



Conservation Agriculture: Scope and Its Impact on Soil Health and Crop Production

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Introduction

- In India, out of total geographical area (329 m ha), about 147 m ha is subjected to varying degree and forms of soil degradation.
- Extensive tillage operations will result in Soil degradation, enhances organic matter decomposition, destruction of soil aggregates, soil erosion and ultimately results in decline of soil productivity.
- Hence, there is need of practices that will minimize the various soil problems such as degradation of land and the concept of conservation agriculture is being emerging as a solution to this problem.
- Conservation agriculture is not only essential for sustenance of soil productivity but is also essential to minimize the energy consumption in agriculture.

Conservation Agriculture

“A concept for resource-saving agricultural crop production that strives to achieve acceptable profits together with high and sustained production levels while concurrently conserving the environment” (FAO 2007).

- Conservation agriculture aims to conserve, improve and make efficient use of natural resources through integrated management of available soil, water and biological resources combined with external inputs.
- It contributes to environmental conservation as well as to enhanced and sustained agricultural production. It can also be referred as resource- efficient agriculture

Need For Conservation Agriculture

- Population pressure & Unsustainable use of land
- Severe land degradation and food insecurity

So, we have to produce more food from less land through more efficient use of natural resources and minimum impact on environment.

Conventional Agriculture

Conventional agriculture is a broad term that has a number of definitions, but a crop can be classified as conventional if synthetic chemicals are used to maintain the plants. A significant amount of chemical and energy input is required in conventional agriculture to produce the highest possible yield of crops. “This method usually alters the natural environment, deteriorates soil quality, and eliminates biodiversity.” (USDA.gov). Conventional agriculture was developed to make farming more efficient, but achieves that efficiency at a major cost to the environment.

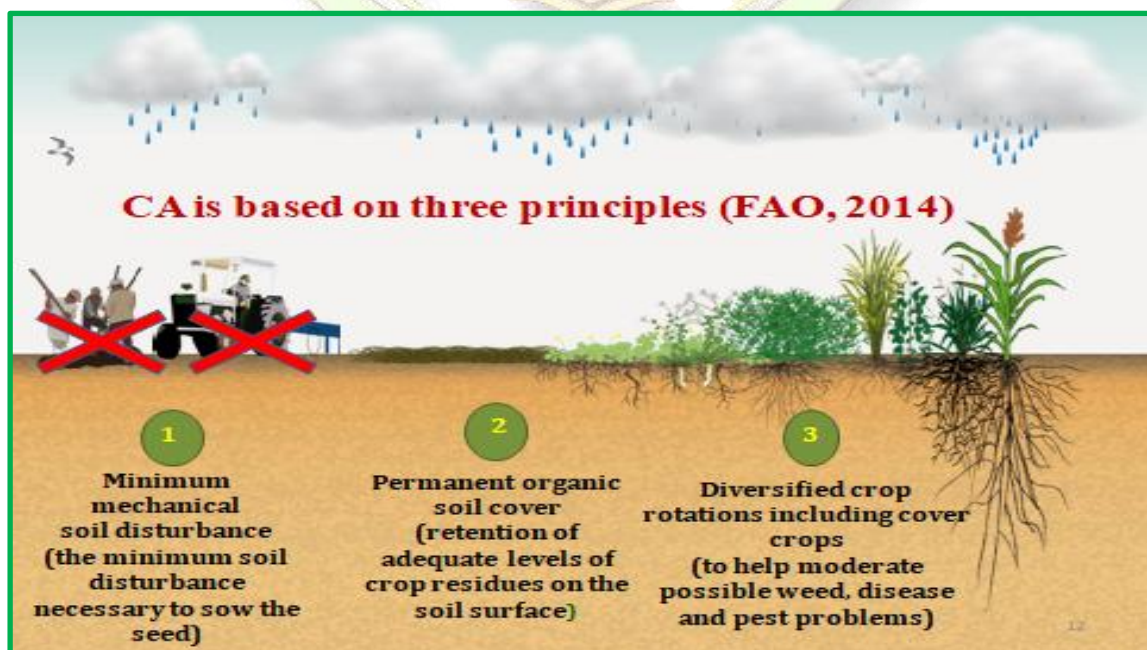
The goal of conventional agriculture is to maximize the potential yield of crops. Production of these crops is beneficial to nothing but food security and economy. Once established, a conventional farm requires constant maintenance but produces maximal yields. Maintenance is made easy for farmers as conventional farming typically involves monocropping, but is also very expensive. In a conventional system farmers will designate entire fields to just one crop, which creates uniformity. Uniformity can determine both the success and failure of conventional systems. A uniform crop is ideal because it reduces labor costs and makes harvesting easy, but it can also impact biodiversity and make crops susceptible to pathogens. Chemicals and genetically modified organisms make maintenance of conventional systems relatively simple for farmers, but require a constant input of energy and money. In a conventional system, farmers can apply pesticides and herbicides to crops at a much more efficient rate if they are made up of just one type of plant, but this has a number of unintended consequences. Since the goal of conventional agriculture is to maximize yields, environmental health and biodiversity are usually not preserved. Problems associated with conventional agriculture are as follows:

