Weeds are vital to the existence of farmland species, study finds

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Weeds, which are widely deemed as a nuisance plant, are vital to the existence of many farmland species according to a new University of Hull study published in the journal *Biological Conservation* today.

Since many weeds produce flowers and seed, they are an integral part of our ecosystem and together with other crop and non-crop seeds found on farms, they provide food for over 330 species of insects, birds and animals.

Scientists at the Universities of Hull and Bristol examined the distribution of berries and soil-surface seeds collected over an entire year. They built up the first picture of its kind showing which farmland habitats are the most important seed producers and how the seed resources change in different seasons.

Whilst considerable research has linked agricultural intensification with dramatic declines of seed-feeding birds, surprisingly little is known about the wider importance of seeds for other farmland animals, especially insects. Moreover, understanding the dynamics of farmland seed food resources for species of conservation concern is of considerable research interest.

The team of researchers created complex 'food-webs' which linked all farmland insects, birds and mammals which are known to feed on the seeds recorded on a typical organic farm. They used the food-web to identify the key seed-producing plants favoured by most animals. This

enabled them to model the impacts of increasing farm management on seed resources and food-web interactions.

Dr Darren Evans, a lecturer in Conservation Biology at the University of Hull and who led the research said: "We understand a lot about farmland birds and mammals, but little about the plants and insects that underpin them. In this study, we discovered not only the importance of weed and non-crop species for many farmland animals but that the vast majority of seed-feeding animals on farms are insects, which are often overlooked by conservationists."

The team of researchers converted seed counts into mass and energy estimates; they found that shed seeds and berries available on a single organic farm have can produce a staggering 560 gigajoules of energy.

Dr Evans added: "We show that an increase in farm management intensity can lead to a decline of up to 19% in overall seed biomass and energy, which is presumably why agricultural intensification causes many farmland birds to suffer a 'hunger-gap' in mid-winter. Non-farmed habitats such as woodlands and hedgerows are important for seed resources, but we also show that some farmed areas are too".

The team predicted that increased farming intensity can have large cascading effects throughout an entire ecosystem, which can indirectly affect animals associated with the seeds.

The scientists conclude that farmers can maintain or enhance biodiversity by appropriately managing uncultivated, semi-natural habitats such as hedgerows and woodlands but that even small changes to cropped areas, such as allowing some weed species to grow, could have a huge impact on the quantity and variety of seeds available on the farm and the animals that feed on them. They suggest that rather than focussing limited conservation resources on a small number of

charismatic species such as birds, an alternative approach is to understand and manage the complex network of species interactions on farms and to explore ways of incorporating this into policy.

More information: 'Seeds in farmland food-webs: Resource importance, distribution and the impacts of farmland management' *Biological Conservation*.

Provided by University of Hull