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Fact Sheet

Fact Sheet 470

Forage Production

This fact sheet is one in the series Enterprise Guide for Southern Maryland, *providing information about alternative agricultural enterprises for farmers.*

With the decline of the tobacco industry in Southern Maryland, many farmers are turning to other agricultural enterprises as a source of income. Farmers may want to consider forage production as an alternative to tobacco. This fact sheet will help you determine what varieties of forage to grow and how to grow them for the best possible yields.

Varieties

Your selection for forage varieties and species depends upon several factors such as: disease resistance, stand persistence, yield, seasonal growth pattern, crop usage (as for hay or pasture), and market potential.

Growers should determine before planting whether the crop will be used for hay or pasture. Some species are suited for both uses, but seeding rates for planting may be different. Some species also have growth habits that do not lend to both uses.

Table 1 lists a number of cool season species of grasses that are productive primarily in the spring and fall. Legumes are also listed. These are considered warm season species because their growth habits begin around March and continue through October.

Many good public and private alfalfa varieties are available. Consider using varieties with resistance or tolerance to alfalfa weevil, pea aphid, potato leafhopper, anthracnose, leafspot and phytophthora root rot. A current list of varieties performing well in the University of Maryland forage variety trials may be obtained at local Extension offices or directly from the University of Maryland Department of Natural Resource Sciences and Landscape Architecture.

Preparing the Soil

Forages adapt to a wide range of soil types. Soils with lower water holding capacities, such as loamy sands and sandy loams, are less productive. Heavier soils, such as loams, silt loams and clay loams, have a higher water holding capacity and produce higher yields. Most forages do not thrive well in soils with poor drainage. It is important that you select well-drained soils for forage production.

Soil Tests

Have your soil tested for pH and fertility levels before applying for any fertilizer or lime. This service is available at the University of Maryland Soil Testing Lab. Contact your county Extension office for soil test instructions.

Most of the commonly grown grasses and legumes require a soil pH of at least 6.5 for best growth. For alfalfa, soil pH should be in the 6.8 to 7.0 range. Apply the recommended amounts of lime based on the soil test results.

Soil Fertilization

Application of fertilizer materials is a very important factor in the establishment and maintenance of a successful forage stand. Apply fertilizers according to soil test recommendations. Make sure that residual fertility levels for phosphorus and potash are high or very high. Also, topdress the soil annually. The continued growth, development, and yield of your forage field depend on topdressings of fertilizer, since plant growth removes these nutrients from the soil.

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Planting

Tillage vs. No-Tillage

Use conventional tillage or no-tillage techniques to establish a forage crop. This fact sheet primarily addresses conventional tillage practices. In order to successfully establish a no-till seeding carefully consider the following recommendations: 1) Be sure to reduce weed competition with herbicides. 2) Make sure that the no-till drill is inserting the seed at the required depth uniformly through residues with adequate seed to soil contact. 3) It is typically required to increase the seeding rate in a no-till establishment by 20%. 4) Drive slowly (below 5 mph) when planting to reduce drill bounce, and subsequent erratic seed placement. Individuals interested in no-tillage techniques may contact their county Extension office and request copies of Agronomy Mimeo 96 Steps to Successful No-Tillage Pasture Renovation or Agronomy Mimeo 97 Guidelines for No-Tillage Establishment of Alfalfa.

Seeding Plan

When establishing your forage crop, consider these factors: time of seeding, seedbed preparation, species selection, method of seeding, and rainfall. Good planning is essential. Begin at least 6 to 12 months before you start seeding.

Plan to seed either in the spring (late February through March) or late summer (August through mid-September). Soil moisture is usually ample in the spring. This ensures that plants have several months to establish themselves before hotter, drier summer weather sets in. With spring seedings, though, weeds become more of a problem than with late summer seedings.

Planting delays or poor seed germination also can result in sparse stands, which further allows weeds to establish and compete for water and nutrients.

In late summer, soil moisture may be low. You may have to delay seeding until the soil moisture is adequate. Late planting does not allow the adequate development of roots and increases the possibility of winterkill.

Taking into account the factors affecting the time of seeding-moisture, temperature, and weed control-seed your grass and legume-grass mixtures in late summer; lespedeza in the spring; and alfalfa either in late summer or spring.

Prepare a proper seedbed (fine, firm and weed-free) to ensure good seed-to-soil contact. You can achieve this by plowing, discing and firming the land. Steep hillsides and slopes present erosion hazards when plowed. Use no-tillage seeding in this case (see Agronomy Mimeo 96 or 97). You can use spring tooth drags or deep-disc as long as enough soil is exposed for seed-to-soil contact.

