POSITIVE OUTCOME AREAS

- [x] SOIL
- [ ] CARBON
- [x] WATER
- [x] BIODIVERSITY
- [x] ANIMAL HEALTH & WELFARE
- [x] SOCIAL

TECHNICAL GUIDE

# How to think about IPM in arable and pasture systems

## What is Integrated Pest Management (IPM)?

Integrated crop management (of which IPM is a key component) is a holistic approach to combining crop production techniques that mitigate environmental impact and enhance biodiversity whilst producing viable crops. It's more than just adding wildflowers to margins or planting trees. This guide is designed to help draw together an integrated crop management plan that covers pest management, the importance of crop nutrition, soil health and on-farm biodiversity.

As our climate becomes more unpredictable and we experience extreme weather events more often, we need to ensure that our growing systems are resilient and working with nature. By developing and implementing an ever-evolving integrated crop management plan, land managers have the tools to mitigate against a changing climate that may increase pest and disease pressure and result in poor soil health, which all affect crop performance and profitability.

IPM is not a one size fits all approach, and is an ongoing process combining cultural, biological and physical practices so that the need for chemical inputs can be reduced from being prophylactic to become based on thresholds or replaced totally. It is typified in an organic system, where chemical inputs are not permitted, and so management is essential to reduce the risk of pests and diseases.

## What does the science say about IPM?

**IPMworks toolbox** provides a range of information sources to support IPM on farm, and the benefits of IPM techniques are reviewed in this document by Natural England, written to support government policy (search NECR575 Edition 1 Integrated Pest Management (IPM) for Biodiversity Enhancement - NECR575)

Healthy plants actively defend themselves when given the right conditions. Balanced nutrition, good soil structure, and thriving microbial life enable crops to produce protective biochemicals that deter pests and disease.

The Plant Health Pyramid, developed by John Kempf, provides a simple but powerful framework for understanding how plants build immunity and natural resilience.

These include:

- **Phenolics, terpenes, and alkaloids** that make plants less palatable to insects.
- **Phytoalexins** that act like natural antibiotics, strengthening cell walls.
- **Volatile organic compounds (VOCs)** that confuse or repel pests and attract beneficial insects like parasitic wasps.

This biochemical "immune system" depends on well nourished, biologically supported roots. When soils are aerated and alive, nutrients are available in the right balance and energy goes into defence, not stress.

**Find out more:**
**IPMworks toolbox:** ipmworks.net/toolbox/en/#/

**Plant Health Pyramid:** advancingecoag.com/wp-content/uploads/2024/01/Plant-Health-Pyramid-2024.pdf

**Healthy Crops – A new Agricultural Resolution:** gaiafoundation.org/wp-content/uploads/2021/01/HealthyCrops_CHABOUSSOU-1.pdf

## Case study: IPM at New Shardelowes

New Shardelowes, a mixed arable and livestock farm in South Cambridgeshire, is moving from intensive practices toward an ecologically integrated system under farmer and conservation manager Ed Wombwell. As chair of the East Cambridge Farmers Cluster, Ed views Integrated Pest Management (IPM) not as a checklist but as long-term ecological balance.

His approach prioritises prevention, understanding pest life cycles, and recognising both abiotic and biotic interactions. Monitoring is tailored to the farm's landscape of hedgerows, woodland, and changing weather. Wildflower strips connect arable fields to semi-natural habitats, drawing in beneficial insects and reducing insecticide reliance. Uncultivated margins and hedgerows provide food and refuge for beetles, spiders, bats, and insectivorous birds, which naturally regulate fly populations in livestock systems. Long crop rotations,

potatoes returning only every eight years combine with "assist strips" to establish beneficial species. Herbal leys, sainfoin, and chicory boost biodiversity, improve soil, and aid parasite control.

At New Shardelowes, IPM is treated as **whole-farm ecology**: linking crops to habitats, planning rotations, and integrating livestock to build natural pest control. "Patience is key," Ed says. "Beneficials take time to establish, but the rewards are resilience, reduced chemical reliance, and farming with nature, not against it."

## Impact

The impact of IPM extends beyond pest control. In arable systems, expect reduced insecticide use, stronger rotations and healthier soils underpinning crop vigour. Yields may stabilise rather than spike, but profitability improves through lower input costs and better ecosystem services.

