

Integrated
Pest
Management
CASE STUDY

“IPM strikes me
as a financial
no-brainer”



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Little Mill Farm (Peter Hall)

“I mean, to be honest, I don’t really see a downside to any of this. In terms of finance it doesn’t cost you more”

Peter Hall, Little Mill Farm, Marden, Kent

Farm size and soil type: 173 ha farm on clay loams with some areas of heavy clay Wealden soils.

History: Four generations of the family have farmed the land around Little Mill Farm since the business was established in 1896. Conservation management started in 1983. Organic conversion in 1987/88. Integrated crop management and innovative regenerative techniques have been developed on the farm over the last 25 years.

Crops Grown: 13 ha of conventionally grown apples, pears, plums. 90 ha combinable crops. Four ha Organic Concept Orchard.

Regenerative Agriculture and Integrated

Pest Management: Approximately 30% of the farm is managed for organic production – including apples, grassland and grapes. The rest of the farm is managed conventionally.



Setting the context and stating the issues.

Peter Hall inherited multiple challenges when he took over the management of Little Mill Farm, Marden in 1980. The orchards on the 173 ha heavy clay Wealden farm required considerable investment. Margins were tight and the increasing resistance of many insects to pesticides challenged the production system. Peter's training at Wye College under, amongst others, Professor John Nix, however, underpinned some important economic principles which have shaped the business: maximise the use of every asset, diversify income streams and aim high for business profitability. Never chase yield at any cost and build the farm's natural resources such as habitats and soil.

Investment into the natural assets of the farm has included the creation of 10 ha of wetland for flood control alongside the River Teise, 18 ha of wildflower meadow, otter holts together with 10 km of conservation headlands and field margins. The work has been partly funded by successive agri-environment schemes and has created a network of wildlife corridors throughout the farm. This habitat provides a haven for beneficial insects around the productive areas. Bird watching volunteers are engaged with ringing and recording the substantial increase in bird species on the farm. The business, which includes both organic and conventional

production systems, has won many environmental awards over the last thirty years including the prestigious M&S Organic Grower of the Year and The Fruiterer's Company Environmental Award.

Q: How did you get started on this journey to IPM?

From an early age, Peter enjoyed 'grubbing around' on the farm. His fascination with insects, boosted by experts from East Malling Research Station in the 1980s, has saved today's business thousands of pounds through effective use of beneficial predators controlling pests in the farm's commercial orchards.

"I've always grubbed around in the undergrowth. As a child, I used to get very involved with all these things and just enjoyed the natural world. Although I'm conventionally trained, I've always had a very sympathetic view on farming with the least possible impact."

But consumers demand perfect fruit, even in organic systems, and marketable yield can be decimated by both pests and diseases. Unlike arable systems, orchards lack rotations to build fertility, limit pests and reduce damage from disease. Modern fruit varieties have been bred to provide sweetness, a crunchy texture and year-round availability rather than pest and disease resistance. Typically, these varieties, such as the Gala grown on the farm, require repeated pesticide applications throughout the growing season.

"All these varieties are popular because they are year-round available. People like them, and they're very sweet and crunchy. They were grown for yield, and flavour, but the assumption was always that they were going to be grown with the full range of pesticides. If there's one scab or a spore around that's viable, it will germinate on Gala. Gala is super susceptible to everything."



Peter is very aware that climate change may be driving pest resistance through an increase from two or three – potentially to five generational cycles each year. *“The upshot of the increased temperature is going to be faster life cycles and reproduction of pest species. As you know, insects are pretty well 100% temperature-dependent in terms of their reproduction rate and their life cycle.”* At the same time older, damaging pesticides have been banned so growers must find alternative methods of control.

Q: Do you have examples of where IPM has worked well on your farm?

Two case studies show how Peter Hall has successfully developed IPM practices:

Building populations of pollinating and predatory insects.



Drawing (Peter Hall)

Orchards rely on beneficial insects for pollination and to control pests – both of which activities determine yield and profitability. The average size of the orchards at Little Mill is 2 ha (small in modern fruit growing) and the habitat provided by the hedgerows has been encouraged to flourish over years.

“I think that’s been a huge advantage in that you’re never far away from a hedgerow which is an absolute haven for beneficials – the pollinating insects and predatory insects. You know, we’ve got that great advantage.”

