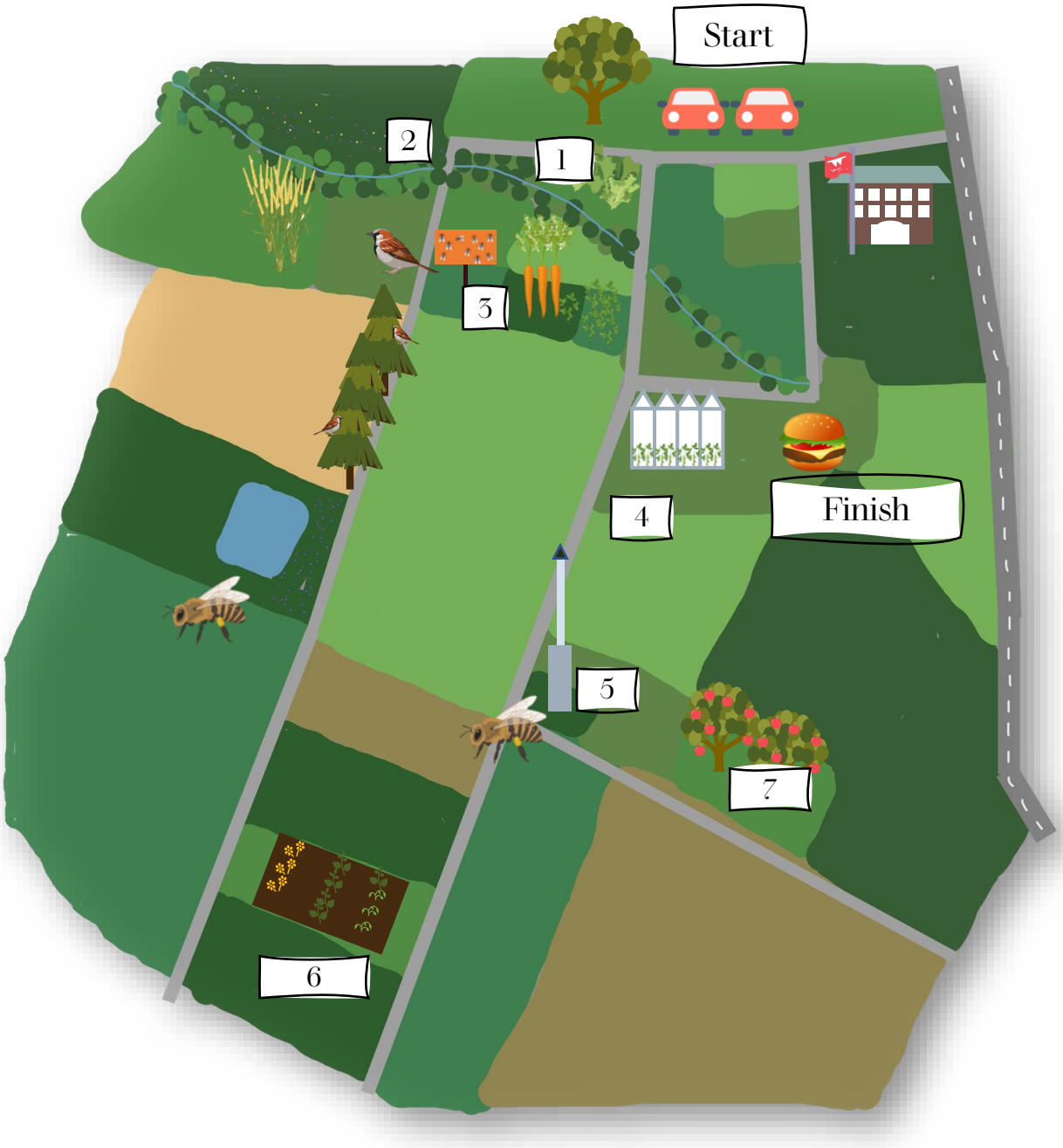
Wellesbourne Field Walk

Warwickshire Rural Hub and Syngenta



FOOD GRP

WARWICK
THE UNIVERSITY OF WARWICK

SCHOOL OF LIFE SCIENCES

Start Car Park 3

1 Quarantine Field:

The Quarantine Field is a restricted access area where we work on soilborne diseases caused by fungal pathogens - it is a unique facility in the UK. Many of these pathogens have spores or resting structures that can survive for several years or even decades; hence we must be careful to wash and disinfect all boots and equipment to prevent spread to our other field areas. Historically the entire field was inoculated with a fungal pathogen causing white rot disease in onions (root disease), but we have more recently introduced other pathogens in specific areas. This allows us to ensure that diseases develop in trials for instance to test new crop protection products / control approaches or assess new varieties for resistance. These are:
1) Sclerotinia - (where lettuce is growing) which infects more than 400 plant species; causes white mould disease.
2) Fusarium of onion (behind trees) - causes wilt and basal rot.
3) Clubroot of brassicas (behind trees) - causes deformed roots and stunted plants - trials have identified resistance in the Warwick brassica diversity sets.
4) Cavity spot of carrot (concrete pipes set in ground) - causes lesions on carrot roots - these macrocosms are filled with sieved sandy soil to optimise carrot growth and provide a contained unit for infection studies.

2 Biodiversity Area in Cottage Field West & Tree Sparrow Village

The University has identified 'achieving ecology and biodiversity net gain' as one of the five pathways to our 2019 Climate Emergency declaration response. Our Campus Masterplan, which leads to 2030 and beyond, sets a blueprint for future development and commits to managing biodiversity holistically and to ensure biodiversity on campus is better than before. The Ecology and Biodiversity Plan was approved in 2021 and provides a framework and methodology for protecting, creating and enhancing habitats and species within the campus and beyond. Some of our recent projects include tree and hedgerow planting, hedge laying, wildflower meadow establishment, reduced mowing, and bug hotel creation. We are passionate to work with students to use the campus as a living lab for their studies.

