

Viticulture

Test & Trial – Row Fruit Report



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This report has been prepared by Andrew Tinsley of Consult 80 on behalf of the Kent Downs AONB Unit. The Test and Trial has been overseen by Nick Johannsen, Director of the Kent Downs AONB Unit

The Viticulture Test and Trial is being carried out by the National Association for the Areas of Outstanding Natural Beauty on behalf of Defra. It forms part of the development of schemes that reward farmers and land managers for producing public goods.



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1 Executive summary

A Test and Trial study was conducted to examine the potential for inclusion of row fruit crops in the new schemes that reward farmers and land managers for producing public goods, particularly the Sustainable Farming Incentive scheme. A sample of 22 growers of row crops was drawn up and 19 of them agreed to take part in the study, covering the crops of interest to the study, namely apples, pears, stone fruit (plums, cherries, apricots) and blackcurrants. The scope of the study was widened to include hops and growers of these main crops who also grow vines. Through remote interviews (via telephone, Zoom or MS Teams) these 19 growers were asked questions designed to establish how they address protection of the environment in their management and production. The draft report and recommendations were discussed by the group collectively during a virtual meeting held on Zoom.

It was clear that the UK fruit industry, represented by this sample, is practicing Integrated Pest Management and making efforts to protect the environment and enhance biodiversity. A major driver for this is the market requirement to meet the rigorous demands of the Red Tractor Assurance scheme. Red Tractor is recognised by many retailers and brands as evidence of due diligence, demonstrating a commitment to food safety, traceability and good agricultural practice (GAP) at farm level. This scheme is a tool for market access, and as such it evolves in response to the risk management expectations and Corporate Social Responsibility agendas of supply chain customers. In the context of this study Red Tractor could be said to represent the industry benchmark.

Some businesses also choose to work to the more demanding requirements of LEAF (Linking Environment and Farming) and their assurance scheme - LEAF Marque. LEAF Marque focuses upon sustainability and biodiversity goals and could be said to represent industry best practice on these topics. There is a degree of interconnectedness between these two schemes. LEAF Marque requires farms entering it to also be a member of a baseline assurance scheme., and within the UK, this is almost invariably Red Tractor. In many cases, the assessments are consolidated and completed by assessors who are trained to assess both standards. The two schemes are complementary rather than in direct competition. A strong, progressive baseline increases the potential for best practice.

All the participants, indeed much of the industry, have made considerable improvements in the last 30 years in their custodianship of the countryside and protection of the environment in which they live and work. There is potential for UK growers in general to navigate their businesses from baseline, through benchmark on to current best practice and then beyond in the future. However, these businesses face the barriers of the availability of staff, of management time and of funds for this investment.

The participants in this study were all keen to continue to contribute to public goods but expressed concerns over the costs of such investment: in cash, lost income, staff and management time. Participants identified a need for further research on enhancing biodiversity in row fruit production systems and also for education and training for them and their staff.

The competition between the multiple retailers constraining prices, plus inexorably increasing costs, results in margins being continually squeezed. Under these circumstances cash available to a business is more likely to be invested in improving production and potential returns than on improving

the environment. There is a distinct risk that the environmental gains achieved to date may be eroded in the future as times get tougher. Therefore, in order to safeguard these gains during this developing, potentially deteriorating, economic climate, there should be remuneration for the pre-existing environmental protection actions that growers are currently taking.

The requirements of the new scheme must be practical and achievable without economic loss and payment rates need to be sufficiently attractive to encourage widespread uptake for maximum beneficial impact on the environment. The general consensus amongst the participants in this study was that the rates proposed for the pilots were insufficient to cover any but the most limited and basic activities and that they should be increased such that at the Intermediate level the total payment for Land, Soil and Hedgerow Standards together should be at least £250 per hectare and £350 - 400 for the Advanced level where considerably more input is required.

The production of a simple Land Management Plan (LMP) by a grower involves relatively little cost but would also generate correspondingly limited impact on the farm environment. A LMP that will generate measurable and valuable change in the farm environment will require a professional survey and detailed advice on planning and implementation. Clearly the scale, scope and cost of such a LMP would depend on the size of the holding and number and types of production sites. Support within the new schemes should reflect this.

Figure 1: Apple trees with green compost



2 Introduction

The Kent Downs Area of Outstanding Natural Beauty (AONB) Unit has been conducting a Test and Trial as part of Defra's research to support the new schemes that reward farmers and land managers for producing public goods. This Test and Trial is part of a collaborative bid to Defra from the National Association for Areas of Outstanding Natural Beauty. The Test and Trial is examining the potential for viticulture to provide public goods as defined by Defra.

Permission was granted to extend this work to include row fruit: apples, pears, stone fruit (i.e. cherries, plums, apricots) and blackcurrants. This is due to the potential for viticulture-based actions for these new schemes (that reward farmers and land managers for producing public goods) to be applied to row fruit as well.

2.1 Aims and objectives

The Row Fruit Test and Trial aims to examine the proposed viticulture actions and make an assessment of whether they would be appropriate (either in their entirety or partially) to the row fruit sector.

The objectives are to:

- Identify the public good (as defined by Defra) that row fruit growers are able to deliver
- Identify which of these public goods can't be delivered using market forces alone and require financial incentives in order to facilitate widespread adoption
- Identify similarities and differences between the benefits that can be derived by row fruit growers and vineyards
- Provide an evidence base to back up the assertions made, including consultation with growers
- Provide a set of actions and recommendations for the new schemes that reward farmers and land managers for producing public goods that relate to row fruit to include:
 - Actions that will attract funding
 - Benefits of actions (public goods)
 - Proposed levels of payment required to attract growers to the scheme
 - Methods of assessing success

2.2 Background

The Government initiative previously known as Environmental Land Management (E.L.M.) comprises schemes that reward environmental benefits. The Sustainable Farming Incentive is one of three new schemes, alongside the Local Nature Recovery and Landscape Recovery schemes. All three schemes will operate together and pay for sustainable farming practices, improve animal health and welfare, improve environmental outcomes, and reduce carbon emissions. They will create habitats for nature recovery and make landscape-scale changes such as establishing new woodland and other ecosystem services, providing key means to deliver against the 25 Year Environment Plan goals and carbon net zero targets. Pilots for the Sustainable Farming Incentive are beginning this year.

The piloting and implementation of the Sustainable Farming Incentive is one of the cornerstones of the government's new agricultural policy. Founded on the principle of 'public money for public goods', the intention is that it will provide a powerful way of achieving England's goals and targets, while supporting the rural economy. The scheme means that farmers and other land managers may be paid for delivering the following public goods:

- Clean air
- Clean and plentiful water
- Thriving plants and wildlife
- Protection from environmental hazards
- Beauty, heritage and engagement with the environment
- Reduction of and adaptation to climate change

Before full roll-out of the scheme in 2024 Defra is working closely with environmental and agricultural stakeholders to design the new scheme. Part of that collaboration involves running a programme of Tests and Trials in partnership with farmer groups, representative bodies and non-governmental organisations, aiming to understand how the new schemes could work across a range of regions and sectors. The Tests and Trials started in 2018. The 6 priorities running through them are:

- Land management plans (LMP)
- Role of advice and guidance
- Payments
- Spatial prioritisation
- Collaboration
- Delivery mechanisms

Defra is running a series of pilots for the Sustainable Farming Incentive from 2021 to test and improve the scheme design before its full roll-out over the next three years. These pilots, on a mix of large and small farms, are designed to help compare different approaches and will mainly test:

- How best to construct different types of agreements at different scales
- How to target incentives to provide specific environmental outcomes in specific areas
- Underlying scheme mechanics e.g. applications and payments approach and the use of advisers.

Defra aims to continue to engage with the wider agricultural community and capture views not just until the full rollout of the Sustainable Farming Incentive, Local Nature Recovery and Landscape Recovery schemes, but beyond, in order to keep improving the schemes. [Ref. Defra Policy Paper: Sustainable Farming Incentive: Defra's plans for piloting and launching the scheme Published 10 March 2021]

2.3 UK fruit industry

Both the UK area of fruit cropping and the number of businesses have declined considerably since the middle of the last century, but during this century the changes in area have been less marked and

in some cases the area of production has recently started to increase (see Table 1). [Ref. Defra Horticultural dataset Published 2 July 2020]

The volume of home production has not only been influenced by the changes in area under production but also by changes in the varieties grown, the production systems and improvements in management (see Table 2). Thus, despite the area of dessert apple production halving over the last 35 years, the volume of production has increased by over a third over the same time period.

Meanwhile the value of home-produced crops has correspondingly changed as a result of these developments, not just in volume of production but also the costs of production, competition in the marketplace etc. (see Table 3).

