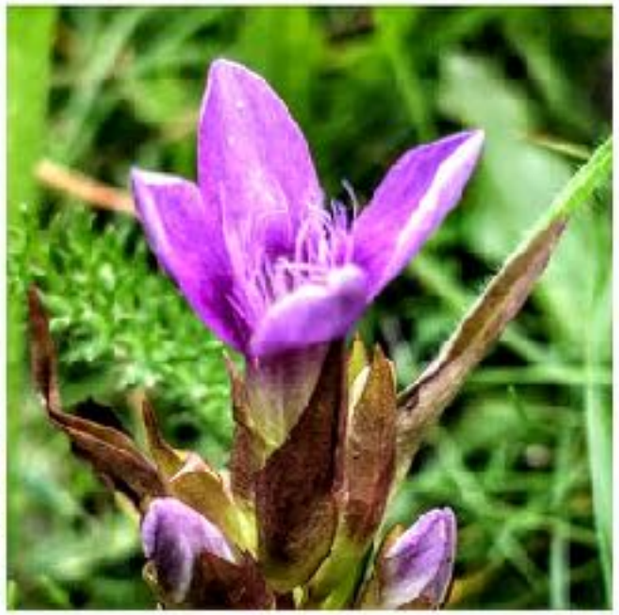
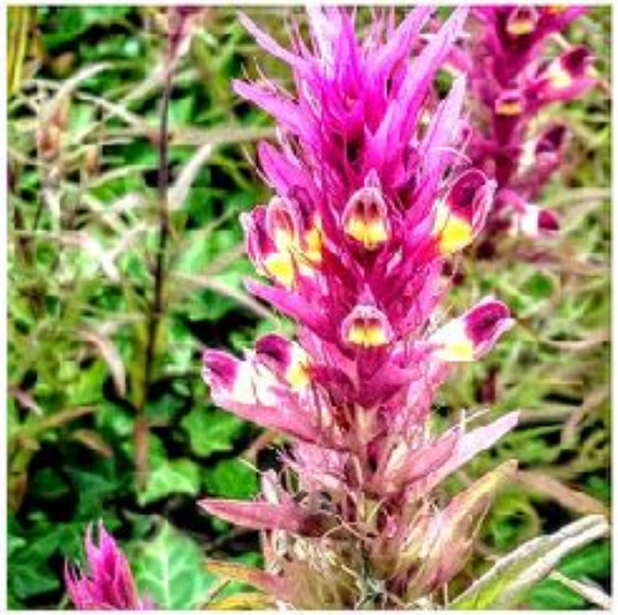


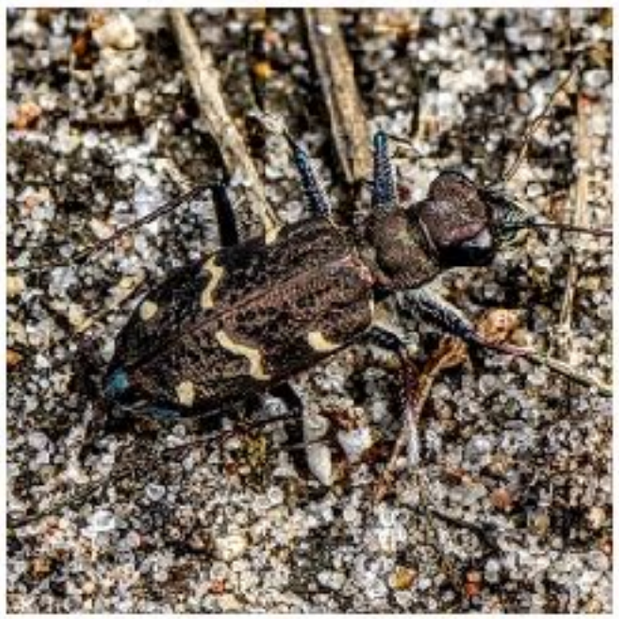
The Species Recovery Trust is a charity set up to tackle the loss of some of the rarest species in the UK.

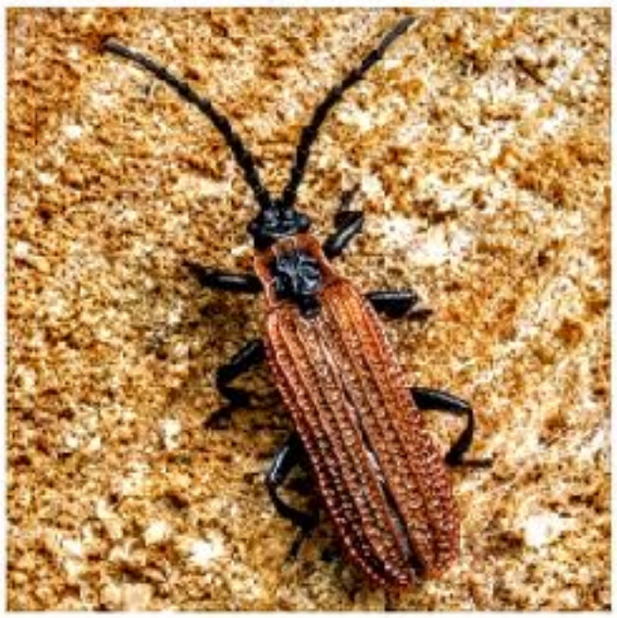
There are over nine hundred native species in the UK that are classed as under threat, with several hundreds more currently widespread but known to be in significant decline. The countryside is now bereft of many species that were a familiar sight a mere generation ago.

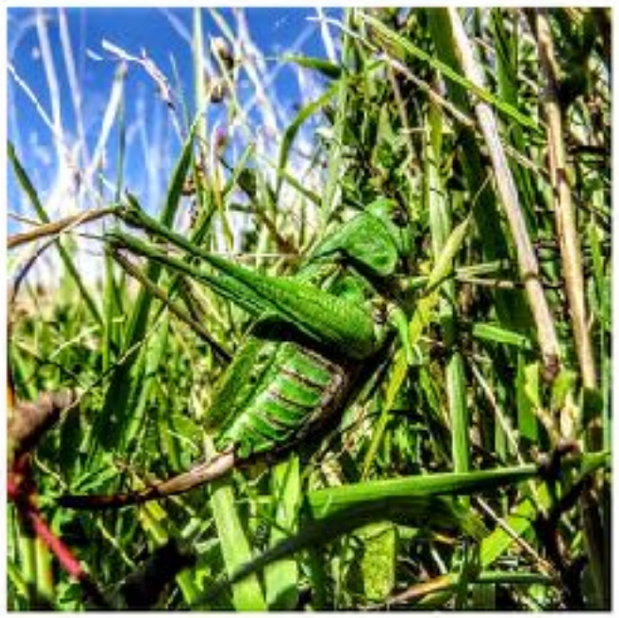
A small number of these species are on the absolute brink of existence, poised to become extinct in our lifetimes; our goal is to stop them vanishing.

Our aim is to remove 50 species from the edge of extinction in the UK by the year 2050. In addition we are reconnecting people with wildlife and the natural world through training programmes and awareness raising.







# the species recovery trust

www.speciesrecoverytrust.org.uk

Registered Charity 1146387