

# Interseeding Cover Crops in Late Season Vegetables: Covering Ground to Build Soil Health

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# Interseeding Cover Crops in Late Season Vegetables: Covering Ground to Build Soil Health

A guide to research findings and real-life case studies about best practices for interseeding cover crops in mixed vegetable systems.

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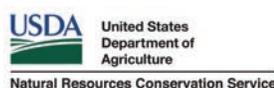
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## Key Takeaways

Interseeding is an effective way to increase cover crop acreage on diversified vegetable farms; however, there are tradeoffs.

Although interseeding (Figure 1) results in soil coverage and protection during the growing season and after the harvest of late-season crops, it also increases weed management challenges. When a crop will be harvested early enough for good postharvest cover crop establishment, consider the tradeoffs between interseeding and more uniform and less weedy cover crop stands from postharvest seeding. Interseeding is one tool in the cover cropping toolbox available for vegetable farms in northern New England. Whether to use it depends on farm cropping mix and farmer management goals.

*Choose cash crops* that are suitable for interseeding. Although interseeding has been successfully used in many cash crops, some are not well suited to this practice. Cash crops should have some ability to compete with the cover crop through quick upward growth, robust shading of the soil, or being planted in plasticulture systems. Less aggressive crops such as bare soil onions, carrots, and radishes should be avoided. Short-season crops such as lettuces, beans, and radishes have better outcomes from being harvested, mowed, disked, and full-width cover cropped as opposed to interseeded.

The *cover crop species* for interseeding should be carefully selected. Cover crops that aggressively compete with the cash crop for water, nutrients, and sunlight should be avoided. Potential disease and insect pest hosts should also be avoided. Tillage radish could serve as a disease reservoir on farms that grow brassica cash crops. We found that a mix of annual ryegrass and crimson clover performed well due to the low growth habits and the

crimson clover's ability to reduce nitrogen demands for both species. Note that both species overwintered in Maine in some, but not all, winters.

The *method* of seeding a cover crop can be important. This is especially true during dry spells. Our research showed that lightly working the soil after seeding results in earlier and more uniform cover crop emergence, as well as significantly higher end-of-season cover crop biomass compared to other seeding methods. This approach also kills weeds at cover crop planting time. As a result, we recommend seeding just before or during the last cultivation of the cash crop.

The *timing* of interseeding cover crops into vegetables is important. Seeding cover crops at last cultivation or while sidedressing (about 30 days after planting/transplanting the cash crop) works well for many crops. Planting too early can result in excessive cover crop growth and eliminates the ability to manage weeds early in the season. Although interseeding reduces weed density, weeds that get through the cover crop can easily set seed. This is most likely to happen if interseeding cover crops occurs too early in the season. Conversely, seeding too late results in low cover crop establishment due to shading from the cash crop. It may also be difficult to complete field work due to the maturity of cash crops.



Figure 1: A farmer collaborator inspecting a cabbage field that was interseeded with annual ryegrass and crimson clover cover crop seed.

## Introduction

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This guide is the result of a 3-year project funded by the Northeast Sustainable Agriculture Research and Education's Novel Approaches program. The work was also supported by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS), and the Maine Agricultural and Forestry Experiment Station (MAFES). The project investigated the practice of planting cover crops over standing cash crops, or *interseeding*.

In 2021, our research team surveyed vegetable producers in northern New England (Maine, Vermont, New Hampshire) about their cover cropping practices. That survey revealed that 78% of farmer respondents (n=21) are limited in their ability to plant cover crops due to "late-season cash crops coming out too late." As a result of that survey, and numerous conversations with mixed vegetable farmers, our team: (a) reviewed relevant literature, (b) conducted four replicated research trials over 2 years each, and (c) recruited farmers to share their prior experiences and to trial this practice. This guide is a summary of that work.

## Interseeding Versus Postharvest Cover Cropping

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Interseeding, the practice of planting cover crops among growing cash crops, allows for early establishment of cover crops before harvest. When timed well, interseeding can enhance organic matter, reduce erosion, and retain nutrients without negatively impacting cash crop yields (7). This approach is particularly valuable in regions with short growing seasons, where postharvest cover crop seeding may not provide enough time for good establishment.

In northern New England, vegetable farmers operate within short growing seasons. As a result, farmers often struggle to establish cover crops postharvest, leaving soil

vulnerable to erosion and nutrient leaching. These risks are expected to get worse with the wetter springs predicted under future climate scenarios (16).

Interseeding offers a promising solution. By establishing cover crops before cash crop harvest, farmers can ensure ground cover during fall and winter months, reducing nutrient loss, stabilizing soils against erosion, and improving long-term soil health (4, 10, 12).

Although most research on interseeding has focused on commodity crops such as corn and soybeans in the Mid-Atlantic and Midwest (8), the practice is increasingly being explored in vegetable production systems. Early studies show that timing, species selection, and placement are critical to avoid competition for light, water, and nutrients, as well as to suppress weeds (3, 6, 13, 15).

In contrast, postharvest cover cropping – planting cover crops after cash crop harvest – is more widely practiced in the Northeast. This method takes advantage of fields not in active production, allowing cover crops to grow without competition for resources (9). Postharvest, also known as *full-width* cover cropping, allows for better weed control prior to seeding through tillage or herbicide applications. It also allows for a seed drill or more controlled seeding method to result in more uniform seed placement, quicker germination, and better weed competition than interseeding. However, its effectiveness can be limited by late planting, which reduces biomass and cover crops' abilities to overwinter. Postharvest planting is not always feasible in northern New England, making interseeding an important alternative approach for protecting soils.

## Farm Systems And Site Conditions To Consider Before Getting Started

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Growers should consider several factors when designing an interseeding approach for their farm. These include the characteristics of the cash crops (for example, crop type and associated spacing requirements, growth rate, and nutrient and water needs) and site characteristics (for example, weed pressure and erosion potential). As with full-width cover cropping, one can employ interseeded cover crops for several different purposes. These include biomass production, weed competition, nitrogen fixation, and soil stabilization, among others. In the following sections, we describe interseeding's effects on cash crops and their agroecosystems, as well as the management considerations that should be addressed when using interseeding strategies on the farm (for example, species selection, seeding method and equipment, and seeding timing). We then show how these considerations are likely to influence



**Figure 2:** Cabbage planted on tight spacing does not allow enough sunlight to support germination and success of interseeded cover crops.

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agronomic outcomes, specifically yield, soil water content, and nutrient flow.

### Cash Crop Characteristics

When planning to interseed cover crops, consider the characteristics of the cash crop. Factors such as the height, growth rate, and leaf coverage of the cash crop can have a big effect on how much sunlight reaches the cover crops. Choose cash crops that are more suitable to compete for resources such as sunlight, water, and soil nutrients. Crops such as sweet corn, cabbage, broccoli, and winter squash are fast growing, deep rooted, and have large leaves that will likely outcompete cover crops and weeds. Crops such as carrots and bare soil onions are not competitive and would likely be significantly negatively impacted by an interseeded cover crop

### Crop Spacing

Crop spacing and cultural practices directly affect the growth of both cash crops and cover crops. Cash crop row spacing should be wide enough to ensure adequate sunlight, water,



**Figure 3:** A recently mowed field of sweet corn on plastic mulch. Both sides of this bed were cultivated at the same time (around V5); however, the left side had crimson clover and annual ryegrass seed distributed just prior to that cultivation. The left has only a few escaped lambsquarter and shepherd's purse weeds, while the right side is a mass of them.

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and nutrient access for the cash and cover crops. Cash crops may be spaced in wider rows in an interseeding system than in a traditional monocrop or relay-crop system. Wider spacing may decrease the number of cash crop plants in a management unit, and, by extension, overall annual yield. For land-limited operations, this may not be an option. However, it is not advisable to use high-density cash crop spacing in an interseeding system: Tightly spaced cash crops (Figure 2) will limit the success of the interseeded cover crop.

