

Integrated  
Pest  
Management  
CASE STUDY

“In the absence of  
chemicals, you need  
diversity in your system”

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*“The whole point is to get more nature on our farms, use less pesticide and have more freedom in our businesses”*

John Pawsey, Shimpling Park Farm, Suffolk

**Farm size and soil type:** Shimpling Park is eight miles south of Bury St Edmunds and is managed as a whole farm organic system. The soils on the 650 ha estate are predominantly slow draining calcareous clay soils. A further 915 ha is contract farmed organically for neighbouring farmers.

**History:** The Pawsey family have farmed in Suffolk for four generations. Shimpling Park itself has a long history. The estate includes an ancient deer park with Medieval wood pasture. The park boundaries are still marked by veteran pollarded oaks.

**Crops Grown:** Every crop is grown for a specific value-added organic market. The six / seven year rotation includes: either spelt or heritage wheat, spring oats, beans, spring barley and then two years of grass ley.

**Regenerative Agriculture and Integrated Pest Management:** IPM at Shimpling Park brings together a wide range of approaches to control weeds, pests and diseases without using pesticides or artificial fertilisers. The investment in soil health has included leys, green manures and cover crops with the added benefit of grazing sheep. Agro-forestry strips are being established.



## Setting the context and stating the issues.

**John started farming at Shimpling Park with his grandfather in 1985, converting to organic production in 1999 due to concerns about the impact of conventional farming on soils and wildlife. John is very open about the personal and business reasons for changing the farming system.**

*"We were going through a process of trying to drive our fixed costs down. We'd got to the stage where the system was failing as far as I was concerned. We seemed to be spending more and more money on agrochemicals every year. Also the COST of fertiliser was dominating the business as well. We just seem to be spraying more and more, and I got a stage where I felt sort of out of control as far as the business was concerned."*

*"I just think it was a time when we had agronomists who were maybe covering their back? Making us go with some spray because insecticide was so cheap we were just told to put an insecticide on. And because we had an agronomist, well, I was losing confidence in my ability to make decisions."*

*"It was a bit like, a modern car. Even though the internal combustion engine hasn't changed, the electronics now make you scared about opening the bonnet to mend or change things. That's the equivalent of what I felt with the agrochemical thing. I was being told it was getting more and more complex so I felt that you really had to leave it up to the agronomist to make the decisions."*

*"So there was the financial bit, but also the bit of me feeling that I was literally just being told what to do. And so, with those two things together, and also the farm not making any money, I just thought, I just can't keep on doing this thing any more."*

*"What changed me then was, we had an organic farmer down the road called Ben Poole who I could go and see, and everything was fine. So talking to the people I was going to conferences and talks and agronomy groups who would say, 'You can't go organic on your farm!'. I was being told by pretty much everyone I was meeting NOT to do it until I met somebody who actually had done it, and done it for 20 years, and everything was fine. So that gave me the confidence to convert part of the farm at that stage."*

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

John has always had an interest in the natural world.

*"I've always loved nature, you know, for all of my life I spent a huge amount of time outside and just looking at things. As a child I literally spent my whole day outside just walking and looking at stuff. Soon after I came home to farm, my grandfather died and I suppose I sort of felt I had something to prove. So for the first ten years we really went for it as far as progressive conventional farming was concerned. We were one of the first in our area to stop ploughing - doing non-inversion tillage. And I trained to be a BASIS agronomist"*

Changes to the farming system started when the 13 men on the farm went down to eight. "Then as money sort of drifted out of the business, we went down to three. I found myself just sitting on a sprayer doing all the spraying. I'd be sitting, in this white suit and a respirator with a visor in this massively sealed cab with carbon filters, and then literally going out non-selectively spraying cocktails of stuff that I had absolutely no idea what the long-term effect was on nature. I just got increasingly uneasy about the whole thing. Essentially, we were blanket spraying the countryside with chemicals. It goes in the soil, it goes in the crop, it ends up in the hedgerows, that chemical ends up absolutely everywhere"

John's tipping point was on the day when a hare ran underneath the boom on the sprayer and then sat and licked itself on the side of the field.