Table 1 UK planted area of fruit in UK (hectares)

	1985	1995	2005	2015	2019
Dessert apples	12,771	8,849	5,505	5,413	6,292
Culinary apples	7,066	5,594	3,810	3,199	2,638
Pears	3,427	2,941	1,636	1,483	1,515
Plums	2,406	1,588	940	730	585
Cherries	938	604	400	711	766
Blackcurrants	2,876	2,389	2,670	2,514	2,516

Table 2 Home production marketed (k tonnes)

	1985	1995	2005	2015	2019
Dessert apples	154.1	138.5	118.0	160.4	206.5
Culinary apples	146.1	135.0	99.7	89.8	79.9
Pears	47.6	29.7	23.4	26.5	27.4
Plums	20.4	14.4	13.5	11.5	7.4
Cherries	3.8	3.5	1.1	4.7	5.7
Blackcurrants	19.8	16.7	19.7	15.2	13.4

Table 3 Home production value (£ million)

	1985	1995	2005	2015	2019
Dessert apples	51.9	58.0	49.4	77.0	140.8
Culinary apples	29.2	32.8	31.6	40.4	42.0
Pears	14.6	13.4	8.2	12.9	22.8
Plums	6.3	8.5	9.5	11.2	3.0
Cherries	2.9	6.4	1.9	13.8	18.5
Blackcurrants	7.6	27.3	13.2	15.2	14.5

Over the last 70 years the marketplace has developed dramatically, from growers previously almost exclusively supplying the wholesale markets to now almost exclusively supplying the multiple retailers. The direct relationship between the grower and the panelists (market traders) handling and selling their produce has been largely replaced by an indirect relationship with the sales being handled by an intermediary marketing group or a producer organisation (PO). The exceptions being the very largest grower businesses who deal directly with the multiple retailers and those relatively few growers dealing directly with their customers via farm shops and/or pick-your-own (PYO).

In both cases the interest of consumers in how their fruit is produced, and the effect of this on the environment, has had a strong influence on production, management and practices implemented to protect the environment. The various quality assurance schemes in the industry were established to address these consumer concerns over residues and the environment and to demonstrate that growers were obeying the statutory regulations pertaining to these issues.

2.4 Method

Having examined the various documents flowing from the Viticulture Test and Trial [Ref. *Kent Downs AONB ELMS Tests & Trials: Viticulture Published by Vinescapes June 2020*] a questionnaire with 20 questions was developed (see Appendix 1). A sample of 22 growers of row crops was drawn up and 19 of them agreed to take part in the study, including three of the largest tree fruit growers in the country. The area of land that these businesses were currently growing crops of interest to the study were:

- 2,778 ha of apples (17 growers)
- 417 ha of pears (10 growers)
- 125 ha of stone fruit (plums, cherries, apricots) (7 growers)
- 295 ha of blackcurrants (6 growers)
- 58 ha of hops (3 growers)
- 100 ha of vines (4 growers)

Some of the businesses also grow other crops such as other soft fruit, nuts or arable crops and some also had grassland for livestock enterprises. The location of the main site for each of the participating businesses is shown in Figure 2. The actual distribution of production sites, particularly for the larger businesses, is more widespread than shown.

The businesses were sent the questionnaire 3-7 days in advance and then participated in a telephone, Zoom or MS Teams call, whichever was their preference. All the questions were addressed and participants were given the opportunity to ask questions themselves and to make additional statements. All participants were asked to supply examples of environmental management plans, policies etc. that were available.

Additional material of relevance was obtained from a number of individuals and organisations (see the Acknowledgements). All participants were invited to take part in a Zoom workshop to discuss and refine the recommendations and all were very keen to do so.

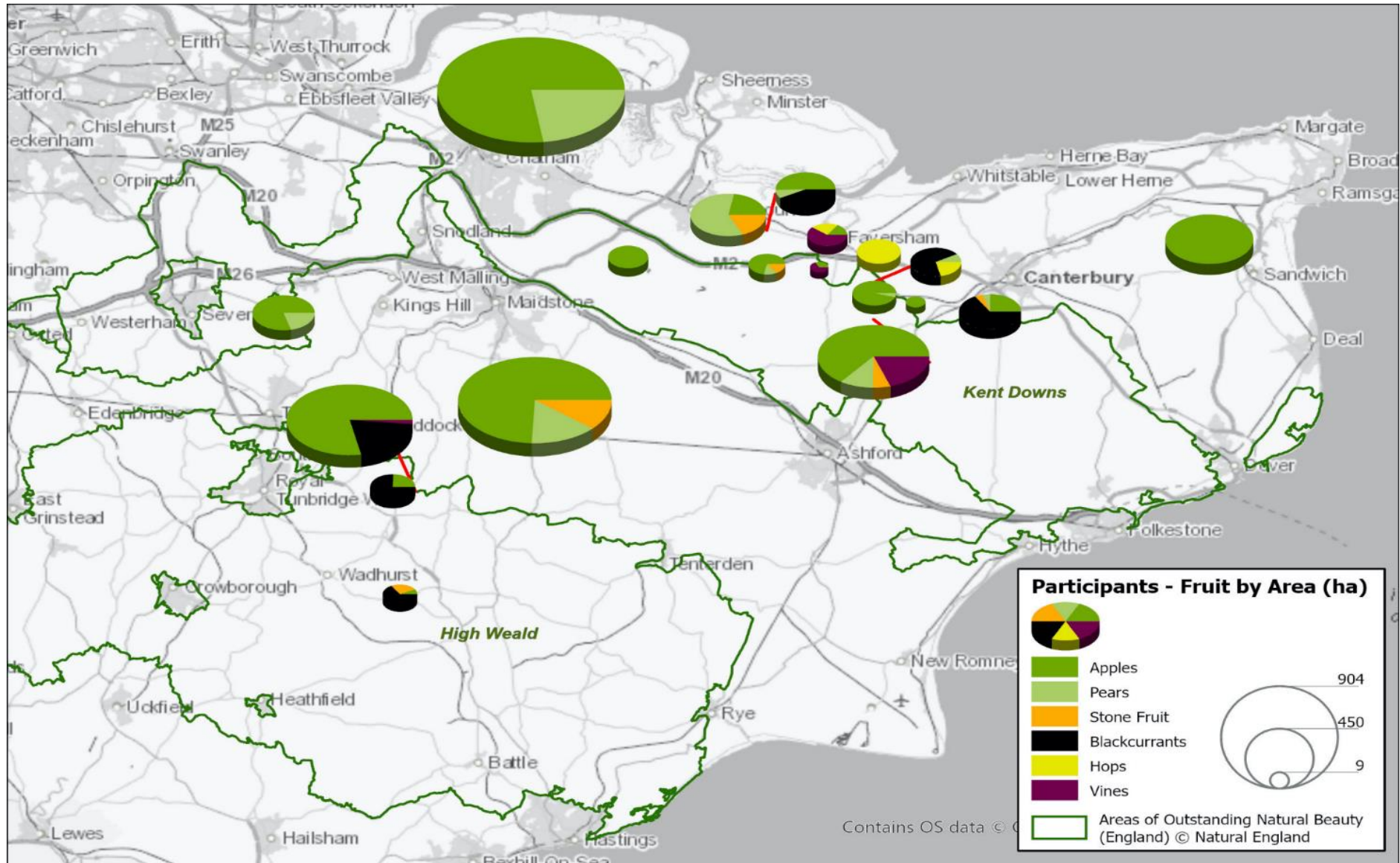


Figure 2: Location of main site and size (ha) of participating businesses

Figure 3: Cover crop between newly planted blackcurrants



3 Findings

3.1 Environmental risks

All human activity has environmental consequences, benign or otherwise, and the commercial production of row fruit and similar crops is no exception. Obviously, the initial clearance of land of the original vegetation for human farming activities had a major impact on wildlife ecology and the landscape, both at the time and subsequently. However, such activity is deeply historic and highly unlikely to recur so does not warrant further consideration here. Indeed, the opposite practice of taking some parcels of land out of production and developing them into habitats suitable for local flora and fauna (akin to re-wilding) is much more likely now. The main risks from agricultural and horticultural production are well known and documented and therefore do not need to be detailed here but are summarised instead. *[Ref. Protecting our Water, Soil and Air - A Code of Good Agricultural Practice for farmers, growers and land managers Published by Defra 2009]*

3.1.1 Soil

The main risks to soil from agricultural and horticultural production can be summarised as:

- Erosion and soil loss
- Compaction and loss of structure and aeration
- Flooding, water-logging and stagnation
- Organic matter and nutrient depletion
- Contamination

3.1.2 Water

The main risks to water from agricultural and horticultural production can be summarised as:

- Scarcity and competition for use
- Flooding, erosion and run-off
- Drought
- Compromised quality and contamination by sediment, nutrients chemical pollution and animal by-products

3.1.3 Climate

The main risks to the climate from agricultural and horticultural production can be summarised as:

- Non-renewable resource consumption for fuels, plastics, agrochemicals and fertilisers etc.
- Greenhouse gas emission
- Depletion of soil-stored carbon

3.1.4 Flora

Inevitably the production of a crop changes the habitat and restricts the availability of space and resources to other non-crop species of plants, lichen, mosses, fungi etc. The use of cultural and crop protection measures favours some species over others. The risks can be summarised as:

- The use of herbicides and management of grass sward that are unfavourable to plant diversity and vegetation structure
- Loss of habitat
- Restricted range of species
- Increased competition
- Decline in population

3.1.5 Fauna

For most of the time orchards and plantations are empty of human activity and available to wildlife, depending on the type and security of fencing around the site.