### Weed Pressure

Weed management is a key consideration when planning for interseeding. Fields with high weed seed banks (the ungerminated weed seeds in the soil) will likely have high weed pressure even in an interseeded cover crop stand. This is particularly true when perennial or biennial weeds are present (for example, quackgrass, Canada thistle, field bindweed). Before interseeding, it is important to identify the predominant weed species present and assess their density in the field.



**Figure 4:** Midseason erosion occurred in a bare soil block of sweet corn after a >2-inch rainstorm event. The neighboring block of corn had been recently interseeded. The young cover crop stabilized the soils and no observable erosion occurred in that block.

In the years leading up to interseeding, it is recommended to manage the weed seed bank to reduce viable weed seeds. Farmers can use chemical, mechanical, or cultural strategies to reduce the weed seed bank and, in turn, minimize competition between weeds and both cash and cover crops.

Tillage or burndown herbicide applications create a weed-free seedbed prior to seeding a full-width cover crop. Interseeded cover crops (Figure 3) are typically introduced into an existing crop canopy where some weeds may already be established. Weed management options are limited once a cover crop is seeded. Starting with a clean, weed-free field will greatly increase cover crop success. That said, interseeded cover crops can successfully compete with weeds in many situations.

### Erosion Potential

Reducing erosion potential is one of the key benefits of cover cropping in general. In areas where soil erosion is a persistent issue or where rainfall is particularly heavy,



**Figure 5:** Overwintered annual ryegrass the spring following our cabbage trials. The canopy of the cabbage crop shaded and smothered the cover crop in the bed yet allowed establishment in the between-row zones. Compared to no cover crop at all, this level of establishment still provided significant spring runoff management.

interseeding can be a valuable strategy for reducing erosion and maintaining soil health. Cover crops with extensive root systems, such as clovers and grasses, help improve soil structure by binding soil particles together, making the soil more stable and less prone to erosion (13). Cover crop canopies slow the force of rain droplets, further reducing soil movement. If erosion control is a goal for your farm, interseeded cover crops will stabilize soils between rows during the growing season. We observed this benefit at a collaborating farmer's on-farm trial. A sweet corn field with no cover crop experienced rill

erosion (Figure 4) after a >2-inch rainstorm while the neighboring block of corn with newly germinated 3-inch annual ryegrass and crimson clover showed no signs of erosion.

Interseeding can be the difference between some amount of overwinter soil coverage and none. In settings where cash crops are harvested too late to establish a cover crop afterwards, interseeding can reduce the amount of soil exposed to snow melt and heavy spring rains. Even in crops where tight spacing allows for cover crop germination only in narrow between-row zones (Figure 5),

## Box A: UMaine Extension Interseeding Study Design

In 2022–2024, our team conducted four replicated research studies to investigate the practice of interseeding. Two trials were conducted in sweet corn (var. Montauk) and two in cabbage (var. Storage No. 4). Two trials addressed interseeding timing and seeding methods, while two addressed cover crop species. All trials were conducted during 2 growing seasons, spread over 3 years (2022, 2023, and 2024). Sweet corn was planted on 30-inch rows in the first week of July. Each plot was four rows wide. Data was collected from the inner two rows of each plot, with the outside rows serving as buffers. Cabbage was planted the last week of June in beds spaced 5.5 feet on center, with 18-inch spacing between rows and 18-inch in-row spacing. The cover crop seed was targeted at the between-bed zones in the cabbage trials and less-so at the bed tops. All trials were conducted at the University of Maine Rogers Research Farm in Old Town, Maine. The trials included:

*Timing/Seeding Method Trials:* In this experiment, we investigated two late-season crops (sweet corn and cabbage) and how they performed when interseeded cover crops were introduced at different stages of cash crop development (that is, timing) and using different methods of planting (that is, seeding method).

The cover crop (25 lb per acre annual ryegrass and crimson clover [60%:40%]) was seeded at designated maturity stages (**timing**) of the sweet corn (V3, V5, V7) (Figure 6), or days after transplanting (DAT) the cabbage (10, 21, or 31 DAT). The seeding **method** treatments included (a) broadcasting (spread by hand) and left on the surface (*broadcast*), (b) broadcasting and raked in (to replicate cultivating the seed in) (*broadcast/incorporate*), and (c) drilling with an Earthway seeder (beets/chard plate) to simulate using a seed drill (*drill*).

*Species Trials:* We also investigated three different cover crop mixes seeded in the same crops as above at the same time: V5 (sweet corn) or 21 DAT (cabbage). All plots were seeded using a broadcast/incorporate

established strips of cover crops can still have a significant effect on slowing water movement and minimizing erosion.

## Implementation Considerations

The following section describes the results of our team’s recent research studies, findings from a systematic literature review, and the experiences of collaborating farmers. The study design is detailed in Box A.

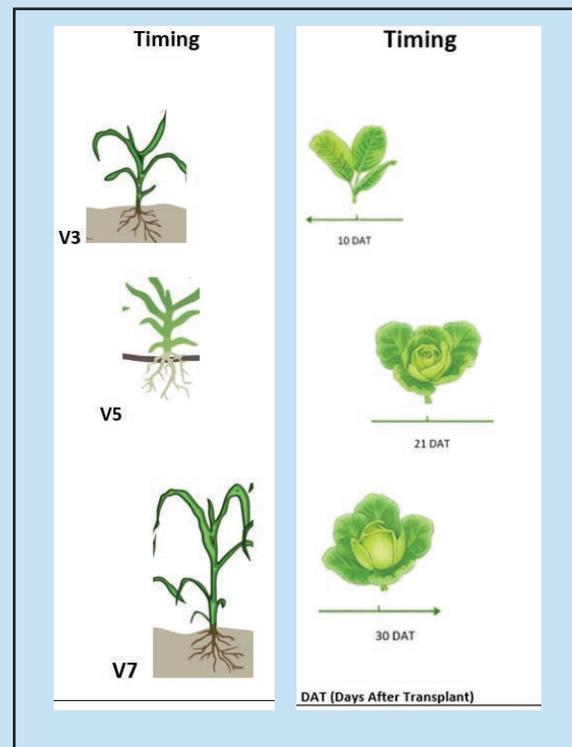
## Cover Crop Species Selection

In any cover cropping scenario, choosing the right cover crop species is crucial for meeting your specific goals, such as weed control, erosion management, nitrogen fixation, or biomass production (4, 13). In an interseeding system, cover crop species interact with the cash crop, meaning that one must select the cover crop for characteristics such as size, growth habit (for example, vining, upright, ground cover), rooting depth and habit, and growth period.

method. The cover crop treatments included (a) annual ryegrass and crimson clover at 25 lb per acre (60%:40%), (b) oats and field peas at 100 lb per acre (50%:50%), (c) winter rye and hairy vetch at 80 lb per acre (69%:31%), and (d) a clean weeded no-cover-crop control.

In addition to the research farm trials, we collaborated with six mixed vegetable farms to conduct on-farm trials. These farms operate at a variety of scales, have different equipment, use various approaches to weed control (for example, herbicide use, hand weeding, and/or mechanical cultivation), and have different soil types. We supplied the farms with technical support and seed and allowed them to implement the interseeding in ways that best fit their production systems. See “Farm Case Studies” below.

*Results from the study described here are shared, along with related findings from other literature, in the following sections. Studies” below.*



**Figure 6:** Representations of the typical crop size and development at the times that cover crop was seeded in the UMaine Extension research trial. The numbers following V in the corn images correspond with the number of true collared leaves on the plant (for example, V3 has three true collared leaves). The cabbage drawings represent the approximate development and size of a cabbage plant at the corresponding DAT.

In full-width cover cropping scenarios, species such as buckwheat, sorghum × sudangrass, and radishes are effective at weed suppression due to their rapid growth and large leaves, which allow them to outcompete weeds for light and nutrients. However, the quick growth of these species also increases the potential for competition with the cash crop in an interseeding scenario.

