



Legume Inter-Seeding



Alfalfa and red clover inter-seeded into winter wheat

Legumes are a group of plants that belong to the *Fabaceae* family (pea and bean). Probably the most notable and beneficial characteristic of legumes is their nitrogen fixing ability. They capture nitrogen (N) from the air, and then convert it into a form of nitrogen, ammonium, that can be used for growth by the plant itself and other adjacent plants. The nitrogen-fixing process requires the presence of Rhizobium bacteria that are responsible for developing the root nodules that fix the nitrogen. Legumes are an important wildlife habitat component because they increase the nutritive, vegetative, and structural diversity of the habitat. Their vegetative and structural characteristics provide roosting, feeding, escape, nesting, winter and brood cover. Their nutritive value comes from the seeds (lespedezas, partridge pea), the plants leaf and stem growth (clovers, alfalfa), and indirectly through the insects that use them. Insects are vital for the rapid growth of many young birds and mammals. A good example would be young turkeys (poults). Insects, which are high in protein, make up a large percentage of a poult's diet. With this high protein diet, their body and muscles grow rapidly. By the second week, poults are able to fly short distances and at three weeks they are able to roost in low trees with the hen. This is very important for brood survival because it removes them from the danger of ground predators. Inter-seeding legumes into cool season grasses also reduces the stem density of the grasses at ground level, therefore, making it easier for young birds and mammals to move about while still having an overhead canopy of vegetation to conceal them.

Legume inter-seeding refers to the practice of planting or seeding various legumes into an existing cover type. Inter-seeding legumes into cool and warm season grasses or between rows of trees and shrubs is an easy way to provide increased plant and structural diversity more beneficial to wildlife. Legumes are commonly mixed with cool season grasses such as Orchardgrass, Timothy and Redtop when the grasses are initially planted. But, because legumes tend to be short-lived, they are frequently inter-seeded into established grass stands to maintain the legume component. Legumes are also commonly inter-seeded, along with forbs, into established stands of warm season grasses like Big and Little Bluestem, Indiangrass, Switchgrass, and Sideoats Grama, instead of being incorporated in the initial planting. In doing so, the slower growing warm season grasses are given more opportunity to become established before the faster growing legumes are introduced.

Planting Equipment and Techniques

Legume inter-seeding is typically performed using a conventional grain drill that is pulled behind a tractor, or by broadcasting the seed using a hand-seeder or a cyclone-type seeder/ fertilizer spreader, mounted to an ATV or 3-point tractor hitch. Many landowners opt to use a hand-seeder while sitting on the back of a pickup truck, rather than investing in expensive equipment. No matter what type of equipment or technique is being used, the existing vegetation should, at the minimum, be reduced to a height of approximately 2 to 4 inches prior to seeding to allow for ease of planting and good seed-to-soil contact. Mowing, light strip disking, strip spraying, prescribed burning or any combination thereof can accomplish this. In addition, care should be taken to not plant legume seed greater than 3/8 of an inch in depth. Table 1 provides recommended seeding rates and seeding dates for selected legumes.

| Legume | Application Rates (lbs./acre) | | | | Planting Dates | |
|-----------------------|-------------------------------|-----------|--------|---------|----------------|----------------|
| | Frost Seed | Broadcast | Drill | Mixture | Spring | Fall |
| Alfalfa | 10 - 12 | 10 - 12 | 8 - 10 | 3 - 4 | 3/1 to 5/1 | 8/1 to 9/1 |
| Alsike clover | 6 - 8 | 6 - 8 | 3 - 4 | 1 - 2 | 1/1 to 5/1 | 8/1 to 9/1 |
| Birdsfoot trefoil | 4 - 6 | 4 - 6 | 2 - 4 | ½ - 1 | 3/1 to 5/1 | 8/1 to 9/1 |
| Annual lespedeza | 15 - 20 | 15 - 20 | 8 - 12 | 5 - 8 | 2/1 to 5/1 | --- |
| Ladino clover | 1 - 2 | 1 - 2 | 1 | ¼ - ½ | 1/1 to 5/1 | 8/1 to 9/1 |
| Marion lespedeza | 15 - 20 | 15 - 20 | 8 - 12 | 5 - 8 | 3/1 to 5/1 | --- |
| Illinois bundleflower | 2 - 3 | 2 - 3 | 1 - 2 | ¼ - ½ | 1/1 to 5/1 | 10/15 to 11/15 |
| Partridge pea | 6 - 8 | 6 - 8 | 4 - 6 | 2 - 4 | 5/1 to 6/1 | 10/15 to 11/15 |
| Red clover | 6 - 8 | 6 - 8 | 4 - 6 | 2 - 4 | 1/1 to 5/1 | 8/1 to 9/1 |
| White Dutch clover | 1 - 2 | 1 - 2 | 1 | ¼ - ½ | 1/1 to 5/1 | 8/1 to 9/1 |

