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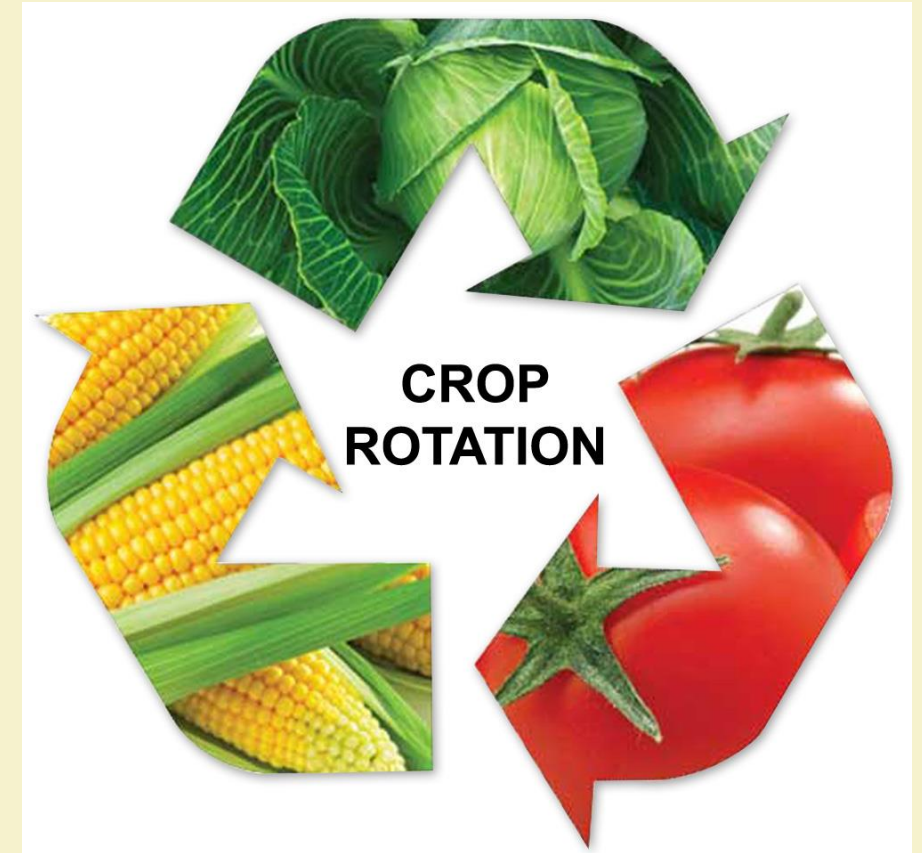
Organic Farming for Sustainable Agricultural Production

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Lecture 30: Crop planning and rotation design in organic system

Introduction to Crop rotation

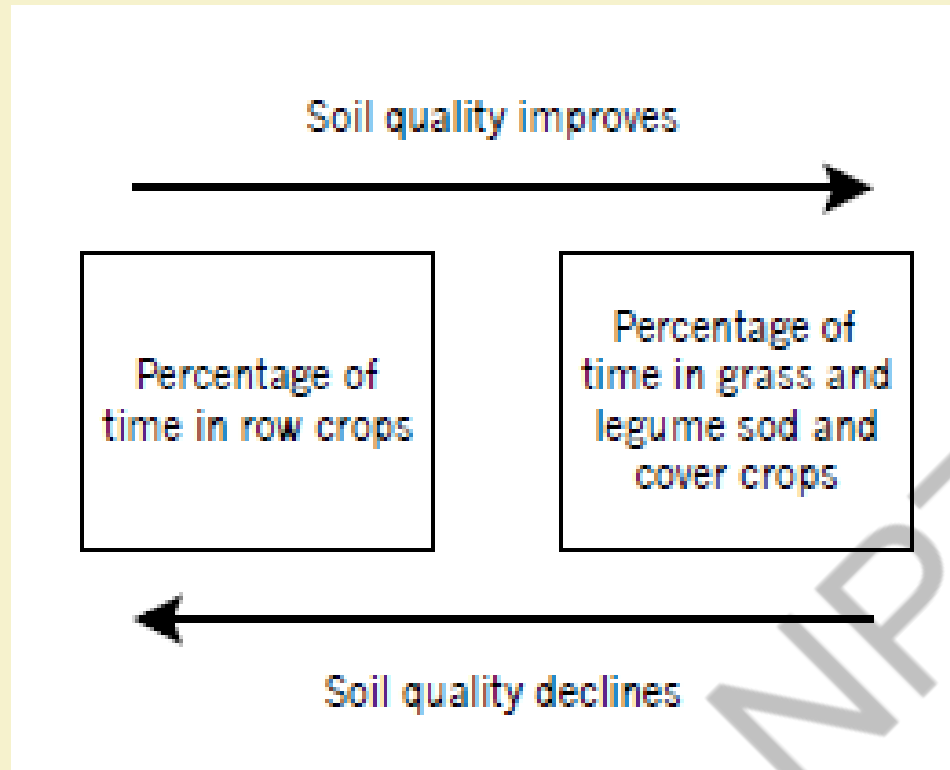
- Crop rotation is “system of growing different kinds of crops in recurrent succession on the same land”
- It may include 2-6 different crops with each crops having a particular benefit either financial or environment
- Crops may be rotated every year or at different times in the growing season
- Many crop rotations will include a legume
- Example of Crop rotation: Rotate Soybeans (legume)– Corn- wheat