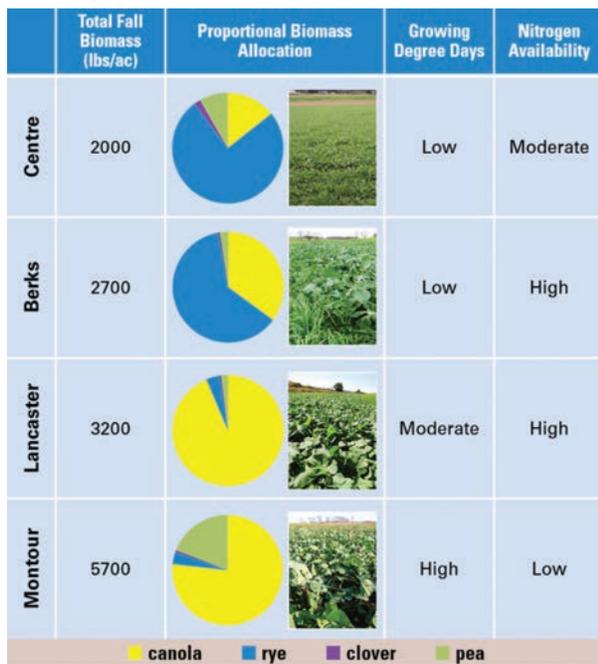
Pest and disease concerns should also be considered. For example, oilseed radish (sometimes referred to as tillage radish) is commonly interseeded as part of a mix that can also include annual ryegrass and crimson clover. This mix is often used in field corn and sweet corn plantings. However, farms that grow brassica cash crops should avoid adding another brassica to the rotation to limit disease and pest host sites.

Grasses with fibrous root systems, such as ryegrass, are beneficial due to their ability to germinate quickly, stabilize soil, and improve water infiltration (5). However, they can severely limit nitrogen availability. Nitrogen-fixing legumes can be slow to germinate, but have reduced nutrient demands and are less likely to compete with the cash crop for nutrients. A grass/legume mix leads to both quick growth and nitrogen fixation. Such combinations are more effective than planting either species alone.

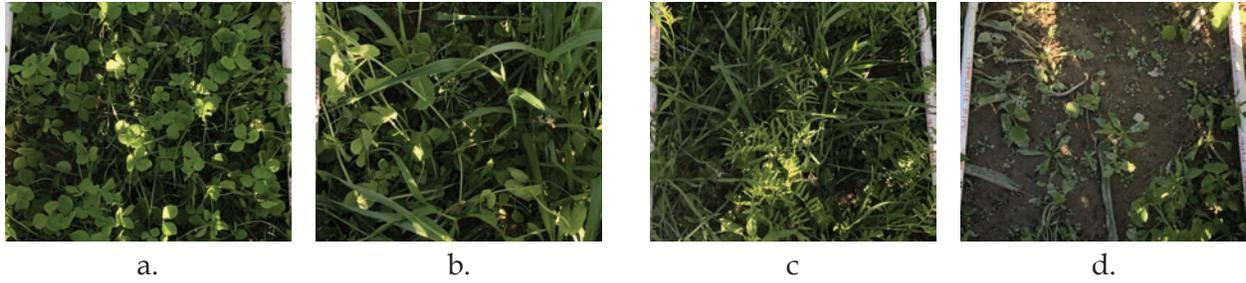
A Penn State review of cover crop mixes (2) showed that the same cover crop mix under different weather and soil conditions performed very differently (Figure 7). This means that planting mixes can serve as insurance against unfavorable weather. For example, if conditions are subpar for crimson clover, the annual ryegrass in the mix may be likely to do well, or vice versa.

In the UMaine Extension species trials (see Box A), we included three different grass/legume mixes: annual ryegrass/crimson clover, oats/peas, and winter rye/hairy vetch. In the sweet corn trial, we observed that sweet corn canopies suppressed all three mixes (Figure 8), despite both mixes being well known for high biomass production in full-width cover cropping systems. However, if mixes were seeded when corn reached the V5 state, as opposed to V3, there were significantly less weed densities at harvest.

Both coverage and growth habits of cover crops and cash crops are important factors to consider. Cabbage and other brassicas have a relatively quick growth habit and large leaves; however, they are low growing. In the dry season of 2022, we observed that when peas and hairy vetch were integrated into interseeding mixes, they vined on top of and through the cabbage plants. This was concerning due to reduced airflow and increased risk for disease. It also increased the



**Figure 7:** A Penn State trial seeded identical cover crop mixes on the same seeding date across the state. The temperatures, soil types, and nitrogen availability varied across the sites. The ratio of cover crop species that thrived at each site varied widely, yet still provided adequate soil coverage. Y-axis: Pennsylvania county. Reprinted with permission.



**Figure 8:** Cover crops in the 2022 sweet corn trial, in which we compared cover crop species mixes. Boxes show that annual ryegrass/crimson clover (a), oats/peas (b), and winter rye/hairy vetch (c) all germinated, yet slowed in growth due to shading from the corn canopy. These plots were seeded when the corn was at the V5 stage. The clean tilled control (d) was hand weeded until V7. Photos were taken at harvest just prior to mowing off the corn stalks.



**Figure 9:** The 2022 cabbage trial of the UMaine Extension interseeding study comparing cover crop species showed that annual ryegrass/crimson clover (a), oats/peas (b), and winter rye/hairy vetch (c) all provided good soil coverage compared to the clean tilled control (d). However, the oats/peas (b) and the winter rye/hairy vetch (c) both had excessive vining and upwards growth that overtopped the cash crop. The annual ryegrass/crimson clover (a) stayed lower growing. All plots were seeded 21 DAT of the cabbage.

difficulty of cabbage harvest. The annual ryegrass/crimson clover was much lower growing, yet still provided uniform soil coverage (Figure 9).

Growers should select interseeding species that suit their soil type, climate, and crop rotation goals, while avoiding excessive competition for nutrients, water, or air movement. Our research and discussions with interseeding practitioners throughout the Northeast lead us to recommend a mix of annual ryegrass and crimson clover for mixed vegetable producers in northern New England.

### Cover Crop Biomass

High biomass is often viewed as a key indicator of success when using cover crops. However, interseeding goals are more nuanced. In an interseeded planting, it is better to have low biomass early in the planting to avoid competition with the cash crop. Cover crops that stay small while cash crops are in the ground, but add biomass after cash crops have been harvested, are desirable. Examples of relatively low-growing cover crops include annual ryegrass, many clover species (crimson, medium red, mammoth, Dutch white), and oil seed radish. Cover crops that are planted too early, or that have robust upright or vining growth habits, are

## Box B: Important Considerations for Using Annual Ryegrass and Crimson Clover

Note that the overwintering ability of both annual ryegrass and crimson clover is not guaranteed in USDA Plant Hardiness Zone 5 and colder; however, at least one species overwintered (Figure 10) in each of the 3 years of our trials. Additionally, annual ryegrass requires aggressive tillage and/or herbicide applications for adequate termination.



**Figure 10:** Annual ryegrass growth the spring after interseeding a late-season sweet corn crop. This plot had very little overwintered crimson clover. Other farms had successful crimson clover spring growth and minimal annual ryegrass.

likely to compete with cash crops for water and nutrients. They may also reduce air flow around the cash crop, increasing the risk of disease.

Several factors influence cover crop biomass when interseeding, including the timing of planting, the choice of cover crop species, and the growth traits of the cash crop. Ideally, one would seed an interseeded cover crop just before the cash crop completes canopy closure. This approach limits excessive cover crop growth prior to cash crop harvest.

Cover crop biomass is also greatly affected by weather. In both our replicated field trials and on-farm trials (see Box A, page 4), our team observed that seeding cover crops in our interseeding plots just prior to soaking rains resulted in higher end-of-season cover crop biomass than plots seeded during dry and hot conditions. This was true even if the plots were seeded earlier, but did not receive rain.