Start liming and fertilizing at least 6 to 12 months before seeding. If you need a high rate of lime to adjust the soil pH, apply one-half before plowing and the other half after plowing, and disc-in with the broadcast fertilizer application. In the case of alfalfa, this may mean seeding an annual crop until the pH can be increased to a 6.8 to 7.0 range.

Forage Selection

When selecting forage to grow, your topmost concerns are forage use and marketability. Growers, in general, should choose legume-grass mixtures. Legumes provide nitrogen for the grass and increase the protein content of the forage. Some hay markets, such as horse hay, have a high demand for grasses, particularly timothy and orchardgrass. Other markets have a high demand for good quality alfalfa. If forages are for pastures, select species that are conducive to grazing, such as orchardgrass, tall fescue, red and ladino clover, and bluegrass (native). Do not choose timothy and alfalfa for pasture mixtures.

Table 2 lists the major forage species adapted to growing conditions in Southern Maryland, and their respective seeding rates when seeded alone or in mixtures. Table 3 lists examples of mixtures for hay and pasture combinations.

When selecting mixtures, limit your choices to one grass and one or two legumes. Avoid "shotgun" mixtures or those having several grass and legume species. Mixtures like these create problems in forage management such as selectivity of grazing and appropriate stage of maturity at harvest.

Proper Equipment

You can use various types of equipment for seeding, such as: grassland drills, grain drills with forage seeding compartments, cultipacker seeders, forage cyclone seeders, and other types of cyclone seeders. Calibrate seeders and follow instructions in the owner's manual to be sure seed and seed mixtures are distributed evenly and uniformly at a depth of ¼ to ½ inch and firmly pressed into the soil. A seed presswheel accomplishes this task if you are using drills. If your seeding equipment does not have a presswheel, then use a cultipacker. Both the cultipacker and presswheel ensure good seed-to-soil contact, which is extremely important for viability after seed germination.

Soil Moisture

Rainfall or soil moisture is critical after planting to start the germination process. As stated earlier, moisture availability is usually more of a problem with late summer seedings than with spring seedings. When preparing to plant, be ready to start by mid-August. If the ground is dry, wait for rainfall or some timely thundershowers to provide the

necessary moisture important to germination. When preparing the soil during drought periods it is essential to seal the soil surface between disking with a roller-harrow to conserve soil moisture, and to also reduce soil cloddishness and subsequent rough seedbed.

Harvesting

When to Pasture

Except for lespedeza, all the forages recommended for pasture are perennials. Pasturing can begin at an earlier stage of growth than when harvesting for hay. Allow enough growth for adequate root system development and storage of food reserves. After grazing, these food reserves are instrumental in forage regrowth. Never allow animals to graze below the plant's growing point. Practice rotational grazing, do not overgraze, never overstock and remove animals after forage consumption in droughty years and winter months.

When to Cut

Stage of forage maturity tells you when to harvest for hay. Cut alfalfa in the late bud or early bloom stage. Harvest clover when in quarter- to half-bloom. Cut most grasses in the boot to early heading stage. Harvest lespedeza when in three-quarter-bloom.

How to Evaluate Quality

You can determine hay quality by the size of buds or number of blossoms, stem size, leafiness, color, odor and the presence of foreign material. High quality hay will have been cut at the proper stage of maturity, will have small stems and branches, a lot of leaves, leaves attached to stems of legumes, are bright green, and should smell of new-mown hay. Hay must not contain metal, wood, or other foreign objects. These have no nutritive value and can harm an animal's digestive tract.

Think of hay quality as feed value. Table 4 shows the nutritive characteristics, expressed on a dry basis, of common types of hay.

Controlling Pests

Weeds

Very few herbicides are available for weed control in grass or legume-grass mixtures. Alfalfa weed control programs provide numerous choices for planting and postemergence application. The best method for selecting a weed control chemical is to identify the weeds in each field and select the herbicides that control those weed species (see Extension Bulletin 237 for details). Here are some guidelines on weed control for forage crops.

I. Grass forages (100-percent grass)

* Apply 1-1.5 quarts [(4 pounds active ingredient (A.I.)/gallon)] per acre of 2,4-D postemergence to broadleaf weeds actively growing. Use lower rates on annuals and biennials, and higher rates for perennials; or
* Apply 0.5-1 quart (4 pounds A.I/.gallon) per acre Banvel postemergence to broadleaf weeds actively growing; or
* Apply 1-1.5 quarts 2,4-D plus 1 pint Banvel (same rates of active ingredient) per acre in combination postemergence to broadleaf weeds actively growing.

