UNIT IX - FORAGE PRODUCTION

Lesson 3: Selecting a Tillage and Planting Method

**Competency/Objective:** Identify the principles for establishing forages.

**Study Questions**

1. What tillage and planting methods are appropriate for establishing a stand?
2. What tillage and planting methods are used to renovate a stand?
3. What factors should be considered when determining fertilizer application needs during forage establishment?

**References**

1. *Advanced Crop Science* (Student Reference). University of Missouri-Columbia: Instructional Materials Laboratory, 2000, Unit IX.
2. Activity Sheet
   a) AS 3.1: Forage Crossword Puzzle
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TEACHING PROCEDURES

A. Review

After the planning has been done and the variety of forage has been selected, the next step is selecting a tillage and planting method. This lesson will discuss these methods: establishing a forage and fertilizing the stand for growth.

B. Motivation

Ask the students what types of equipment they think would be used to establish a forage stand. Ask them to list and describe the equipment and when it would be used.

C. Assignment

D. Supervised Study

E. Discussion

1. There are several methods used to establish a forage stand. Discuss the various types of equipment and methods used to prepare a seedbed and plant the seed. Refer to Figure 3.1 in the Student Reference for an example of a minimum or no-till drill. Figure 3.2 in the Student Reference shows an example of band seeding.

What tillage and planting methods are appropriate for establishing a stand?

a) Three basic types of tillage systems used to prepare the seedbed for forage planting
   1) Complete tillage method
      (a) Deep plow with equipment such as a moldboard plow.
      (b) Apply fertilizers before plowing.
      (c) Do several weeks before planting to allow rain, harrowing, and rolling to compact the soil.
      (d) Seed using a drill or broadcaster.
   2) Reduced tillage method
      (a) Use a field cultivator or chisel to roughen the ground.
      (b) Seeds may then be drilled or broadcast.
      (c) Use some type of roller to compress the seeds into the ground for better germination.
   3) No-till method
      (a) This method is useful in new plantings on areas that are prone to wind erosion and on steep slopes
      (b) A "no-till" seeder is used to incorporate the seed into the soil.
      (c) This results in reduced trips across the field, saving in costs, and reduces soil erosion.
      (d) Existing vegetation must be effectively killed with postemergence herbicide before planting.

b) Four methods of planting forage seeds
   1) Broadcasting
      (a) Least desirable method because of germination efficiency
(b) Increased efficiency by rolling or cultipacking the seedbed before planting
(c) Can be used during midwinter to allow frost to honeycomb the soil allowing the seeds to be covered with sufficient soil for germination

2) Conventional grain drill
   (a) Uses grass seeding attachment - metal tubes scattering seed in front of furrow openers
   (b) Allows for banding - applying a band of fertilizer with the seed placement for efficient use

3) Seeders with corrugated rollers, such as the Brillion seeder
   (a) Allows seed to drop between two corrugated rollers that pack the soil below the seed and then around it
   (b) Ensures a firm seedbed and even distribution of seed that is not sown to deeply

4) No-till seeding - used without any previous tillage

2. Ask students if they can explain the concept of pasture or forage renovation. How might this be accomplished, what equipment may be used, and when is it best done? Complete AS 3.1.

What tillage and planting methods are used to renovate a stand?

   a) Most renovations involve the addition of legumes to grass sod.
   b) Adding a legume (because of its nitrogen fixing capabilities) is cheaper than topdressing the grass with commercial nitrogen fertilizer.
   c) Renovating is never final; it must be done every few years to maintain stands.
   d) Three basic methods are recommended to renovate forages.
       1) Method 1 - Overgraze grass during the fall and early winter.
          (a) Apply lime, phosphorous, and potash before or during renovation as soil tests recommend.
          (b) Broadcast legume seed early in winter to allow freezing and thawing to carry the seed into the soil.
          (c) February seeding will have a 50% chance of succeeding than an April seeding.
          (d) Remove early growth immediately by grazing to allow the legume to establish good root system.
       2) Method 2 - Till the sod in late fall or early winter so that 40 to 50% of the soil is disturbed.
          (a) Broadcast or drill seed into the partially opened soil.
          (b) Continue with steps as described in method 1.
       3) Method 3 - Use a nonselective herbicide to retard grass growth.
          (a) Seed with no-till equipment.
          (b) Use chemical and seed during the growing season - early spring or late summer.
          (c) Apply the herbicide according to label directions.

