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# Living Mulches Technical Guide

How to get  
started with  
living mulches

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**AGRICOLOGY**  
SUSTAINABLE PRACTICAL FARMING



# About This Guide

This guide is designed to support farmers in making informed decisions about adopting living mulches in arable systems. It is based on interviews with UK farmers trialling living mulches, alongside four years of research conducted through an Innovative Farmers Field Lab and subsequent studies by the Organic Research Centre. Developed in response to farmers' questions on how best to implement living mulches, its aim is to provide practical guidance and clarity across the key stages of this novel approach.

There are multiple ways to integrate living mulches, but here, we've based the approach on a low-input system and broken down the key stages of the process – outlining the necessary actions, considerations, and potential risks at each step. Alongside this, we've included alternative strategies and additional insights for those working within conventional systems.

*Every farm is unique, every season brings new challenges, and no two years are the same. With that in mind, this guide aims to provide a framework that allows you to tailor living mulch practices to suit your specific farming system.*

It's important to note that living mulches can create a yield penalty, so trial the system at a scale that aligns with your risk tolerance.



# What Are Living Mulches?

Living mulches are semi-permanent legume understories established within cereal crops by undersowing. By the second year, when the living mulch is well-established, further crops are direct drilled into it. This approach sits at the intersection of traditional farming techniques such as intercropping, mulching, cover cropping, and undersowing. When successfully integrated into a system, living mulches offer an opportunity to reduce external inputs and build greater resilience in arable rotations.<sup>1</sup>

At their best, living mulches have been shown to improve soil structure, reduce runoff, enhance nitrogen (N) availability for future crops, increase in-field biodiversity, suppress annual weed populations, and lower production costs.<sup>2,3,4</sup> However, if not carefully managed, they can compete with crops, cause significant yield penalties, drive up perennial weed burdens, and increase overall costs.<sup>5,6,7</sup>

Beyond the practical considerations of establishing and managing living mulches, thought must be given to where and how they fit within the wider rotation. Some farmers use living mulches to introduce an additional cereal crop into their system by treating the first year of a two-year ley as the 'true living mulch' year, combining fertility building with crop production. This rotational approach can help offset yield penalties when viewed across the whole system. To mitigate the risk of perennial weed pressures, mulches can be introduced at points in the rotation where weed burdens are at their lowest, reducing the likelihood of weed proliferation.

Trialling living mulches on a small scale first can provide valuable insights into how the system performs under specific farm conditions. This can be done by integrating the approach within a small area of an existing crop to assess establishment and management challenges. Once confidence has been gained in the mechanics of the system, a broader review of the rotation can help determine where living mulches are best suited and most beneficial within the whole farm system.

# Living Mulch Timeline

We've mapped out the key steps of integrating living mulches into a rotation, based on spring establishment in an organic system. Every farm and crop will have its own nuances, so this model isn't a one-size-fits-all approach – rather, it's a framework to adapt. At each stage, we've outlined the key actions, considerations, and risks, to help you shape a system that could work for your farm.

For example, you might choose to establish the living mulch after drilling a winter cereal or extend it for an extra year with another cropping cycle. The implementation of the process may change but the fundamental challenges and decisions remain the same.