Note: All desirable legumes will be killed. Follow grazing and harvest restrictions on the label.

II. Alfalfa (100-percent legume)

* Apply 3.5-4.5 pints per acre Eptam 7E, or 2.0-2.5 quarts per acre Balan 60DF before seeding. Incorporate 2-3 inches deep into the soil by discing.
* In establishment year after alfalfa reaches the trifoliate leaf stage and goes dormant, apply 1.09-2.16 ounces Pursuit 70DG, or 1.0-3.0 pounds Kerb 50W, or 2.0-6.0 pints Butyrac 200 per acre for chickweed control and suppression of other winter annual weeds.
* Sencor, Velpar, Sinbar and Karmax are registered for weed control in alfalfa stands one year and older, when dormant. Refer to label for application rates.
* During the growing season, up to 5 days after cutting, apply 0.4–0.8 pints per acre Gramoxone Extra for weed suppression during alfalfa recovery. For grass control in alfalfa fields apply 1.5–2.5 pints per acre Poast up to 14 days prior to cutting for hay.

Insects

Table 5 gives some simple guidelines about controlling insects in forage corps.

Diseases

Like other crops, forages are susceptible to certain diseases. Table 6 gives some helpful hints on controlling diseases in forage crops.

Table 1. Forage varieties and species

Forage Species	Grass	Legume	Special notes
Orchardgrass			
Able	√	–	Medium to late season
Benchmark	√	–	Early season
Hallmark	√	–	Early to medium season
Haymate	√	–	Late season, higher yielding
Pennlate	√	–	Late season
Potomac	√	–	Early to medium season
Tall fescue [a]			
Forager	√	–	
Johnstone	√	–	
Phyter	√	–	
Select	√	–	
Stargrazer	√	–	
Q-Max	√	–	
Perennial ryegrass [a]			
Polly II	√	–	
Timothy			
Clair	√	–	Very early season
Climax	√	–	7 to 10 days later than common
Colt	√	–	early to medium season
Mohawk	√	–	late season
Red clover [b]			
Cinnamon	–	√	
Kenland	–	√	
Kenstar	–	√	
Royal Red	–	√	
Ladino clover			
Ladino	–	√	
Regal	–	√	
Annual lespedeza			
Korean (used most often)	–	√	
Kobe	–	√	
Perennial lespedeza			
Sericea	–	√	
Alfalfa	–	√	

[a] Fungus-(endophyte) free.
[b] Resistant to southern and northern anthracnose.

Table 2. Forage species adapted to growing conditions in Southern Maryland with respective seeding rates

Species	Seeding alone (lb/acre)	Seeding in mixtures (lb/acre)
Orchardgrass	15–30	10–16
Tall fescue	15–25	10–16
Timothy	8	4–6
Red clover	12–16	4–6 (pasture)
Red clover	–	6–8 (hay)
Ladino clover	–	2–4
Lespedeza	16–24	10–16
Alfalfa	15–25	10–16

Table 3. Examples of forage mixtures for combined hay and pasture use

Pastures

Species	Amount	Species	Amount
Orchardgrass	10–16	Tall fescue	10–16
Red clover	4–6	Red clover	4–6
Ladino clover	2–4	Ladino clover	2–4
Lespedeza	10–16	Lespedeza	10–16
Red clover	4–6	Red clover	4–6
Orchardgrass	10–16	Tall fescue	10–16

Hay

Species	Amount	Species	Amount
Orchardgrass	12–20	Tall fescue	10–18
Red clover	6–8	Red clover	6–8
Timothy	4–6	Alfalfa	12–18
Red clover	6–8	Orchardgrass	8–16

Table 4. Nutritive characteristics of common types of hay, expressed in a dry basis

Species	Percentage of dry matter	Percentage of total digestible nutrients[a]	Percentage of protein	Percentage of digestible protein
Alfalfa hay, early bloom	90.0	57.9	18.4	12.7
Ladino clover hay	91.2	61.0	23.0	14.5
Lespedeza hay, midbloom	93.0	57.0	15.7	10.5
Orchardgrass hay	88.0	57.0	9.7	5.8
Red clover hay	87.7	59.0	14.9	8.9

[a] Total digestible nutrients.

Source: *Nutrient Requirements of Domestic Animals, Number 4, Nutrient Requirements of Beef Cattle,* National Academy of Sciences.