In pastures, IPM reduces fly nuisance and parasite burdens, supporting healthier livestock with fewer treatments. Across both, biodiversity flourishes equal more birds, bats, beetles, and pollinators, all reinforcing natural pest regulation. Diverse leys and less compaction improve soil structure, water infiltration, and drought tolerance.

Financially, IPM aligns well with environmental schemes, stacking ecosystem benefits alongside productive farming. The wider impact is resilience: a system better able to adapt to climate, markets, and regulation.

IPM isn't just about fewer pests, it underpins farm resilience:

- Lower insecticide and anthelmintic use.
- More diverse and resilient rotations.
- Healthier soils with better infiltration and drought tolerance.
- More birds, bats, beetles, and pollinators providing natural pest regulation.
- Longterm cost savings from reduced inputs and fewer firefighting sprays.

"IPM is ecology. Manage it with the same commitment as cash crops, the rewards are resilience, biodiversity, and balance."

Ed Wombwell

## Record keeping

Log date, location, observation, and actions, whether in a notebook or software. These records help refine management, evidence scheme compliance, and demonstrate progress. Over time, stable pest pressure, healthier crops, and reduced chemical use signal success.

IPM delivers benefits at different speeds. Some actions show results quickly such as delaying drilling can cut autumn aphid pressure in year one, and rotational grazing can lower parasite burdens within months. Others take longer: herbal leys, soil organic matter, and predator populations typically need 3–5 years to stabilise.

Farmers should treat IPM as a phased approach, trial in a few fields, monitor outcomes, then scale up. Short term learning comes from seasonal monitoring; medium term resilience builds as soil, rotations, and habitats reinforce each other.

| Action | Expected impact |
|---|---|
| Delaying drilling | Noticeable in year 1 (lower autumn aphid pressure) |
| Rotational grazing | Parasite reductions within months |
| Wildflower strips / beetle banks | Predator build-up over 2–3 years |
| Herbal leys / soil organic matter | System resilience over 3–5 years |

# How will IPM work for me?

| Step | What to do | Agroecological rationale |
|---|---|---|
| 1. Map your current rotation | List each field's cropping history for the past 5 years, noting crop family, rooting depth, and nutrient demand. | Identifies gaps and pest carryover risks. |
| 2. Add functional diversity | Introduce at least one crop per rotation that changes functional type e.g. from a cereal to a legume, from a taproot crop to a fibrous root crop. | Increases below ground diversity, reducing uniform pest niches and improving soil structure. |
| 3. Include cover or catch crops | Use multi-species mixes between cash crops, include grasses, legumes, and brassicas. | Protects soil, feeds soil biology, and supports beneficial insects. |
| 4. Integrate fertility-building phases | Add herbal or legume leys in medium to long rotations, especially before high demand crops like wheat or maize. | Builds nitrogen and organic matter while suppressing weeds. |
| 5. Consider companion or relay cropping | Pair crops (e.g. clover under cereals, vetch with oats) to improve ground cover and nutrient capture. | Maintains living roots and increases ecological overlap for beneficial species. |
| 6. Alternate crop families | Avoid repeating species from the same botanical family within a 3–4-year period (e.g. brassica -> brassica). | Disrupts pest and disease host cycles. |
| 7. Link rotation to livestock | If mixed, graze cover crops or leys with appropriate rest periods. | Converts biomass to fertility and breaks pest cycles biologically. |
| 8. Monitor and refine | Track pest, disease, and yield data. Review after each cycle to identify benefits or constraints. | Builds adaptive management and continuous improvement. |

# Practical First Steps

Walk your fields with purpose – note weed patches, compaction zones, pest hotspots, and margins.

- Review last year's records – what pests caused losses and what worked?
- Pick 1–3 manageable entry actions rather than changing everything at once (e.g., delay drilling, add a beetle bank, sow an herbal ley).
- Link actions to your rotation – for arable, focus on soil and crop sequencing, for pasture, sward diversity and parasite management.

Success depends on context: soil type, drainage, microclimate, previous rotations, and stocking rates all influence pest pressures. Be clear on desired outcomes whether it is reducing aphid sprays, cutting fly pressure, or lowering herbicide costs and match actions to risk.

