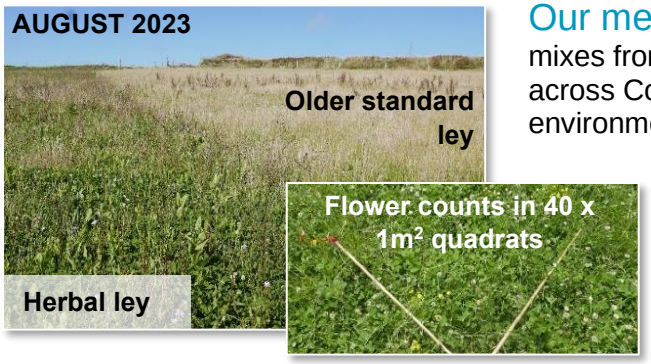
Case Study:
Are herbal leys good for bumblebees?

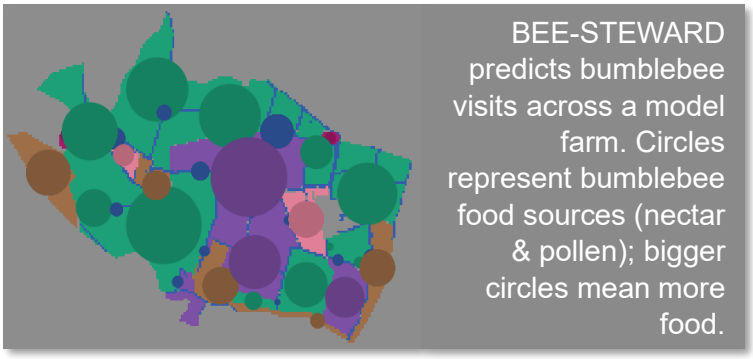
Herbal leys (also called multi-species leys) contain a mix of grasses, legumes and herbs, and provide diverse forage for grazing animals. Research indicates these swards do as well as standard rye-grass leys in terms of dry matter yield, milk yield and lamb weight, and can outperform rye-grass leys for weed suppression and nitrogen leaching. Seed mixes are more expensive, but herbal leys may require less inorganic fertiliser. They can also withstand extreme weather and perform well on poor soils[1]. However, we know little about the long-term environmental impacts of herbal leys.

Our study: We used BEE-STEWARD, a computer-based decision support tool, to compare the effects of herbal leys and rye-grass leys on bumblebee populations. BEE-STEWARD combines the number of flowers in a ley with the pollen and nectar value of those flowers for bumblebees, and simulates what will happen to bumblebee populations over several years under different types of management.



Our methods (flower surveys): Diverse herbal ley mixes from a range of suppliers were sown at seven farms across Cornwall in 2018 - 2022, with six fields under agri-environment schemes. Two were used for cattle grazing, two for mob cattle grazing, two for sheep grazing, one cut for silage, and one cut for silage and cattle grazed. We visited these farms once a month from April - September 2023, recording the number of each species of flower found in 40 x 1m^2 quadrats at each site.

BEE-STEWARD: We entered our flower survey data into a realistic 'model farm' on the computer, with arable (green fields), hedges (blue) and semi natural grasslands (pink). The purple fields are the leys. We used BEE-STEWARD to predict what would happen to bumblebees over a period of five years under two management scenarios: one with herbal leys and one with rye-grass leys.



BEE-STEWARD predicts bumblebee visits across a model farm. Circles represent bumblebee food sources (nectar & pollen); bigger circles mean more food.

Our results: After 5 years, we predict there will be **twice as many bumblebee colonies per km^2** and **twice as many adult bumblebee queens** on a farm with **herbal leys**, compared to an equivalent farm with rye-grass leys.

