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INSIDE

Horse Pasture Management – Species Selection

Jeremy W. Singer, Extension Specialist, Field and Forage Crops, Dan Kluchinski, Mercer County Agricultural Agent, and Bill Bamka, Burlington County Agricultural Agent

Horse property owners are continuously confronted with pasture management decisions that ultimately affect the productivity, persistence, and appearance of their pastures. An understanding of pasture species, growth habits, and specific growing conditions are required for proper species selection and management.

First and foremost, an assessment of soil drainage, intended grazing pressure, and production goals are necessary. This information will aid in making decisions about the types of grasses and legumes that can be planted for optimum pasture production. Realize that species selection is not the only factor influencing production success, but is the foundation upon which productive pastures are based. Finally, the way in which the pasture is utilized (continuously grazed, rotationally grazed, or exercise lot) must be considered to determine production limits.

Soil Drainage

Soil drainage is an important consideration when selecting pasture species. Certain pasture species can tolerate wet soils while others cannot. Planting pasture species not adapted to soil drainage will most likely produce disappointing results. While it is possible to improve soil drainage by installing a tile-drainage system, it is expensive. It is more cost effective to purchase species tolerant of wet soils. Determining your soil type and soil drainage characteristics will help you in selecting adapted species. This information is available from your county soil survey.

Soils typically with higher moisture retention are clay-textured soils, or shallow soils with an underlying shale or stone that restricts water movement. Applications of organic materials will increase organic matter content and moisture retention. This is of particular importance with regard to manure management. Long-term manure application to pastures increases organic matter that can increase the water holding capacity of a soil. Realize however, if a pasture is very wet, it should be abandoned as a pasture and possibly used for hay

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production or a tile-drainage system should be considered. Pasturing animals on wet sites with little vegetation has the potential for non-point source pollution from excess nutrients in manure. If soils are droughty, such as sand textured soils, species that tolerate dry soil conditions should be selected.

Grasses

Grasses are the mainstays of horse pastures. Table 1 lists recommended grass species adapted to New Jersey growing conditions. These species are cool-season grasses, as compared to warm-season grasses. Cool season grasses are most commonly grown in New Jersey. Cool-season grasses thrive in temperate climates, with the majority of their growth occurring in the early spring and late fall when temperatures are cooler. Productivity of cool-season grasses decreases during hot summer weather. Cool season grasses include Kentucky bluegrass, perennial ryegrass and tall fescue. Warm-season grasses usually have a tropical origin and are most productive in the hot summer months, however, they often are less hardy and can winter kill. Cool-season grasses also vary in cold hardiness. Susceptible species often winter kill when exposed to below normal winter temperatures.

In addition to winter survival, Table 1 provides information on seedling vigor. The higher the vigor, the more rapid the germination and establishment of the species. The tolerance of the species to droughty or wet soil conditions, and to low pH (soil acidity) are also listed, as is tolerance to frequent grazing.

Although commonly recommended throughout the northeastern USA, timothy and smooth bromegrass are probably not good choices for horse pastures unless a regular schedule of pasture rotation is practiced, because they do not tolerate frequent grazing. Reed canarygrass tolerates wet soils, but even the new low-alkaloid varieties are not as palatable as other pasture species. Orchardgrass tolerates frequent grazing better than smooth bromegrass and timothy, is high yielding, and establishes quickly. It is usually recommended with Kentucky bluegrass and white clover. Perennial ryegrass can be substituted for orchardgrass, but because it is not winter hardy, reseeding each spring may be necessary in more northern locations.

Legumes

Legumes are a family of plants that include alfalfa, birdsfoot trefoil and clovers. Table 2 lists recommended legume species for New Jersey, and provides

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Table 1. Characteristics of Cool-Season Perennial Grasses

Grass	Seedling Vigor	Tolerance to Soil Limitations			Winter Hardiness	Tolerance to Frequent Grazing*
		Drought	Wet	Low pH		
Kentucky bluegrass	M	L/M	M	M	H	H
Orchardgrass	H	M	M	M	M	M
Perennial ryegrass	H	L	M	M	L	M
Reed canarygrass	L	H	H	H	H	M
Smooth bromegrass	H	H	M	M	H	L
Tall fescue	H	M	M	H	M	M
Timothy	M	L	L	M	H	L

H=high, M=medium, L=low

*Frequent grazing refers to any grazing system that provides the recommended 3 week rest period between grazing events.