Establishment  
Phase

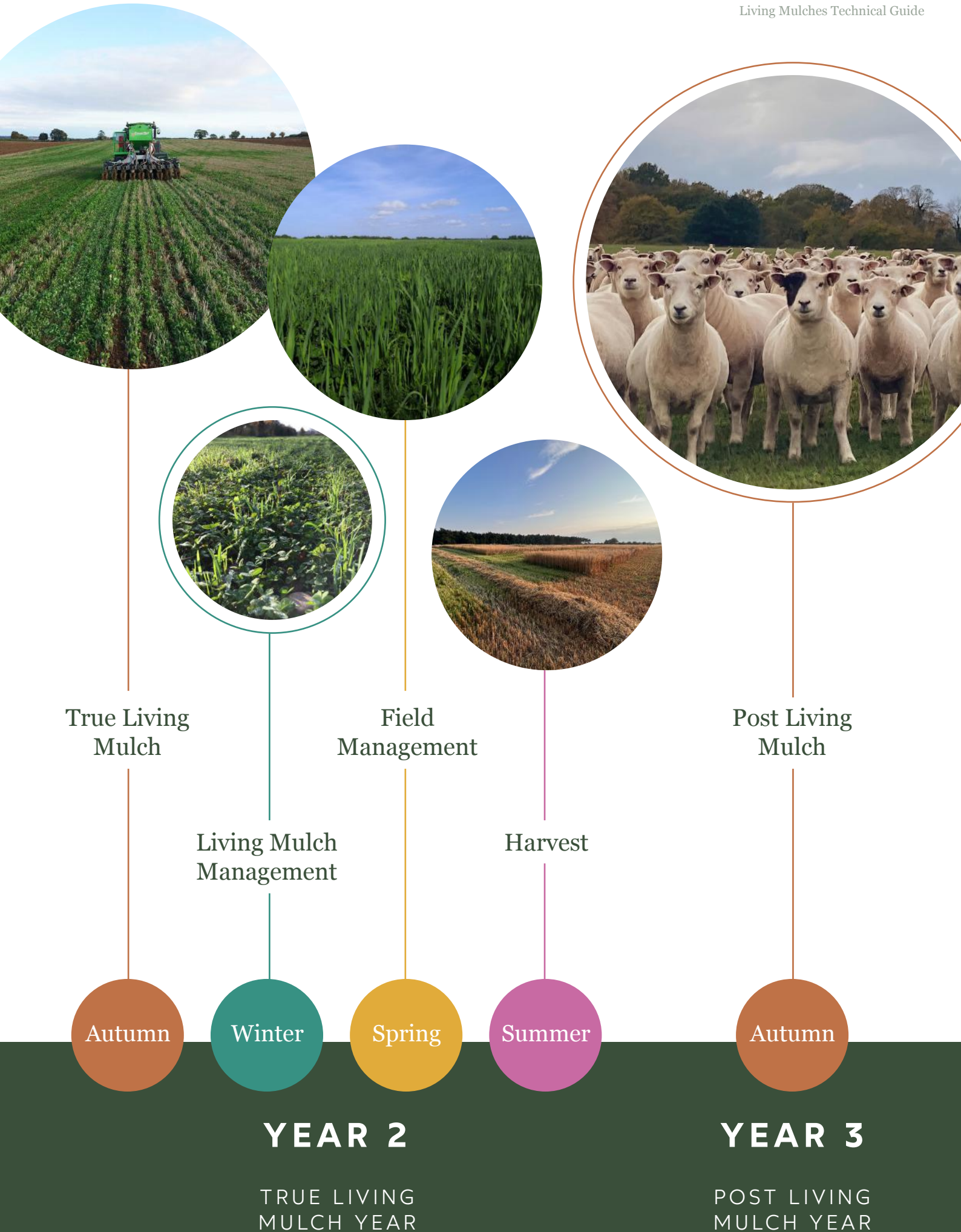
Field Management  
and Harvest

Spring

Summer

**YEAR 1**

ESTABLISHMENT  
YEAR



**YEAR 1**  
**SPRING**  
SUMMER

**YEAR 2**  
AUTUMN  
WINTER  
SPRING  
SUMMER

**YEAR 3**  
AUTUMN

# Year 1 Establishment Year

# Spring

## Establishment phase



### Action

Cereal sowing



### Considerations

Cereal selection, seed rate, row spacing



### Risks

Cereal crop may shade out living mulch before establishment or fail to suppress it adequately, allowing vigorous growth that creates harvest challenges

Spring-sown cereals provide the best opportunity for establishing a living mulch. Attempting to introduce a living mulch into a winter cereal can lead to excessive competition, with the established crop outcompeting the mulch before it has a chance to take hold.

Undersowing leys into spring cereals is a well established practice in organic and low-input systems. While living mulch mixtures tend to be less diverse than traditional leys, the principle remains the same. In organic systems, the naturally lower cereal crop density and open structure aid establishment. However, in conventionally managed crops, the more vigorous growth and higher plant density can create a more challenging environment for mulch establishment, with increased shading limiting its development.

Oats and wheat have proven to be strong options at this stage, with wheat performing slightly better due to its upright growth habit and reduced shading. In contrast, rye can cast too much shade throughout the growing season, suppressing the mulch before it properly establishes.

The cultivation and seeding approach at this stage mirrors that of growing a standard spring cereal. Spring cereals can be drilled at a seed rate of around 250kg per hectare (ha) with a close row spacing of 125mm – allowing the living mulch a reasonable chance to establish while ensuring the clover remains at a low enough level to prevent excessive competition with the cereal crop or interference at harvest. The close row spacing also aids weed suppression, particularly in organic and low-input systems.

In conventional systems, a pre-emergence herbicide can be applied, and the living mulch seed drilled simultaneously. In this case, wider row spacing may be an option, with the mulch seed drilled in separate rows from the cereal crop.