**Examples:**

- High blackgrass pressure -> delay drilling + competitive varieties.
- High worm burden -> rotational grazing + faecal egg counts.

Use what you already have: adjust drill dates, grazing plans, or margins before investing in new infrastructure. Plan capacity i.e. who will monitor traps and when?

**Common pitfalls include:**

- Poor herbal ley establishment from lack of seed soil contact or missing clover inoculation.
- Expecting predator populations to build in year one, most take 2–3 years.
- Grazing too tightly, undermining parasite control.
- Choosing low vigour crop varieties that give weeds the upper hand.
- Think of IPM as another enterprise: plan, establish, and manage with the same rigour as any cash crop.
- By working towards improved soil health, the plant will become healthier and more resilient to disease and pests, as highlighted by John Kempf's Plant health pyramid.

# Monitoring

Monitoring underpins effective IPM and informs timely, targeted action. Start with a baseline audit:

- **Soil**: spade tests, nutrient analysis, organic matter.
- Habitats: map hedgerows, margins, beetle banks, wildflower areas.
- **Pest history**: use spray and yield records to identify problem fields.

# Routine tools

- **Arable**: pheromone, sticky, or light traps; weather data and disease forecasts; weekly field walks.
- **Pasture**: faecal egg counts every 4–6 weeks; fly pressure checks; sward height and quality assessments.

## Cost of implimentation of IPM

Introducing Integrated Pest Management (IPM) does not have to mean high upfront costs. Many practices can be phased in, trialled on small areas, and scaled up once proven. As farmer Ed Wombwell notes, "you spend money differently rather than necessarily spending more."

Investments in diverse rotations, cover crops, or herbal leys involve seed costs but are offset by reduced pesticide and fertiliser use. Healthier soils improve nutrient cycling, water retention, and crop resilience, while fewer machinery passes lower fuel and labour costs. "The farm business became more predictable," Ed explains, "we weren't gambling as much on inputs working, because the whole system was more robust."

Efficiency also drives savings. Cultural controls, such as delayed drilling, stale seedbeds, or rotational grazing require good timing and record keeping rather than major expense. Biological controls and habitat creation (beetle banks, hedges, wildflower strips) may need some initial labour and seed investment, but once established, they continue to deliver benefits year after year.

The environmental returns are equally strong. Building soil biology reduces erosion, compaction, and nutrient loss. Lower chemical reliance prevents resistance build-up in pests and diseases. Biodiversity increases with more worms, birds, beetles, and pollinators, all supporting natural regulation and ecosystem services. As Ed describes, "we saw more worms, more birds, and fewer flare ups of problem weeds once the system balanced itself."

For most farmers, the biggest long-term gain is resilience. IPM reduces dependence on purchased inputs and exposure to market price shocks, while healthier soils and diverse rotations buffer the effects of drought and heavy rainfall. Over time, combined financial and environmental benefits outweigh early investments.

## Key take-home messages

- Many IPM measures cost more in planning than cash.
- Start with one to three manageable actions that suit your system.
- Monitor, record, and review progress, it is how you adapt and evidence success.
- Expect ecological approaches to take time; avoid abandoning too early.
- IPM works best when treated as a core part of the farm business, not an add-on.

## Whole farm system

IPM works best when embedded across the whole farm, rotations, soil, crops, and livestock. Rather than as an isolated set of actions. Prevention is the starting point: knowing what pests are linked to each crop or pasture, what issues occurred last year, and what pressures are emerging locally.

For arable systems, IPM begins with crop rotation, soil health, and variety choice, for pasture, with sward diversity and rotational grazing. From these foundations, IPM builds through monitoring, cultural and biological controls, and finally, if necessary, targeted chemical inputs.

Farmers can start small, trialling an herbal ley, delaying drilling, or introducing a wildflower strip then scale up as confidence grows. The strength of IPM lies in its adaptability: it fits any system but works best when seen as part of an ecological balance where every element contributes to resilience.

## Contacts

### Soil Association advice and support

**Contact our Farming and Land Use Team**
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**Find out more:**
www.soilassociation.org/guides-for-whole-farm-planning