In our studies, rainfall patterns were likely responsible for biomass development of both cover crops and weeds. Maine experienced record-breaking rainfall during the growing season of 2023. That resulted in both difficulty with weed management and rapid cover crop growth. That high biomass created competition and difficulty with harvesting the cash crop.

These results highlight the importance of weather variability – early-seeded cover crops can struggle in drought years but thrive when moisture is sufficient. This highlights the need to carefully select planting dates based on expected weather conditions.

### Seeding Methods and Equipment

For general cover cropping approaches, the seeding method of drilling is often preferred over broadcasting because it ensures better seed-to-soil contact, decreases time to germination, and increases stand uniformity (6). For interseeding, specialized high-clearance drills with removable shoes (seed

placement units) are available. These interseeding drills (Figure 11) allow for seed placement between rows without disturbing or damaging the cash crop, especially when dealing with tall crops such as corn or soybeans (8). However, these specialized drills are expensive and not widely available, particularly for smaller acreage mixed vegetable operations.

Broadcasting seed is the simplest and most accessible method of interseeding. Distributing seed by hand, push spreaders, or tractor-mounted spin or drop spreaders are all viable options, depending on the scale of the operation and available equipment. Working the soil to incorporate the seed in the same pass as broadcasting, or immediately after, can significantly increase seed germination uniformity and speed. This is sometimes referred to as the “broadcast and incorporate” method.



**Figure 11:** The "interseeder" is a custom-fabricated grain drill. Compared to a traditional grain drill, this unit has much higher clearance, and the shoes and drop tubes are designed to be easily removable. This allows the drill to pass over established crops of field corn and soybeans and seed in the between-row zones without disturbing the crop. The down pressure on each seeding unit is similar to that of a no-till drill, as these units are typically used more than a month after any type of cultivation, or in no-till systems.

Aerial seeding by fixed-wing plane, helicopter, or drone is another broadcast method that can be considered. This approach works when the crop is too tall to allow for other seed distribution methods. Although it can be effective in reaching hard-to-access areas, aerial seeding can be more expensive, limited by weather conditions, and may result in inconsistent seed germination.

Farmer collaborators on the UMaine Extension research project described in Box A all independently decided to use some form of drop spreader or spin spreader (Figures 12–14) to seed interseeded cover crops, either at the same time as, or just before a cultivation pass (see Farm Case Studies, pages 19-24).

In the trials described in Box A, we used three seeding methods, including (a) broadcasting by hand, in which seeds are spread over the soil surface (*broadcast*); (b) broadcasting by hand, followed by incorporating into the soil by raking in cover crop seeds to imitate cultivation (*broadcast/incorporate*); or (c) using an Earthway push seeder (*drill*), to imitate a seed drill. The drill method allows seeds to be



**Figure 12:** A G-cultivating tractor with an electric driven hopper box on the front axle for distributing cover crop seed just ahead of and in the same pass as the cultivators.

planted in rows, ensuring better spacing and coverage for more controlled establishment.

In these trials there was significantly more biomass when cover crop seed was broadcast and incorporated into standing sweet corn, compared to other seeding methods. In both years of the corn trial (2022 and 2024), there were very dry conditions during the seeding period. Covering seeds with soil decreased the risk that seeds would dry out and die. Drilling seed also resulted in uniform cover crop germination in some plots, yet it did not work well in compacted soils.

Surprisingly, there was little difference in cover crop biomass yields between each of the trialed seeding methods in the cabbage trials. This was particularly true in the extremely wet season of 2023, when it was likely that seeds had adequate moisture whether they were in the soil or on the surface. That said, incorporation of seed with a cultivator simultaneously kills weeds while improving conditions for seed germination. This gives

cover crops a leg up on weeds and increases their chance for success.

This study suggests that small-scale farmers do not necessarily need specialized equipment for interseeding. Simple methods such as hand broadcasting or using chest-mounted spin spreaders can be effective and affordable, making the practice accessible even for those with limited resources. Additionally, both small- and large-scale farmers can modify existing farm tools to suit their interseeding needs. These modifications reduce the need for costly new machinery and can make interseeding viable with no additional passes. These efficiencies make interseeding a practical and budget-friendly option across different farm sizes.

### Seeding Timing

Timing is critical for successful interseeding. Early interseeding may lead to more biomass production but also more competition with cash crops. Early seeding also limits weed



**Figure 13:** A ground-driven Gandy box mounted on a cultivation tractor. The unit is adjustable to allow for calibration of the seeding rate. The seed is dropped through a tube onto a homemade deflection plate to distribute the seed evenly in the wheel tracks. In the same pass, the seed is incorporated into the soil and weeds are killed both in and between the beds.



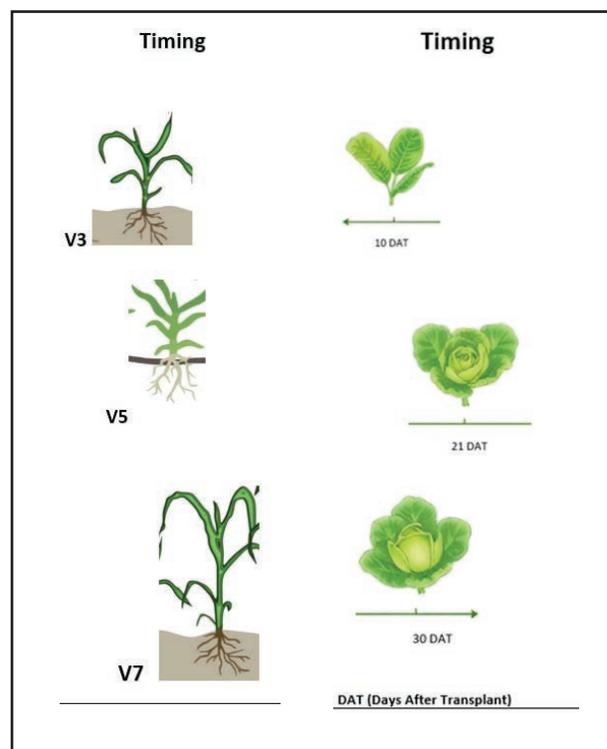
**Figure 14:** A Gandy Orbit Air seeder allows for distribution of fertilizer and cover crop seed simultaneously. The seed is blown through the distribution tubes and hits the candy apple red deflection plates for even distribution. The seed is then worked in by the Lilliston cultivators. This unit is configured for use in sweet corn.

management activities; strategies such as mechanical cultivation cannot be used after cover crops have been seeded. If cover crops do not develop sufficient canopy cover quickly, weeds may grow and set seed. This could lead to a large weed seed bank, and years of weed control challenges. Although seeding cover crops later in the season reduces the risk of competition with the cash crop and allows for more weed control opportunities, it is possible to wait *too* long. When a cash crop is too mature, it may be physically impossible to enter the field (for example, the vining of a cucurbit crop blocks walking access). Additionally, if the soil is too shaded by the cash crop, a cover crop is unlikely to germinate.

For example, the UMaine Extension trials with sweet corn (var. Montauk) interseeded with annual ryegrass and crimson clover were done during the V3, V5, and V7 growth stages (Figure 15). The V3 stage corresponds to the period when the corn plants are still relatively small and have not yet fully shaded the ground between rows. By V7, the corn was too tall to access the field with equipment. A Penn State trial recommended V4 or V5 as the optimal time for interseeding into field corn (9). The corn at this stage is small enough for the cover crop to access sunlight, water, and nutrients. The corn crop is mature enough that it will soon shade the cover crop, reducing the cover crop's competitiveness with the corn. The findings from Curran et al. (2018) are similar to those of this UMaine Extension study, even though field corn has a much more aggressive growth habit than sweet corn. Both studies found that interseeding at the V5 stage allowed for equipment access to the fields, adequate cover crop germination, and reduced weed growth as compared to both the V3 and the V7 growth stages. From a practical perspective, this maturity stage often corresponds with the sidedressing and the final cultivation of a sweet corn crop. This suggests that

interseeding into either sweet or field corn could integrate well into existing management calendars.