**Image left:** Wheat over establishing clover mulch



### Action

Undersowing the living mulch



### Considerations

Species selection, sowing rate, machinery, timings



### Risks

A vigorous living mulch species chosen at this stage can outcompete the crop in year two. Sowing timing affects germination, and poor germination risks living mulch viability in year two

## YEAR 1

### SPRING

SUMMER

## YEAR 2

AUTUMN

WINTER

SPRING

SUMMER

## YEAR 3

AUTUMN

Selecting the right species for a living mulch is one of the most critical decisions in the process. Choosing an overly vigorous species will lead to the mulch outcompeting the cash crop in the second year, which will deliver significant yield penalties. White clover, while commonly used, can lead to root zone competition in the second year, reducing tillering and yields. Similarly, lucerne can prove too aggressive in low-input or organic systems, dominating the cereal crop in year two. Every species used as a mulch comes with trade-offs, and careful selection is essential.

**Key factors to consider when choosing a suitable living mulch include soil adaptability, lifespan, growth dynamics throughout the year, and establishment speed.<sup>8</sup>**

White clover is widely used in living mulch systems due to its low-growing habit, ability to maintain soil cover through winter, and N-fixing properties. A two-variety mix of white clovers is an option: Aberace (*Trifolium repens*), a small-leafed wild clover growing up to 15cm, can form 70% of the mix, with AberHerald (*Trifolium repens*), a medium-leaf variety used in grazing systems, making up the remaining 30%. This mix is typically sown at a rate of 7.5kg/ha. The combination provides a predominantly small leaf white clover base with a medium leaf variety adding some insurance in poor germination years. However, one key challenge with white clover-based living mulches is the root zone competition in the second year, as its rooting depth closely corresponds to that of cereals, potentially leading to a yield penalty



Photo: Mark Lea



Photo: Mark Lea

One strategy to mitigate root competition in an all-clover stand is incorporating black medick/yellow trefoil (*Medicago lupulina*) as 20-30% of the mix. With its deep taproot, black medick competes less with the cereal crop. Its shorter lifecycle means it dies off after flowering but readily self-seeds into the second year, maintaining some ground cover.

Lucerne (*Medicago sativ*) is another option for a living mulch in certain systems; its deep taproot significantly reduces root competition compared to clover-based mulches, lowering the risk of a yield penalty. Additionally, lucerne offers a forage cut post-harvest and can fix in the region of 300 kg of atmospheric N/ha.<sup>9</sup> It is typically sown at 25kg/ha and can be established alongside winter oilseed rape where conditions allow. However, in low-input and organic systems, lucerne's vigour can overwhelm the cereal crop in the second year. Some farmers using lucerne have adopted low-dose chemical applications to manage its growth – See page 18 'Winter Mulch management' for further details

Spring establishment of a clover-based living mulch carries some risk, as weather conditions and seedbed quality can significantly impact success. One approach is undersowing in late April using a front-mounted air seeder followed by a Cambridge roll. If timed after a final harrow pass to remove newly germinated weeds, this creates a shallow tilth that supports mulch germination. Given its small seed size, drilling clover deeper than a few millimetres can hinder establishment. Rolling the seedbed reduces moisture loss and provides better contact of the seed with soil and soil moisture. Alternatively, a broadcast seeder mounted on a harrow can be used, though this may lead to uneven spread patterns and variable seeding depths.

**Top left:**  
Spring cereal drilling

**Top right:**  
Overseeding the living mulch

**Below:**  
Last harrow before overseeding



Photo: Mark Lea

# Summer

## Field management and harvest



### Action

Field management



### Risks

Non establishment of undersow, cash crop shades out undersow

#### YEAR 1

SPRING

**SUMMER**

#### YEAR 2

AUTUMN

WINTER

SPRING

SUMMER

#### YEAR 3

AUTUMN

Once the living mulch has been undersown, no further field management is required throughout the season. At this stage, the system is largely dependent on weather conditions for successful establishment. A drought in the first year can significantly impact the survival of the mulch, and unfortunately, there are few practical measures to counteract this risk.

*Living mulch survival can also be affected by crop selection - if the accompanying cereal is overly vigorous, excessive shading during the summer growth period may suppress the mulch, preventing it from establishing.*

Some studies have observed short-term N transfer from legumes to cereals through root exudates, occurring when the roots of establishing companion plants intermingle.<sup>10</sup> This differs from the more widely recognised process of N fixation from legumes, where atmospheric N is converted and stored in the soil for use by future crops. While root exudates have the potential to provide some N to the cereal crop during the early stages of living mulch establishment, the impact at this point is likely to be minimal, as the mulch seedlings remain small and have limited capacity to contribute meaningfully to crop nutrition.