Orchards and plantations are visited by many mammals, birds, reptiles, amphibians and invertebrates but the use of cultural and crop protection measures again favours some species over others. The risks can again be summarised as:

- The use of insecticides will limit biodiversity and directly kill some species
- Loss of habitat
- Loss of food resource
- Restricted range
- Decline in population

3.1.6 Landscape

With their straight lines and height orchards, blackcurrant plantations and hop gardens provide landscape structure, texture and variations in colour throughout the season. Risks to the landscape can be summarised as:

- Uniform monoculture
- Poly tunnels, rain covers, hail nets etc.
- Unsightly temporary buildings such as portable toilet blocks, caravan sites for pickers etc.

3.2 Industry practice

The grower interviews established the production systems and current practice of the participating growers. In order to market their produce through a multiple retailer in the UK, fruit growers must be a member of a quality assurance scheme. All participants were members of the Red Tractor Assurance Scheme and 11 of them were also members of the LEAF Marque scheme.

3.2.1 Red Tractor

Building on earlier schemes Red Tractor was established in 2000 and is the UK's largest farm and food standards scheme, covering animal welfare, food safety, traceability and environmental protection. It is a 'not for profit company' run by the food industry to ensure that food comes from a trustworthy and safe source. Fresh produce that is certified by Red Tractor is also recognised as equivalent to Tesco's Nurture scheme and the worldwide standard for good agricultural practice, GlobalGAP. [Ref. *Red Tractor Assurance for Farms Fresh Produce Scheme - Crop Module Top Fruit Published June 2016*] NB This currently still applies until the Red Tractor Crop Protocol review is complete and Version 5 of its Standards is launched.

Members must follow the guidelines and standards set by the scheme and they are regularly audited by independent experts to ensure that their production both adheres to legal requirements and meets the high standards of the scheme itself.

Members are required to conduct a formal risk assessment on all crops from planting and crop production processes through to storage and packing and for vehicles which are the member's responsibility for product transportation. These risk assessments are to identify any physical, chemical, allergenic or microbiological food safety risks or hazards. Where a risk or hazard has been identified there must be clear preventive actions developed and implemented within the operation to mitigate or control the risk to an acceptable level and ensure that crops are food safe. Traceability is an important element of the scheme.

Members are advised to select the most environmentally benign crop control product that provides effective control and to time applications to safeguard beneficial and non-target insects. Comprehensive records are required for all crop protection applications, including justification for the treatment from crop monitoring and also weather conditions.

In the scheme it is recognised that increasing biodiversity on the farm is an important factor in building up reliable numbers of predators against a wide range of the pests that can attack fruit crops. Members are reminded that the provision of alternative hosts and food sources attractive to predators at different times in the season to the crop plants, is a valuable way of encouraging predators onto the site. Leaving grass alleys un-mown has been shown to encourage anthocorid bug predators in orchards and is therefore encouraged.

When planting windbreaks around an orchard or planting up a non-cropping area, growers are encouraged to include goat willow, hazel and cherry plums alongside the normal alder species to provide food and havens for predators such as anthocorids and lacewings. Sowing annual flowering plants, such as *Phacelia* spp, mustard and wild carrot around headlands or in fallow areas to encourage a wide range of pollinating insects and predators such as typhlodromid mites, ladybirds, hoverflies and anthocorids is advised.

Although the standards recognise that maintaining a weed free strip, at the same width as the tree canopy between flowering and harvest, will improve yields and fruit size they point out that if this is done using repeated doses of fairly soluble residual herbicides and if no organic matter is returned to the soil, environmental contamination and soil degradation may result. Growers are therefore advised to use a combination of mulches and contact herbicides and the minimum of residual herbicides in

Figure 4: Native species windbreak



the weed control programme. In practical terms the only approved residual herbicide, pendimethalin, is unavailable for tree fruit and blackcurrants and growers use the only approved contact/translocated herbicide, glyphosate.

The use of mulches makes it possible to reduce herbicide inputs by achieving a significant suppression of annual weeds. The standards recommend that straw or other organic mulches are used, because when they biodegrade and are incorporated into the soil by worms, the soil is enriched and aerated and carbon is stored. Organic mulches are best applied as an even layer approximately 10cm thick after blossom when the soil has warmed up but while it still has plenty of moisture reserves. The standards recommend that this layer is topped up biennially as a complete layer will suppress the summer germinating weeds. If the mulch is maintained, good control of annual weeds can be expected throughout the year.

The standards advise that regular analysis of soil, leaf and fruit samples should be made, with soil analysis done at least every three years. Fertiliser rates should be determined as a result of these analyses and limited to those sufficient to achieve optimum cropping. Growers are advised to avoid large single doses as generally uptake is improved and leaching is reduced if smaller doses are applied at intervals. It is strongly advised that nitrogen applications are limited to those periods of the year when the roots are active and can take up the nutrient. Growers should avoid applying nitrogen between mid-autumn and early spring when uptake is low and rainfall will flush nutrients down the soil profile into groundwater. Where leaf and/or fruit analysis and previous history indicate low levels of major or micronutrients it is recommended that soil applications may be supplemented with foliar sprays. Growers are strongly advised not to apply fertiliser to conservation areas or wildlife corridors.

Red Tractor is currently consulting over the development of Version 5 of its Standards. There will be an increased expectation for Site Risk Assessments and the scheme will supply new templates for Risk Assessment, Internal Audit and Site Risk Assessment to support smaller growers. *[Ref. Red Tractor Assurance for Farms Fresh Produce Scheme - Fresh Produce Standards Version 5 - 2021]*

Regarding the environment the proposed Version 5 Standards highlight:

Increased consumer awareness of the importance of 'Caring for the Planet'

Changes to plant protection products store requirements to reflect best practice

New Standards to cover record keeping and professional advice in the use of biological controls

Improvements on waste management to encourage use of the waste hierarchy and to help direct farms to reputable waste handlers

3.2.2 LEAF

Established in 1991, LEAF has been committed to driving change and delivering more sustainable farming through the adoption of Integrated Farm Management (IFM). Their vision for the next 10 years is "to inspire and enable more circular approaches to farming and food systems through integrated, regenerative and vibrant nature-based solutions, that deliver productivity and prosperity among farmers, enriches the environment and positively engages young people and wider society." *[Ref. LEAF Marque Standard for all inspections from 1st January 2020 Version 15.0]*

Members of the LEAF Marque scheme are expected to understand that protecting and enhancing biodiversity lies at the very heart of IFM and that they have a significant role as custodians of the countryside, managing natural resources, landscape and wildlife on behalf of society. LEAF recognises that proactive conservation management and constructive protection of natural resources is essential to allow healthy populations to flourish and enrich the environment.

LEAF states that a healthy and diverse on-farm biodiversity will help deliver more robust and resilient agriculture. This is partly due to the multitude of ecosystem services that biodiversity contributes to food production, including pollination, pest control, preventing soil erosion, flood prevention and improving water quality. In addition, LEAF considers that the social value of biodiversity should not be underestimated and that a rich, living, breathing countryside is a crucial link between consumers and farmers. LEAF claims that actions undertaken under the LEAF Marque Standard have proven environmental performance impact, including conservation and biodiversity, Integrated Pest Management, soil quality, animal welfare, non-renewable resource use efficiency, community relations and water resource management.

LEAF Marque members must develop an effective farm management strategy in order to maintain, protect and enhance the UK's valuable biodiversity and to improve their farm's contribution to the environment. Growers are expected to optimise this valuable natural resource, to create an improved awareness of the importance of biodiversity and locate those special areas on their farms where there is an opportunity to improve habitats and their quality over time. LEAF considers that the quality of habitat is more important than quantity of habitat. Although members are strongly encouraged to aim to increase the area set aside for habitat LEAF currently state that for maximum overall impact it is "more important to ensure that all habitat is actively managed to optimise the quality for biodiversity." These two statements are not really contradictory as they recommend an overall environmentally sound approach with increased focus where it would be of greatest benefit.

