



# Archaeophytes Project

## 2018 Report

Project funded by:



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<b>PROGRESS REPORT - 2018</b>	<b>1</b>
<b>PROJECT OVERVIEW</b>	<b>3</b>
<b>2018 SUMMARY</b>	<b>4</b>
<b>THE SITES</b>	<b>5</b>
<b>WHITTLESFORD</b>	<b>5</b>
<b>BUTSER ANCIENT FARM</b>	<b>7</b>
<b>COLLEGE LAKES</b>	<b>9</b>
<b>SALISBURY</b>	<b>11</b>
<b>OTHER SITES</b>	<b>14</b>
<b>PERTWOOD ESTATE</b>	<b>14</b>
<b>LOWER SMITE</b>	<b>14</b>
<b>HENGISTBURY HEAD</b>	<b>14</b>
<b>WANDLEBURY</b>	<b>14</b>
<b>ACKNOWLEDGEMENTS</b>	<b>15</b>
<b>ABOUT US</b>	<b>16</b>

## Project Overview

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This project aims to re-introduce Darnel (*Lolium temulentum*) and Upright Goosefoot (*Chenopodium urbicum*) back to a range of sites across England. This project so far has obtained seed for both species and bulked it up to usable quantities, researched the growth of plants in different mediums and established populations in nine field sites and two test beds at Kew Gardens and Salisbury.

Work in 2018 focussed on growing the plants in more 'natural' situations, in amongst vegetation assemblages and crops rather than in monoculture beds.

This approach proved successful for Darnel, and at Whittlesford and Butser we were able to observe it growing in amongst crops, as had been observed on Inish Maan during fieldwork in 2017.

Unfortunately, the heatwave of 2018 proved catastrophic for Upright Goosefoot, and we lost it from nearly all the test sites. Some of the sites that had kept plants back were able to re-plant and bring plants up to seeding later on in the year, but the combination of heath and lack of rain proved fatal for most of the plants.

Tests were also carried out on Ergot infection in Darnel and edibility of Goosefoot.



Figure 1 Location of 2018 project sites

## 2018 Summary

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### What we learnt

- Upright Goosefoot appears to have extremely low tolerance to heat/drought conditions
- Darnel can grow both in amongst crops and uncropped field margins, and produces ripe seeds even when the heads are below the height of the sward
- We have still not observed Ergot in Darnel, even when we deliberately attempted to infect it
- Upright Goosefoot is edible and relatively flavoursome, both using seeds and greens. This corroborates earlier findings that it was used as a food plant in the Iron Age

### What our next plans are

- Repeat uncropped margin trials at Whittlesford with larger amount of seed
- Repeat in-crop trials at Butser
- Start new in-crop trials at College Lakes
- Re-grow Upright Goosefoot at all sites, following 2018's disastrous results following the heatwave
- Expand project to one more arable trial site

## The Sites

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### Whittlesford

Whittlesford is an arable site in Cambridgeshire, run by the acclaimed agro-ecologist Ashley Arbon. Darnel was sown into an arable headland in the Autumn. The purpose of this trial was to observe the success rate of the plants growing in an uncultivated margin, amongst other grasses and arable weeds.

Initial germination was encouraging, but the long cold spring combined with increased rabbit grazing pressure (with fewer green shoots than normal for them to feed on) had an adverse effect on the plants. In the summer nearly all the plants that had survived the spring produced flowering spikes, which were all present during a site visit in July.

The inflorescences of the Darnel appeared to cope well within the sward, although present in overall low numbers.

A small amount of Goosefoot seed was sown on the edge of a manure heap in an environment we believed would favour the plant. Sadly, as with all the Goosefoot sites this year, the plants died in the June heatwave.

Whittlesford Images



## Butser Ancient Farm

Both Goosefoot and Darnel were sown in the Spring.

The Goosefoot plants were sown in the same bed, which was rotovated to encourage any existing seed to germinate.

Sadly, we lost all the initial batch of plants in the heatwave. A second batch from a reserve stock was planted in late June and these did produce seed, although the plants were small and rather poorly- looking. Discussions were had about daily watering of the plants, but it was felt this was both unsuitable in terms of water use and man hours, and also would give an inaccurate representation of the plant's survival in a natural situation.

Darnel seeds were sown directly into the Emmer wheat crop at the same time as the Spring harvest. On initially visiting we feared no darnel plants had been successful, but upon closer inspection we found several of them in amongst the wheat.