**Top:**

Spring cereal growing over  
establishing living mulch

**Left:**

Living mulch seedlings after harvest



### Action

Harvest



### Considerations

Yield penalty, harvesting straw, post-harvest actions



### Risks

Living mulch enters the straw swath, increasing green matter content. Living mulch fails to establish proper ground cover.

## YEAR 1

SPRING

SUMMER

## YEAR 2

AUTUMN

WINTER

SPRING

SUMMER

## YEAR 3

AUTUMN

A yield penalty in the first year of the living mulch system is uncommon, as competition between the cash crop and the mulch remains minimal at this stage. However, if the understorey establishes well, harvesting can present some challenges. While small amounts of green material may pass through the combine and mix with the straw swath, this is typically not a major issue in the first year due to the mulch remaining at a low level. The greater challenge arises if the straw requires drying or moving, as spreading the swath without pulling mulch into it can be difficult. If baling is delayed, the mulch may begin to grow up into the straw, making it harder to separate. Additionally, small fragments of mulch leaves can enter the grain tank as admixture, potentially increasing moisture levels and making crop cleaning more challenging.

Post-harvest, the reduced competition allows the understorey to develop quickly. This rapid regrowth creates an opportunity for light grazing with sheep soon after harvest. Where lucerne has been used as the mulch, its vigour may allow for a forage cut before autumn drilling.

If the understorey appears patchy after harvest, overseeding can help strengthen the mulch. However, if establishment has been particularly poor, this approach may introduce weed management issues in the second year. At this stage, it is important to assess whether the living mulch system should continue, particularly if weed pressure is already high.

A successful establishment phase will result in a good spread of small mulch seedlings across the field, with minimal barren areas. Strong post-harvest growth will provide complete ground cover, and light grazing can encourage mulch development while offering an additional layer of weed suppression.

**Right:** Developed living mulch 1 month after harvest



*A successful establishment phase will result in a good spread of small living mulch seedlings across the field, with minimal barren areas.*



**YEAR 1**  
SPRING  
SUMMER

**YEAR 2**  
AUTUMN  
WINTER  
SPRING  
SUMMER

**YEAR 3**  
AUTUMN

# Year 2 True Living Mulch Year

# Autumn

## True living mulch



### Action

Cash crop selection



### Considerations

Growth habit, tillering, height, vigour



### Risks

Significant yield penalty as living mulch outcompetes crop

At this stage, the system transitions into a ‘true living mulch,’ where the established undersow receives a direct-drilled crop.

Choosing the right cereal at this stage is one of the most critical factors in determining success or failure. This decision, combined with the mulch species selected in year one, will heavily influence the outcome. Vigorous crops stand the best chance of thriving in what is now a highly competitive environment. Modern winter wheat varieties can struggle in clover-based mulches due to intense root zone competition and a lack of competitiveness, often suffering significant yield penalties in low-input systems. As a result, it’s generally not recommended. In contrast, winter oats cope better with clover, showing lower yield reductions, while rye has proven to be a stronger performer in living mulch systems where both the mulch and cash crop share similar rooting depths. The height and vigour of rye give it an advantage.

When root zone competition sets in, tillering can be affected, locking in potential yield penalties by late spring of year two. Key considerations for cash crop selection include growth habit, tillering productivity, height, and overall vigour – each playing a role in mitigating the impact of mulch competition. Straw strength is another important factor, as a lodged crop within a dense mulch can be extremely difficult to harvest without suffering significant losses.



### Action

Direct drilling



### Considerations

Living mulch management, timing, machinery, widths, seed rate



### Risks

Poor cash crop establishment, pest pressures, reduced tillering

YEAR 1  
SPRING  
SUMMER

YEAR 2  
AUTUMN  
WINTER  
SPRING  
SUMMER

YEAR 3  
AUTUMN

Before drilling, the living mulch should be grazed or mown back hard to create optimal conditions for crop establishment. A range of drilling dates can be considered, with a well-established mulch improving trafficability in wet conditions and offering some flexibility in timing. Mid-September drilling has shown yield benefits in some systems, though earlier sowing may require additional winter management of the mulch through grazing or mowing. It should be noted that living mulches can harbour large slug populations in wet years. Crops such as rye are particularly vulnerable, suffering significant damage, which makes early drilling less suitable when slug activity is high.

Both disc and tine drills have proven effective in living mulch systems. Tine drills tend to cut back the mulch more aggressively, creating a less competitive environment for crop establishment. While the increased soil disturbance with tine drills can bring more annual weed seeds to the surface, this is not to a detrimental level.