Legumes from page 2

information on seedling vigor, tolerance to soil moisture and low pH. Potential for frost heaving, persistence, and tolerance to frequent grazing are also listed.

Legumes provide a good source of protein and calcium, as well as nitrogen to the pasture through nitrogen fixation. Common white clover and Ladino white clover are the most popular legumes for horse pastures. Although alfalfa is commonly recommended, it is seldom found in pasture mixes. Red clover is also commonly recommended but most horse owners avoid it because it can cause the slobbers. Slobbers or excessive drooling is caused by an alkaloid (slaframine) found in red clover. Birdsfoot trefoil is another recommended legume, but it is not commonly included in pasture mixes. It tolerates wet soil conditions better than alfalfa or red clover but is harder to establish and does not tolerate frequent grazing as well as the white clovers. Usually, the clover component in pasture seed mixes is low. Clover seed in the soil will also germinate and contribute significantly to pasture productivity.

Stocking Density and Grazing Pressure

If the amount of pasture is limiting, stocking densities are high, or rotational grazing is not practiced, species that tolerate frequent grazing are essential. Pasture grasses and legumes have different abilities to recover from grazing. Species that have growing points underground tolerate frequent grazing better than those with growing points above ground. Kentucky bluegrass always maintains storage and growing points underground, while timothy and smooth bromegrass have growing points that are aboveground at certain growth stages. If these species are grazed while their growing points are aboveground it will damage and eventually kill them. White clover tolerates frequent grazing but has a low tolerance to drought. Tall fescue is fairly tolerant of frequent grazing and can withstand trampling.

Research on horse pastures in New Jersey has indicated that most are overstocked. Therefore, tolerance to frequent grazing is most often the critical criterion for horse property owners when selecting species for pasture establishment or renovation. Consequently, it is not surprising that Kentucky bluegrass and common white clover are the two most abundant species in horse pastures.

Seeding Mixes

A common seeding mixture in the northeastern USA contains Kentucky bluegrass, endophyte-free tall fescue, and white clover. This is a mix that performs well, unless site-specific pasture conditions limit the use of these species. Kentucky bluegrass and white clover both tolerate frequent grazing but are sensitive to dry soil conditions. Tall fescue tolerates dry conditions better than Kentucky bluegrass or white clover Tall fescue is often avoided by horse owners because it may not be as palatable as other grasses and can become infected with an endophyte that affects pregnant mares. Pregnant mares should be removed from endophyte-infected tall fescue pastures during the last three months of gestation. Endophyte-free tall fescue varieties are commercially available for pasture use. Endophyte-free tall fescue plays a major role in horse pastures in adapted areas and with proper management can provide an excellent source of forage for horses. More recently, endophytes have been introduced to perennial ryegrass cultivars. Consequently, if purchasing perennial ryegrass, make sure you buy endophyte-free cultivars. *Reprinted from RCE FS103.* ❑

Table 2. Characteristics of Perennial Forage Legumes

Legume	Seedling Vigor	Tolerance to Soil Limitations			Heaving Potential	Persistance	Tolearance to Frequent Grazing*
		Droughty	Wet	Low pH			
Alfalfa	M	H	L	L	H	H	L
Birdsfoot trefoil	L	M	H	H	L	M	M
Red clover	H	L	M	M	M	L	M
White clover	M	L	H	M	L	H	H

H=high, M=medium, L=low

*Frequent grazing refers to any grazing system that provides the recommended 3 week rest period between grazing events.

Control of White Clover in Turf

John Meade, Extension Specialist Emeritus in Weed Science

Programs for the control of clover in turf are based on weakening the clover while strengthening the desirable grasses. The factors involved, well known to agronomists, include the following: 1) fertilizer, both kinds and timing of application; 2) adjustment of soil pH; 3) cutting height; and 4) watering practices.

1) Clover produces nitrogen in the soil by a symbiotic relationship with bacteria in its roots. However, when nitrogen is applied to the soil in rather high rates, the clover is weakened in relation to the grass and will not do well. Fertilizer should be applied in September and a light dose again in the spring. If using slow release types of fertilizer from natural sources, the control program will take longer than if using quick-acting types.

