UNIT - FORAGES

Lesson 4: Establishing and Maintaining Alfalfa

TEACHING PROCEDURES

A. Review

Review the previous lessons.

B. Motivation

Alfalfa is the premier forage legume. It is used for hay, silage, haylage, and greenchop, as well as in pelletized feeds. It fits well into any forage program and can be produced anywhere in Missouri.

C. Assignment

D. Supervised Study

E. Discussion

1. Ask the students to discuss how to utilize alfalfa or alfalfa feeds. Discuss the value of alfalfa as a crop in your area. (HO 3)

How is alfalfa forage utilized?

1) Highest yielding legume in Missouri
2) Main use - harvested forage
   a) Hay
   b) Silage
   c) Green chop
   d) Haylage
   e) Processed feed
      (1) Pellets
      (2) Cubes
   f) Managed grazing program (Must control bloat.)
   g) Protein concentrate for human diet

2. Ask the students to describe the sites of alfalfa production in their area. (Chances are that their best sites are planted in alfalfa). Also have the students identify the soil characteristics desired for alfalfa production. List these on the board.

What soil characteristics are suitable for alfalfa production?

1) Suitable soil important for successful alfalfa production
2) Best adapted to deep loams
   a) Rich and fertile
   b) Well drained (Do not plant alfalfa in poorly drained soils!)
3) pH - 6.5 to 7.5 optimum
3. Have the students discuss seed bed preparation. List the steps on the board. Note that seedbed preparation for alfalfa is not unlike seed bed preparation for other agricultural crops.

How should the seed bed be prepared?

1) Test soil for nutrient and pH levels; apply lime and fertilizers to bring up to recommended levels.
2) A fine, firm, weed-free seed bed is essential. (Seedlings grow slowly and do not compete well.)
3) A preplant herbicide is desirable for spring seeding.

4. Ask students to discuss nitrogen fixation by legume plants. Also discuss the inoculation of legume seeds.

What is nitrogen fixation and why are legume seeds inoculated?

1) Legumes live in association with a bacteria that "fixes" nitrogen for the plant. Therefore, legumes rarely need nitrogen fertilization. Nitrogen fertilization can be detrimental to legumes because of reduced fixation.
2) Inoculating the seed prior to sowing adds the bacteria to the new plants.
   a) Helps with rapid establishment of seedlings
   b) Provides a superior strain of the bacteria

NOTE: Nitrogen-fixing bacteria are always present in the soil and will associate themselves with the new plants. However, these naturally occurring strains are usually inferior in their nitrogen fixing capabilities to those used for seed inoculation. The object of inoculation is to infect the young plants with the superior strain before the inferior strain might become established.

5. Discuss grazing of cattle on alfalfa pastures. Ask the students how they manage alfalfa pastures.

Why is it important to take cattle off alfalfa or make a last cut well before the average frost date?

1) Remove cattle in the fall to allow alfalfa to grow and restore root reserves for the winter.
   a) Cattle can graze after frost.
   b) Graze wheat while alfalfa is resting.
2) The same is true of harvested forage.
   a) Cut enough ahead of frost to allow carbohydrates from photosynthesis to accumulate in the root storage system.
   b) Allow four to six weeks for regrowth before frost.

6. List important considerations for harvesting quality alfalfa hay. Ask the students to describe the procedures they use for harvesting alfalfa hay on their farms. Compare procedures and list them on the board.
What are some important considerations for harvesting alfalfa hay?

1) Harvest at the proper time for maximum quality.
   a) Cut at 1/10 bloom stage.
   b) Harvest at the bud stage of maturity for the first cut.
   c) Later cutting should be in the early bloom stage.
   d) Last cutting must be no later than four to six weeks before frost.

2) Save all the leaves you can.
   a) Leaves contain two-thirds of the protein and most of the Vitamin A.
   b) Every day past optimum harvest time, the stem-to-leaf ratio increases and digestibility is reduced.
   c) Raking time of alfalfa is very important.
      (1) Use of conditioner will reduce drying time and damage to the crop from rain.
      (2) Don't rake the alfalfa any more than necessary - it knocks leaves off.
   d) Pay attention to moisture content.
      (1) Chopped hay has a moisture content of 20-25 percent.
      (2) Loose hay has 20 percent
      (3) Baled hay has 15 percent moisture.
      (4) If it is too moist, hay may ignite from spontaneous combustion.

7. Ask student what insect and disease pests they have observed or heard of in their areas or on their farms. List on the board these and other insect pests and diseases that may be troublesome to the alfalfa producer. Emphasize the necessity of a good pest management program. Also discuss control measures for these pests.

What are some of the important diseases and insect pests of alfalfa?

1) Diseases
   a) Mold
      (1) Light green to yellow blotches appear on the leaves.
      (2) Terminals of the shoots are often dwarfed, and the leaves are twisted and rolled.
      (3) A grayish cottony growth, which is the mycelium of the fungus, is often visible on the underside of the leaflets.
      (4) Cool, moist weather favors this disease.
   b) Bacterial wilt
      (1) First symptoms are yellowish-brown discolorations in the woody cylinder of the tap root. (This appears in cross sections as a ring under the bark and will eventually extend throughout the woody cylinder.)
      (2) Plants become stunted with yellow shoots having small, cupped leaves.
      (3) The bacteria are in the soil and enter through wounds.
   c) Leaf spots
      (1) Common leaf spot
         (a) Small, circular, brown to black spots appear on the leaflets.
(b) As the spots become older, a small, raised disc (usually lighter in color) appears in the center of the spot.
(c) The infected leaves turn yellow and drop as the disease progresses.
(d) This disease occurs wherever alfalfa is grown and develops during moist periods with moderate to cool temperatures.