*Seeding rates are another key consideration, as increasing seed rates can help counteract reduced tillering. A 20% increase in seeding rates for rye or a 50% increase for oats can be effective in mitigating mulch competition and minimising yield penalties.*



Photo: Matt England



**Above:**

Direct drilling in to living mulch

**Right:**

Direct drilling on the Fring Estate

# Winter

## Living Mulch management



### Action

Living mulch suppression



### Considerations

Grazing, flailing, conditions, timings



### Risks

Overgrown living mulch hampers crop establishment, reducing tillering of the cash crop and locking in yield penalties

YEAR 1  
SPRING  
SUMMER

YEAR 2  
AUTUMN  
WINTER  
SPRING  
SUMMER

YEAR 3  
AUTUMN

During the winter, action needs to be taken to prevent the living mulch from outcompeting the cash crop as spring growth kicks in. Grazing with sheep is a widely used approach, with both the cereal and mulch grazed back to maintain balance. However, careful management is required – sheep must be moved on before overgrazing occurs, with high stocking densities over small areas and frequent movement proving most effective. Ground conditions must be suitable to prevent crop damage, and having a fallback area for relocating sheep in poor weather is recommended.

Alternatively, a flail can be used, with weather conditions taken into account. The cereal will regrow ahead of the mulch, allowing it to ‘get away.’ Crucially, grazing or mowing must be completed before stem extension (typically around mid-March), depending on location. As long as some leaf area remains and intervention occurs well before stem extension, the cereal/mulch mix can be grazed down quite low without adverse effects. Reducing mulch competition as much as possible is beneficial, and cereal grazing can also promote tillering and aid disease control.<sup>11</sup>

If lucerne is being used in non-organic systems, some farmers use the approach of ‘chemical mowing’ at around GS30-GS31 with a low dosage of acetolactate synthase (ALS) inhibiting herbicides to stunt the growth of the lucerne (this practice can be associated with rising levels of herbicide resistance, an issue that requires consideration). Without spring suppression, lucerne will quickly dominate, preventing the establishment of a winter cereal crop. This makes lucerne an unsuitable choice for organic and low-input systems.



**Right:**

Cereal establishing through living mulch

**Below:**

Grazed and non grazed living mulch and cereal

**Below right:**

Winter oats growing away from established living mulch

Photo: Mark Lea



Photo: Matt England



# Spring

## Field management



### Action

Crop management



### Considerations

Yield penalty, weed management



### Risks

Overly vigorous living mulch swamps crop, perennial weeds dominate the system

YEAR 1  
SPRING  
SUMMER

YEAR 2  
AUTUMN  
WINTER  
SPRING  
SUMMER

YEAR 3  
AUTUMN

The growing season is largely a competition for dominance between the mulch and the cereal crop, with limited interventions available to the farmer beyond those already mentioned. Success at this stage largely depends on selecting the right living mulch species and applying suitable sowing rates in year one. While the absence of cultivation helps to significantly reduce annual weed pressure, perennial weeds can start to take hold.

Mechanical control options at this stage are limited to a weed mower such as a CombCut machine or a late pass with a Weed Surfer to reduce seed return. Once the mulch is established, controlling perennial weeds becomes increasingly difficult, making it clear that tackling docks, thistles, and couch grass must be a priority elsewhere in the rotation.

*Ideally, when living mulch establishment begins in year one, the overall weed burden within the system should be minimal - helping to prevent major issues later in the process.*



Photo: Mark Lea



Photo: Matt England



Photo: Matt England

**Top:**  
Side by side living mulch and control comparison

**Middle left:**  
Rye over clover mulch

**Middle right:**  
Oats over clover mulch

**Left:**  
Oats growing over clover mulch

# Summer Harvest



## Action

Harvest



## Considerations

Yield penalty, straw harvest, grain cleaning, costs savings, perennial weeds, grazing, soil health



## Risks

Yield penalty, making straw, grain cleaning

YEAR 1  
SPRING  
SUMMER

YEAR 2  
AUTUMN  
WINTER  
SPRING  
SUMMER

YEAR 3  
AUTUMN

Harvest challenges in year two mirror those of year one but tend to be more pronounced, as the established living mulch is likely to be taller. One key consideration is that mulch material will enter the straw swath, increasing green matter content – at this stage any movement of the straw risks the mulch being pulled into the swath. Additionally, mulch can find its way into the grain tank, raising moisture levels and complicating the grain cleaning process.

By this stage, any yield penalties caused by living mulch competition will become clear – this remains the primary drawback of the system. The extent of yield reduction will depend on cereal selection, mulch cultivar choice, and, to some extent, weather conditions. However, cost savings and broader benefits to soil and system health should be weighed against any losses. The way the mulch is integrated into the wider rotation can also help mitigate the impact of yield penalties. In some cases, grain protein levels are slightly improved in direct drilled crops, while post-harvest soil N levels are significantly higher – offering benefits to subsequent plantings. When viewed across the full rotation, with an extended clover/mulch presence but no reduction in the number of combinable crops, the overall yield penalty may be fully offset.

