



## TRansition paths to sUustainable legume-based systems in Europe

# Heritage Varieties for enhanced human and beneficial insect nutrition

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### Background

Legumes can play a vital role in human nutrition by providing high quality protein, as well as a range of vitamins and minerals. Modern crop varieties have been selected for yield and other agronomic characteristics rather than food quality. A decline in the content of vitamins and minerals in a range of vegetables since the second World War is widely acknowledged; this could be due to a range of factors but changes in the varieties grown is likely to be important. A great number of older, heritage, varieties have been preserved, although they may no longer be commercially available at present due to seed legislation. There is potential to select varieties that provide high nutritive value but we need to understand more about which varieties can do so and explore whether the heritage varieties have benefits and warrant their reintroduction

Legumes also play an important role in ecosystem service provision as they provide both nectar and pollen for beneficial insects; we need to know more about the utilisation of cultivated pulses by beneficial insects, especially pollinators, and how this relates to differences in the quantity and quality of nectar and pollen. There is potential to grow varieties that will support important pollinating insects by selecting those that provide high quality floral resources, but first we need to understand more about how those floral resources differ and how the bees respond to them.



### Progress so far

The practical work for this Case Study will begin in 2018. In 2017, in preparation, we initiated pilot work at Ryton Gardens using 10 varieties of *Vicia faba* in order to: 1) compare the yield and other agronomic properties of heritage and modern varieties; 2) assess differences in the production of floral volatiles by different varieties and determine if these were related to visitation by pollinating insects; 3) assess differences between the varieties in terms of food value with regard to vitamins and minerals. We recorded: germination and emergence; plant growth and development; floral volatiles using an air entrainment method; pests and diseases; crop yield (fresh and dry); bee visitation rates

### Results so far

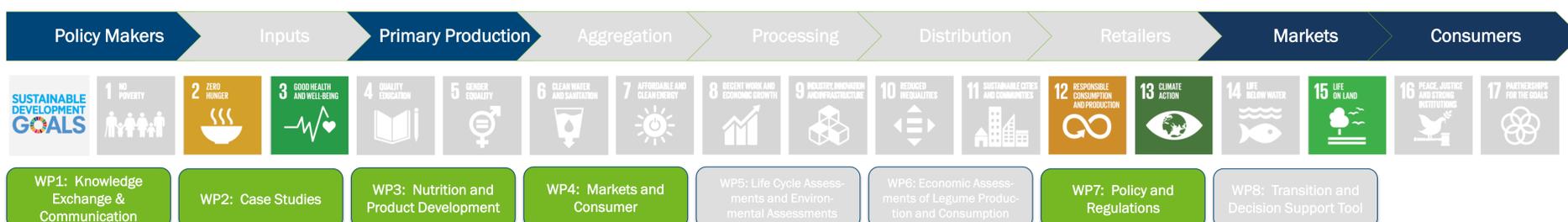
We found differences in:

- initial seed weight
- emergence
- vegetable biomass
- bean yields
- pest damage

Bee visitation rates were very low due to poor weather and an absence of bees. Floral volatiles and dry beans were collected and the samples stored for analysis.

### Next steps in 2018

- Trials will be repeated using both *Vicia faba* (broad bean) and *Phaseolus vulgaris* (French bean).
- Native bumblebee colonies will be introduced to ensure pollinator presence.
- Data will be collected as in 2017
- Pollinating insect visitation will be quantified and related to the production of floral volatile chemicals
- The quality of floral resources that are provided in return (e.g. amino acid profiles of pollen and the sugar content of nectar) will be analysed.



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