

# Contents

---

|  |    |
|--|----|
| <b>Getting Started</b> .....                                 | 6  |
| <b>Choosing Cover Crops</b> .....                            | 6  |
| Objectives/Benefits of Cover Crops.....                      | 7  |
| Fitting Cover Crops Into Your System.....                    | 11 |
| Approximate Cover Crop Seeding Dates.....                    | 13 |
| <b>Pure Stands vs. Mixtures</b> .....                        | 16 |
| <b>Suggested Cover Crops for Common Rotations</b> .....      | 16 |
| <b>Seeding Methods</b> .....                                 | 18 |
| Drilled Seeding.....   | 19 |
| Broadcast Seeding With Shallow Incorporation.....            | 20 |
| Aerial/Surface Seeding (Interseeding).....                   | 21 |
| Row Crop Planter Seeding.....                                | 22 |
| Slurry Manure Seeding.....                                   | 23 |
| Frost Seeding.....   | 24 |
| <b>Manure and Biosolids Applications</b> .....               | 24 |
| <b>Terminating Cover Crops</b> .....                         | 26 |
| <b>Cover Crops As Weeds</b> .....                            | 27 |
| <b>Cover Crops As Weed Fighters</b> .....                    | 28 |
| <b>Herbicide Carryover and Cover Crops</b> .....             | 29 |
| Injury Potential of Some Common<br>Corn Herbicides.....      | 31 |
| Injury Potential of Some Common Soybean<br>Herbicides.....   | 34 |
| <b>Insects and Slugs</b> .....                               | 36 |
| Positive Effects.....  | 36 |
| Negative Effects.....  | 37 |
| <b>Nematodes</b> .....                                       | 39 |
| Nematode Host Susceptibility of Selected<br>Cover Crops..... | 40 |
| <b>Diseases</b> .....  | 41 |

|   |     |
|---|-----|
| <b>Cover Crop Effects on Cash Crops</b> .....       | 41  |
| <b>Soil Fertility</b> .....                         | 43  |
| <b>Climate Considerations</b> .....                 | 44  |
| <b>Crop Insurance and USDA Program Issues</b> ..... | 46  |
| <b>Cover Crops Species</b> .....                    | 47  |
| Grasses.....  | 50  |
| Legumes.....  | 90  |
| Non-legume Broadleaves.....                         | 118 |
| Up-and-coming Species.....                          | 138 |
| <b>Pure Live Seed</b> .....                         | 146 |
| <b>Conversion Factors</b> .....                     | 147 |
| <b>Resources</b> .....                              | 158 |

---

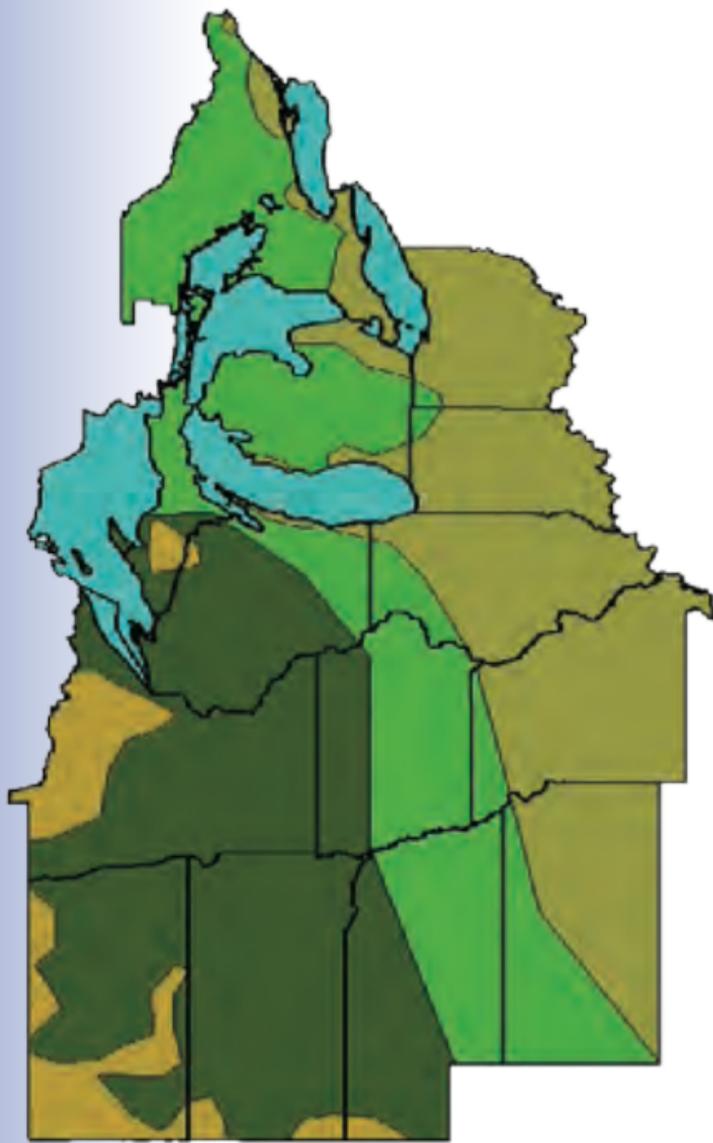
*Producers who want to prevent soil erosion, improve nutrient cycling, sustain their soils, and protect the environment have been returning to a very old practice: planting cover crops.*