Following harvest, the established mulch provides an immediate opportunity for grazing. If sheep are not available at that time, flail or disk mowing may be worthwhile to defoliate perennial weeds.



Photo: Matt England



Photo: Mark Lea



**Top:**  
Oats harvest over clover mulch

**Above:**  
Oats before harvest with clover mulch

**Middle:**  
Post harvest with living mulch

**Right:**  
Harvest of oats over living mulch

YEAR 1  
SPRING  
SUMMER

YEAR 2  
AUTUMN  
WINTER  
SPRING  
SUMMER

YEAR 3  
AUTUMN

# Year 3 Post Living Mulch Year

# Autumn

## Post living mulch



### Action

Post harvest actions



### Considerations

Ley variety selection, timings, grazing, weeds, benefits, reflections, whole systems approach – taking the living mulch into another cereal crop

In organic and low-input systems, rising perennial weed populations by this stage often mean that the mulch is best transitioned into a diverse ley for grazing and fertility building. However, in systems where perennial weeds remain under control and yield penalties have been minimal, an additional year of living mulch production could be considered. The decision on how to proceed depends on how the mulch has been integrated into the wider rotation.

A diverse ley can be direct drilled into the existing mulch after harvest when conditions allow, ideally in August. Species selection should be tailored to the composition of the living mulch – if clover dominates it will likely outcompete other species, making vigorous grasses and herbs the most suitable additions.

*In grazing systems, lambs have shown strong growth rates on the ley, with mob grazing proving effective, allowing for extended recovery periods to strengthen the sward.*

By extending the mulch into a third year and increasing species diversity, the benefits of a longer-term ley can be achieved without reducing the number of combinable crops in the rotation. While cereal yields in the 'true mulch' year will be lower, overall system productivity may be maintained or even improved, provided that perennial weed pressure and slug populations remain at manageable levels.

# Living Mulch Trials: A Diary of Discovery at Fring Estate



Matt England is the Farming and Conservation Manager at the Fring Estate in Northwest Norfolk. Of the estate's 1,450 hectares, 850 hectares are tenanted from the Sandringham Estate and have been farmed organically since their conversion in 2021. The fields where living mulches are being trialled have light sandy soil and very low fertility, which is challenging. Within what is now a 4-year organic cropping rotation, the farm team are growing spring barley, winter linseed / winter oats and peas, and they also have pigs and cattle grazing on 3 year herbal leys. They have been trialling living mulches at Fring for 3 years.



# 2022 A Step into Living Mulches

## March – The Beginning

Farming on sandy, low-fertility soils has always posed challenges, but the potential of living mulches was too intriguing to ignore. I wanted to harvest the sun's energy in July to September when the solar radiation is at its highest and typically most farms (including ours) have absolutely nothing growing in the ground, so I think it's key to make the most of the sun while it's there in the summer.

I also wanted to accumulate N in the rotation, protect soils from climatic extremes, maintain ground cover, suppress weeds, reduce or eliminate cultivations, enhance insect populations, and reduce costs.

## Establishment and Drilling

We inherited a field of red clover and attempted to establish cereals in it, trailing intercropping alongside. After an autumn silage cut, we drilled spring barley in March using three different methods: ploughing and drilling, min-tilling, and direct drilling.

I used a Weaving Sabre tine drill (a fairly crude direct tine drill), which wasn't ideal – a disc drill would have been much better. Since then, I've been using a Pronto drill – again not a proper direct drill but because we have very light soil, I can direct drill with it as long as I roll afterwards to close the slots.

## Observations

The ploughing and drilling method was a success. However, min-till and direct drilling were complete failures. Sowing in March didn't allow the barley enough time to establish before the aggressive red clover took over. Lesson learned? Red clover is the wrong variety as spring cereals don't have enough time to establish before the clover starts to grow.



# 2023 Refining the Approach

## **April 2023 – A New Approach with White Clover**

Determined to make living mulches work, I opted for Jura small-leaved white clover – the only organically certified four-leaf variety. We undersowed it into a spring barley crop using a set of OPICO harrows with a seeder box on, seeding at 5kg/ha.

## **August 2023 – Harvest**

By the time it came to harvest we had a nice green mat across the field. The mulch did make harvesting of the crop more difficult – the bottom of the crop stays damp for much longer. (If you've had a wet spring and your clover has started to grow on, that's when you can start having problems with too much growth). It was a very wet harvest, so the clover grew away quite nicely.