2) Soil pH at the level of 6.0 to 7.0 is usually best for grass growth, but the higher number (alkaline soil) encourages clover growth. For best results, omit the use of lime for a time to allow the soil to approach the lower level. Grass does much better than clover at this acidic level.

3) Cutting height should be set as high as possible to encourage grass growth and provide shade to discourage the clover.

4) Water should be applied when the grass shows signs of drought stress. The familiar "footprint in the grass" is a good sign that water is needed. Do not water frequently at low rates. Water only when needed and then use enough to wet the soil to approximately six inches.

This is not a quick fix for clover control and two or three years may pass before results are apparent. But in the meantime, the grass will be getting stronger and the result will be an attractive lawn. ❑

Briefs

Cover Crops for Field Grown Cut Flower Weeds

Betty Marose of the University of Maryland is leading a research effort to investigate the use of mulch as an alternative to herbicides. Cover crops (hairy vetch, crimson clover, annual rye, mixtures of rye with vetch, or rye with crimson clover) are established in research plots first. These are killed or mowed prior to planting flower seeds. The mulch residue then acts as a physical barrier, preventing weed infestation. Weed and flower growth in these plots are compared to plots managed with conventional tillage practices (no mulch) and others with plastic mulch.

Results of the weed management research are very promising:

- Hairy vetch proved the most effective at providing a dense, dark-colored mulch that remained on the soil surface throughout the entire growing season.
- Vetch killed with an herbicide resulted in a thicker and longer-lasting residue than vetch killed by mowing.
- Weed growth was significantly decreased in the mulch-residue plots compared to the conventionally tilled plots.
- Flowering date and total flower production were not significantly affected by mulch cover compared to conventional tillage. Thus the mulch was able to reduce weed pressure without negative impacts on flower production.

Future studies will evaluate the mulch system under different moisture conditions and document the effects of mulch on nitrogen and water utilization. Early-season insect feeding was significantly worse in mulch residue plots of sunflower and lupine (eight other species showed no significant difference), so further investigation is required.

Biological Control of Bacterial Diseases?

University of Florida researchers observed promising results when applying bacteriophages for control of bacterial spot on tomato caused by the bacterium *Xanthomonas campestris* pv. *Vesicatoria*. Bacteriophages are viruses that attack bacteria.

Bacteriophages (mixture of host range mutants) were applied to tomatoes grown in greenhouses and in the field. Treatments consistently reduced the incidence and severity of bacterial spot resulting in increases in plant vigor and tomato yield. Bacteriophages show promise for controlling this disease and others caused by bacteria. (J.E. Flarerty et al. 2000. Control of Bacterial Spot on Tomato in the Greenhouse and Field with H-Mutant Bacteriophages. HortScience 35:882)

The Ultimate IPM Web Site

The amount of information on the internet is incredible. However, unless you are fairly well informed it is easy to be misled. *Always consider the source!*

The National IPM Network is a WWW system established to provide the most accurate urban and agricultural IPM information. *Participating institutions have agreed to a set of standards, which ensure science-based, unbiased pest management information.*

The backbone of the National IPM Network consists of web servers for each of the USDA defined regions (Southern, Northeastern, North Central, and Western) in the US. Within each region,

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New IPM Field Guides Available

Jack Rabin, Assistant Director, NJAES and Wes Kline, Cumberland County Agriculture Agent

Rutgers Cooperative Extension has recently published a manual of Integrated Pest Management (IPM) Field Guides. Included are 45 IPM Guides on 34+ major and minor, mostly horticultural, food crops grown in our region.

Until recent years, IPM practices remained complex, arcane, and closest to the discipline of entomology. Practicing IPM requires training, skill, field experience and is also time consuming. Frequently the most precious thing on a farm for growers and managers is time.

The purpose of the Field Guides is to simplify large amounts of information into decision aids useful in the field. In one place, thousands of technical resources underlying the practice of ICM/IPM for crops in the Mid-Atlantic region has been concisely captured, synthesized, and simplified. Using the Field Guides may help make practicing IPM less time consuming.