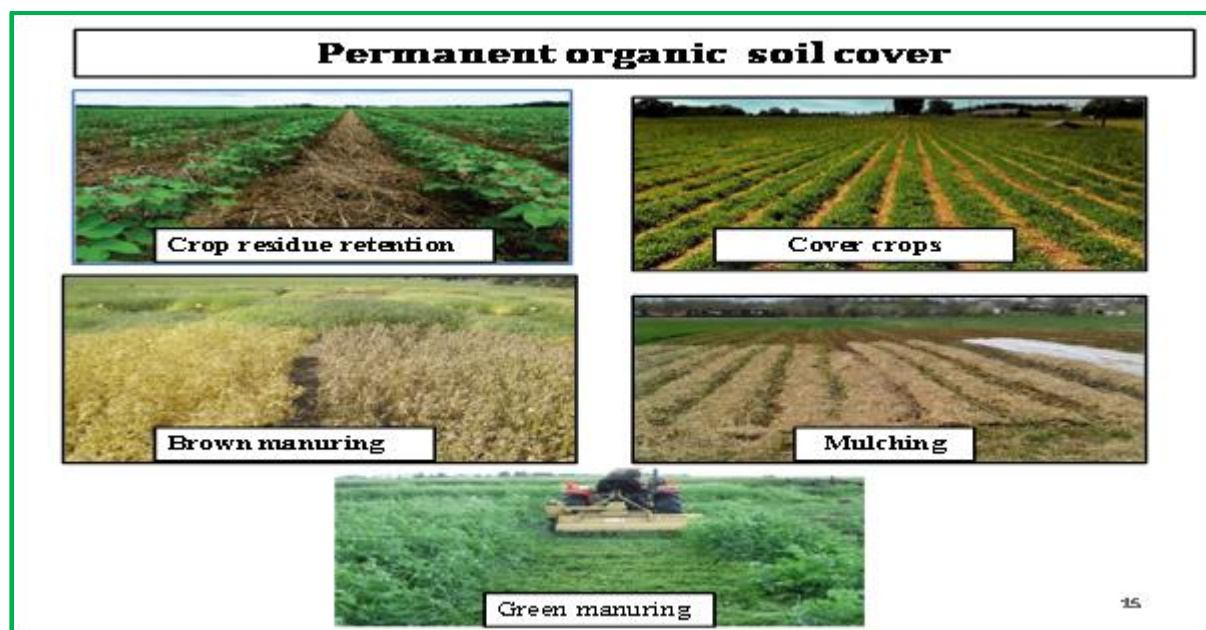
- Excessive soil tillage
- Run off losses
- Soil erosion
- Nutrient leaching
- Residue burning
- Loss of microorganisms
- Environmental pollution
- Nutrient losses
- Emission of GHG

Conservation Agriculture Practices Includes

Minimum mechanical soil disturbance

- Conservation tillage
 - a) Zero tillage
 - b) Reduced tillage
 - c) Minimum tillage
- Direct sowing
- Specialized equipments: laser levelling, happy seeder *etc.*,





Benefits of Conservation Agriculture

1. Reduction in cost of production
2. Enhancement of soil quality
3. Enhancement in long term C sequestration and build-up in soil organic matter
4. Reduction in the incidence of weeds
5. Enhancement in water and nutrient use efficiency
6. Enhancement in production and productivity (4-10%)
7. Reduction in green house gas emission and improved environmental sustainability
8. Reduces loss of nutrients
9. Opportunities for crop-diversification and intensification
10. Improvement in resource use efficiency

Scope of Conservation Agriculture

- To regenerate the degraded lands
- To improve soil biological processes
- To recycle the crop residues
- To conserve soil and water
- Mechanization in CA
- To improve resource use efficiency
- To increase the yields
- To reduce the cost of production

Constraints for Adoption of Conservation Agriculture

1. Lack of appropriate seeders especially for small and medium scale farmers
2. Mindset of farming community
3. Wide spread use of crop residues for livestock feed and fuel
4. Lack of knowledge on recycling of crop residues
5. Lack of knowledge about potential of CA to agriculture leaders, extension agents and progressive farmers
6. Lack Skilled and scientific manpower

Conclusion

The technologies of CA such as,

- Conservation tillage slow down the OM decomposition and reduces the loss C into atmosphere also reduces the cost of production
- Residue retention, cover crops, mulching, brown manuring reduces the evaporation losses and provides opportunity time for infiltration of water
- Effective crop rotations and intercropping maintains the soil fertility besides reduces the incidence of pest, diseases and weeds
- Conservation agriculture helps to maintain soil health and sustainable yields with protecting the environment

