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## Including Flowering Legumes for Horse, Pollinator, and Perennial Pasture Health

By Laura Johnson, UVM Extension Pollinator Support Specialist and Certified Crop Adviser  
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Pollinators are essential to the production of many food crops. According to the USDA, 100+ crops rely on pollinators, adding \$18 billion in farm revenue. Both wild and domesticated pollinators are at risk due to parasites, pesticides, reduced floral abundance and diversity, and habitat destruction. Honeybees are of primary concern nationwide, as the number of hives has decreased from 6 million in the 1940's to about 2.5 million today<sup>1</sup>. Wild pollinators such as bumblebees are also in serious decline, including here in Vermont<sup>2,3</sup>.

There are seven types of pollinators: bees, butterflies, moths, wasps, beetles, flies, and birds. Bees contribute 80% of all pollination services, while other groups contribute 20%. There are approximately 322+ bee species in Vermont, with more being discovered still. Of all bees, 75% of bees nest in the ground and other bees will nest in stems or cavities. There are many reasons why horse owners should care about bees and pollinators in relation to their pasture systems. The following are three reasons to consider:

- Global insect decline is a current concern, and they need our help. Not only do they contribute to our food security, but they also support overall ecosystem health.
- Growing legumes in pasture provides flowers for pollinators in addition to low-cost N fertility.
- When legumes are included in grazing systems, they can increase livestock feed quality (protein and digestibility) and pasture health and resilience.

There are a variety of flowering legume species that grow in the northeast to consider for a holistic approach to grazing and can help address the needs of horses, pollinators, and soils. Some of these include species of white and red clover, alfalfa, and birdsfoot trefoil. The following information will broadly focus on how to leverage certain common flowering legume species in a northeast horse grazing system.

### Horse health on pasture with flowering legumes

Managing horse nutritional needs and limitations on pasture in a rotational grazing system is a learned skill. Horse dietary requirements are higher in fiber (digestible energy), and lower in crude protein as compared to other livestock requirements. This means forages grazed should be grazed high and more developmentally mature. Horses do well on plants late in their vegetative stage, even somewhat stemmy, when reaching their reproductive stage<sup>4</sup>. Some key points to consider are:

- Grow mixed stands of legumes vs. pure grass stands. Including legumes improves nutritional value of feed by adding protein and minerals.



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- Wait for vegetation to reach 8"-10" before grazing and move horses once vegetation height is reduced to 4"-6". This can be hard to see at a distance, so walking pasture paddocks is important to assess overall plant heights<sup>4</sup>.
- Pasture plant regrowth is best when plants are grazed in the middle of the vegetative stage before reproductive maturity (seed set). Find a balance here between optimal forage for horse health *and* plant regrowth<sup>4</sup>.
- Permit some legume blooms to support pollinators and optimize soil health benefits.

Legumes and certain horse health considerations should not be ignored.

- Avoid alsike clover species. This clover type can cause a photoreactive response in horses and, with long term exposure, liver damage<sup>5</sup>. Most sensitive are light-colored horses and other light-colored livestock.
- Legumes thrive in cool wet weather, and so does "black patch" or *Rhizoctonia leguminicola*. This non-toxic fungus is not much more than a nuisance and causes "slobbers" or excessive drooling in horses. The fungus can also be found in dried hay<sup>5</sup>.

### **Bee and non-bee health in and around pasture with flowering legumes**

Wild and managed bee and non-bee pollinators have dietary needs not dissimilar to common domestic farm animals. Certain managed bees, like honey bees, are in fact defined as livestock by the United States Department of Agriculture. Like other farm livestock, pollinators require carbohydrates, proteins, fats, vitamins, and minerals. Many obtain these dietary resources from flowering forages in the form of pollen and nectar.

Pollinator mouth part physiology and floral design are characteristics that guide floral selection and resource accessibility. Flowers of legumes tend to have long, tubular corollas of varying depths and are most accessible to bees, butterflies, and other pollinators with tongues.