3. The last but most important step may be to make sure the seed has a chance of maximizing its potential with needed nutrients. Ask students if they can identify the first step in proper nutrient assessment. Soil tests must be used to guide the fertilizer program.

What factors should be considered when determining fertilizer application needs during forage establishment?

   a) Test the soil to determine the pH level and nutrient status of the soil.
      1) This should be done at least 6 months prior to seeding.
      2) It allows time to correct deficiencies in the topsoil.
3) The pH should be between 6.0 and 6.8 depending on the legume or grass and the soil type.
   b) Adequate lime must be applied.
      1) Lime will also supply calcium and magnesium.
      2) Lime also affects the availability of other essential nutrients. For example, phosphorous availability is increased and the pH is increased.
      3) Apply part of the lime at least 6 months prior to seeding.
   c) Available phosphorous is a key element to establishing legumes and grasses.
   d) Nitrogen should be applied later to aid in aboveground vegetative growth.
   e) Phosphorous encourages root development.
   f) Starter fertilizer should consist primarily of phosphorous and a small amount of nitrogen.
   g) Established stand needs a liberal amount of potash to meet their potassium needs.
   h) Topdressing of established stands should be done according to soil tests. Soil tests should be done every 3 to 4 years.

F. **Other Activity**

Secure soil tests from some students’ home farms with well-established and not-so-well established forages. Examine and explain the differences.

G. **Conclusion**

This lesson is an important step in successful forage production. Knowing how to prepare the soil and the methods that may be used for seeding is crucial for this success. These seeding methods will vary with different parts of the state and with different soil types and conditions. The importance of soil tests should be stressed. Producers must know the pH of the soil and the nutrient availability when establishing the stand and when maintaining the forage stand.

H. **Answers to Activity Sheet**


I. **Answers to Evaluation**

1. Complete tillage, reduced tillage, no-till
2. Broadcasting, conventional drill, special seeders, no-till seeding
3. a. Overgraze grass during the fall and early winter.
   b. Till the sod in late fall or early winter so that 40 to 50% of the soil is disturbed.
   c. Use a nonselective herbicide to retard grass growth.
4. d
5. b
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EVALUATION

Complete the following short answer questions.

1. What are three tillage methods for preparing the seedbed for planting?
   a. 
   b. 
   c. 

2. What are four general planting methods used to seed forages?
   a. 
   b. 
   c. 
   d. 

3. What are the three methods recommended to renovate forages?
   a. 
   b. 
   c. 

Circle the letter that corresponds to the best answer.

4. Which element below is used to regulate the pH of the soil?
   a. Nitrogen
   b. Phosphorous
   c. Potassium
   d. Lime

6. How often should soil tests be taken to aid in the maintaining of a good forage stand?
   a. Every year
   b. Every 3 to 4 years
   c. Every 6 to 7 years
   d. Every 10 years
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Forage Crossword Puzzle

Objective: Students will be able to recognize terms associated with forage production.

Directions: Complete the crossword puzzle below by filling in the blanks with the correct words associated with the down and across phrases.

Across
1. Nutrient that encourages root development
3. Nutrient that encourages aboveground vegetative growth
4. Spreading the seed on top of the ground
7. A method of removing early growth to allow root development
8. Placing the seed directly over the fertilizer

Down
2. One reason why legumes may be lost from a forage
5. Adding this is cheaper than topdressing grass with nitrogen
6. Should be applied before plowing and then turned under