Members follow 'Six Simple Steps' to help improve the performance, health and long term sustainability of their land. They are encouraged to set a baseline by assessing and mapping their habitats and identifying priority areas for monitoring, managing and enhancing their biodiversity. They are encouraged to keep a photographic diary of those areas that they specifically value or are proud of or are looking to improve and where they have seen change and enhancement over time. By recording and mapping their farm they build up a long term picture of how they have managed and protected biodiversity as an integral part of their production systems. The LEAF Six Simple Steps for managing biodiversity are:

1. Identify habitats
2. Identify key species management
3. Manage farmland sympathetically
4. Be pro-active in management of habitats
5. Enhance existing habitats and populations
6. Work with others

[Ref. <https://leafuk.org/farming/simply-sustainable-series>]

As part of its public engagement LEAF manages Open Farm Sunday, a widely supported and effective annual event when LEAF members in the industry open their gates and welcome consumers onto

farms to discover the story behind their food and the vital role that farmers and growers have in caring for the countryside. LEAF manages Open Farm School Days which encourage school children out onto farms to learn more about where their food comes from and how it is produced.

LEAF is also working on a LEAF ELM Test and Trial [Ref. *LEAF ELM Tests & Trials - Key Findings to date Published March 2021*]. Amongst the many conclusions drawn by LEAF are that:

- Apps such as the one under development during their trial could play a role in on-farm self-assessment of public goods including biodiversity. Offering apps as an optional tool complementary to existing advice services and monitoring networks could avoid discrepancies between diverse farm circumstances and build on existing skills, knowledge and experience
- To provide information of an adequately reliable and consistent quality for government use, any app-based tool will require training, support and verification and uptake of app-based tools will be dependent on user confidence in protocols regarding gathering, transfer, storage and end-use of data
- Integration with existing software, hardware and network capabilities is critical

They also point out that the LEAF Sustainable Farming Review is a tried and tested tool to plan and record environmental actions and practical decisions within a whole farm system and has potential to be adopted as a Land Management Plan (LMP) for the schemes that reward environmental benefits (previously labelled E.L.M. scheme). [Ref. *LEAF Marque Certification as Indicator of Public Goods Delivery Through E.L.M. Interim Report, September 2020*]. Earned Recognition of outcomes delivered by the LEAF Marque assurance system has precedent in the UK agri-environmental context through reduced inspection burden for cross-compliance under the Common Agricultural Policy. Furthermore, LEAF Marque Standard v.15.0 contains mandatory Control Points pertaining to the delivery of all six public goods intended for payment through the schemes that reward environmental benefits.

Although the process of progression towards LEAF Marque certification has brought additional benefits to participating farm businesses, including addressing their carbon footprint and making cost savings through energy, water and nutrient use efficiency, it is clear that the time taken to complete paperwork was the single biggest barrier for participants.

LEAF warns that the new Sustainable Farming Incentive scheme and its sister schemes need to present clear benefits to justify time spent on administration or engagement will be lost regardless of training and advice provision.

3.2.3 Industry benchmark

All producers are expected by law to abide by the statutory rules and regulations that apply to the industry and this can be taken as the baseline. As noted previously, in order to market their produce through a multiple retailer in the UK, fruit growers must be members of a quality assurance scheme. All participants in this study are members of the Red Tractor scheme, a benchmark that is above and beyond the baseline of simply adhering to legislation.

3.2.3.1 Soil

All the row fruit crops covered in the study, except the hops, are planted with grass sward alleyways and headlands. The use of overall herbicide on the orchard floor is no longer practiced, with the exception of hops. There are also examples of traditional orchards with an overall sward floor but due to them being uneconomic they are not usually to be found on commercial fruit farms and there was only one in the sample. Historically the orchard floor of some traditional pear orchards was routinely cultivated during the growing season to control competitor weeds but this is no longer practised.

3.2.3.1.1 Erosion and soil loss

As a consequence of the perennial nature of these crops and the use of sward alleyways and headlands, the incidence of soil erosion is very rare and limited to particularly steep slopes in wet winters. In comparison with broad acre annual field crops the risk of soil erosion from row fruit production is minimal because the production systems actually restrict lateral water movement, diminishing the problem.

3.2.3.1.2 Compaction and loss of structure and aeration

Due to the longevity of orchards and plantations and their layout, it is inevitable that tractors and equipment will follow essentially the same path through them resulting in semi-permanent wheelings, particularly in the alleyways and in very wet weather conditions. The compaction underneath these is reduced to some extent by the roots of the sward and by minimising traffic. Some participants mow the sward in the same pass as applying crop protection sprays, thus reducing the number of passes. Modern equipment is lighter and with better wheels and weight distribution than older kit. The use of four-wheel drive tractors reduces wheel slippage. Where compaction has occurred it is usually addressed by the periodic use of wing-tined or similar subsoiling equipment to break up the compacted layer during suitable weather conditions later on in the season when the soil has dried out.

3.2.3.1.3 Flooding, water-logging and stagnation

Flooding of orchards and plantations is very rare and generally confined to those sites adjacent to watercourses in very wet weather. Except on the very best soils, such as the brick-earths of North and East Kent, the majority of sites have field drainage installed, draining into ditches, ponds or watercourses. A few sites have low-lying areas subject to seasonal water-logging dependent on the level of rainfall and this clearly has a deleterious effect on cropping levels and fruit quality. Consequently, on some sites these areas have been taken out of cropping and developed into habitats suitable for local flora and fauna.

3.2.3.1.4 Organic matter and nutrients

Modern agricultural practices can result in a decline in organic matter in the soil and this is a particular problem for broad acre annual crops. Prior to planting most row crop growers will grow a break cover crop of some type for a year or two. This helps to stabilise the soil, reduce the populations of weeds, pests and diseases and adds organic matter to the soil. The crops in this study are all perennial and deciduous, so during the life of the crop the annual leaf fall returns organic matter to the soil via the work of earthworms.

Organic mulches are widely used nowadays during orchard establishment and in some cases throughout the lifetime. As well as suppressing weeds and conserving soil moisture these add organic matter to the soil.

It is now very rare for orchard or plantation prunings to be raked out and burnt and instead they are left in situ in the alleyway and pulverised, thus adding organic matter to the soil. Historically, at the end of their life trees and bushes were bulldozed out of the ground, piled up and burnt. This is still widely done but some businesses are starting to explore the use of forestry-derived machinery for pulverising trees in situ after grubbing up, thus returning organic matter (and carbon) to the soil.

Hop bines are removed from the hop garden (yard in the west of England) as part of the harvest process and turned into compost, which is spread on non-hop land due to the disease risk.

None of the participants apply fertilisers using a broadcast spreader but instead use a band spreader to apply them just to the strip beneath the crop. Some of the participants applied fertiliser in the irrigation (fertigation), particularly in their newer orchards. All applications are based on the results of regular soil analysis and often leaf and fruit analysis too. A few participants had commissioned specialists to carry out a full soil mapping of their holdings. All participants were aware of the relative performance of different areas of their sites and some adjusted their rates of fertiliser application accordingly.

3.2.3.1.5 Contamination

In addition to the legal regulations, the high cost of fertilisers and crop protection products means that growers manage production to ensure that these inputs are tailored to the needs of the crop and not wasted. This minimises environmental contamination of the soil, surroundings and watercourses.

3.2.3.2 Water

Historically row fruit crops were not irrigated and neither were blackcurrants or hops. There was some irrigation applied by rain gun on some farms during the latter half of the last century but this was not common. Over the last 30 years, as part of the development of modern intensive production systems, many new apple, pear and stone fruit orchards have been equipped with either trickle irrigation or fertigation (artificial fertiliser added to the irrigation water) systems. These systems, generally used in conjunction with soil moisture sensors, control water application by computer to ensure that water is only applied when the level in the soil is inadequate for the needs of the crop at that stage of development. The more sophisticated systems also use leaf wetness sensors to measure evaporation and are linked to automated weather stations.

Some of the participants relied on mains water, either drawn directly as required or drawn during the winter and stored on site. Others have abstraction licences from either boreholes or watercourses, again sometimes restricted to the winter months and requiring on-site storage. Some had built reservoirs and others use natural ponds or lakes. Others had constructed large water tanks. All of the participants have met the legislative requirements to safeguard the soil and groundwater from the washings when cleaning out spray application equipment and some had built bio-beds or bio-filters to manage and process these washings. Some of the participants have invested in rainwater collection from building roofs to use in sprayers and as grey water in buildings.

Figure 5: Pear and apple orchard



Although water use by the crops in this study is very efficient in comparison with broad acre annual field crops, nevertheless there are risks associated due to the availability of water, whether from the mains supply or by abstraction. A large proportion of UK commercial tree fruit production is situated in the south-east of England, one of the drier areas of the country. The population density and pressure of new house building is also more marked in the south-east and so there is increasing competition for the limited resource of mains water. Even those with abstraction licences from boreholes and/or watercourses will be affected by restrictions imposed in times of drought and limited supply, a concern mentioned by many of the participants.