The UMaine Extension trials in cabbage (Storage No. 4) found the timing of interseeding to be even more critical to avoid crop damage than for corn. In these trials, annual ryegrass and crimson clover was interseeded at different time intervals – 10, 21, and 30 DAT (Figure 16). Early interseeding, at 10 DAT, allowed cover crops to establish while the cabbage was still small. However, this timing can lead to excessive growth and competition for water, nutrients, sunlight, and airflow to the cabbage crop. The 21 DAT



**Figure 15:** Representations of the typical crop size and development at the times that cover crop was seeded in the UMaine Extension research trial. The numbers following V in the corn images correspond with the number of true collared leaves on the plant (for example, V3 has three true collared leaves). The cabbage drawings represent the approximate development and size of a cabbage plant at the corresponding DAT.



a.



b.



c.

**Figure 16:** (a) Annual ryegrass and crimson clover interseeded 21 DAT to a cabbage crop at a collaborating farm. In the wet season of 2023, the cover crop grew excessively and overtopped the cabbage. There was a harvestable yield of cabbage, yet the cover complicated the harvest, reduced airflow, and caused some visible signs of nutrient deficiency in some of the crop. (b) In the drier year of 2022, the 21 DAT treatment resulted in a low cover crop with good soil coverage (photo of the between-row-zone). (c) In 2022, the 21 DAT cabbage had less competition from the cover crop as compared to 2023, but still yielded significantly lower than the 30 DAT and control treatments.

treatments also proved to be too early in a year with record-setting wet conditions (2023). This was true in the UMaine Extension cabbage research trials and the on-farm trial sites. In the drier year of 2022, our 30 DAT treatment yielded the same as the control; the 10 and 21 DAT treatments yielded lower than the control.

Several farms in the Northeast are using full-season living covers, often between rows of plastic mulch. In this scenario, timing is not a factor, because the cover crop is seeded when the plastic is laid, or while planting the crop. However, this system usually requires a method of mowing (Figure 17) to keep the cover crop and escaped weeds under control with the mower as opposed to through careful timing and competition for sunlight.

### Weed Competition

Cover crops can suppress weeds through competition and allelopathy (natural



**Figure 17:** A collaborating farmer mowing cover crops between rows of peppers on plastic mulch. This is a particularly narrow lawn mower with a mulching mower deck. Fields should be relatively free of rocks to avoid damage to workers, the crop, and the mower.

chemicals leached from the roots of some cover crop species that reduce seed germination and weed growth). However, achieving effective weed control with interseeding often requires management with either carefully timed cultivation or thoughtful herbicide applications. Here, we discuss practices observed on Maine farms and the relationship between cover crop and weed biomass as influenced by seeding timing and incorporation method.

Some Maine farms have increased bed spacing and purchased or retrofitted narrow mowers. This allows for mowing of escaped weeds and keeps earlier seeded cover crops in

check. However, most farmers who use interseeding in Maine are seeding the cover crops at last cultivation and then are done with weed management at that point.

Distributing cover crop seeds and cultivating in the same pass, or immediately after, increases cover crop germination due to increased seed-to-soil contact. This approach also kills weeds at planting to give the cover crop an advantage over the weeds. Several research projects, including our own, have demonstrated that an effectively established cover crop will significantly reduce weed populations compared to having no cover crop in between-row zones.

### Box C: Herbicide Considerations

For farms that use herbicides, product selection should be tailored to avoid damage to the cover crops (Figure 18). Opting for herbicides with short-lived residual effects, especially in postemergence applications, helps to reduce effects to the cover crops while still managing weeds. For example, in a corn system with annual ryegrass interseeded as the cover crop, a suitable approach might involve using glyphosate-resistant corn with an early glyphosate application to control weeds, while avoiding residual herbicides that interfere with ryegrass establishment. Herbicides such as pyroxasulfone (Zidua) and metolachlor (Dual II Magnum) can significantly hinder annual ryegrass emergence. Similarly, mesotrione (Callisto, Lumax, Lexar) and clopyralid (Stinger, Hornet, SureStart) can damage legumes and mustard cover crops (11). The success of interseeding depends heavily on matching the cover crop species with herbicide type, rate, and application timing to minimize injury and support effective weed management.

When using an herbicide-based system, carefully consider herbicide active ingredients and how they will interact with the cover crops. A Penn State fact sheet, *Improving the Success of Interseeding Cover Crops in Corn* (1), has a list of active ingredients and their likelihood to cause injury to different cover crop types.



**Figure 18:** Residual herbicide caused poor germination and visible damage to an interseeded winter rye.

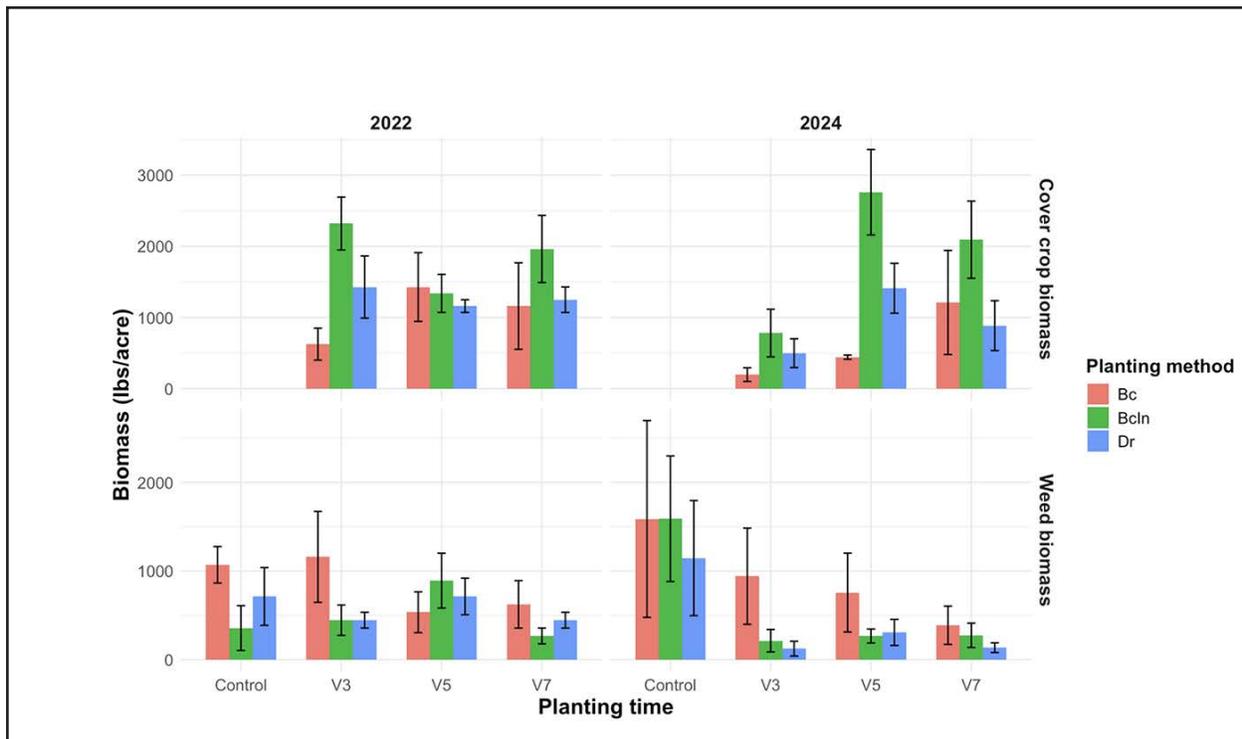
In the UMaine Extension trials (see Box A, page 4) interseeding had inconsistent effects on weed biomass. In dry years (2022), early establishment of cover crops in cabbage trials led to a predictable reduction in weed biomass. However, in wet years (2023), this was not the case. The relatively greater amount of weed biomass at all seeding dates in that year was due to quick weed growth rates. That quick growth was attributed to the plentiful soil moisture and the ineffectiveness of weed management prior to seeding the cover crop. Large weeds were pulled by hand, but rapidly rerooted.