We are members of the Arden Farm Wildlife Network and the South Warwickshire Sustainable Farming Group. We have been grateful to receive assistance/funding from the Warwickshire Wildlife Trust, the Arden Farm Wildlife Network, Severn Trent and the University of Warwick to support installation of nest boxes, wild bird feeding areas, wildflower strips and new hedges.

The Arden Farm Wildlife Network secured £17,380 from Severn Trent's 'Boost for Biodiversity' grant scheme to support a 'Tree sparrow village' project. This, along with supplementary feeding of wild bird food over the winter months gives wild birds plenty of food all year round. In addition, the funding helped to install 110 tree sparrow boxes across 11 farms in the area. As tree sparrows live in colonies, it is vital that their boxes are placed in close proximity to each other. Sadly, no tree sparrows have been seen by our visiting ornithologist Gus Ariss.

We have also installed a barn owl box. Barn owls have suffered huge declines over the last 50 years due to agricultural intensification and habitat loss and by working collaboratively the Arden Farm Wildlife Network is helping to restore their habitat and nesting sites at a landscape scale. Barn owls like to feed on voles and when populations of these are low or seasons poor then this directly reduces the barn owl populations. We have a plan to establish a further rough tussocky grass meadow at the far end of Long Meadow West to encourage vole breeding and thus attract Barn owls to the feeding ground and hopefully they may decide to nest here.

In early spring 2021 we planted 1,800 hedgerow trees as two hedges (200m and 160m) to improve biodiversity and provide corridors for insects, pollinators and wildlife.

We are collaborating with Severn Trent and the Warwickshire Wildlife Trust in their 'Wilder Communities' project. At the Wellesbourne Campus we have sown an area of approximately 0.25 hectares with mixes of wildflower and grass seeds. All of the areas have been sown as strips, parallel to hedgerows. We have beehives to the south in a pollen and nectar rich small meadow.

