

Conserving Important Arable Plants on Sandy, Shale and Free-draining Soils



Poppies and mayweeds in a cultivated margin © John Secker

Introduction

Many of the species that we think of as arable weeds were here before the widespread advent of arable farming. They would have been present where soils were naturally eroded, where wild animals had disturbed the ground and in areas of inherently infertile or shallow soils. Early farmers soon discovered they faced an annual battle: cultivating the soil increased the ecological niche for weed species.

The Bronze Age and Romano British periods saw an increase in the area of land under cultivation, together with an increase in the variety of crops grown. Crops introduced from mainland Europe and further afield would have brought new arable plants with them, transported with the crop seed. This accidental transportation has continued into present times, seeing species, such as *Amsinckia micrantha* and *Amaranthus* spp., becoming

established as arable weeds associated with intensive vegetable production.

Arable plants have become part of our cultural history. Shakespeare was familiar with the arable farmers struggle to control weeds within their crops. In *Henry VI*, Shakespeare used weeds to represent war and destruction, and they symbolise the disorder of the nation coupled with the mental disorder of an individual in *King Lear*.

Why are sandy soils so important?

Arable land occupies roughly one third of Britain's land surface and in general, the areas that have been under cultivation for the longest time host the richest communities of arable plants. Early farmers found that sandy soils were easier to clear and increased the effectiveness of their primitive ploughs. These sandy lands were quick to warm and naturally

well drained, factors combining to offer a wider period for sowing compared to heavier soils.

The lighter lands are now known to be potential homes to a wide range of arable plant species. While it is true that some species favour precise conditions and soil types, there is clear evidence that some species exploit rotational niches. For example, it is possible to find the same suite of arable plants within a spring barley stubble in North Cornwall, North Norfolk and the Scottish Hebridean Islands with Corn Marigold featuring across all three areas.

The presence of arable plants helps facilitate a healthy arable ecosystem from the “bottom up”, offering greater resilience than simply planting plots of short lived agricultural cultivars to bolster food chains. Arable plants provide food for a wide range of farmland invertebrates, such as beetles, hoverflies, flies and bees, which in turn increase the foraging value of the habitat for farmland birds. This is especially important at the time of the year when adults are seeking food items for fledglings. Farmland bird chick survival rates are heavily dependent on suitable food availability.



Venus'-looking-glass © Cath Shellswell



Red-tipped Cudweed © Cath Shellswell

Where can arable plants be found?

Modern farming methods have all but excluded some of our rarer arable plants, and technology has hastened the decline in populations. The efficiency of herbicides coupled with nitrogen responsive crops leaves little place for non-target species within modern production.

Paradoxically, increases in the area of food crops for direct human consumption plays a role in removing potential habitat. Plants that could hold on within a spring cereal and occasional root crop rotation find little opportunity for reproduction under intensive vegetable production with its regular comprehensive soil movement and bed management.

Despite the challenges faced, arable plants have held on by exploiting the gaps we have left. Larger trailed equipment finds it difficult to access tight corners, game covers offer a spring germination opportunity and field headlands have always been seen as poor places to target inputs towards. The widespread adoption of agri-environment schemes has expanded the potential suitable habitat, large cultivated plots, cultivated headland strips and annually sown wild bird mixtures that are not fertilised can hold strong populations of arable plants.

Spring sown barley with cultivated headland at Eastbrook Farm. Corn Marigold, Venus'-looking-glass, Sea Spurrey, Mayweed and Common Poppy are present. As is Cornflower, which is thought to have been brought in accidentally within a seed mix.



© Tim Schofield

What options and opportunities are there alongside modern farming?

The fast drying nature of sandy soils often means field work can be carried out early in the year. As land managers we need to allow arable plants to exploit this to complete a full life cycle.

With lighter soils being marginal at world prices, it may be more economic for areas to be uncropped and managed as fallow. This could be to simply avoid applying inputs to areas with low yield potential or to receive environmental payments through existing or future schemes. Benign arable plants can be successfully conserved through several agri-environment options. Cultivated fallow for arable plants and low input cereal options are the best, but arable plants have also been found within other options such as under-sown spring cereals, wild bird seed mixtures and over-wintered or spring fallows.

How can weed burdens be avoided?