Animal derived manures are rarely applied in row fruit production, except sometimes during establishment, but then only according to the regulations on rate and timing. The use of artificial and organic fertilisers are well known to present a risk of groundwater pollution, particularly from nitrogen and phosphorus, and legislation and guidance have been in place for some years to control the problem. Fertiliser rates based on regular analyses and tailored to the crop, along with the widespread practice of band spreading fertiliser just beneath the crop plant and not broadcasting it overall in row fruit crops, have successfully reduced the risk of this type of pollution in row fruit production. Fertigation and foliar feed application at specific times of the year has further minimised this risk as applications are finely tuned to the needs of the crop plant at each growth stage.

For many years crop protection chemicals (herbicides, insecticides and fungicides) have been detected in both groundwater and watercourses and legislation has been enacted to address the problem. Over the last 40 years the crop protection industry has developed more efficient, more specifically focussed products that are applied at considerably lower rates per hectare than in the past. Over the same period the fruit industry has moved from high volume application (1,100 l/ha) to low (300 l/ha) and ultra low volumes (<150 l/ha) applied more accurately with specialised machinery designed to limit, or in some cases (tunnel sprayer) eliminate, spray drift.

In addition to improving the microclimate, windbreaks and hedgerows help to intercept and prevent drift. All these measures have resulted in decreased pollution of groundwater and watercourses by crop protection products and their breakdown products. According to the Pesticides Forum “indicators in this report suggest that pesticides are being used in an increasingly sustainable fashion as a result of government, industry and other bodies working collaboratively.” *[Ref. Pesticides in the UK - The 2017 report on the impact and sustainable use of pesticides]*

3.2.3.3 Climate

The use of fossil fuels to power farm equipment and vehicles and mains electricity to light and power controlled atmosphere cold stores and pack-houses clearly contribute to the release of greenhouse gasses, particularly CO₂. Replacement of old machinery with more efficient new models certainly helps to reduce the amount of greenhouse gasses emitted, as does minimising the run time by improved planning of operations. There are currently no suitable electric or hydrogen powered tractors available commercially for the industry but some of the larger participants expressed an interest in trialling them in the future as and when they become available. Many of the participants have replaced gas or diesel powered forklift trucks with electric ones and have replaced older lighting with modern energy efficient LED systems. Some of the larger participants have invested in solar panel arrays to generate electricity.

Frequent cultivation increases the release of greenhouse gasses into the atmosphere. However, the perennial nature of row fruit crops and the sequestration of carbon in the plant structure and in the organic matter in the soil all help to minimise the release of greenhouse gasses into the atmosphere throughout the life of the crop, generally around 20 years for modern systems.

There are clearly emissions of greenhouse gasses arising from row fruit crop production but they are offset to some extent by carbon sequestration by the crops. Some participants have already conducted a carbon footprint audit, feeding into plans for a future carbon neutral target. One industry body is currently conducting a similar project for the UK apple and pear industry.

3.2.3.4 Flora

The use of sward alleyways and headlands encourages a range of plant species within these areas. However, the relatively frequent mowing of the sward to limit competition with the crop imposes a selection pressure and also influences the availability and abundance of flowers for visiting insects. Dandelions are a good food source for many insects and due to their prostrate habit and repeat flowering can be encouraged in alleyways and headlands by reducing the frequency of mowing, and this was practiced by some participants. Some participants had also tried sowing wildflowers in and around the orchard or plantation. Unfortunately, as many of the flowering plant species that support beneficials and neutral insects are uncompetitive with other species in the sward it is therefore necessary to re-sow these seeds annually or biennially, an additional drain on finance and labour.

Following research into the major pest pear sucker, it was shown that allowing the common stinging nettle to grow in and near pear orchards encouraged high enough populations of the predatory anthocorid bugs to ensure that in most seasons no pesticide sprays were required for this pest. Many pear growers now therefore encourage nettles. *[Ref AHDB Factsheet 28/12 Developing integrated management controls for pear sucker]*

The area underneath the crop is still generally managed as a weed-free strip using herbicides, although during crop plant establishment these strips may be kept weed-free using an organic or plastic mulch. The range of herbicides currently approved and available for growers to use is much more restricted now than in previous decades and has resulted in increased use of mulches and more non-crop species being present in orchards and plantations.

To improve the microclimate in the orchard or plantation, particularly during flowering and pollination early in the season and later on in the run-up to harvest, most sites are well protected from wind by windbreaks, hedges or woodland. The Red Tractor assurance scheme standards for top fruit state that “All orchards should be adequately protected by deciduous windbreaks/hedges to ensure a good microclimate in the orchard and minimise spray drift.” Single species windbreaks such as poplar or alder are increasingly being augmented with wildflower margins or replaced with mixed species hedging to improve the environment for insects and birds. *[Ref. Red Tractor Assurance for Farms Fresh Produce Scheme - Crop Module Top Fruit Published June 2016]*

Various lichen species are common on older trees (30+) but not so on younger ones and so lichen is very rare in modern orchards, which are generally grubbed and replaced after 20 years.

Numerous fungi are present in orchards and plantations and most are generally beneficial or harmless and so ignored. However, those that cause disease and crop losses are very much focussed on, resulting in the majority of the crop protection spray applications made during the season. Modern fungicides are applied at very low rates and volumes only when required and so the effect on non-target organisms is minimised. The most recent developments have recruited other fungi and bacteria to compete with or attack the target disease, thus further reducing fungicide use. All of the participants modified their spray programmes taking crop monitoring, weather conditions and disease prediction models into account and some had their own weather stations on site using these disease modelling programs to provide warnings and justify treatment.

Inevitably the production of a crop restricts the availability of space and resources to other non-crop species but, in comparison with many other crops, row fruit share more of their environment with non-cropping plant species and so the risk to the latter is minimised.

3.2.3.5 Fauna

Orchards and plantations are not wildlife deserts and indeed are visited by many species, some welcome and others not. Sheep used to graze beneath standard trees but are not part of the modern orchard production system. Rabbits can cause considerable damage to tree trunks and branches and so are protected against either by individual tree guards or more commonly nowadays by a rabbit fence around the site. Voles and mice can on occasion cause damage to trunks and roots, particularly when sheltered from predators underneath a mulch. On some sites, deer feed on young trees and need to be excluded by taller fencing. Badgers do not generally damage crops but they can play havoc with fencing and so badger gates need to be installed where badgers have their habitual runs. Foxes are partial to fallen fruit and their black droppings are often found in orchards, but they are not known to scump. Depending on the site, lizards, snakes and amphibians might be present too and their presence is safeguarded.

Most birds are welcome guests and generally no protection measures are required against them. Historically bullfinches caused considerable damage to developing flower buds but the decline in numbers means that they are no longer considered a pest and the occasional sighting is appreciated. Pigeons can feed on sprouting leaves of some trees, particularly cherry, but in most cases this is not serious enough to warrant the use of bird scarers except on very young trees. In some locations, rooks damage apples prior to harvest and so bird scarers are required to minimise losses, which have been recorded as high as 10%. Historically starlings caused major crop losses of cherries but the widespread use of bird-proof netting to protect this valuable crop has worked and bird damage is now mainly limited to the odd jay or blackbird that has sneaked in around the net.

By far the most numerous of fauna that live in or visit orchards and plantations are the invertebrates, including worms and insects. Most of these are either beneficial or have no effect on the crop but there are some that are considered to be pests i.e. they cause economic damage.

The guiding principle of Integrated Pest Management developed and adopted over the last 40 years has been to limit harmful effects on beneficial insects and indeed to encourage them in order to control pests. Recent developments include the deployment of naturally occurring bacteria and viruses to

control pest insects. Modern insecticides are applied at very low rates and volumes only when required and so the effect on non-target organisms is minimised.

To improve biocontrol, leading growers modify the environment to suit beneficial insects. This ranges from including food and shelter plantings that favour them to providing sites that help with overwintering and nesting such as earwig refuges, bug and bee hotels, sunny bare soil for solitary bees etc. Not all of the flowering plant species that support beneficials and neutral insects are particularly competitive and it is often necessary to re-sow their seeds annually or biennially.

Crop monitoring and pest insect trapping is used by all of the participants, and indeed most of the industry, to determine whether control is required or not and to allow fine tuning of the timing of insecticides and to minimise the number of applications. Recent developments in novel biocontrol and mating disruption technology have been taken up by some. The adoption of spray programmes and cultural practices that encourage beneficial species and do not harm non-target species reduces the risk to the latter.