- White clovers are accessible to many, including bees with shorter tongues, like honey bees. It is a highly valued nectar plant. Plant small to intermediate or medium type cultivars, such as 'Pinnacle' white clover, which are more tolerant to grazed pastures and tend to flower more<sup>6</sup>.
- Red clovers serve as a pollen resource for many bees. This clover has long corollas that limit nectar access to long tongued insects, such as certain bumble bees. Plant medium type cultivars in pastures<sup>6</sup>.
- Birdsfoot trefoil and alfalfa are other pollinator attractive legumes that support managed and wild bees, like the alfalfa leafcutter bee. Plant Empire-type varieties of birdsfoot trefoil, which have spreading and indeterminate growth habits favorable to grazed pasture conditions<sup>7</sup>.

Notably, there are many non-legume plants to consider that are common weeds in and around pastures and are valued as food and habitat for pollinators.

- Goldenrod, black eyed Susans, and other aster species have "open access" blooms. The open-faced flowers are widely accessible to pollinators with and without tongues, like syrphid flies and lady beetles.



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- Some “open access” blooming weeds have hollow or pithy stems. These stem types provide nesting habitat for certain bees and other insects where they can rear young and overwinter. Some examples include Joe Pye weed, brambles, Queen-Anne's Lace, and Japanese knotweed.

### Pasture health and agronomics

Healthy pastures are cultivated by balancing soil and plant interactions. Standard soil testing is a helpful way to assess pH and soil nutrients for optimal plant health. Plant nutrient recommendations of soil chemical analysis results are forage dependent.

- Some legumes, like birdsfoot trefoil and red and white clover, can withstand more acidic environments and will grow in low pH soils. However, to optimize nitrogen fixation, a pH greater than 6 is best. Avoid nitrogen fertilization, as this may suppress nitrogen fixation and favor grass growth.
- Other legume species, like alfalfa, need a more neutral pH of 7 or more for healthy growth.
- Before seeding anything, it is advisable to address low pH through lime applications, which can wake up an existing seedbank of clovers in the soil.

Clovers convert atmospheric nitrogen to supply their own nitrogen for growth. This nitrogen fixation also contributes to surrounding plant nutrient needs. A pasture composed of 30% legumes can supply adequate nitrogen for a mixed stand of grasses and legumes<sup>6</sup>. Nitrogen contributions to the soil are optimized when legumes are permitted to at least reach early bloom before being mowed or grazed, which also benefits pollinator health.

Soil physical and biological properties, such as low compaction, high soil aggregate stability, and organic matter are also important. These soil health parameters can be enhanced with high above and below ground plant biomass, which is supported by carefully managed rotational grazing.

Mixed clover-grass stands can yield more forage overall and are more resilient over time. They can better withstand climate extremes, overwintering, and are less susceptible to winter kill than single species stands. However, periodic overseeding of established stands may be necessary. Overseeding can be done as a fall, winter, and/or spring sowing. Understanding clover reproduction can help inform its level of persistence in a mixed sward and need potential for reseeding.

- Red clover and alfalfa are short-term perennials, typically persisting just a few years. Both reproduce by seed and are dependent on insect mediated pollination for seed production. Red clover is easy to establish and ideal for frost seeding, while alfalfa required more intensive management for establishment.
- White clover is a creeping perennial and reproduces via above ground stems (stolons) and seed. Insect mediated pollination is necessary for seed production. This clover type is persistent, can withstand closely grazed pastures, and tends to fill in open patches.
- Birdsfoot trefoil will not persist unless plants are allowed to flower in the summer for pollination and seed production. This legume can persist when allowed to reseed itself, otherwise, it will be short lived<sup>6</sup>.



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For those thoughtfully stewarding horses, soils, forages, grazing plans, and are interested in pollinator health, consider the incorporation and enhancement of common legumes in your pasture environment. Carefully managed mix stands that include common and easily established legumes can reduce feed expenses and make for happy, healthy horses.

*Disclaimer: The advice included in this publication may not be appropriate for horses who are overweight or prone to certain metabolic conditions. Always consult with your veterinarian or equine nutritionist before grazing.*

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