The Mid-Atlantic ICM/IPM Field Guides were created for agriculturists with field experience. Users include crop consultants, agricultural agents, growers, and agribusiness product field representatives, who will use the Field Guides or train others to monitor fields.

Over the last decade, agriculturists have agonized over definitions of IPM and sustainable practices. The Rutgers Field Guides avoid this debate. Some retailers use IPM definitions as measures of whether growers' products qualify to be labeled as grown using IPM practices. The Field Guides, in experienced hands, are an excellent compliment to the recently published Massachusetts IPM definitions booklet which uses this scoring method.

The full manual is also being released with a Mid-Atlantic ICM/IPM database on CD, available soon. The 45 published Field Guides on 34+ major and minor crops in the region were distilled from 1,672 valid scientific references. For each reference used to support an IPM practice recommendation, a plain language abstract was prepared, and the citation organized and databased. Some of these references were not peer reviewed research in journals, but also older historical research publications, training materials used by IPM leaders in the region, etc. Some of the IPM Field Guides were field tested by public and private field staff.

Since the manual (Rutgers Cooperative Extension document E-229) is 160 pages long, growers can request individual Field Guides for crops of interest (see side box), rather than the complete package. Contact Rutgers Cooperative Extension of Cumberland County, 856.451.2800 for further information.

Field Guide titles by crops covered:

(IWM = Integrated Weed Management)

Alfalfa IPM
Asparagus IPM
Asparagus IWM
Basil IPM
Bell Pepper IPM
Bell Pepper IWM
Blueberry IPM
Broccoli/Cauliflower IPM
Broccoli/Cauliflower IWM
Cabbage IPM
Cabbage IWM
Eggplant IPM
Eggplant IWM
Ethnic Crucifers IPM
Field Corn IPM for DE and MD
Field Corn IPM for NJ
Green Onion and Leek IPM
Green Onion and Leek IWM
Leafy Crucifers IPM
Leafy Crucifers IWM
Lettuce, Endive and Escarole IPM
Lettuce, Endive and Escarole IWM
Lima Bean (Processing) IPM
Lima Bean (Processing) IWM
Muskmelon IPM
Muskmelon IWM
Pea (Processing) IPM
Pea (Processing) IWM
Potato (White) IPM
Potato (White) IWM
Snap Bean (Processing) IPM
Snap Bean (Processing) IWM
Soybean IPM
Spinach IPM
Spinach IWM
Summer Squash and Zucchini Squash IPM
Summer Squash and Zucchini Squash IWM
Tomato (Processing) IPM
Tomato (Processing) IWM
Umbelliferous Herbs (Parsley, Cilantro, Dill and Fennel) IPM
Winter Squash and Pumpkin IPM
Winter Squash and Pumpkin IWM
Winter Wheat IPM for DE and MD
Winter Wheat IPM for NJ

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participating institutions are providing state-specific or subject-specific information.

Check out the northeastern site developed by Cornell University: http://www.nysaes.cornell.edu/ipmnet/

Fallow Periods in Greenhouses

Insects and mites can be ongoing problems in greenhouses because there is often a constant supply of plant material for the pests' food and reproduction. If all plant material is removed for a sufficient period of time, pests may die of starvation. This is particularly true in cool, temperate areas where vents and doors can be closed and pest movement into and out of greenhouses is restricted for much of the year. For the procedure to be effective, the greenhouse temperature should be sufficiently warm during the fallow period to prevent pests from going into diapause (i.e., 'hibernation'). All plant material ('food') of any sort, including weeds, must be removed (the removal of plant material itself can greatly reduce pest numbers). Obviously the economics of crop production may preclude fallow periods in a greenhouse, but the idea should be kept in mind when considering options for pest control.

Source: RCE Greenhouse IPM Notes. Submitted by Jim Willmott, Camden County Agricultural Agent ❑

Editor's Note: This is the last issue of the Organic edition of the Plant & Pest Advisory for the 2000 season. Thank you for your support.

Rutgers Cooperative Extension - NJAES
U.S. DEPARTMENT OF AGRICULTURE
Rutgers - The State University of New Jersey

Plant & Pest Advisory
18 College Farm Road
Cook College
New Brunswick, N.J. 08901-8551

PLANT & PEST ADVISORY
ORGANIC EDITION CONTRIBUTORS