Table 5. Controlling insects in forage crops

Insect	Description	Damage	Remarks
Alfalfa weevil	Larvae are light green with black heads and a light white stripe down the back. Adults are grayish-brown weevils about ¼-inch long with a dark triangular area (brown or black) at the base of wings.	Overwinters as an adult; emerges to lay eggs on alfalfa stems mid-April to early May. Larva skeletonize first-cutting alfalfa; adults may seriously damage second-cutting alfalfa	Apply 1.6-2.8 ounces Baythroid 2E, or 2.56-3.84 ounces Warrior T, or 4.0-8.0 ounces Pounce 3.2 EC, or 6.4-12.8 Ambush 2E per acre, when 50% or more tips show weevil feeding damage. One generation a year.
Potato leafhopper	Winged, pale yellow-green, wedge-shape, sap sucking, ⅛-inch long.	Migrates each season in air currents from the south, usually arriving in June. Adults complete life cycles in about 3 weeks. Expect three generations a year—damage to second-, third- and maybe fourth-cutting alfalfa.	Apply 0.8-1.6 ounces Baythroid 2E, or 1.9-3.2 ounces Warrior T, or 2.0-8.0 ounces Pounce 3.2 EC, or 3.2-12.8 Ambush 2E per acre, after monitoring alfalfa fields and sweep netting to determine leafhopper population. Treatment should be based on stage of crop growth and IPM threshold. **Do not wait** until field is already turning yellow. May be best to apply this spray as a preventive.

Costs and Returns

Yield and Price Assumptions

Yield/acre	Price/ton		
	$100.00	$125.00	$150.00
Alfalfa hay			
4 ton	400.00	500.00	600.00
6 ton	600.00	750.00	900.00
8 ton	800.00	1,000.00	1,200.00

Yield/acre	Price/ton		
	$75.00	$100.00	$125.00
Clover/grass			
2 ton	150.00	200.00	250.00
4 ton	300.00	400.00	500.00
6 ton	450.00	600.00	750.00

Estimated Cash Costs Per Acre

Item	Establishment	Annual Maintenance
Alfalfa seed (22 lb)	$75.00	–
Lime (2 ton)	54.00	–
Fertilizer (10-75-150)	30.00	–
(0-100-480 with boron)	–	50.00
(Boron) (2 lb/yr)	3.00	–
Inoculant	1.60	–
Fuel (10 gal)	15.00	–
(2 gal)	–	3.00
Insecticide (Lorsban)	12.00	–
(Pounce)	–	10.00
Totals	$190.60	$73.00
Total cost at the end of one year		$263.60

Item	Establishment	Annual Maintenance
Seed:		
Red clover (8 lb)	$16.00	–
Ladino clover (4 lb)	12.00	–
Orchardgrass (15 lb)	20.00	–
(Red clover, ladino clover, and tall fescue)	34.00	–
(Red clover, timothy)	26.00	–
Lime (1 ton)	27.00	–
Fertilizer (15-60-60)	25.00	–
(0-20-240)	–	45.00
Inoculant	1.00	–
Fuel (7 gal)	10.50	–
(1 gal)	–	1.50
Totals	$111.50	$46.50
Total cost at the end of one year		$158.00

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Table 6. Controlling diseases in forage crops

Disease	Causes	Symptoms	Control
Phytophthora root rot (wet foot disease)	Fungus organism associated with wet, low, poorly drained soils; high amounts of rainfall.	Young and older plants become stunted, leaf yellows, general wilting; main top root destroyed. If conditions prevail, stand will die. (Lateral roots, may carry plants for several years, but yields are greatly reduced.)	Select varieties resistant to phytophthora root rot.
Sclerotinia crown & stem rot	Soil-borne fungus that survives indefinitely for long periods.	Young stands and alfalfa in wet areas are particularly susceptible; fungus attacks stems and crowns in wet, cool springs; crowns and stems become soft and discolored. White, fluffy mass of growth appears (mycelium), and later produces sclerotia that are hard and black.	1) Cut infected fields after crown buds appear to remove rank growth; this promotes drying out. 2) Plant disease-free seed. 3) Keep forage rotations several years apart. 4) Plow fields to bury sclerotia.
Anthracnose	A fungus organism that is favored by hot, moist weather. Using nonresistant cultivars and harvesting operations encourage the development and spread of the disease.	Dead, straw-colored stems appear throughout the field; younger plants exhibit a "shepherd's crook" when young shoots die; diamond-shaped lesions with dark borders appear on lower part of stems and maintain the spores, ultimately causing stem death. Crowns show bluish-black discolorations after infection works its way from the stems and goes down the stalks.	Plant resistant cultivars; clean off forage harvesting equipment before moving them from field to field and before storage.

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