## **October 2023 – Grazing Trials**

To manage the mulch before drilling, we brought in sheep for tight grazing over two weeks. The process, though effective, was a challenge as I had to wait on the grazier's availability to move the sheep on. In contrast, topping the mulch mechanically in 2024 seemed a more convenient option. The timing of the drilling is absolutely key – you don't want to be waiting for sheep to get off and need to drill as soon as the clover hits dormancy.

## **November 2023 – Cash Crop Drilling**

Using the Pronto drill, we sowed Mascani winter oats at a higher-than-usual rate (400 plants/m<sup>2</sup>), about 20% higher than the farm average, aiming to outcompete the clover. Oats get away very quickly compared to something like wheat which doesn't have the same vigour.





# 2024 Learning from the Results

## **February 2024 – Cash Crop Management – Fertility Building**

After a very mild winter, the oats had grown and established very well, the clover was still dormant, and around this time I also put about 20 cubic metres of digestate onto the field to try give the oats a bit of a push.

## **March 2024 – Growth and Weeds**

By early spring, the clover and oats had grown together, successfully suppressing annual weeds. I didn't have major problems because I had a good stand of oats – it's all about crop competition; if you have plenty of growth in spring, you shouldn't have too many weeds. Generally, we get the most of thistles and docks, which don't really start growing until March, so if you can cover the ground enough by then, it's not too bad, but this is a big consideration when thinking about how long to have a living mulch down for.

## **June 2024 – Cash Crop and Mulch Observations**

The clover fixed N effectively, but in low-fertility areas, oat tiller numbers were significantly reduced. Where pigs had been previously, the living mulch worked well, with there being plenty of nutrition to get the oats growing and tillering nicely, they shaded out the clover.

We recorded about 228 tillers (in the control about 324), so it looked like there may be up to a 20% yield penalty from the living mulch versus the control. However, the plants were much healthier and there seemed to be more seeds per panicle on the living mulch field versus the control, which I thought may help bring the yield up a bit.

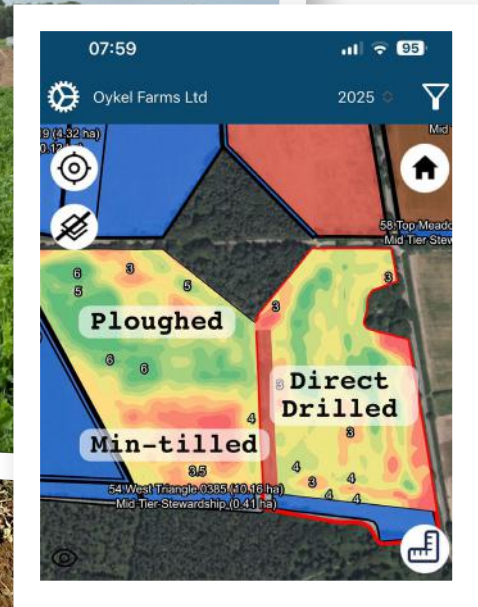
## **August 2024 – Harvest**

My yield predictions were close, 21% yield penalty, with only a cost saving of £40-£50/ha made from not ploughing the field.

Yield maps showed me that yields were higher in areas that had been ploughed as opposed to min tilled, and there were variations caused by pigs being present. There were no good yielding areas where the living mulch was – the only area that came close was where I had overlapped with the drill so had a lot more seed there.

### October 2024 – Topping and Drilling

Moving over to the newly established mulch in the rotation, we chose to top it before drilling rather than using sheep, and this worked well. After the harvest results, the main changes I made were drilling a month earlier and doubling the seed rate of the oats (to 800 plants/m<sup>2</sup>), with the aim of outcompeting the clover and replicating yields seen in areas where I'd overlapped with the drill in the previous year.



# 2025 Next Steps

## March 2025 – Looking Forward

The oats are looking really good. Hoping that they will almost stop the clover growing, as opposed to last year when they were growing together. Whatever your living mulch is, you have to beat it out of the blocks in the spring. Cereals have about a 5-degree window where it can grow, and the clover can't, and that's where you've got to be making up ground on the clover.

*This year, I'm trialling yellow trefoil as we look to establish the next living mulch. Its deeper roots should avoid competing with the oats for moisture.*

It operates in a different root zone to the clover which sits in the same root zone as the oats. The idea is the yellow trefoil with its deeper roots won't be taking all the moisture out of the soil where the oats are sitting.

I will probably undersow in April, then drill winter oats into the undersow in the autumn after harvest, and harvest those oats in August 2026. After harvest in 2026 I will likely plough the mulch in Spring 2027 to get rid of perennial weeds and sow a spring cereal crop which will hopefully benefit from the N fixation of 2 years of clover.