*Although farmers have been using cover crops for centuries, today's producers are part of a generation that has little experience with them. As they rediscover the role that cover crops can play in sustainable farming systems, many growers find they lack the experience and information necessary to take advantage of all the potential benefits cover crops can offer. That inexperience can lead to costly mistakes.*

*This guide will help you effectively select, grow, and use cover crops in your farming systems. While this guide isn't the final word on cover crops, it is meant to be a useful reference.*



The bar shading in the chart above corresponds to the color codes on this map. The periods on the chart are averages for these areas and will vary roughly two weeks from south to north.





## Cover Crops As Weed Fighters

Some cover crops are notable for their ability to suppress weeds, which may be due to competition, shading, or allelopathy (see Cover Crop Effects on Cash Crops, page 41). Current research suggests that using cover crops to suppress weeds depends on maximizing cover crop biomass production. Cover crop mulches suppress weeds both physically and chemically.

Physically, cover crop mulches provide a restrictive barrier that lowers temperatures and light at the soil surface, thus inhibiting the germination and emergence of small-seeded summer annual weeds. Chemically, certain cover crop mulches suppress the germination of weeds by releasing phytotoxic allelopathic chemicals. The specific causes are not always known. More data are needed in these areas.

## Herbicide Carryover and Cover Crops

Vigorous establishment is crucial to achieving maximum growth and benefit from cover crops. Carefully plan your herbicide programs to prevent herbicide carryover injury. Pre-emergence and post-emergence herbicides with residual control applied to main crops could cause carryover injury to cover crops.



## Crimson Clover

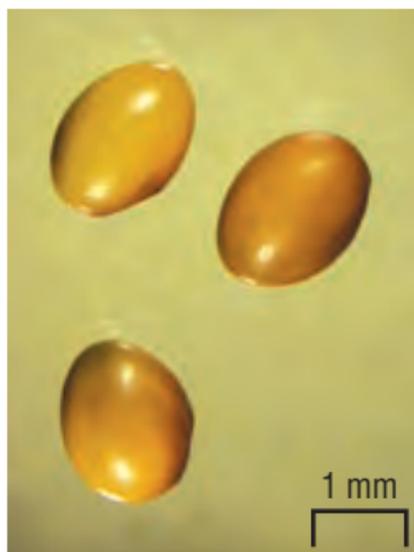
*Trifolium incarnatum*

**Plant Characteristics:** Upright to semi-upright winter annual that grows 12-20 inches tall. Has light green leaves covered with soft hairs, crimson (dark red) flowers, and a taproot.

### Seed Characteristics:

Average seeds per pound: 149,800. Emergence time: 7-10 days. Minimum germination soil temperature: 42°F.

**Seeding:** Use crimson or berseem clover inoculum. Does not frost seed well. Plant with spring grains or after winter wheat harvest. May be interseeded into cash crop at physiological maturity. Rapid growth, good for short windows.



Seed

| Method                               | Lbs./A Pure Live Seed (PLS) |
|--------------------------------------|-----------------------------|
| Drilled*                             | 10-20                       |
| Broadcast with Shallow Incorporation | 11-22                       |
| Aerial/Surface Seeding               | 12-24                       |

\*Depth: ¼ - ½ inch

**Soil Tolerances:** Somewhat poorly drained to well-drained soils with a pH of 5.5-7.0. Very good tolerance of low soil fertility.