Drilling legume seed requires the use of a grain drill. A grain drill is typically used for inter-seeding legumes on large projects; inter-seeding legumes into existing vegetation; or inter-seeding legumes where soil erosion potential precludes exposing bare soil. The drill is pulled behind a farm tractor and makes several parallel slits in the soil. The seed is carried through tubes from the seed box and dropped into the slits in the ground at metered distances. Grain drills are frequently available through local cooperatives, custom farm service applicators, and local farmers. Local Soil and Water Conservation Districts, and Pheasants Forever or Quail Unlimited chapters may also have drills for rent. Grain drills require the operator to physically adjust the seeding rate and planting depth mechanisms of the equipment to ensure proper seed placement. If the drill is not calibrated correctly, legume seed can be unintentionally planted at depths greater than 3/8 of an inch, resulting in a

planting failure and waste of time and money. If you are not familiar with using farm equipment, it is best to hire the services of an experienced layman to operate the machinery.

Broadcasting, as the name implies, is the method whereby seed is cast (spread) evenly across the soil's surface. Its success depends on making sure good seed-to-soil contact is achieved by using various methods to press or incorporate the seed into the soil after the seed has been spread. The most commonly used methods of incorporating the broadcasted seed into the soil surface include the use of a harrow, culti-packer, rake; or a log, chain, or piece of chain link fencing, dragged behind a tractor. Because broadcasting requires good seed-to-soil contact, a sufficient amount of bare soil (40% to 70%) must be evenly distributed throughout the area to be inter-seeded. This can be achieved utilizing light strip disking, prescribed burning, or a combination of both in the fall prior to broadcasting. The object is to reduce the density of the grass cover and increase the bare soil component so that the inter-seeded legumes have sufficient room to become established and are not suffocated by the existing grasses.

Frost seeding is a special method used for broadcasting seed that eliminates the need to incorporate the seed mechanically after it has been broadcast. The optimum time to conduct frost seeding is in late winter to early spring after the snow is gone but while the ground is still frozen. In Indiana, frost seeding should occur from February 1st to March 15th (first part of February in southern Indiana, first part of March in northern Indiana). The daily freezing, thawing, and refreezing cycle that occurs in the soil surface at this time will cause the broadcasted seed to be incorporated into the soil, reducing the need for mechanical incorporation. Frost seeding works best with legumes that germinate at low temperatures and grow rapidly. Red clover, white clover, alsike clover, ladino clover, and birdsfoot trefoil are well suited for frost seeding. Frost seeding is not recommended for use on sandy soils because these soils do not exhibit pronounced freeze/thaw patterns sufficient to incorporate the seed successfully. Sites currently seeded to bunch-type grasses, such as orchardgrass, wild ryes, big bluestem, or little bluestem offer a more favorable environment for frost seeding than do sites currently seeded to sod-forming grasses, like bluegrass or switchgrass. Bunch-type grasses have more of a bare ground component associated with them and therefore provide a greater opportunity for good seed-to-soil contact.