*"I've seen hares running in front of the sprayer all the time, but it wasn't until I physically saw it run underneath the boom and then lick itself that I just wanted to stop doing the spraying. I was just so uneasy about the impact that we were having on wildlife and on our soils."*

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

**Two case studies show how bi-cropping reduces disease pressure on beans - and how using a range of techniques can control weeds to protect yields.**

## **Bi-cropping winter beans with winter wheat to control Chocolate Spot and reduce weeds.**

Organic systems face particular challenges which take time and effort to resolve. John has found that: *"It's difficult to grow winter beans organically. We are very susceptible to various fungal diseases, especially chocolate spot."*



Chocolate spot on beans (Shutterstock)

Chocolate Spot (*Botrytis fabae*) is one of the most serious and widespread diseases on winter beans slashing yields by up to 50%. Severe infections develop rapidly, especially in wet humid weather, in dense crops and following frost damage. Once the disease has established, leaves are damaged and subsequent defoliation of the plant can lead to the total failure of the crop.

To reduce the risks of crop failure – and to maximise other agronomic benefits – bi-cropping provides a credible integrated pest management solution. Shimpling have trialled different bi-crops and found

that growing wheat and beans together as one crop is successful and profitable. Disease and pest pressures are lower. The tangled structure of the bi-crop provides support to help the crop to stand up – and the addition of legumes to the rotation improves soil fertility and biodiversity. Weed control is an added bonus.

*"Bi-cropping is not just about disease. With the mix of plants, you don't get a lot of rubbish in there, because there is a huge amount of shading. Beans are very, very weedy without herbicides. So if you put them with a wheat crop, the wheat shades out the weeds. The weed seed, if you like, is the wheat."*

The Processors and Growers Research Organisation helped the estate to trial different varieties of beans to suit this approach. *"Vespa was the last one to succumb to chocolate spot by about a week. That meant that it yielded a little bit more, so we're going for Vespa winter beans."*

The beans are drilled with two milling varieties of wheat. *"A blend of Extase and Siskin winter wheat, chosen really because of their disease profile but also because they're both milling varieties and can be sold as a mix. There has been research to suggest that as the beans senesce, they release some of their nitrogen which can go into the grain protein. That might help to get the 11% protein we need for the organic milling spec."*

The seed rate is high to compensate for late drilling. *"We put our seed rate up quite a bit this year at 275 kg/ha, because we are sowing wheat when it's a bit later. We don't normally roll after beans so we drill a little bit deeper – we don't want the beans to emerge too quickly before Christmas or they could get chocolate spot. Or they can get frosted. Getting that plant population right is really crucial. If you get them too dense, then, it's much more likely you'll get the disease. But if you do get it - you've still got the financial buffer of the wheat yield."*

Maximising the economic performance of a bicrop depends on being able to harvest and market the two crops separately. Wheat and bean mixtures are relatively simple in this respect costing just £13.50/t to separate. *"Wheat and beans have proved to be the most reliable plus it's the easiest one to harvest and separate. That's important, obviously. If you can't separate the crops successfully, then you've got to sell it as a whole crop, and that's much more difficult to market."*

For the milling wheats the level of protein and Hagberg (a measure of grain quality) determine the



value of the crop. John is able to gather data on quality in real time as the crop goes through the combine.

*“We’ve got a protein analyser on our combine and so we map the farm for yield and for protein. The combine measures every 10 seconds. It goes through a yield monitor, but it’s constantly measuring the protein. It passes a light through the grain every 10 seconds and creates a protein map using GPS located on RTK<sup>1</sup>. And then when you have a full tank on the combine, you can select a different bay to segregate quality at harvest time”.*

Quality is essential to the profitability of this system. Organic milling wheat and beans have lower yields than conventional crops but they are low cost to grow and command high premiums. In 2021 the yield was three t/ha with a ratio of wheat to beans of 2:1. Wheat was sold at £315 and beans at £510 providing an output of £1,140/ha and gross margin of £913/ha. Heritage varieties of wheat can attract further premiums of £250/t. Whilst the market for heritage varieties is still quite small, John has found that investing in relationships with local buyers pays dividends. Local millers are keen to buy from Shimpling estate for the sustainability story – but especially for the quality of taste and texture of the bread.