(2) Lepto leaf spot.
(a) Occurs throughout Missouri but more prevalent in the northern portion of the state.
(b) Small brown spots on the leaflets which are surrounded by a halo, enlarge and acquire a tan center with an irregular brown border.
(c) The infected leaves die and cling to the stem for a time.
(d) Only young leaves become infected, and the greatest damage occurs on young growth after clipping if favorable moist weather conditions occur at that time.
(e) In older growth only the young upper leaves become infected and have typical symptoms. (These older leaves seldom die.)

(3) Stemphylium leaf spot
(a) Occurs throughout Missouri but is most prevalent in the Bootheel
(b) Spots on the leaflet are oval or irregular and appear sunken.
(c) Usually these spots are dark brown with lighter centers, and they are often surrounded with a pale halo.
(d) Older spots are concentrically ringed and resemble a target.
(e) A single lesion can cause a leaf to drop so this disease can cause severe defoliation.
(f) It is favored by moist, warm weather.

d) Anthracnose
(1) Occurs throughout Missouri but is most prevalent in the southern portions
(2) Diamond-shaped lesions with dark borders appear on the lower portions of the stems.
(3) The centers of the lesions contain small black bodies that produce spores.
(4) The fungus may girdle and kill stems, crown buds, and even the crown.
(5) The "shepard's crook" is often observed in young dead shoots.
(6) Dead, straw-colored stems scattered throughout the field indicate anthracnose infection and future stand loss.
(7) This disease is favored by hot, moist weather.

e) Black Stem Diseases
(1) Spring Black Stem
(a) Dark spots with irregular borders appear on the leaves.
(b) Spots enlarge and merge until much of the leaflet is covered.
(c) The leaves turn yellow and drop.
(d) Stem lesions are dark green at first and later turn black.
(e) Stem lesions may enlarge and merge until most or all of the lower portion of the stem becomes black.
(f) Young shoots are often girdled and killed.
(g) The disease is favored by cool, moist weather.

(2) Summer Black Stem
(a) Large, usually circular, light gray to black spots appear on the leaves during the summer and early fall.
(b) Young spots on the leaves are often surrounded by a halo.
(c) Considerable leaf drop results from severe infections.
(d) Brown to black lesions appear on the stem.
(e) These lesions enlarge and often cover large portions of the stems.
(f) The disease is favored by cool, moist weather.

2) Insect pests
a) Alfalfa Weevil
(1) Small yellowish-green larvae with shiny black heads which become light green with a white stripe down the middle of their backs as they grow.
(2) Adult weevils are light reddish-brown with a darker brown stripe and are about 1/4 inch long.
(3) Cooler temperatures prolong adult feeding while higher temperatures force weevils into summer estivation (inactive state).
(4) Adults enter surrounding vegetation and remain inactive in summer but return to alfalfa in the late summer and fall to resume feeding and begin egg-laying.
(5) Control by following a schedule of cultural practices and timed use of insecticide sprays. (Spray first cutting growth, harvest first cutting as early as possible, and then use a stubble spray if necessary.)
b) Aphids
(1) Spotted Alfalfa Aphid
(a) Small (1/8" long) with four to six rows of spots on its pale yellow or green back
(b) Prefers hot and dry conditions (occurs most frequently under drought conditions)
(c) Sucks juices from alfalfa plants (Excessive feeding can stunt growth and kill seedlings.)
(d) Injects toxins into alfalfa plants which cause yellowing
(e) Secretes "honeydew" which may result in growth of sooty mold that reduces hay quality and gums up the sickle bar during mowing
(f) Control with insecticide sprays and use resistant varieties.
(2) Pea Aphid
(a) Pear-shaped insect ranging in color from light to dark green.
(b) Prefers cool, dry conditions
(c) Sucks juices from all parts of the alfalfa plant causing yellowing, wilting, and stunting (Plant tips may die.)
(d) Control by using insecticides, planting resistant varieties, and maintaining vigorous, weed-free stands.

c) Grasshoppers
(1) Brown, green, or gray insects up to 1 3/4 inches long.
(2) Typical damage consists of large irregular holes extending from leaf margins to centers. (Growing tips of alfalfa plants may also be injured.)
(3) Can do considerable amount of damage in a very short time
(4) Insecticides give temporary control. (Reinfestation can occur in ten to fourteen days.)
(5) Do not mow grasses along field edges where high populations are found until grasshoppers are controlled. (Mowing feeding sites causes grasshoppers to move into crops.)

d) Meadow Spittlebug
(1) Small (1/4 to 3/8 inch) grasshopper-like insects ranging in color from tan to reddish-brown to black
(2) Nymphs suck the juices from plants for nourishment and to form soapy-looking "spittlemasses."
(3) Decreases yield and protein content of hay
(4) Spittle may cause the growth of mold in curing hay.
(5) Control by spraying insecticides on cool, overcast days when weather conditions are ideal for nymphs to be high up on the plants.

e) Variegated Cutworm
(1) Moth larvae are about 2 inches long and range in color from black to light greenish-yellow or tan with a row of light yellow diamond-shaped spots down the middle of their backs.
(2) Cuts stems and makes irregular holes in leaves and stems (usually more severe on young stands of alfalfa).
(3) Spray immediately after hay has been removed. (Never spray hay that is still in the field.)

f) Fall Armyworm
(1) Larvae are 1 1/4 inches long, smooth-skinned and vary in color from light tan to green to almost black with yellow stripes.
(2) Severe damage of established alfalfa stands is rare but fall seedlings can be destroyed. (Heavy feeding results in defoliation.)
(3) Control with insecticide sprays.