3 Long Meadow Centre:

We maintain plots of carrot and brassicas (swede and cauliflower) to monitor the pests of these crops. No insecticides are applied, and we grow the swedes and carrots year-round.
We monitor flies and beetles infesting the brassicas using yellow water traps (insects attracted by the colour), carrot fly using orange sticky traps (attracted by colour) and moths using pheromone traps (males attracted by the smell of the lure – female sex pheromone).
The information is used for the development and validation of weather-based forecasts and is also used in real time as part of the Pest Bulletin – which is available through the Warwick and Syngenta UK web sites.
This year we are also testing Smart traps for various pests. These attract the pests in the usual ways, but each trap has a camera that photographs the trap surface at intervals and sends the image to a website where it can be viewed remotely.

4 Natural Light Growing Centre:

The Natural Light Growing Centre (NLG) is close to the end of a 22-month project called RIPEHouse (funded by Defra Farming Innovation Pathways programme) programme) to demonstrate food production under increased sunlight and biostimulants over conventional protected cropping. A novel cladding material ETFE (ethylene tetrafluoroethylene) allows in more visible, UV and far red light to reach the plants allowing trials looking at how these increased levels compare to traditional glasshouse and polytunnel production. Our research has focused on plant health, growth rates, disease and pest, self-life, sugar levels (brix), yield and flavour. During 2022 the primary crop was baby cucumbers alongside tomatoes, peppers, strawberries, chillies and various herbs. In 2023 the primary crop has been strawberries alongside all the crops from 2022.

Emilio Loo Monardez from the Warwick Manufacturing Group will speak here about work on automation and robotics.

5 Insect Suction Trap & Weather Station

The suction trap is part of a network of traps through England and Scotland managed by the Rothamsted Insect Survey. It is a 12.2 m high 'vacuum cleaner' that continually sucks in air at the top of the tower. Any small insects flying in that air fall to the bottom of the tower and are drowned in a solution of preservative in a small bottle at the bottom. The sample bottles rotate daily. We collect the bottles, decant the insects into tubes and send them to Rothamsted where the insects are identified and counted. The counts of pest aphids (the traps do catch other insects) are posted each week on a web site for growers' information. Some of the traps have been running for 40+ years so they are a great resource of data on insect abundance and phenology and the data can be used to develop forecasts or look at the impact of climate change, for example.

We are very lucky at Wellesbourne to host a small population of corn buntings, which are relatively scarce ground-nesting birds. They have been on our land for many years, and we have some historical data on their abundance collected by a past colleague - Joe Hardman. We now have a wonderful volunteer ornithologist who is monitoring them (and the other birds on the site). We are trying to assist the corn buntings. We have learnt from another excellent ornithologist based in Wiltshire that the males appreciate song posts to sing and defend their territory and they also like dense barley crops and long grass/vegetation. So, we have tried to provide all three for them. Last year there were about 5 nests – some in the barley and some in the long grass. This year we have double drilled barley in Long Meadow West next to the wildflower strips. Corn buntings also visit some of the neighbouring farms and we are liaising with them through the Arden Farm Wildlife Network of which we are members (managed by the Warwickshire Rural Hub and the Warwickshire Wildlife Trust).

6 Eight Year Rotation, Farm Crops, Borehole, Reservoir & Headlands

We are very lucky to have a Borehole on site. Extraction is permitted for 320cum per day to a maximum of 55000 cum / annum. The concrete reservoir is filled and supplies the glasshouses, GRU etc and also fills overnight the outdoor reservoir with max capacity 22700cum.

School of Life Sciences rotational land runs an an 8-year rotation with a tenant farmer planting arable crops (winter wheat, winter barley, spring barley) to maintain consistency and uniformity across the ground for the next trials. All trials are able to be irrigated from the reservoir via the underground network of pipes and risers you can see located along the headlands. Permanent headlands were established to provide good access to trials and for irrigation lines etc.

Pump Ground (Sector 3)
At the far end near the asphalt track is an international commercial seed breeding trial with emphasis on spacing and timing to maximise yields at harvest intervals throughout the season. This is the fourth year of a highly successful programme honing down precise details.