## Multi-faceted IPM weed control:

John has concluded that the key to successful weed control is shaping the whole farming system around the needs, health and potential of the heavy calcareous clays (Hanslope series) and creating a rotation that includes livestock to control weeds. Blackgrass is one of several challenges on this soil

series so a wide range of tactics have been developed to minimise the impact on profitability of any problem weeds.

Each stage of the rotation limits the opportunities for weeds. First wheats benefit from the fertility of the preceding sheep-grazed ley. Heritage wheat and spelt are highly competitive in this situation because of their height, growth structure and ability to shade weeds.

*“Well, for weed control, tall is good, but also consider the shape of the leaves. A Heritage winter or spring oat leaf is very broad and long. On a modern wheat variety the leaves are straight and erect so in a dense crop, they are reaching up to get more sunlight. Our crops are not so dense. We want a long leaf to droop and shade through all the growth stages to keep weeds out. And spelt has a very, very long ear. Even when the crop has senesced the ears are still very good at shading out weeds”.*

The following spring oat crop provides an opportunity to tackle blackgrass before drilling.

*“That’s the great benefit of the spring oats – we can cultivate the blackgrass out before we drill, plus oats are very competitive. Blackgrass is generally less of a problem in an organic system because it requires a huge amount of fertility. Our black grass just sits in the bottom of the crop – it’s weaker than a well fertilised blackgrass plant”.*

Winter beans can be the weediest part of the rotation. The previous case study explains how bi-cropping provides cost-effective control.

The final crop, spring barley, also allows seedbed weed control. At this stage of the rotation fertility is lower.

*“So, if we do have weeds there, it’s the bit of the rotation with the lowest fertility so the weeds are less able to compete. Anyway, they will be grazed. Because we’ve got leys in our system, we have a sort of a ‘reset button’ so we can manage weeds within the ley with sheep”.*

<sup>1</sup> RealTime Kinematics – or RTK – is a satellite data correction system used in agriculture to ensure that land surveys, agricultural inspections, and maps are accurate to real life. This high degree of accuracy enables machinery to remove weeds without harming the crop.



Cameleon Inter-row hoeing system

For crops that require additional weed control, inter-row hoeing targets cultivation with minimal soil disturbance. The estate uses a Swedish drill to sow in wider rows reducing intra-row competition between crop plants at high seed rates.

*"We put a huge amount of seeds in a very narrow row. 20 years ago we found that some crops didn't like being bunched up in a narrow row, particularly oats and barley which tiller more. They would compete against each other. In a dry year they would senesce earlier because they were wanting more moisture and more light."*

*"So we switched to sowing the crop in bands of 120mm in wider rows. Under a normal coulter on the drill is a spreader plate which blows the seed across 120mm. Our crop rows are now 321mm so we can hoe 200mm between the rows."*

Drilling a 200 mm row width makes it possible to hoe safely with no impact on yield because crop plants tiller to boost ear numbers.

*"We found you could hoe up to 70% of the field with no detrimental effect on field. That leaves 30% of field in the rows that's got a crop dense enough to smother weeds. Tilling is very important - the tillers stretch across the rows to fill those rows in, and that smothers the weeds."*

Avoiding repeated herbicide applications cuts costs.

*"Our costs are very low because we're using the shading ability of crop plants. With this hoe we only*

*hoe once, because it's a very direct action. The springtine hoe wasn't as aggressive so we had to go twice."*

*"We generally go at growth stage 31, 32 when the canopy's just about to close over. We go at the last minute with just one hoe, but it's very aggressive and takes everything out, and that saves time."*

*"The fuel consumption is relatively low - approximately 25 litres of fuel an hour because it's low draft pulled with 180 to 200 horsepower for a nine metre machine."*

John concludes that he feels the system as a whole works well.

*"In the absence of chemicals, you have to have diversity in your system, in cultivation. And my feeling, having done it for 20 years is that I'm very happy with the fact that our soil health is going up and our soil organic matter is building through the kind of rotation that we run."*