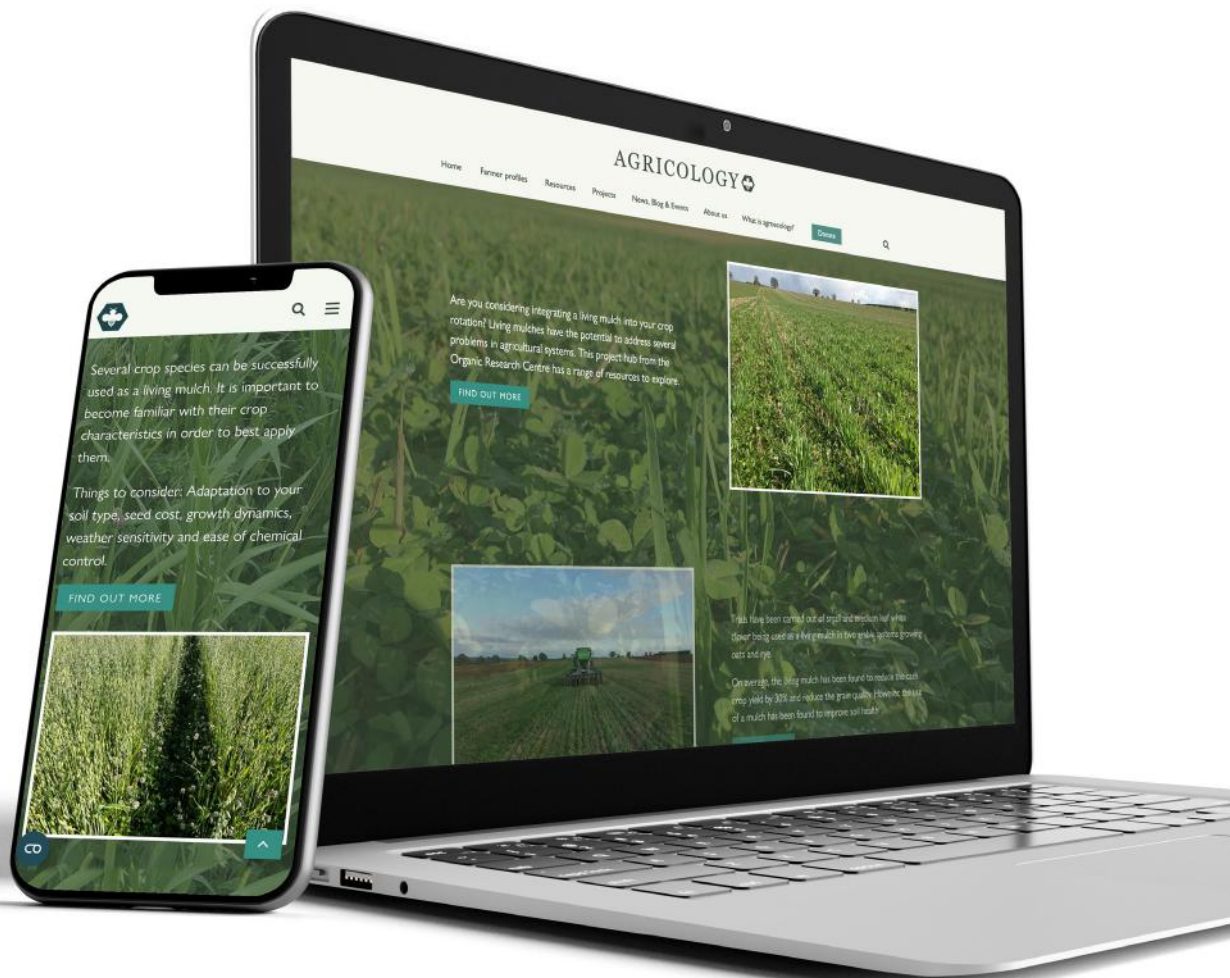




# Further information

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If you want to dive deeper in to living mulches head to the AgricoLOGY website and explore our [Living Mulches Hub](#), which pulls together a wide range of videos, research papers, tools and reports on living mulches



## Thanks

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Our thanks go out to all those that contributed time, energy and knowledge to the creation of this guide. Special mentions to Mark Lea, Matt England, Janie Caldbeck, Matt Smee, Isi Mackintosh, Nicola Noble and Phil Sumption. The original Innovative Farmers field lab on living mulches and ongoing work by the Organic Research Centre led to the creation of this guide, to all the farmers and researchers involved in this past and present our thanks goes out to you.

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