Regardless of the current grass species present, sites scheduled for frost seeding should be manipulated to reduce stand height, reduce stand density, and increase the amount of exposed soil. This can be accomplished using strip mowing, light strip disking, strip spraying, prescribed burning or combinations thereof in the late summer or early fall prior to seeding. The use of strip spraying is a good choice on sloping areas where exposure of bare soil during the winter months may lead to excessive erosion. Vegetation killed by the herbicide treatment will provide a protective cover for the soil surface while still allowing the inter-seeded legumes to work into the soil as a result of the freezing and thawing cycle. If soil erosion is a concern on areas treated by strip disking, a fall-applied cover crop of winter wheat may be broadcast over the disturbed area at the rate of ½ bushel per acre.

Legume Selection

A successful legume inter-seeding is also dependent on making sure you have matched the legume or legume mixture to the soil conditions. Table 2 lists characteristics of selected legumes to assist you in matching the proper legume to the existing soil. For example, alfalfa should only be seeded into well-drained, fertile soils. If you are wanting to inter-seed legumes into areas that are poorly drained and remain damp for long periods, then it is best to limit your selection to alsike, ladino or white Dutch clover, depending on soil fertility. The table also provides longevity and plant height information.

Other important factors to keep in mind when selecting legumes for planting are: 1) use only certified seed to ensure high germination and seed purity; 2) use high quality seed; 3) use seed that

been tested for germination within the last 12 months (check the label on the bag); and 4) use seed that is disease resistant and adapted to your local growing conditions (soil and weather).

As noted at the beginning of this fact sheet, legumes benefit by the presence of specialized Rhizobium bacteria. In fact, each legume requires its own specific species of Rhizobium bacteria in order to form the nitrogen-fixing root nodules. To ensure successful legume establishment, it is important that the specific Rhizobium bacteria for the legume is present at the time of planting. This is most frequently achieved by mixing an inoculant that contains the specific bacteria with the seed prior to planting. Most seed vendors will usually send the right inoculant with their legume seed or pre-inoculate the seed prior to shipment. If you are planting a specific legume in an area where that legume has been planted in the past, then the necessary bacteria will be present in the soil. However, the native strains of bacteria living in the soil tend to be poorer nitrogen fixers than those bacteria strains selected for used in inoculants, and may result in poor legume establishment. Inoculants are very inexpensive, so it's worth the extra cost of buying the inoculant to ensure successful establishment. When buying inoculant, check the date on the packet to make sure it is fresh, and follow the instructions on the packet to properly inoculate the seed prior to planting.

Table 2. Characteristics of Selected Legumes

| Legume | Minimum Drainage | Minimum Soil Fertility | Soil pH | Longevity (Years) | Average Plant Height (feet) |
|-----------------------|-------------------------|------------------------|------------|-------------------|-----------------------------|
| Alfalfa | Well drained | High | 6.6 to 7.2 | 6 to 7 | 2 to 3 |
| Alsike clover | Poorly drained | Medium | 6.0 to 6.5 | 2 to 3 | 1 to 3 |
| Birdsfoot trefoil | Somewhat poorly drained | Medium | 6.0 to 6.8 | 6 to 10 | ½ |
| Annual lespedeza* | Somewhat poorly drained | Low | 5.5 to 6.2 | Re-seeds Annually | ½ to 2 ½ |
| Ladino clover | Poorly drained | High | 6.0 to 6.5 | 6 to 10 | 1 |
| Marion lespedeza** | Somewhat poorly drained | Low | 5.3 to 6.0 | Re-seeds Annually | ½ to 2 ½ |
| Illinois bundleflower | Somewhat poorly drained | Low | 5.5 to 6.2 | Re-seeds Annually | 2 to 4 |
| Partridge pea | Moderately well drained | Low | 5.5 to 6.2 | Re-seeds Annually | 2 to 3 |
| Red clover | Somewhat poorly drained | Medium | 6.2 to 6.8 | 3 to 6 | 1 to 1 ½ |
| White Dutch clover | Poorly drained | Medium | 6.0 to 6.5 | 6 to 10 | ½ |

* Plant south of I-70

** Plant south of US 24

Related Habitat Management Fact Sheets:

Legume Food Plots
 Strip Mowing
 Strip Disking
 Strip Spraying

Prescribed Burning
 Cool Season Grass Establishment
 Warm Season Grass Establishment
 Warm Season Grass Management