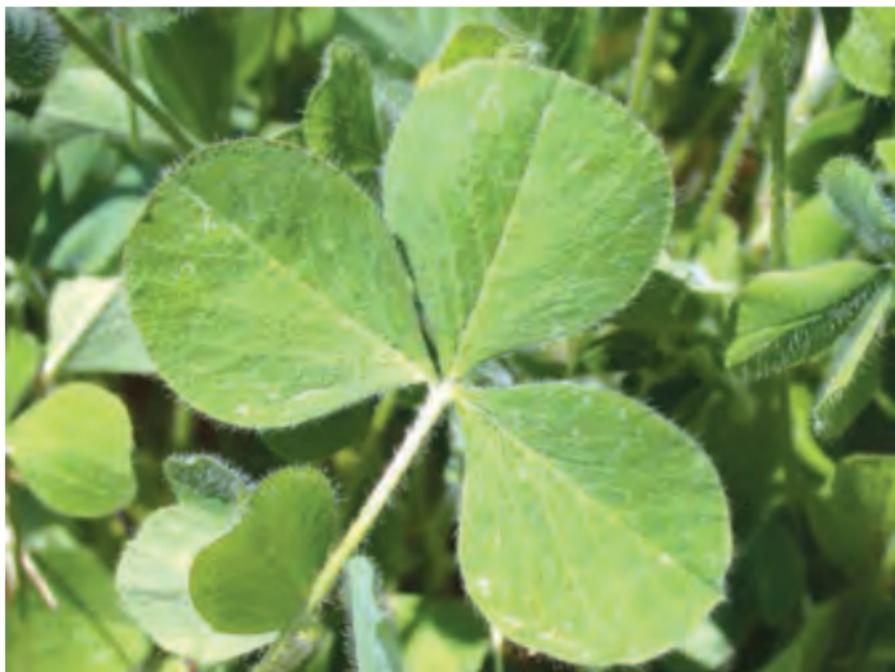
**Environmental Tolerances:** Good shade, heat, and drought tolerance. Does not tolerate flooding or ponding.

**Termination:** Till (multiple passes often required), apply herbicides.

### Crop Selection Benefits:

|                          |   |   |   |   |
|--------------------------|---|---|---|---|
| <i>N Source</i>          | ● | ● | ● | ● |
| <i>N Scavenger</i>       | ● | ○ | ○ | ○ |
| <i>Soil Builder</i>      | ● | ● | ● | ● |
| <i>Subsoil Loosener</i>  | ● | ● | ○ | ○ |
| <i>Topsoil Loosener</i>  | ● | ● | ● | ○ |
| <i>Erosion Preventer</i> | ● | ● | ● | ○ |
| <i>Lasting Residue</i>   | ● | ● | ○ | ○ |
| <i>Weed Fighter</i>      | ● | ● | ○ | ○ |
| <i>Grazing Value</i>     | ● | ● | ● | ● |
| <i>Forage Value</i>      | ● | ● | ● | ● |

Continued on next page.



*Leaf*

**Additional Benefits:** None observed.

**Vegetable Considerations:** N release can vary considerably depending on stand density and growth, and soil temperature and moisture after clover has been destroyed. Pair with vegetables that respond to N release that peaks in early to mid-summer.

**Cautions:** Bloat hazard. May attract meadow voles.



*Flower*



*Crimson clover in corn residue*

## ***Up-and-coming Species***

The following pages provide information about cover crops that some Midwest growers have been starting to use. There is limited experience in the Midwest with these species as cover crops, but they are included here to indicate some new possibilities. Researchers need to experiment and observe these species much more before we can make any specific recommendations.





## Winter Camelina (Gold of Pleasure, False Flax)

Seed

*Camelina sativa*

**Plant Characteristics:** This broadleaf (non-legume) is a member of the mustard family and an industrial oilseed crop. Grows 16-35 inches tall. Has spring and winter types but winter types are the only successful cover crops. Grows as a rosette in the fall and overwinters as a rosette. Bolts in spring.

**Seed Characteristics:** Seeds per pound: 400,000.  
Minimum germination soil temperature: 32°F.  
Emergence time: 7-10 days.

**Seeding:** Seeding rate: 3-5 pounds/A. Broadcast seeding is not recommended because the seed is too small and without the soil-seed contact establishment will be poor. Establishment is best when drilled in no-till in the fall. Very sensitive to seeding depth so drilling must be shallow.

**Environmental Tolerances:** Very winter-hardy even in extreme winters such as in North Dakota and Montana. Seedlings can tolerate 15°F.

**Cautions:** Spring camelina types are unlikely to survive the winter. Regrowth and volunteer plants in subsequent crops can be a problem.