3.2.3.6 Landscape

By their very nature orchards, blackcurrant plantations and hop gardens provide landscape texture and variations in colour throughout the season. Tree fruit crops particularly add colour during blossom and prior to harvest and thus are already considered to be an important landscape feature. Indeed, blossom trails are annually way-marked in Kent and other fruit growing areas to encourage the public to drive around the area appreciating the sight.

When thinking of an orchard the public often conjure up bucolic images of lambs gambolling amongst the grass and wildflowers underneath the spreading branches of tall old gnarled fruit trees laden with red apples. Apart from the fact that lambs and ripe apples do not share the same time frame, the demands of the marketplace and realities of the economics of farming today simply preclude commercial production with such systems. Despite other sources of support for such traditional orchards having been available in recent years their numbers are very low and often represented by non-commercial Community Orchards.

3.2.4 Best practice

All of the participants, indeed much of the industry, have made considerable improvements in recent years in their custodianship of the countryside and protection of the environment in which they live and work. All participants demonstrated that they were trying to achieve many elements of best practice. Best practice can be summarised as:

- Growing on the best available site for the crop and not on marginal land
- 'Sacrificing' marginal and less productive areas to wildlife habitat
- Improving drainage where required before planting
- Improving soil structure and organic matter content prior to planting and during the crop lifetime
- Accurate soil mapping
- Fertiliser programming based on regular soil, leaf and fruit analyses and cropping levels

- Accurate crop estimation using the latest technologies
- Precision placement of fertilisers
- If irrigation is required then installing the most efficient trickle system linked to soil moisture and leaf moisture sensors and local weather stations
- Preventing the contamination of watercourses, ditches, ponds etc. by minimising spray drift
- Use of a bio-bed or bio-filter to manage washings from crop protection equipment;
- Integrated crop management, including beneficial friendly spray programmes
- Insect trapping to forecast infestations and schedule sprays
- Mating disruption technology for pest species
- Weather stations linked to disease modelling programs to forecast infections and schedule sprays
- Regular crop monitoring or scouting
- The minimal and justified use of contact/translocated herbicides
- Development and maintenance of some bare soil within the site to provide nesting sites for solitary bees
- Routine use of organic mulches
- Pulverisation of prunings in situ to return organic matter to the soil
- Pulverisation of plants in situ at the end of their lifetime to return organic matter to the soil
- Multi-species hedges and windbreaks to minimise spray drift and enhance biodiversity
- Assessment and mapping of farm habitats and identifying priority areas for monitoring, managing and enhancing their biodiversity
- Encouragement of valuable flowering species and alternate hosts for beneficial insects in and around orchards and plantations
- Placing of earwig refuges and bug and bee hotels in and around sites
- Placing of suitable bird nest boxes around sites
- Regular reviews and updating of environmental plans and policies with the input of professional ecologists
- Addressing the whole farm carbon footprint using the most efficient equipment and management programmes to minimise greenhouse gas emissions
- Maintaining and encouraging responsible public access
- Engaging with and educating the public through on-farm events such as Open Farm Sunday, school visits etc.

The adoption of the full best practice suite is constrained by the level of investment, the time and the need for expertise required and the potential lost income from areas of ‘sacrificed ’land. All of which ultimately come down to cash.

4 Potential opportunities

As noted in the previous two sections much is already being done but there is more that still could be done, the barriers being the availability of staff time, management time and investment funds.

4.1 Environmental improvement

The landscape value of orchards, blackcurrant plantations and hop gardens is well recognised and little needs to be done to improve their contribution to landscape texture and variations in colour throughout the season. Most orchards, plantations and hop gardens are sheltered by windbreaks, hedges or woodland but some large orchard blocks do not have many windbreaks within them. In addition to benefitting the microclimate on the site, additional multi-species windbreaks would enhance the biodiversity and improve the landscape texture.

There are also opportunities to improve the landscape and environmental value of the land bordering these production sites. As noted in the previous section on best practice, there are measures to enhance biodiversity by providing and improving habitats and 're-wilding' less productive areas, sites prone to water-logging etc. that could be implemented or extended.

LEAF has clearly stated that they consider that the quality of habitat is more important than quantity of habitat. Although their members are encouraged to aim to increase the area set aside for habitat, their stance is that it is more important to ensure that all habitat is actively managed to optimise the habitat quality for biodiversity. This considered approach seems a sound principle on which to base the Sustainable Farming Incentive scheme.

4.2 Public goods

Tree fruit crops particularly add colour during blossom and prior to harvest and thus are already considered to be an important landscape feature. Public appreciation of the contribution of orchards to the rural landscape is encouraged by the seasonal signposting of blossom trails in the important fruit growing areas of England. Being perennial crops they have longevity within the landscape, providing time for the varied habitats that they provide to develop and mature.

Under the new schemes landowners will be expected to manage their arable and horticultural land to increase farmland biodiversity, including wild bird and pollinator populations by:

- Providing food rich habitats for a variety of species
- Managing pest populations
- Increasing habitat connectivity
- Strengthening landscape character
- Ensuring efficient use of nutrients
- Improving water quality by reducing levels of sediment, nutrients and chemical pollution in water
- Reducing flooding, erosion and run-off
- Maintaining or enhancing carbon storage, water storage and biodiversity
- Increasing resilience to climate change

- Reducing greenhouse gas emissions
- Contributing to improved local air quality.

As discussed previously in this report all of these issues are being addressed to a greater or lesser extent by the industry in order to meet legal requirements and the expectations of customers, in addition to their own sense of custodianship. The participants in this study were all keen to continue to contribute to public goods, as demonstrated by the actions agreed by them (see Section 5), but expressed concerns over the costs of such investment: in cash, lost income, staff and management time. Participants identified a need for further research on enhancing biodiversity in row fruit production systems and also for education and training for them and their staff.

Under the current and forecast economic climate the competing driver to trim costs further and invest in more efficient production is compelling. The payment structure for the schemes that reward farmers and land managers for producing public goods must therefore reward current good practice and be sufficiently attractive to encourage growers to make further investment in actions providing public goods. Proposed standards and levels of payment for the scheme pilots are summarised in Appendix 2 and can be found in full at:

<https://www.gov.uk/government/publications/sustainable-farming-incentive-scheme-pilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launching-the-scheme#annex-1>

Figure 6: Insectary plants in orchard



5 Comparison with Viticulture Test and Trial

The Viticulture Test and Trial [Ref. Kent Downs AONB ELMS Tests & Trials: Viticulture Published by Vinescapes June 2020] found a significant level of support for environmental conservation by vineyard enterprises. In that study the main areas of focus which were identified for further encouragement were:

- Evaluation of erosion risk when preparing land for planting vineyards
- The importance of organic matter in vineyard soils
- Managing the vineyard floor to promote biodiversity
- Minimising environmental and human risks generated by pesticide applications
- Promoting biodiversity in the vineyard environment through habitat management
- Integrated Pest Management (IPM) techniques for grapevine protection
- Conserving native species and controlling non-native invasive species
- Monitoring and reducing greenhouse gas emissions, and water, energy and carbon footprints
- Mitigating against and adapting to climate change

It was suggested that these could be encouraged by developing education and training. A need was identified for further 'local' research in this area to identify native species that could be re-introduced as beneficial to vineyard biodiversity and wider ecosystem services and natural capital in specific landscape types, and which would help vineyards meet the public goods tests for the schemes that reward environmental benefit of:

- Ensuring clean and plentiful water - by reducing spray applications and pesticide loss to ground and buffering against any future irrigation requirements
- Clean air - by reducing spray applications and tractor movements as less mowing would also be required
- Mitigation and adaption to climate change - by encouraging biodiversity and carbon sink potential within an adaptation setting, also offering shade in extreme conditions and reducing evapotranspiration
- Protection from and mitigation of environmental hazards - by reducing pesticide use and promoting biodiversity, also by reducing soil erosion through established ground cover
- Thriving plants and wildlife - by encouraging biodiversity and re-introducing native species through vineyard greening which in turn attract birds and insects, natural pest predators and may offer wildlife corridors
- Beauty, heritage and engagement - by improving vineyards aesthetic appeal insensitive landscapes, re-introducing native beneficial species, providing opportunity for a unique story of environmental land management in vineyards which should in turn attract visitors and wider engagement and interest in the work

The views of the growers consulted during the Row Fruit and the Viticulture Test and Trial studies were very similar. The general similarities between the production systems of vineyards, tree fruit orchards, blackcurrant plantations and hop gardens means that there is a great deal of overlap in the approach and practical actions that these distinct crop sectors are taking, and could take, to address the potential requirements of the new schemes that reward environmental benefit.