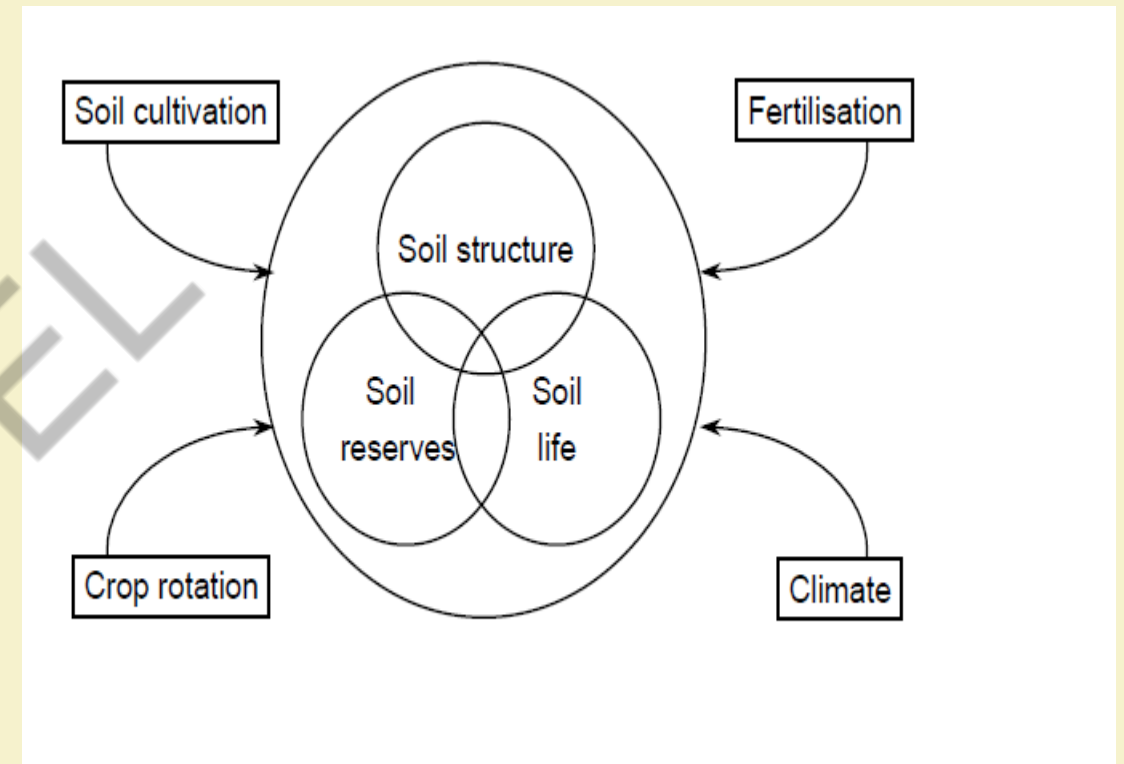
Why Rotate Crops ?

According to “Cereal-Legume Cropping Systems:

- Enhance soil and water conservation, build soil organic matter
- Provide weed, disease and insect control
- Enhance biological diversity
- Ensure economic profitability for the farming system