Cameleon Inter-row hoeing system

## Q: What have been the main benefits of using an IPM approach?

### Social Benefits: *"I love what I am doing now – and I didn't love it before. It's incredibly exciting!"*

- Feeling more in control of the business having broken away from the agronomist.
- Validation for this way of farming – and hope for the future.
- Many more people on the estate all contributing to the success of the business. Great relationships with enthusiastic staff.
- Selling direct to the public: *"Now we have that closeness to our end market and actually seeing the appreciation on people's faces."*
- Speaking at events to share experience: knowledge exchange is REALLY exciting and gives an opportunity to learn through questions from other farmers: *"Most of the solutions, you have to find out yourself, but it's also listening and getting knowledge from other people."*
- Spending holidays in the woods on the estate and appreciating the richness, complexity and diversity of this ecosystem.
- *Walking around the farm and seeing it look so healthy.*
- *"Eating stuff from the farm directly from the field is a big positive for me. I just feel my farm looks healthier. I can eat the bean tops if I want to because they haven't just been sprayed."*

### Environmental benefits: *"Watching Nature recover"*

- Seeing more wildlife on the farms: a comparison of survey results (2015/2016 to 2020/2021) carried out by the Suffolk Wildlife Trust noted the high quality of habitats and increases in arable farmland bird species (including yellowhammer, corn bunting, kestrel, meadow pipit and linnet). Both breeding season and over wintering bird populations were boosted: *"We're just seeing things recover on the farm, for the first time in my memory we've got corn buntings back on the farm. We're seeing grey partridges back, getting more lapwings on the farm, merlins and hobbies. We're doing everything we can to get turtle doves back."*

- Bees, butterflies, dragonflies and flowering plants all abundant on the estate due to the high quality habitats.
- Ancient woodland is being restored and agroforestry is spreading beneficial predators into the arable land.
- Soil organic matter has increased from 2.9% to 5.5%<sup>2</sup>. The Farm Carbon Toolkit confirms 7.55 t/CO<sub>2</sub> equivalent is sequestered per hectare.

### Economic benefits: *"Being more in control of my business"*

- A highly credible organic business with twenty years of experience as a regenerative farmer and a great reputation for the stewardship of land leading to over 900 ha of contract arable land. *"One of the reasons why our contract farming enterprise expanded was because agents have seen what we've done. They've seen the figures, and they now put us forward as a credible financial option to people around us. We get asked to farm people's land all the time. We've had to tender for all of them, and we have to be super competitive in the tendering process - obviously."*
- The business is: *"Probably better off financially – but we don't tend to focus on just profit – it is much more about the whole value of life."*
- The business is carbon neutral and sequestering seven tonnes of carbon per hectare per year (Farm Carbon Toolkit).
- Opportunities exist in the future to develop this as an income stream.
- Young people on the farm bringing in insights and additional income.
- *"In the 1950s my grandfather had 54 men on the farm. Recently we found that with all the other people doing business on the farm there will still be 54 people doing different things. They're running businesses, young guys coming and doing contracting work for us. The number of people on the farm hasn't gone down, but they're just doing very different things."*The investment in natural capital provides long term opportunities and benefits to successors on the estate.

<sup>2</sup> Loss on ignition.



Corn bunting



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

### Look out for information that can help you.

- Attend AHDB meetings and events such as Groundswell that focus on regenerative farming.
- Join organisations such as BASE and talk to as many farmers as possible either face to face or on Twitter.
- Find other farmers who are making the same changes: visit them, learn from their farms and gain confidence from their successes.
- After the event, change one thing, anything, on your farm.

### Get to know your own soil.

- Build a rotation and cropping system that suits your soil and will minimise weeds, pests and diseases.
- Think about crop spacings, crop architecture and the conditions for crop growth on your land.
- Introduce livestock for the many benefits they bring to the business and the soil.

### Be aware that it takes time to re-build natural processes.

- Building up soil structure, organic matter and beneficial predators all takes time.
- Start the process slowly. Speed up and scale up once you have gained confidence.

### As your natural capital increases, you can increase the level of trust you have in nature.

- “Let nature have much more of a say in how things develop on your farm, because you’re really trusting it to deliver the natural processes.”

### Add value to all crops, segregate storage and market them proactively.

- *“To add value to a wider rotation of high value crops you may need to adapt your grain store to store smaller batches of high value crops for different markets.”*
- Consider processing crops to add even further value.

### Engage every person on your farm in the transition to a regenerative system.

- Family members, staff, tenants, and visitors – they all have insight and skills that are of value to the business.
- Make the most of those skills by building long term positive relationships.

### Seek out the best machinery worldwide.

- Visit manufacturers and farms to see new equipment in action.