6 Proposed actions for Row Fruit Test and Trial

All the participants said that with bitter competition between the multiple retailers constraining prices plus inexorably increasing costs their margins were being continually squeezed. One participant stated that each year he 'bet the farm' and with one or two bad seasons he would go under and have to sell up. Under those circumstances cash available to the business is more likely to be invested in improving production and potential returns than on improving the environment.

The stance was unanimous amongst the participants that the value of pre-existing environmental protection actions that growers are currently taking should be recognised. There is a distinct risk that the environmental gains achieved to date may be eroded in the future as times get tougher. Therefore, in order to safeguard these gains during the difficult and potentially worsening economic climate, there should be remuneration for them and not just for new actions.

6.1 Actions that should attract funding

It is understood that participants in the various Sustainable Farming Incentive pilots, will be paid for land management actions that contribute towards a 'standard'. These standards will help farmers and growers to create greener landscapes, improve biodiversity and tackle climate change. More information on the standards and payment rates will be published by government in due course.

[Ref. <https://www.gov.uk/government/publications/sustainable-farming-incentive-scheme-pilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launching-the-scheme#annex-1>] It is not yet clear what actions will attract funding under the other proposed new schemes (Local Nature Recovery and Landscape Recovery, both due to be piloted in 2022) and so all of the actions proposed in this study are considered appropriate for the Sustainable Farming Incentive scheme. However, in due course some of the proposed actions may prove to be more suitable for one of the other schemes.

Currently it is envisaged that in the first phase of piloting, participants will be able to select from eight standards to build their own agreements. As the pilots progress more standards will be developed and introduced. Within each standard there will be three levels for participants to choose from: Introductory, Intermediate and Advanced. Each level is more challenging and rewarding than the previous level and will deliver greater environmental benefits. None of the standards will pay for things that are minimum expectations required by law.

Scheme participants will be able to choose which standards they want to apply for and to which land parcels they want the standard to apply. They will also be able to pick a different level for each standard, to develop an agreement that works for their business. From the consultations held during this Test and Trial the participants were happy with this proposed approach. The Test and Trial participants felt that scheme participants should be able to commit to a selection of actions suitable for their own particular sites and production systems and management and that it should not be necessary to commit to all actions or for all sites. From the consultations held during this Test and Trial the following actions are proposed:

- Production of a Land Management Plan (LMP), with professional help where external expertise is required

-
- Annual review of LMP against targets and timetable
 - Whole site evaluation to identify areas of lower productivity, awkward working etc. that could be suitable for turning into new wildlife habitat areas
 - Assessment and mapping of farm habitats and identifying priority areas for monitoring, managing and enhancing their biodiversity
 - Preparation and establishment of new wildlife habitat areas with suitable native plant species
 - Ongoing upkeep and management of wildlife habitat areas unless specifically prohibited e.g. for an SSSI
 - When grubbing and replanting sites, replacement of existing single species wind breaks surrounding sites (and internal orchard/plantation wind breaks where practicable) with multi-species ones of native plants
 - Provision of habitat continuity by linking wind breaks, hedgerows, woodland, watercourses and ponds to form wildlife corridors
 - Management of the understory of wind breaks and hedgerows to include plants that attract and support insects
 - Management of ditches, watercourses, ponds and lakes to enhance their habitat and biodiversity
 - Use of a bio-bed or bio-filter to manage washings from crop protection equipment
 - Establishment and maintenance of flowering plants within the site in alleyways and headlands that attract and support insects according to the latest R&D findings
 - Management of the alleyway and headland sward to enhance biodiversity and insect activity according to the latest R&D findings
 - Establishment and ongoing management of nesting sites suitable for solitary bees, particularly the bare strip beneath trees/bushes maintained by judicious herbicide use
 - Placement of earwig refuges and bug hotels in and around sites
 - Placement of suitable bird nest boxes around sites
 - Improvement of soil organic matter levels and soil storage of carbon by the application of 10cm depth of organic mulch at least biennially
 - Pulverisation of prunings in situ to return organic matter to the soil
 - Pulverisation of whole plants in situ at the end of their life to store carbon in the soil and improve soil structure
 - Soil mapping and investment in GPS guided equipment for precision placement of fertilisers
 - Determination of the whole farm carbon footprint and deployment of the most efficient equipment and management programmes to minimise greenhouse gas emissions
 - Installation and maintenance of fencing and hedging alongside public rights of way to improve public safety and reduce environmental contamination by the public
 - Installation and maintenance of explanatory signage to educate the public about production, biodiversity and the local environment
 - Establishment and maintenance of permissive access where safe and appropriate
 - On farm public events to educate the public about production, biodiversity and the local environment

6.2 Mapping these actions onto the proposed Standards

It is understood that for participants in the first phase of the National Pilot land management action payment rates will be roughly the same as those under Countryside Stewardship. This is considered to be the starting position and payment rates will be developed for the launch of the schemes that reward environmental benefit from 2022 in consultation with farmers, growers and representative groups.

[Ref. <https://www.gov.uk/government/publications/sustainable-farming-incentive-scheme-pilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launching-the-scheme#annex-1>]

Participants will be able to choose which standards they want to apply for and to which land parcels they want the standard to apply. They will also be able to pick a different level for each standard, to develop an agreement that works for their business. The payment rates for the pilots are shown in Appendix 2 and in the link above.

Following discussion during the Zoom meeting of participating growers and subsequent canvassing of opinion it was agreed that the following proposed actions and associated rates should be mapped onto the pilot standards as follows:

6.2.1 Arable and Horticultural Land Standard

Introductory level

- Production of a basic Land Management Plan (LMP)
- Management of the alleyway and headland sward to enhance biodiversity and insect activity according to the latest R&D findings

Intermediate level - all actions in the introductory level plus

- Production of a Land Management Plan (LMP), with some professional help where external expertise is required
- Triennial review of LMP against modest targets and timetable
- Establishment and ongoing management of nesting sites suitable for solitary bees, particularly the bare strip beneath trees/bushes maintained by judicious herbicide use
- Placement of earwig refuges and bug hotels in and around sites
- When grubbing and replanting sites replacement of existing single species wind breaks surrounding sites with multi-species ones of native plants
- Installation and maintenance of fencing and hedging alongside public rights of way to improve public safety and reduce environmental contamination by the public

Advanced level - all actions in the introductory and intermediate levels plus

- Production of a Land Management Plan (LMP) with external professional input
- Annual review of LMP against demanding targets and timetable
- Whole site evaluation to identify areas of lower productivity, awkward working etc. that could be suitable for turning into new wildlife habitat areas

- Preparation and establishment of new wildlife habitat areas with suitable native plant species
- When grubbing and replanting sites replacement of existing single species wind breaks surrounding sites (and internal orchard/plantation wind breaks where practicable) with multi-species ones of native plants
- Ongoing upkeep and management of wildlife habitat areas unless specifically prohibited e.g. for an SSSI
- Establishment and maintenance of flowering plants within the site in alleyways and headlands that attract and support insects according to the latest R&D findings
- Determination of the whole farm carbon footprint and consequent deployment of the most efficient equipment and management programmes to minimise greenhouse gas emissions
- Installation and maintenance of explanatory signage to educate the public about production, biodiversity and the local environment
- Establishment and maintenance of permissive access where safe and appropriate
- On farm public events to educate the public about production, biodiversity and the local environment

6.2.2 Arable and Horticultural Soils Standard

Introductory level

- Pre-planting soil assessment
- Triennial soil analysis
- Annual fruit analysis where appropriate
- Placement of fertilisers with a band spreader just to the strip beneath the crop
- Pulverisation of prunings in situ to return organic matter to the soil

Intermediate level - all actions in the introductory level plus

- Improvement of soil organic matter levels and soil storage of carbon by the application of 10cm depth of organic mulch at least biennially

Advanced level - all actions in the introductory and intermediate levels plus

- Detailed soil mapping and production of a soil management plan
- Investment in GPS guided equipment for precision placement of fertilisers
- Pulverisation of whole plants in situ at the end of their life to store carbon in the soil and improve soil structure

6.2.3 Hedgerows Standard

Introductory level

- Rotational cutting of hedges leaving some areas uncut
- Encourage occasional hedgerow trees

Intermediate level - all actions in the introductory level plus

- Increase the food and habitat available to wildlife by leaving more areas uncut or raising the cutting height, and by having frequent hedgerow trees

- Management of the understory of wind breaks and hedgerows to include plants that attract and support insects
- Protect hedgerows from crop protection products, fertilisers and physical disturbance with buffer strips

Advanced level - all actions in the introductory and intermediate levels plus

- Placement of suitable bird nest boxes around sites
- Provision of habitat continuity by linking wind breaks, hedgerows, woodland, watercourses and ponds to form wildlife corridors
- Establishment and maintenance of flowering plants within hedgerows that attract and support insects according to the latest R&D findings

6.2.4 Waterbody Buffering Standard

Introductory level

- Run-off and soil erosion risk assessment
- Grass buffer strips

Intermediate level - all actions in the introductory level plus

- Increased buffer strip width
- Rotational ditch management

Advanced Level - all actions in the introductory and intermediate levels plus

- Management of ditches, watercourses, ponds and lakes to enhance their habitat and biodiversity
- Use of a bio-bed or bio-filter to manage washings from crop protection equipment
- Provide further habitats for wildlife and enhance soil structure and nutrient uptake
- Improved diversity within the buffer by including an appropriate wildflower mix

6.2.5 Payment rates

Although it was recognised that the Government does not intend that these schemes be simply substitutes for the BPS it is inevitable that farmers and growers will compare the potential rates of payment for the new schemes with those currently available from BPS etc. The general consensus amongst the participants in this study was that the rates proposed for the pilots were insufficient to cover any but the most limited and basic activities and that they should be increased such that at the Intermediate level the total payment for Land, Soil and Hedgerow Standards together should be at least £250 per hectare and £350 - 400 for the Advanced level where considerably more input is required. It was felt that the ongoing cost of habitat maintenance (e.g. regular re-sowing of wild flowers) had not been taken into account by the proposed rates and that they should be.

