CROP ROTATION

Learning Objectives

The learner will:

- Understand various benefits of a system of crop rotation.
- Examine two popular rotational designs.

Crop rotation overview

- Crop rotation is the practice of growing a wide variety of crops in a sequential system throughout the field with the intention of avoiding a buildup of disease and pests associated with mono-cropping.
- Crop rotation also promotes good soil health by alternating crops with different nutrient needs, therefore avoiding depletion of any one necessary element present in the soil.
- Crop rotation can also benefit overall soil structure by alternating deep and shallow rooting plants, breaking up subsoil and reducing the effects of plow pan.
- The practice of crop rotation is ancient in its use, and is widely recognized as a cornerstone of good agricultural practice.

Importance of legumes in crop rotation

- Legumes are plants in the family Fabaceae and are described as “nitrogen fixing” plants. Legumes collect nitrogen from the air and fix it on the root systems in the form of nodules.
- Legumes are a great crop to alternate with heavier feeding plants such as corn. The legumes return nitrogen to the soil after the plant is harvested or dies back.
- Legumes fix nitrogen through a symbiotic relationship with bacteria known as rhizobia that is naturally occurring in soil but often introduced in the form of an inoculant by the farmer planting the legume.
- Two types of legumes that are farmed are forages and grain. Common forages are: alfalfa, vetch, and clovers. Common grains are: Beans, lentils and peas.

Benefits of crop rotation

- Crop rotation can increase yields by15-20% when compared to monoculture.
- Increases the overall biomass of the soil
- Improves weed suppression by maintaining better soil health and providing living leguminous mulches.
- Provides valuable fodder for livestock while enriching the soil.

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Popular rotational designs

- *The Corn Belt system on large farms:* Apply manure, grow corn, follow with soybeans, apply manure, grow corn, and follow with several plantings of alfalfa. In this rotation, legumes fix nitrogen in the soil before the heavy feeder crop (corn, in this example.) Specific plant pest cycles are interrupted. Specific plant disease is similarly suppressed. In this crop rotation, alfalfa cultivation also serves to smother weeds. Manure is applied before the heaviest feeder. Livestock feed is grown for use on farm or for sale.
- *Intensive vegetable rotational system:* This eight year rotational cycle can be adapted to many growing regions. Sweet corn followed by tubers followed by squash, followed by root crops then beans followed by tomatoes, followed by peas then Brassicas. This style has been most recently made popular by Eliot Coleman and is benefited by the following relationships.

Potatoes *follow sweet corn…because research has shown corn to be one of the preceding crops that most benefit the yield of potatoes.*

Sweet Corn *follows the cabbage family because, in contrast to many other crops, corn shows no yield decline when following a crop of brassicas. Secondly, the cabbage family can be undersown to a leguminous green manure which, when turned under the following spring, provides the most ideal growing conditions for sweet corn.*

The Cabbage Family *follows peas because the pea crop is finished and the ground is cleared [early] allowing a vigorous green manure crop to be established.*

Peas *follow tomatoes because they need an early seedbed, and tomatoes can be undersown to a non-winter-hardy green manure crop that provides soil protection over winter with no decomposition and regrowth problems in the spring.*

Tomatoes *follow beans in the rotation because this places them 4 years away from their close cousin, the potato.*

Beans *follow root crops because they are not known to be subject to the detrimental effect that certain root crops such as carrots and beets may exert in the following year.*

Root Crops *follow squash (and potatoes) because those two are good "cleaning" crops (they can be kept weed-free relatively easily), thus there are fewer weeds to contend with in the root crops, which are among the most difficult to keep cleanly cultivated. Second, squash has been shown to be a beneficial preceding crop for roots.*

Squash *is grown after potatoes in order to have the two "cleaning" crops back to back prior to the root crops, thus reducing weed problems in the root crops*

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Assessment/Review

- Why is it important to have a solid understanding of characteristics of specific crops and the relationships between specific crops in order to design an effective crop rotation system?
- What is the importance of legumes in a rotational cycle of planting?
- Besides general soil/plant health, what are some specific benefits to rotating crops?