Figure 19 shows results in cover crop and weed biomass, by seeding treatment and seeding timing in the sweet corn trials. Plots with high cover crop biomass had lower weed biomass, particularly in broadcast and

incorporated plots. Broadcast plots and drilled plots with lower cover crop biomass had higher weed biomass. These results highlight the effectiveness of well-established cover crops in suppressing weeds and the importance of timely cover crop planting. However, weather conditions appear to supersede planting method and timing.

Focusing on effective weed control just prior to seeding the cover crop is important to provide the cover crop the time to establish and effectively suppress new weeds. Many farms are incorporating seeding into their final cultivation pass. This approach:

- aligns well with the optimal timing found in the UMaine Extension trials
- kills weeds at the same time as seeding



**Figure 19:** End-of-season cover crop biomass results for 2 years (2022 and 2024) of interseeding trials in sweet corn (Asieduwaa et al., forthcoming). The planting dates refer to the sweet corn crop maturity when the cover crop was seeded over it. The planting methods (broadcast alone [Bc], broadcast and incorporate [Bcln], or drill with an Earthway seeder [Dr]) had some influence on cover crop biomass, particularly during dry periods. The Bcln seeding method created significantly more end-of-season cover crop biomass in two of the six seeding dates. The low 2024 V3 biomasses are attributed to very hot and dry conditions at that seeding date.

- incorporates the seed into the soil, significantly increasing germination success and the competitiveness of the cover crop against future weeds
- reduces the time requirements to interseed, as the cultivation pass is already on the to-do list

## Agronomic Outcomes

### Cash Crop Yield

When implemented correctly, interseeding should have no effect on cash crop yields. However, this depends on factors such as the vigor and competitiveness of the cover crop, the resources available to the cash crop, and site characteristics. In the following section, we summarize factors that can negatively affect cash crop yields, followed by practices that have no effect on yields.

### Approaches That Can Negatively Affect Yields

#### *Seeding Cover Crops Prior to Planting Cash Crops*

A Wisconsin-based study (3, 13) of various full-season living mulches looked at full-width cover crops planted in late April, about 4 weeks prior to planting the cash crops. The cover crops included buckwheat, crimson clover, field peas, or medium red clover. The cover crops (and weeds) were mowed just prior to planting crops, and at 10- to 14-day intervals throughout the season. Although weeds were suppressed in the living mulch systems, yields of bell pepper and snap beans were significantly lower in all of the cover crop types compared to clean tilled plots. The broccoli crop failed completely in both seasons of the trial because the heads did not reach a marketable size. The reduced yields were attributed to competition for nutrients and high evapotranspiration of the cover crops, which reduced water availability to the

cash crops. The research team recommended strip tilling to reduce competition between cover crops and cash crops, and selecting lower growing cover crops as a potential approach to reduce competition.

#### *Seeding Early (21 DAT or Earlier)*

A study in New York (7) demonstrated that interseeding oats, hairy vetch, or lana vetch 10 DAT cabbage reduces cabbage yields significantly.

#### *Interseeding with Cool-season Grasses Versus Legumes*

That same New York study (7) showed that when seeding oats — a cool-season grass — into cabbage at either 20 or 30 DAT yields were reduced even with additional nitrogen fertilizer. However, hairy vetch, a legume, planted at 20 DAT did not reduce cabbage yields and provided modest weed suppression compared to two cultivations alone. Although this study found hairy vetch to have no negative effect on yields, trials described in Box A found hairy vetch to put on too much vertical growth, limiting airflow around the crop and interfering with the harvest. The New York trial (7) demonstrated that early seeding and fast-growing grass cover crop species selection can interfere with cash crop yields.

### Approaches With No Observed Effects On Yields

#### *Full Season Seeding Between Plastic Mulch*

Our research team has worked with farms that are successfully planting living mulch cover crops between crops on plastic mulch with no effect on yields. These farms are mowing those between-row zones on an every 2- to 3-week schedule.

#### *Seeding at a Later Crop Maturity Stage*

A New York-based study (15) demonstrated that seeding either lana vetch or lana vetch

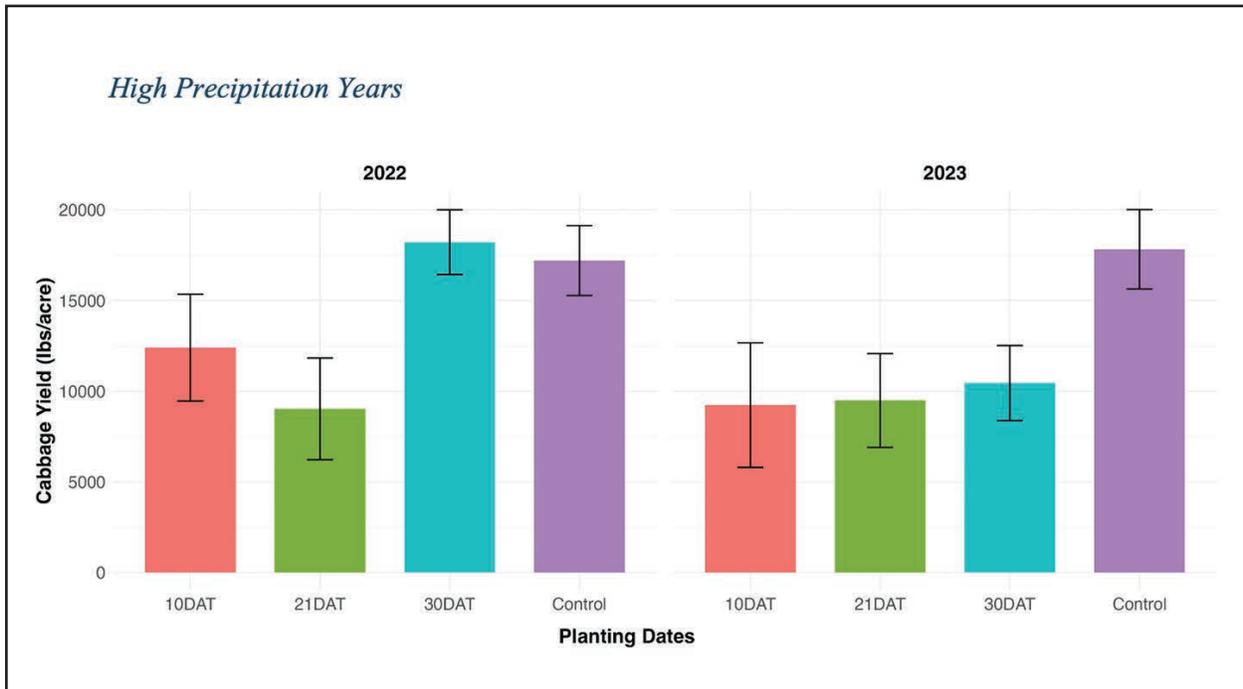
and winter rye 30 days after direct seeding led to higher pumpkin yields compared to seeding either cover crop 20 days prior to, or at the cash crop seeding date. The 30-days-after treatment yielded the same as bare-ground control plots.

In the UMaine Extension studies, it was also clear that waiting to plant cover crops until later in the season led to higher cash crop yields. For example, the increase in cabbage yield at later planting dates (Figure 20) shows that this approach may help reduce competition, allowing cabbage to establish more effectively before interacting with cover crops. That said, in the record-setting wet season of 2023, the 30 DAT seeding date still resulted in reduced yields compared to the control.

### *Interseeding into Corn or Other Upright Crops*

A series of trials at Penn State (8) showed that interseeding various combinations of annual ryegrass and multiple legume species between V3 and V7 does not reduce field corn yields, and may even improve them by enhancing soil health and reducing erosion.