The Insectrial Revolution - Insect frass as bio-fertiliser on cabbage crop and spring barley crop. Currently, the application of insect meal for food and feed is of strong economic, ecological and social interest. Black soldier fly larvae are the most common insect reared as substitutes for conventional food and feed. Insect meal production in Europe is forecast to reach one million tonnes by 2030 (IPIFF 2021). This implies that Europe will produce three million tonnes of frass (waste). Therefore, the development of the frass market is as important as protein. To date, not many field studies have been conducted in Europe to evaluate the effect of frass on plants. Hence in this field trial, we are evaluating the effect of frass included at various nitrogen rates on cabbage plants and a spring barley crop. The frass characteristics are significantly affected by the Black soldier fly's feed.

Warwick beans for transforming 'Urbean Eating'. New varieties of common dry beans including Godiva (blonde kidney), Capulet (white navy) and Olivia (black cannellini) are being grown to produce the key ingredient for 'BEAN MEALS' (a new project supported by the BBSRC Transforming UK Food Systems programme that will work with cooks in Leicestershire schools and Coventry communities). Two areas of production include an area drilled with an Ojyord Wintersteiger field drill into a bed formed seedbed for breeders seed increase and a second area is a no till trial using a 6 metre Weaving Sabre tine drill.

The Sabre Drill has made low disturbance crop establishment simple and intuitive since its launch, offering precise placement of seed while avoiding trash blockages and unnecessary downtime. The new and revamped version makes several key adjustments, all serving to make the Sabre Drill even more accessible and powerful for everyday use. Following intense development and testing, new features include:

- Revamped and easier calibration process
- Relocated depth wheels that bring the weight closer to the tractor
- Hydraulic depth control instead of manual adjustment
- Side-to-side rolling pivot for more precise contouring
- Ability to handle large quantities of trash
- Simple depth adjustment of the seeding coulter

Standard Spec: 4 rows of 12mm tines with tungsten tips and stainless-steel adjustable seed tubes. 2,000L hopper and tank sieve, colour touch screen RDS iSOCAN controls with GPS forward speed monitoring, wide floatation wheels, hydraulic depth control, wheel eradicators, a double row of following "z" harrows and LED road and work lights, all within a transport width of 3.0 Metres. ISOBUS Ready.

In short, the aim for the Sabre tine has been to establish crops in a cheap and efficient way with a simple style drill. The drill has the capability to go into Direct, Min-till and conventional systems. Being a mounted tine drill, it has the weight to drill into seriously hard ground (i.e. last autumn) but then keep going when it starts rains like this spring. In the past tine drills haven't been the best at seed placement but with the centre wing pivots it allows both wings to pivot independently to each other to ensure more consistency across the 6m. Easy to work on and easy to empty of seed.

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Apple Genome Orchard & Mason Bees: Dave Chandler & Fiona Tainsh
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Mason bees as pollinators. The red mason bee is a solitary bee (i.e., it doesn't form colonies like honeybees or bumblebees where you get a single queen that produces lots of daughter worker bees). The female bees nest in hollow reeds or holes in the earth. They lay their eggs in small cells that are lined with mud and provisioned with pollen. If conditions are suitable then they will form multiple individual nests in the same spot. There are about 250 solitary bee species in the UK. Mason bees are efficient pollinators and are thought to be more effective than honeybees or bumblebees on a per bee basis. We are working with Mason Bees UK who have developed a service that provides mason bees to fruit growers. Bee cocoons are put into a release box in the crop in the spring alongside nest boxes. The cocoons hatch and young adult bees emerge when the crop is in blossom. They then pollinate the crop and make cells in the nest boxes. These are then collected in July, the cocoons are then extracted in the autumn, stored over winter and returned to the field the next year. If left out on their own then the cocoons would suffer high mortality from bad weather, predators etc so this system makes sure there are enough bees for the next year.

In Fiona's PhD we are getting baseline information about this pollination system including:

1) understanding whether this mass rearing system leaves the bees more vulnerable to diseases

and

2) developing molecular markers so we can study the population genetics of the bee. We have a release system set up in the orchard with a release box and nest tubes.

Acknowledgements

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