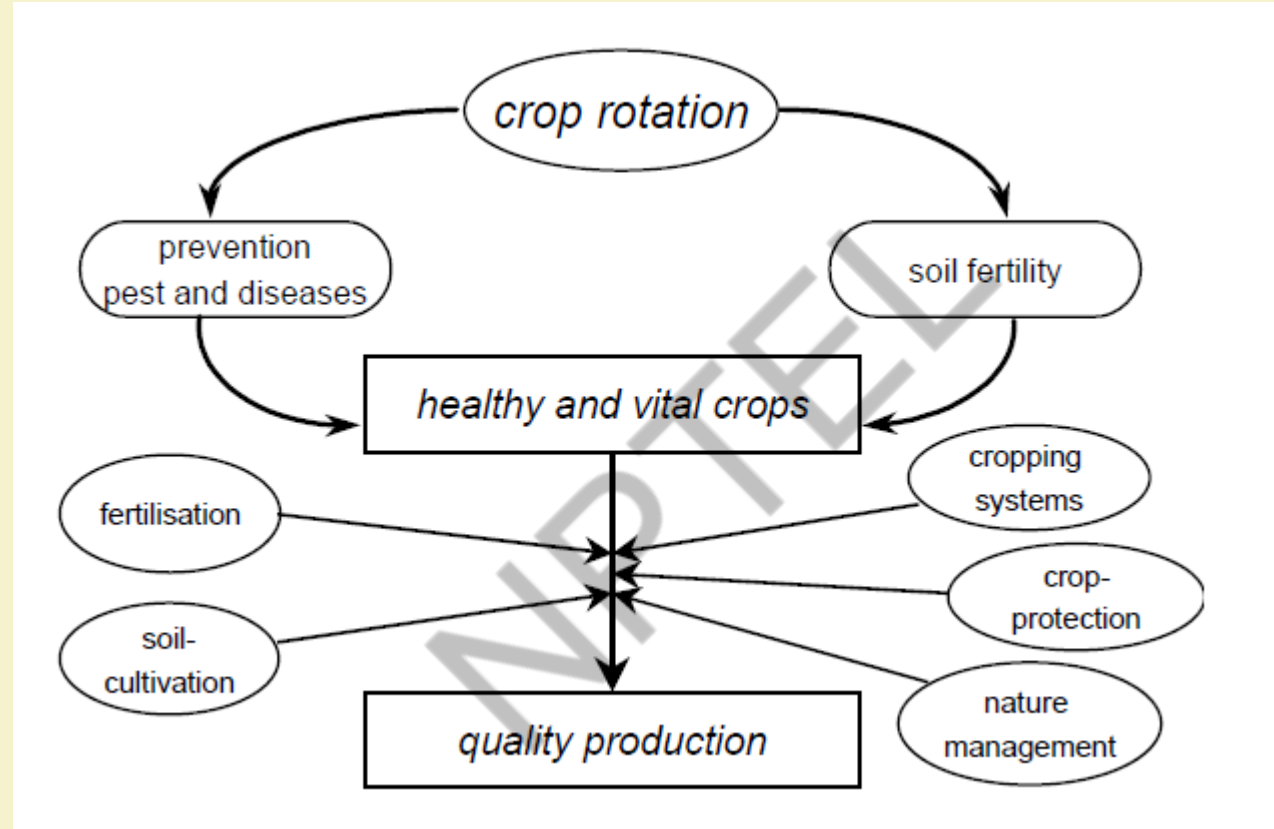


Relation of soil quality to the types of crops that predominate in the rotation



Soil fertility complex in relation to external factors

Quality production as a function of crop rotation



Crop selection in rotation

- Follow a legume crop with a high nitrogen demanding crops
- Grow less nitrogen demanding crops in the initial phase of rotation
- Try to grow a deep- rooted crops as a part of rotation
- Grow the same annual crop for only one year
- Use crop sequence that promote healthier crops
- Use crop sequence that aid in controlling weeds
- Grow some crops that will leave significance amount of residue

Condition for Successful Crop rotations

- Include the use of cover crops to provide fertility, control weeds and provide habitat for beneficial insects;
- Have a diversity of plant species to encourage natural predators, discourage pest and disease build-up, and minimize economic and environmental risk;
- Provide a balance between soil conservation and crop production by adding organic matter to the soil to both supply nutrients and improve soil quality properties such as water infiltration and water holding capacity and
- Provide weed control by alternating between warm and cool weather plants and including weed inhibiting plants (such as rye and sorghum).

Common Goals for Crop Rotation

- Maintain healthy soil by adding nitrogen and other nutrients in a way that is environmentally safe and conforms with regulations
 - Produce nutritious food.
 - Capture solar energy wherever possible
 - Control insects and diseases, especially soilborne diseases; for example, “Break the wilt cycle among crops in the tomato family.”
 - Reduce weed pressure; for example, “Manage the rotation to confuse the weeds.”
 - Minimize off-farm inputs
 - Provide economic stability.
- ➡ Maintain biotic diversity
 - ➡ Unlock the living potential of the soil.
 - ➡ Diversify tasks to keep labor happy and productive all season.
 - ➡ Balance the needs of the farm with the needs of the farmer and develop a spiritual relationship with the land.
 - ➡ Refine the aesthetic quality of fields and farm
 - ➡ Increase profitability having a diverse line of products to market.