Large diverse hedges with field margins surround the orchards. These have provided perfect habitat for the insects that underpin yield. There is no need to establish additional pollinator habitat: *“We don’t need a species-rich alley because the orchards are small. There’s so much habitat around the outside that, whilst desirable, we don’t actually need to have it in*

the orchard as well. These little solitary bees like the bare-ground in the bottom of hedgerows; they’re brilliant at pollination. They’re 100 times more effective than honeybees, for example.”

Habitat also supports the predators that control pests in this IPM system. *“Predatory insects are so critically important. We have thick, multi-species hedges rather than just windbreaks. And, you know, it’s the creation of habitat that delivers the life cycle requirements year-round to the insects you’re trying to encourage.”*

Fruit tree red spider mite is controlled using IPM approaches. According to the AHDB, fruit tree red spider mite is an important secondary pest of apple particularly if its key natural enemy, the orchard predatory mite *Typhlodromus pyri*, is absent. The key variety grown at Little Mill, Gala, is particularly susceptible. Infected apple leaves are brittle and drop early. Heavy infestations causes ‘russetting’ which affects the marketable yield of apples and can harm fruit bud formation for the following year. Chemical control requires high volumes of sprays and red spider mite readily develops strains resistant to acaricides.

Peter has found that the best way to avoid resistance is to sustain healthy populations of *T.pyri* mites. Plus, the pesticides that are used in the conventional orchards are carefully chosen to minimise the impact on beneficial insects.

*“The pesticides we use are very specific and targeted, so we’re not killing off beneficial insects when they’re in the orchard whether they’re *Typhlodromus* in apples or *Anthocoris* in pears. With *Anthocoris*, we definitely rely on the jungle around the edges. We tailor the surrounding area to make it suitable for their overwintering. What I’m doing with IPM is using the best of modern technology and the best of grandfather’s husbandry. We are tipping the balance of power in favour of the good guys all the time.”*



Red spider mite (Alamy)

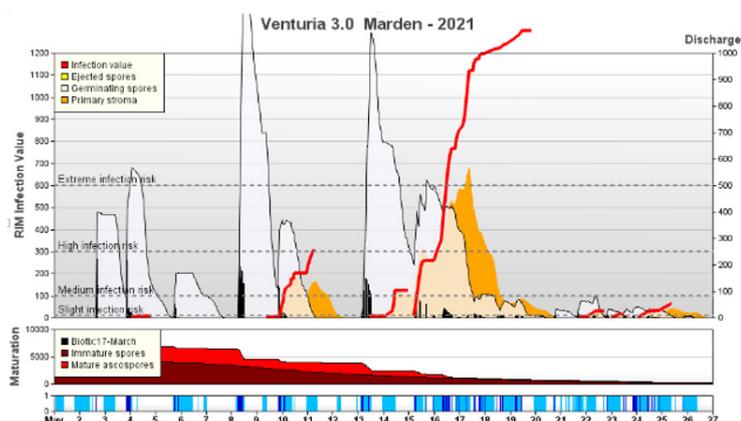


Apple scab (Alamy)

Minimising Apple Scab fungicides using meteorological data to target sprays.

Peter describes the challenge of minimising apple scab: *“It’s a fungal infection. It starts on the leaves and then it moves on to the fruit. When it rains, spores land on young growing tissue, which is very susceptible. Scab is a very, very successful disease. If you leave a chink in your armour, it will be through it. We had years where we got it wrong before we had this technology. I mean, it was just hopeless. We sprayed and sprayed and sprayed and sprayed - and then chucked half the crop on the ground.”*

The technology that has transformed the approach to scab control includes two weather stations and a computer programme. Peter has found that the weather stations are tough, cheap, robust and accurate. They have both lasted 18 years. Each year the data they provide reduces fungicide use by at least 33%. The programme combines accurate real time farm-level data about temperature and rainfall and leaf wetness and generates a graph of infection risk on which spray decisions can be based.



“I think the weather stations and the computer programs for predicting disease are absolutely essential because the vast majority of the sprays that go on are fungicides. With this approach you can time sprays absolutely spot on. So, for example, this year has been a pretty difficult year for apple scab. We’ve used our weather station meticulously and we use less chemical. We now spray every other row every week so we only do half the crop at a time. So we are using less product because the rates are lower. And we target each spray exactly on the weather. You can also extend the gap because there’s no sign of disease. It’s absolutely invaluable in terms of timeliness on everything.”

The weather stations are positioned to reflect conditions in the orchards and located close to the farm office to enable continuous wireless data download to the server.

The impact on fungicide use has been dramatic.