The UMaine Extension sweet corn trials similarly showed no differences in yields across all timing treatments. The upright growth habit of corn minimizes the risk of competition with the cover crop. That said, pushing the interseeding date until the last cultivation will minimize the amount of weed seed development.



**Figure 20:** The UMaine Extension cabbage trial showed that, in 2022, the highest cabbage yields were observed in both the control treatment and when a mix of annual ryegrass and crimson clover was planted 30 DAT. However, in the extremely wet season of 2023, all cover crop seeding dates resulted in excessive cover crop and weed biomass. As a result, the highest cabbage yield occurred in the no-cover-crop control treatment.

## Other Factors

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### Soil Water

Cover crops can affect soil water content in different ways, depending on the time of the year and management of the cover crop. Spring cover crops can speed up the drying of wet spring soils, via evapotranspiration. Terminated cover crop mulches retain soil moisture by protecting the soil from the sun, keeping soils cool and slowing evaporation. Interseeding can help improve soil water levels if the cover crops are not allowed to grow excessively large. Low-growing interseeded cover crops shade the soil and encourage rainwater to slow and sink into the soil. If interseeded cover crops show excessive growth, have irrigation systems ready and monitor crops closely. Mowing or string trimming may be another strategy to control excessively quick-growing cover crops.

### Nutrient Management

Interseeding cover crops can greatly enhance soil nutrient retention, providing multiple benefits for both crop growth and the environment. For example, including a nitrogen-fixing legume in a cover crop mix can reduce the risk of nutrient competition from the cash crop.

Interseeding results in established cover crops being present in the field immediately at crop harvest. This allows any unused soil nutrients to immediately be taken up by the cover crop. This process prevents nutrients from leaching into waterways, as cover crops can hold those nutrients in the fields until the following season when the cover crop will be terminated and incorporated.

However, it is important to note that while interseeding helps with nutrient conservation, excessive biomass from early seeding, aggressive species selection, or wet years may cause cover crops to compete with cash crops for resources. In the UMaine Extension trials,

early-seeded cover crops in wet conditions competed with cash crops for nutrients, leading to lower yields, whereas later-planted cover crops reduced competition and allowed the cash crop to thrive.

Soil testing and proper nutrient management is key to success with interseeding. If you are not already, consider conducting a pre-sidedress nitrate test (or total available nitrogen) about 3 weeks after transplanting to inform any need for additional sidedress fertility around the time of interseeding (14).

## Conclusions

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Leaving bare soil over winter leads to the loss of soil sediment, nutrients, and pesticide residues from our farming fields and into waterways. The direct impact of winter and spring rains on bare soils degrades soil aggregation and structure. It also allows winter annual weeds to thrive and reproduce.

Many cash crops in northern New England are harvested too late to establish a cover crop postharvest. In these fields, interseeding can be an effective strategy to provide soil coverage overwinter. Although coverage may not be as uniform or weed-free as a full-width cover crop planting, this practice can effectively improve soil health.

Although interseeding can be an effective and sustainable approach, the potential drawbacks highlight the importance of careful planning and management. Addressing these challenges through proper crop species selection, cash crop spacing, and monitoring strategies can help maximize the benefits while minimizing the risks associated with interseeding.

## Potential Drawbacks

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Interseeding offers numerous benefits, but it also presents several challenges that require careful consideration. One of the major concerns is *competition between the cash crop and cover crops*. When cover crops are interseeded, they share sunlight, water, and nutrients with the cash crop. If the cover crop is particularly vigorous, it can outcompete the cash crop, increasing disease issues or making harvest and field operations difficult.

*Weed management* challenges also may arise, as the presence of cover crops can complicate herbicide application and/or manual or mechanical weed control strategies. Seeding late to allow more time for weed management, cultivating at cover crop seeding, and providing conditions for rapid cover crop germination will all help cash crops and cover crops to outcompete the weeds.

Lastly, interseeding requires *time, labor, and financial investment*. Farmers must carefully manage row spacing, seeding rates, and herbicide applications, all of which increase operational complexity. The added costs include not only labor but also the price of seeds and the potential investment in specialized tools or equipment.

## Recommendations

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For farmers who are interested in interseeding, we recommend the following approaches:

- *Interseed only into cash crops* with competitive upright growth or large leaf areas. Avoid lower growing, less competitive crops.
- Interseed with *cover crop species* that are low growing. A mix that includes a legume will minimize the risk of nutrient competition with the cash crop. Avoid cover crop species that might harbor pests

or that are in the same crop family as cash crops. We recommend starting with annual ryegrass and crimson clover.

- *Time planting of cover crops* at about 30 days after seeding or transplanting the cash crop. This gives the cash crop time to establish ahead of the cover crop, and can allow the cash crop to suppress the cover crop until harvest. Doing so reduces the risk of competition with the cash crop for water, nutrients, sunlight, and airflow. This often aligns with the final cultivation.
- *Incorporate cover crop seeds* when planting. Cultivating or hand weeding over the seed reduces weeds at the time of seeding and increases cover crop seed-to-soil contact to increase the germination rate. This is particularly important in dry years. Distributing seed while making the final cultivation pass or sidedressing fertilizer allows for interseeding with no additional field passes.

## Farmer Case Studies — Goranson Farm (Dresden, ME)

### Farm at a Glance

- Soil health manager/Co-owner: Carl Johanson
- County: Lincoln
- Crops grown for sale: A wide variety of diversified organic vegetables, include leafy greens, potatoes, peppers, herbs, sweet corn, cabbage, strawberries, and winter squash. The farm grows more than 50 crops in total.
- Farm size: 35 acres of cash crops plus 44 acres of cover crops.
- Soil types: The farm's soil textures range from fine sandy loams to silt loams, with notable types such as Allagash fine sandy loam, Madawaska fine sandy loam, and Charles silt loam.
- Primary soil health practices: Reduced tillage, cover crops, perennial crops, and mulching of late harvested fields, such as after their storage carrot harvest.
- Soil health concerns: The farm is focused on building organic matter and retaining nitrogen. Most crops require frequent sidedressing, and Carl hopes to reduce that. The farm is located at the confluence of two major rivers. Keeping soil in the field and keeping sediment and nutrients out of the rivers is a high priority.

### Goals for Interseeding

The farm's interseeding goals include maintaining consistent soil coverage to protect the soil from erosion and to support overall soil health. Interseeding also helps the crew to reduce field passes and minimize tillage, both of which help to conserve resources, reduce labor, and improve efficiency. By seeding just prior to the final cultivation, their cover crops are established prior to crop harvest. After the cash crop is harvested, there is no need to work the field and seed. Managing weed pressure is also a significant focus. Finally, the farm aims to establish cleaner, high-quality crops by using interseeding practices to prevent soil splashing onto the crop and provide a barrier between the winter squash and the soil.

### Cash Crops Interseeded and Cover Crop Choices

Goranson Farm has experimented with interseeding in various crops such as sweet corn, cabbage, kale, rutabaga, and winter squash. Carl started with cover crop choices such as crimson clover and annual ryegrass. However, he faced challenges with ryegrass, particularly with it being difficult terminating it after overwintering. Carl also tried Japanese millet in winter squash, but found it to be too aggressive. He now uses mixes of medium red and crimson clover (Figure 21) for interseeding in most crops.

### Seeding Methods and Timing

Timing is critical for successful interseeding, and Carl has developed specific methods to optimize this. For sweet corn, he times the

interseeding around canopy closure at the V5 growth stage, or whenever the final cultivation happens. This allows establishment of cover crops without interfering with the growth of the corn. For winter squash and brassicas, Carl is still trying different timings to determine the most effective, but generally aims for just prior to the final cultivation. His goal is to seed immediately prior to that cultivation pass. He has been having success using a chest-mounted broadcast seeder to spread seed over winter squash crops just prior to winter squash vine run.