Farm Size, Cover Crops, and Crop Rotations

- Farm size affects cover cropping and the management of the crop rotation. Organic farmers plant cover crops to protect the soil, increase soil organic matter, improve soil physical properties, and accumulate nutrients.
- Cover crops may also provide habitat for beneficial insects or help crowd out weeds.
- Most expert farmers integrate cover crops into their fields at every opportunity.
- Many expert farmers use a full year of cover crops to restore the soil after intensive use.
- Farmers with limited acreage (<5 acres) find that including cover crops and providing adequate rotation of crop families on a given field is challenging. Many smaller farms rely on mulch, compost, and short-term winter cover crops in place of multi-season cover crops.

Ranking of annual vegetables based on relative nutrient requirements

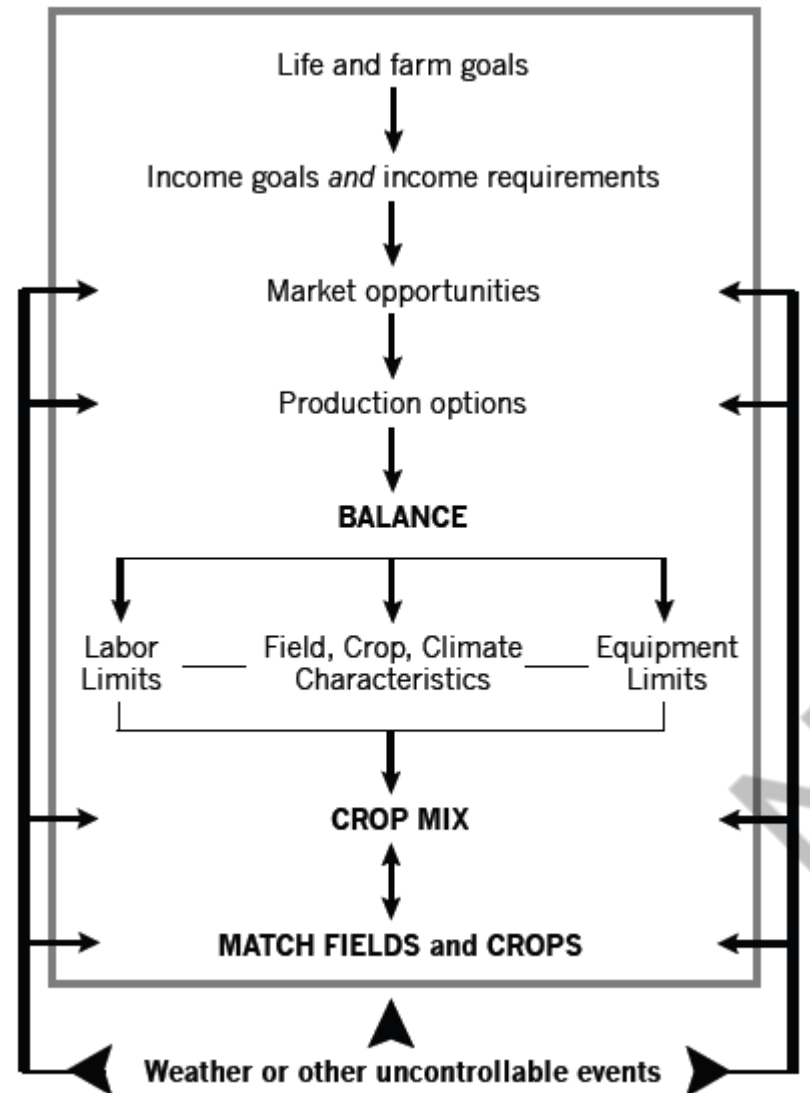
Low	Medium	High
Beans	Cucumber	Broccoli
Beet	Brinjal	Cabbage
Carrots	Pumpkin	Cauliflower
Peas	Spinach	Lettuce
Radish	Sweet potato	Potato
	Water melon	Tomato
	Brassica greens	Sweet Corn

Source: A.A. Hanson Practical Handbook of Agricultural science (Boca Raton FL: Taylor & francis group LLC 1990)

Rooting depth for several crops

Shallow rooted (60 cm)	Moderately deep rooted (90 cm)	Deep rooted (120 cm)	Very deep rooted (180 cm)
Rice	Groundnut	Cotton	Safflower
Onion	Tobacco	Maize	Citrus
Cabbage	Wheat	Sorghum	Grapevine
Cauliflower	Chilli	Pearlmillet	Coffee
Potato	French bean	Soybean	lucern
Lettuce	Carrot	Sugarcane	
		Arhar	

Schematic Summary of Crop rotation Planning



- Many expert farmers do extensive planning and record keeping on paper. Most have some form of field maps. Some use computers. A few keep all details in their heads. Most of the panel farmers agreed that farmers should write down their field records and plans.
- Many of the key responsibilities and tasks require reflection and observation as well as information.
- The chart illustrates the central role of rotation in the overall farming operation. The chart does not cover all aspects of farm management—only those that the farmers thought were most important in determining the rotation and that are linked to rotation management.



Examples of Crop rotation in India