The plan was to harvest Darnel in with the wheat, but by harvest time all the Darnel heads had dropped off (this was similar to what was observed in Salisbury). Whether this is normal or happened as a result of the heatwave is unknown. It would certainly represent a good tactic for an arable 'weed' in order for its seeds to enter the soil before potential removal during seed processing. However, the historical evidence of Darnel seed entering the food chain and being incorporated into bread would suggest the seeds do get harvested.

This needs more observation work in 2019.



Goosefoot bed in Spring



Replanting second batch in June



Darnel located within crop bed



Crop bed with Emmer wheat, showing difficulty of location Darnel!



## College Lakes

This was a new site for the project, but is well known for growing a range of rare arable species both in a nursery and in trial fields.

The work in 2018 focussed on replicating the Kew trials of growing Darnel in the Autumn and Spring, which confirmed earlier finding that these two sowing times lead to the production of almost identical plants.

The staff were keen to grow both plants in the nursery in 2018 to look at their viability and growth.

In the autumn Darnel will be introduced to the main crop field, initially in a 1x1m plot and then its spread from here observed.

The following Spring Goosefoot will be added to observe its behaviour in an arable context.



Spring-sown Darnel in the nursery



Upright Goosefoot in the nursery



The trial field in spring...



...and in summer

## Salisbury

The Salisbury trial site enabled us to gather rather more ephemeral data this year, focussing on Darnel and Ergot infections, and the palatability of Goosefoot.

We also observed the behaviour and mortality of Goosefoot in the heatwave through June and July, compared with a control set of plants that were watered daily.

We lost all the Goosefoot plants in the un-watered bed, which was on a par with the other sites. What was surprising was that the plants in the watered beds also became poorly and failed to gain much height or produce a good yield of seeds. They appeared simply stressed by the heat, even with adequate watering.

The Ergot trials consisted on obtaining heads of False Oatgrass that had been infected with a fungus (which we believed to be Ergot although this is slightly outside our area of expertise) and threading them onto the inflorescences of the Darnel.

The heads were monitored for two weeks and then the infected material removed. Two of the Darnel heads had unfortunately dehisced in the heat, but the two remaining heads were still intact but showed no sign of infection. At the same time several of the wheat plants in the trial bed succumbed to fungal infection, either through airborne spores or as a result of the deliberate infection, so fungal spores were clearly in existence, but none of the Darnel succumbed to it. This was not a terribly scientifically robust trial, but nonetheless gave a small insight. This work will be repeated in 2019, and the autumn sowing of plants has already led to a good stock of young plants.

In addition, a small culinary experiment was carried out to test the palatability of Goosefoot (details below). The result of this test showed both the Goosefoot leaves and seeds are edible, but slightly underwhelming in their taste.



Un-watered Goosefoot, with plants showing deep red stems and small leaves (roughly 6cm long)



A watered plant, although still small and prostrate compared with previous years



Goosefoot seedlings, showing the difficulty of identifying them when young



Darnel inflorescence with the infected head of False Oatgrass threaded on to it



Preparing Goosefoot



Pan-fried Organic Chicken seasoned with ground Upright Goosefoot seeds, served on a bed of linguine and steam-wilted Upright Goosefoot leaves, drizzled with an Upright Goosefoot infused jus

## Other sites

### Pertwood Estate

A suitable site was found here for the Goosefoot, although the estate manager was nervous about planting Darnel so this was not taken forward. A small plot was sown with Upright Goosefoot in the Spring.

An inspection in the summer revealed plentiful amounts of Fat Hen, but it appeared none of the Upright Goosefoot has survived the summer.

### Lower Smite

A small amount of Upright Goosefoot was planted in the WWT trial beds. Similar to Pertwood in, the summer two types of goosefoot were found, but no *urbicum* plants.

### Hengistbury Head

Both Darnel and Goosefoot were successfully grown again, although the Goosefoot plants were much smaller than the previous year, even with watering throughout the summer. The Darnel flowered, but dropped its seeds before they could be collected.

A second batch of Goosefoot which has been grown in trays was added in July.



### Wandlebury

Goosefoot was directly seeded outdoors in a trial site, and despite some optimism with several other *Chenopodia* appearing, no Upright Goosefoot survived. We are not sure whether the seeds failed to germinate or the seedlings died once they appeared.

## Acknowledgements

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- Simon Jay; Butser Ancient Farm
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- Caroline Corsie; Worcestershire Wildlife Trust
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And primarily John Martin and Natural England for their continued support and funding of the project.

## About Us

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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.

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