### Tools and Equipment

Goranson Farm has tested several tools for seeding. They have used chest-mounted spin spreaders, tractor-mounted Gandy boxes, and an old horse-drawn grain drill, with spin spreading currently preferred for its simplicity and ease of use by farm workers. The farm has modified an antique grain drill with high clearance, which is mounted on a

front three-point hitch for interseeding. This has been less efficient due to calibration issues and the need for specific tractor requirements. Carl is planning to mount Gandy boxes on smaller tractors with higher clearance to improve the efficiency of the interseeding process.

### Successes

The farm has seen several positive outcomes from interseeding. The most notable achievement is improved soil coverage (Figure 22), which effectively reduces erosion and minimizes the exposure of bare soil to winter and early spring conditions. Additionally, fewer field passes have resulted in reduced fuel and labor costs. They've also had some success in improving weed suppression through interseeding.

### Challenges

Despite the successes, the farm has faced a few challenges. One of the main issues is timing and the ability to get out to seed



**Figure 21:** A winter squash field at Goranson Farm after harvest. This field was interseeded with a mix of medium red clover and crimson clover just prior to vine run. After harvest there are a few runaway lambsquarter weeds to be mowed, but the soil is almost completely covered with a well-established clover cover.



**Figure 22:** Medium red clover that was interseeded in a sweet corn field at Goranson Farm. After the crop was harvested and mowed, the cover crop was able to rapidly grow and provide nearly complete soil coverage.

during the busyness of the late growing season. Additionally, annual ryegrass has unintentionally set seed, prompting reconsideration of cover crop mixes. Weather conditions, particularly rainfall patterns and soil moisture, significantly impact the success of interseeding, making the practice highly weather-dependent. When cover crops fail to establish, the main losses are the cost of seed and time invested rather than increased weed pressure.

### **Would Goranson Farm Recommend Interseeding?**

Carl would definitely recommend interseeding to other farmers. His advice is to first define clear goals for interseeding that align with specific farm needs, as this will guide decision-making. He also encourages farmers to experiment with different cover crop species to determine the best fit for specific cash crops and soil conditions. Proper timing of seeding is essential to maximize

establishment and minimize competition with cash crops. Finally, Carl suggests using available resources, such as fact sheets and other farms' experiences, to better understand and refine interseeding practices.

### **Next Steps**

Looking ahead, Goranson Farm plans to continue experimenting with interseeding methods in squash crops, refining their approach based on ongoing trials. Carl plans to mount Gandy boxes on smaller tractors to improve the efficiency of his interseeding efforts. Interseeding has proven to be a promising practice on Goranson Farm, despite some challenges. By continuing to refine methods, adjusting cover crop choices, and exploring new equipment, the farm aims to integrate interseeding more effectively into its operations.

## Farmer Case Studies — Jordan's Farm

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### Farm at a Glance

- Soil health manager/Co-owner: Phil Jordan
- County: Cumberland
- Crops grown for sale: Corn, brassicas (broccoli, brussels sprouts, cabbage, cauliflower, kale), eggplant, rutabaga, peppers, flowers, beans, peas, strawberries, squash, pumpkins, potatoes, cucumbers, tomatoes, and more
- Farm size: 60–75 acres per year
- Soil types: The farm is very close to the coast with beaches and mud flats very nearby. Soil textures range from heavy loam to sandy loam, with some areas almost pure sand.
- Primary soil health practices: Cover cropping (~90% of land), compost application, lime application in spring, chisel plowing in spring
- Soil health concerns: Erosion is the main concern, particularly on hilly terrain. Poor drainage is also a concern in some fields.

### Goals for Interseeding

Phil's goals for interseeding are to establish cover crops on land that is harvested too late for a traditional cover crop. This practice helps reduce soil erosion, particularly on sloped fields, which is a major concern for his farm. Additionally, Phil aims to save time and fuel by minimizing the number of field passes required for cover cropping. Interseeding also helps maintain a root system during winter and heavy rains, providing long-term soil health benefits.

### Cash Crops Interseeded and Cover Crop Choices

Phil has interseeded a variety of crops, including corn and brassicas, and a wide variety of plasticulture-grown crops. His cover crop choices typically include crimson clover and annual ryegrass; however, he has also experimented with Dutch white and medium red clovers, which he found promising. In wet years, the red clover was

used successfully. However, Phil has observed little difference between crimson and red clover and prefers crimson clover.

### Seeding Methods and Timing

Phil has kept seeding timing relatively simple. He seeds bare soil crops at last cultivation. For plasticulture crops (Figure 23), he typically seeds a few weeks after transplanting. In the plasticulture crops, the height of the cover crop is maintained with a narrow mulching ride lawn mower. With the regular mowing keeping the cover crop low, the timing of seeding seems to be less important.

### Tools and Equipment

Phil and his team have tested several seeding methods to determine the most effective approach for their operation. They started with a spin spreader on the back of the tractor, which they were already using for sidedressing urea over their sweet corn.

## Successes

Phil has seen several positive outcomes from interseeding. Soil health has improved, particularly in terms of organic matter and erosion control. By reducing the number of field passes, Phil has also experienced increased operational efficiency, saving both time and fuel. Additionally, Phil observed that deer preferred grazing on cover crops instead of his corn, potentially reducing crop damage. A field of crimson clover flowers also attracted bees, creating a beneficial pollinator habitat, and dozens of community members stopped by the fields of blooming crimson clover for photos.

Although this worked well, they found that the ryegrass seed that was mixed in with the urea would get blown by light winds much more than the fertilizer granules, leaving an uneven distribution. Next, Phil and his team transitioned to custom-built electric-driven



**Figure 23:** Summer squash on plastic mulch with annual ryegrass and crimson clover planted between rows. The between-row zones are mowed regularly throughout the season with a narrow mulching ride mower.

hoppers on a G-cultivation tractor. In 2023 they mounted Gandy boxes on a Farmall 200 cultivation tractor (Figure 24), a self-fabricated system that allows simultaneous sidedressing, interseeding, and the last cultivation pass. This system has been very effective. In areas where machinery is not suitable, sidedressing is done by hand.

## Challenges

Weed pressure has been a persistent issue. However, Phil has been able to manage this with careful attention. Weather conditions have also played a significant role in the success of interseeding. Moderately dry years tend to be more favorable for interseeding, as cover crops help reduce weed pressure. Wet seasons can lead to excessive cover crop growth, making management more difficult. Extremely dry years (such as 2025) can lead to very poor germination and a failed cover crop.



**Figure 24:** The Farmall 200 cultivation tractor used for interseeding. Phil found a pair of unused Gandy boxes on the farm. He attached those to the ground-drive system, installed a drop tube, and placed a piece of bent plate metal at the bottom of the drop tube to act as a deflection plate. The Gandy box can be easily calibrated to distribute a specified amount of seed. The wheel track and in-row cultivation units then work the seed into the soil all in the same pass.

## Would Phil Recommend Interseeding?

Phil is a strong advocate for interseeding and recommends it as a practical and time-saving method for cover cropping. He advises other farmers to integrate interseeding into their existing farm operations, such as sidedressing and/or cultivation, as this avoids the need for extra steps. He also encourages experimenting with different cover crops to find the best options for specific soil types and climates. Finally, Phil stresses the importance of monitoring weather conditions and adjusting practices accordingly to ensure successful interseeding. He emphasizes that while dry years may result in slow cover crop growth, they are often preferable to wet years, when cover crops might put on excessive growth.

## Next Steps

Phil's experience with interseeding highlights its benefits for improving soil health and enhancing operational efficiency. Although challenges such as weed pressure and weather variability are present, Phil believes that interseeding is an effective way to simplify cover cropping while saving valuable resources.

## Additional Resources

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- "Improving the Success of Interseeding Cover Crops in Corn". 2015. Pennsylvania State University.
- "Making the Most of Mixtures. Considerations for Winter Cover Crops." 2017. Pennsylvania State University.
- "Living Mulch Suppresses Weeds and Yields in Organic Vegetable Plots." 2018. University of Wisconsin, Madison. CIAS Research Brief #100.
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## Acknowledgments

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