“Now the spraying is absolutely spot on. It’s effective. It works better. You use less product. The rates are lower. You can target it better. It’s predictive. You have better, okay timing, we’ve mentioned before. You extended your non-spray periods, and we now have no leaf scab as a result of it.

“We’re not not putting chemical on. It’s that we’re putting it on at the right time. So we will almost finish spraying for scab round about now. We might put the odd little bit of something in if we have really heavy pressure. But actually, we’ve done our work now. Whereas, if we hadn’t got it right, we’d be spraying the whole way through to autumn. So we’ve saved ourselves, you know, probably six to eight weeks’ worth of scab fungicides, for example. So just the very fact that it’s not going into the environment must have additional benefits.”



Apple harvest (Shutterstock)

The profitability of the crop has also increased.

"You're basically tailoring your spray program to exactly what's really happening rather than just putting a blanket where I spray every week or every ten days with this cocktail regardless of whether there's any pressure or not. We've brought down the number of spray rounds and reduced the produce applied by a third.

"The reductions [in fungicides] are huge because it doesn't just stop there. If you've got a crop that's full of disease, you can't sell it. So not only have you reduced your fungicide bill and the fungicide loading on the surrounding countryside, but you've also increased your marketable yield. The stuff that goes in the juice cart. I mean if it's not Class one, then it's worthless. It's just a cost.

"I reckon we have saved ourselves around about a third of the fungicides we've been applying previously by getting the timing absolutely right, particularly at the beginning of the season. Most of our savings are at the tail end of the season where we were able to stop spraying a great deal earlier and with no impact on yield – none whatsoever."



Yellowhammer David Norton
(rspb-images.com)

Q: What do you feel have been the main benefits of the IPM approach to your business?

Economic Benefits.

- Profitable crops to sell with lower variable costs (fungicides reduced 33%).
- Effective disease and pest control: no sacrifice of standards and minimal loading of chemical on the environment.
- Increasing marketable yield and avoiding crop failure.
- The weather station is affordable (£1160) robust and cost effective with a short payback period.
- Securing agri-environment payments makes habitat creation and management cost effective. Improved habitats surrounding orchards increases pollination, provides pest control and enhances the marketable yield.
- Buffer zones protect waterways reducing the potential for pollution and prosecution by the Environment Agency.

Environmental Benefits.

- IPM minimises the impact of chemicals on the wildlife.
- Massive increases in the variety of bird species and in bird numbers. Yellowhammers have increased from one pair in 2006 to 197 individuals ringed in 2017.

Personal Benefits.

- Tremendously satisfying to see more wildlife about. Great enjoyment from seeing the farm in better heart for the next generation – and sharing the farm with other people on farm walks.
- Wanting to produce not just food but food and nature. Knowing you are having a positive impact on the environment.

Q: Do you have any Top Tips for other Farmers who want to start IPM?

Create diversity in income streams.

- Look for opportunities to make more of your assets in whatever way you can. Take farm business management advice. Use outside eyes to evaluate your assets – all of them. Above all – enjoy the business side of farming.
- Secure agri-environment grants. Natural England staff can help you to do this. Both revenue income and capital grants are valuable for the business.

Grow for margins – not yield.

- Yield is nothing if it costs you a fortune to grow it.
- Focus on managing risk, cutting fixed costs and increasing profitability.

Learn to work with Mother Nature as she is your friend.

- Understand the science that underpins IPM
- Develop low cost practical and effective IPM solutions (e.g. distribute armfuls of leaves and branches containing *T.pyri* predators from suitable old orchards into new orchards).

Learn to trust your own judgement.

- Hold your nerve when pests appear and predators are building slowly.
- Don't spray and kill beneficial predators - Nature will provide the solution if you are prepared to help her.

- Learn to ask the right questions about the whole farm system.
- Look for the best websites and spend time there.
- Read trade magazines and look out for what is new.
- Use your existing agronomist's skills and experience - but also push them to think more widely about IPM as well.

Collaborate:

- Join a farmer cluster to build social networks.
- If no farmer cluster exists in your area - then start one! The Marden Farming Cluster started in 2020 and is supported by Kent Wildlife Trust.
- Make new contacts where you can. Introduce people to each other.
- Spot social opportunities that assist the business (e.g. renting buildings to suitable tenants).

Tell local people what you have achieved.

- Develop your bragging rights for the pub!
- Provide the evidence that farmers are doing good things for the countryside.

Finally – always remember WHY you farm this way.

- Using science in a way that builds nature provides the best solutions.