The production of a simple Land Management Plan by the grower involves relatively little cost but would also generate correspondingly limited impact on the farm environment. A LMP that will generate measurable and valuable change in the farm environment will require a professional survey and detailed advice on planning and implementation. Clearly the scale and scope of such a LMP would depend on the size of the holding and number and types of production sites. Payment for a LMP could

be set at a % of the actual cost supported by the invoice or as an element of the payment rate for each level of the Land Standard e.g £2, £5 and £10 per hectare for Introductory, Intermediate and Advanced respectively.

Although the actions covering increased public access were mapped onto the Advanced Level of the Arable and Horticultural Land Standard in this study it is quite possible that these could either be included in another scheme or even stand alone. This will no doubt become clear as the schemes are piloted and developed further over time.

Concern was expressed over the cost of investment in expensive items such as GPS guided equipment for precision placement of fertilisers, whole tree pulverisers, bio beds and bio filters being borne entirely by the farm business and it was felt that there should be a level of grant aid made available for such investment, either as a separate element within the Sustainable Farming Incentive scheme or within another scheme.

6.3 Monitoring, oversight and assessing success

Government plans to determine how compliance checks for schemes that reward farmers and land managers for producing public goods can be implemented simply and effectively by exploring:

- How farmers can demonstrate success (or, failing that, demonstrate compliance) through record keeping including use of self-assessment to record progress – for example, photos and video evidence
- How to target compliance checks, such as random selection or risk-based selection, and how those checks should best operate how to focus compliance on the quality and outcomes of work, rather than the largely quantitative checks used under previous schemes
- How to focus any enforcement on improvement. For example, if a farmer is having trouble implementing an agreement, wherever possible Defra wants to help them improve, rather than penalising them for what they have not done well
- New ways of monitoring using geospatial data, remote sensing and virtual checks
- How membership of accreditation schemes may be recognised

The two main assurance schemes in the UK fresh produce industry are Red Tractor and LEAF Marque and there is a degree of interconnectedness between these two schemes. LEAF Marque requires farms entering it to also be a member of a baseline assurance scheme, and in the UK, this is almost invariably Red Tractor. In many cases, the assessments are consolidated and completed by assessors who are trained to assess both standards. The two schemes are complementary rather than in direct competition. A strong, progressive baseline increases the potential for best practice.

As the requirements of the Red Tractor Assurance scheme meet current legislation and address customer concerns over production and the environment it is proposed here that the annual Red Tractor audit should be accepted as evidence of baseline (Introductory level) and benchmark (Intermediate level) compliance. It is proposed that, as much as possible, the Sustainable Farming Incentive scheme should be monitored and assessed online. The apps proposed for development by LEAF look promising and in the meantime it is proposed that members of the new scheme should:

- Produce and upload a Land Management Plan (LMP) at the start of the agreement with clear targets and a timetable for delivery appropriate to the level applied for
- Provide evidence annually that they have successfully passed the Red Tractor Assurance scheme audit
- Provide evidence that the LMP has been reviewed and updated according to the timetable appropriate to the level applied for
- Provide evidence, at a frequency appropriate to the level applied for, of progress to meet the LMP targets and timetable, including photographs where appropriate
- Be prepared to host a spot check by an external auditor appointed to audit the schemes that reward farmers and land managers for producing public goods when required. Measured and monitored progress against the targets and timetable set in the LMP would be an assessment of success

Figure 7: Newly planted orchard with green compost



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- Mr Mike Phillips of White Horse Ecology
- Mr Charles Orrell of Natural England

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[1](#)

9 Appendix 1 Grower questionnaire

1. What predominant soil type do you grow on?
2. What type and area of fruit crops do you grow?
3. What access, visits and permissive paths do you allow and what public rights of way are there on your land?
4. Are you a member of either the Countryside Stewardship or the Environmental Stewardship Scheme?
5. Are you a member of an industry quality assurance scheme?
6. Are you a member of LEAF and/or FWAG?
7. Do you practice integrated management?
8. Do you practice biodiversity enhancement?
9. Do you practice precision farming?
10. Do you practice carbon management (solar panels, electric forklifts and tractors, what happens to prunings etc.)?
11. Have you invested in electrification and automation of equipment, robotics etc?
12. What water management do you practice (fertigation, drainage, reservoirs, rainwater collection etc.)?
13. What advice and/or training do you receive?
14. Do you have an environmental management plan (by whom, when and can you send me a copy)?
15. If no plan, why not?
16. If no plan then what steps do you take to protect the environment? (Margins and buffer zones, hedges and windbreaks, 'set aside', woodland, ditches and ponds, rivers etc.)?
17. Do you have any potential or planned environmental protection measures in mind for the future?
18. What do you feel are the barriers to your further investment in environmental protection measures (time, cost, reduced output, lack of expertise etc.)?
19. What potential incentives for further investment in environmental protection measures would you like to see (cash, flexibility, reasonable monitoring and oversight etc)?
20. What would you want the new Environmental Land Management Scheme to do for your business and what benefits would you like it to provide?

10 Appendix 2 Pilot proposed payment levels

A2.1 Arable and Horticultural Land Standard

Introductory level (£28 per hectare)

- Provide year-round resources for farmland birds and insects.
- Better meet your soil requirements by following a nutrient management plan.
- Minimise emissions of ammonia through rapid incorporation of organic manures and slurry on ploughed land.

Intermediate level (£54 per hectare) All actions in the introductory level plus

- Improve nutrient use efficiency and reduce losses to the environment by carrying out a nutrient budget.
- Increase habitat for farm and aquatic wildlife through rotational ditch management.
- Better target your nutrient application by carrying out soil mapping.

Advanced level (£74 per hectare) All actions in the introductory and intermediate levels plus

- Provide nesting and shelter for wildlife by having areas of tall vegetation and scrub.
- Benefit from crop pest predators by locating their habitats next to cropped areas.
- Use efficient precision application equipment for fertilisers and organic manures.

Additional payment on top of the base payment (£10 per tree)

This applies only to in-field trees on arable and horticultural land.

Actions required are to protect your in-field trees and provide a habitat for wildlife by having a buffer.

A2.2 Arable and Horticultural Soils Standard

Introductory level (£30 per hectare)

- Identify the priority areas for soil management on your farm by carrying out a soil assessment.
- Protect your soil from runoff, erosion and flooding and help increase crop yields by taking measures to maintain soil structure and avoid or alleviate soil compaction.
- Improve the soil structure and biology by inputting organic matter on some of your arable and horticultural land.
- Reduce the risk of soil erosion by cultivating and drilling across slopes where appropriate.
- Protect the soil from soil erosion and run-off by maintaining minimum soil cover over winter, where appropriate.

Intermediate level (£47 per hectare) All actions in the introductory level plus

- Further improve soil structure and biology by providing minimum inputs of organic matter over more of your arable and horticultural land.
- Maintain soil organic matter and support soil biology by reducing tillage depths on some of your arable and horticultural land.
- Reduce the risk of soil erosion and maintain soil organic matter by reducing tillage on fields identified as high and very high risk of surface runoff or soil erosion.

Advanced level (£59/ha) All actions in the introductory and intermediate levels plus

- Reduce flooding and improve soil structure, soil carbon and soil biology by producing a soil management plan.
- Reduce soil damage by limiting the area of the field that is travelled on.

Additional payment 1 on top of the base payment: £114 per hectare

This applies only to land you have assessed:

to be at high or very high risk of surface run-off or soil erosion; and/or land that regularly floods

Actions required: maintain good soil structure, retain nutrients and protect soil from run-off and soil erosion by establishing and maintaining dense winter green cover.