Aggressive weed species are obviously a major headache for farmers, affecting the quality of crops, competing for light and nutrients, and acting as disease bridges through the rotation. The build-up of pernicious weeds can also threaten localised populations of less competitive rare species and undermine the viability of suitable options. Some key management principles that could be implemented include:

- Treat the arable plant areas as a hub for the generation of vital ecosystems in the healthy running of the farm. More invertebrates usually means better pollination and better farmland bird survival. Consider arable plants to be a 'crop' rather than a separate part of the arable field. The aim is to create an area with a range of annual flowers that will be home for invertebrates and provide a seed source for small mammals and farmland birds.

- Identify areas of the farm with thin poor soils. It might be better economically to take these out of production as well as the best places that the un-competitive arable plants may grow.
- Choose land that is open and in full light, if a cereal crop does not grow in a shaded headland then arable plants will struggle too.
- South or west facing headlands are the prime spots as these are often drier and in full sun. The land should not be prone to pernicious weeds such as Sterile Brome and Cleavers. Identifying a number of potential sites from the outset is the key, if aggressive species threaten, be prepared to move the area targeted for arable plants. Use cultural control, such as rotating the plots or autumn or spring cultivations, ahead of the ideal germinating period.
- Assess what arable plants are present and target cultivation dates to encourage germination. Select autumn or spring cultivation to favour the target species and ensure that the management will fit with your cropping regime.
- Ensure farm traffic does not use the area unnecessarily. It is not uncommon for contractors unfamiliar with a farm to treat cultivated headland strips as “fallow” and use them for access.
- Do not ignore the value of the seed production from arable plants. Birds, such as Turtle Dove and Cirl Bunting, seek out suitable seed sources. There is often very little available to them within a ‘clean’ growing crop.
- Ploughing often gets the best response from arable plants. Shallow cultivations do not disturb the soil sufficiently to trigger germination and management in the absence of herbicide may allow aggressive grasses to win the battle for light and moisture.
- Plan and manage the option with the same care as you would a commercial crop. Cultivating the plot to a fine tilth gives arable plants the best growing medium to germinate, as if the area was being cultivated for a cereal crop. Remember that these are plants of cultivated and disturbed land. Without cultivation the arable plants will not be triggered to germinate, and some weeds, such as Creeping Thistle, can



Turtle Dove © RSPB

establish and start to dominate.

- Experience may prove that the sterile seedbed technique is the most efficient way to combat unwanted, aggressive species. Chemical control may be the key where it is difficult to rotate areas.
- Un-harvested conservation headlands offer a useful dual role in making space for arable plants in the absence of herbicides and providing some seed foraging for wintering birds.
- Carry out a survey to see what you have and use your knowledge of current distributions to try and extend them. Arable plant seeds can remain dormant in the soil for many years. It's never too late to try.

Rare arable species of shale, sandy and free-draining arable soils:

Small Alison	<i>Alyssum alyssoides</i>
Corn Chamomile	<i>Anthemis arvensis</i>
Annual Vernal-grass	<i>Anthoxanthum aristatum</i>
Loose Silky-bent	<i>Apera spica-venti</i>
Lamb's-succory	<i>Arnoseric minima</i>
Nettle-leaved Goosefoot	<i>Chenopodium murale</i>
Cornflower	<i>Centaurea cyanus</i>
Narrow-leaved Cudweed	<i>Logfia gallica</i>
Red-tipped Cudweed	<i>Filago pyramidata</i>
Common Cudweed	<i>Filago germanica</i>
Corn Cleavers	<i>Galium tricornutum</i>
Corn Marigold	<i>Glebionis segetum</i>
Smooth Cat's-ear	<i>Hypochaeris glabra</i>
Weasel's-snout	<i>Misopates orontium</i>
Prickly Poppy	<i>Roemeria argemone</i>
Annual Knawel	<i>Scleranthus annuus</i>
Small-flowered Catchfly	<i>Silene gallica</i>
Night-flowering Catchfly	<i>Silene noctiflora</i>
Corn Spurrey	<i>Spergula arvensis</i>
Narrow-fruited Cornsalad	<i>Valerianella dentata</i>
Broad-fruited Cornsalad	<i>Valerianella rimosa</i>
Fingered Speedwell	<i>Veronica triphyllos</i>
Spring Speedwell	<i>Veronica verna</i>
Wild Pansy	<i>Viola tricolor</i> subsp. <i>tricolor</i>



Small-flowered Catchfly © Cath Shellswell

Typical benign "indicator" species of shale, sandy and free-draining soils:

Bur-chervil	<i>Anthriscus caucalis</i>
Dense Silky-bent	<i>Apera interrupta</i>
Slender Parsley-piert	<i>Aphanes australis</i>
Black Mustard	<i>Brassica nigra</i>
Lesser Quaking-grass	<i>Briza minor</i>
Fig-leaved Goosefoot	<i>Chenopodium ficifolium</i>
Many-seeded Goosefoot	<i>Lipandra polyspermum</i>
Flixweed or Tansy Mustard	<i>Descurainia sophia</i>
Purple Viper's-bugloss	<i>Echium plantagineum</i>
Common Stork's-bill	<i>Erodium plantagineum</i>
Dwarf Spurge	<i>Erodium moschatum</i>
Tall Ramping-fumitory	<i>Euphorbia exigua</i>
White Ramping-fumitory	<i>Fumaria bastardii</i>
Common Ramping-fumitory	<i>Fumaria capreolata</i>
Western Ramping-fumitory	<i>Fumaria muralis</i>
Nit-grass	<i>Fumaria occidentalis</i>
Long-stalked Crane's-bill	<i>Geranium columbinum</i>
Small-flowered Crane's-bill	<i>Geranium pusillum</i>
Sharp-leaved Fluellen	<i>Kickxia elatine</i>
Round-leaved Fluellen	<i>Kickxia spuria</i>
Hen-bit Dead-nettle	<i>Lamium amplexicaule</i>
Venus'-looking-glass	<i>Legousia hybrida</i>
Small Bugloss	<i>Lycopsis arvensis</i>
Dwarf Mallow	<i>Malva neglecta</i>
Smaller Tree-mallow	<i>Malva multiflora</i>
Rough Poppy	<i>Roemeria hispida</i>
Four-leaved Allseed	<i>Polycarpon tetraphyllum</i>
Rough-fruited Buttercup	<i>Ranunculus muricatus</i>
Hairy Buttercup	<i>Ranunculus sardous</i>
Wild Radish	<i>Raphanus raphanistrum</i>
Field Madder	<i>Sherardia arvensis</i>
White Mustard	<i>Sinapis alba</i>
Field Woundwort	<i>Stachys arvensis</i>
Breckland Speedwell	<i>Veronica praecox</i>

An East Suffolk case study – Eastwood Farm

Eastwood farm lies north-west of Lowestoft, around 2 km from the North Sea. The farm forms the eastern boundary of the wider Somerleyton Estate. The holding runs in a north to south line in a rectangle two/three fields wide. Soils start with loamy sands in the north end and run to sandy clay loams at the south. Across the central area are light sandy loams that reward timely planting. The farm specialises in growing crops for local markets, such as spring and winter malting barley, spring beans for seed and sugar beet.

The rare arable plant Venus'-looking-glass was discovered by accident flowering in a winter barley stubble. This field was initially targeted with a cultivated strip and Venus'-looking-glass was found to be accompanied by strong populations of Pearlwort, Sea Spurrey and Corn Marigold. Most fields now incorporate management that encourages annual arable plants, mostly facilitated through the farm's agri-environment scheme. Through the agreement, cultivated margins, cultivated plots for ground nesting birds and un-harvested conservation headlands are rotated around the farm.

The arable plant populations wax and wane with variations in cultivation date, rainfall and temperature. Corn Marigold has proven especially sensitive to conditions, showing great variation in height and productivity of plants each cropping year. This part of East Anglia can be very dry with very low spring rainfall just at the time spring sown crops require it. Using un-harvested conservation headlands in this climate scenario is particularly effective. The crop acts as an initial nurse protecting arable plants from wind and strong sun. The sown crop plants eventually run out of nutrients, naturally thinning and becoming stunted. Although the annuals are late to develop, they are in a situation that allows them to successfully set seed. The un-harvested crop plants are not cut until the New Year, by which time seeds have been shed, to provide a forage source for overwintering farmland birds.



Further References

Arable Plants – a field guide (2003) Wilson, P. and King, M. **Wild Guides** Ltd.

Rare Arable Flowers App (2015) CEH, Botanical Society of Britain and Ireland, Plantlife, JNCC, Biological Records Centre and Natural England. This can be downloaded from the Apple Store and Google Play by searching Rare Arable Flowers.

Surveying for Arable Plants (2018) Plantlife plantlife.org.uk/uk/discover-wild-plants-nature/habitats/arable-farmland/surveying-arable-plants

Managing for Arable Plants (2018) Plantlife plantlife.org.uk/uk/discover-wild-plants-nature/habitats/arablefarmland/landmanagement-for-arable-plants-agri-environment-schemes