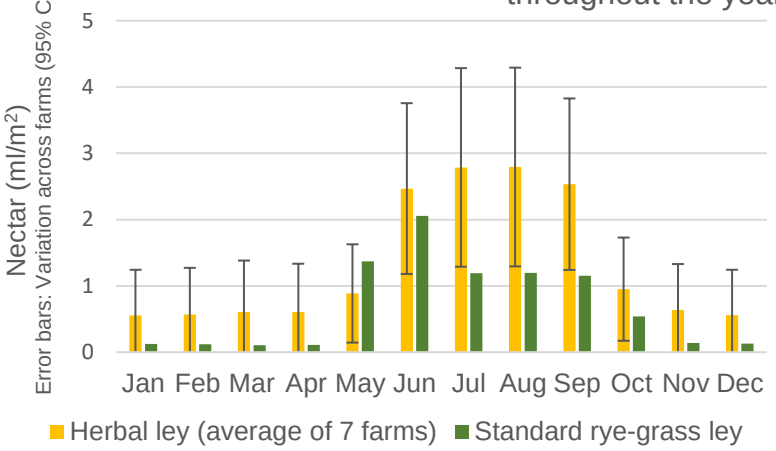
Management that increases **white & red clover, buttercup, chicory** and **dandelion** will be good for bumblebees, as will **grazing and/or cutting fields at different times**.

[1] *The Toolbox of Multi-species Swards (TOMS) project reviewed 77 experimental studies comparing the performance of multi-species and single/binary species swards and undertook further performance studies in Cornwall and Devon. See the TOMS website for more detailed, user-friendly information about herbal ley performance and management: www.multispeciessward.co.uk*

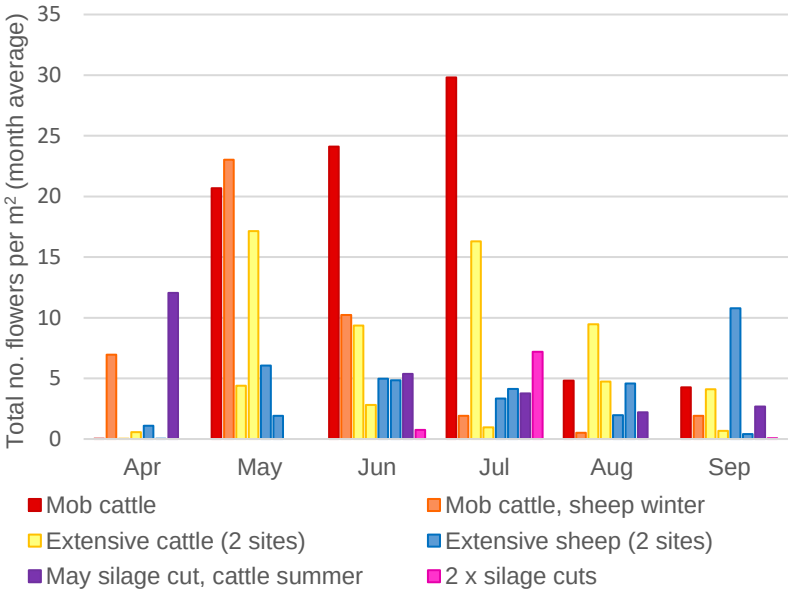
Nectar throughout the year:

Running a BEE-STEWARD simulation for one year, we found around **twice as much nectar** is available for bumblebees in herbal leys from July to October, and **over 5 times as much** in early spring; supporting newly emerged queens. **Buttercups** are important in spring, **white clover**, **red clover** and **chicory** in summer, and **dandelion** all year round.

Nectar availability in different types of ley throughout the year



Seasonal change in total number of flowers in herbal leys under different management (8 sites across 7 farms)



Effects of management in herbal leys:

Clearly, grazing and cutting affects flower abundance in the short term, and therefore the timing of such management will impact local bumblebee colonies. Sites under cattle grazing reach a high of 15 - 30 flowers per m^2, with the two mob grazed sites reaching the highest flower density, each peaking at different times of year. Sites cut for silage had lowest flower density, but flowers returned in June after a May cut. Sheep grazed sites had lower but more consistent flower abundance. Varying the timing of grazing and/or cutting across different fields within the farm is likely to provide more food for bumblebees throughout the season.

With thanks to project partners, funders, volunteers and all the landowners (including Rosuick Farm, Trewince Farm, Bruggan Farm) for allowing access to their fields. This case study was produced as part of the Fowey Valley Bumblebee Project.