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Conservation Agriculture – A New Paradigm

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Introduction

The ever-increasing global population, particularly in many developing countries requires an increased supply of food, fiber, oil which poses a grave challenge before the agricultural scientists to produce more and more from limited, shrinkage, and degraded land and water resources. Tilling soils continuously without adding organic matter has adverse effects on soil health and the quality of the produce. Conservation agriculture, emphasis on the minimum soil disturbance, permanent soil cover through crop residues or other cover crops, and diversified crop rotation using a legume, is a promising technology for rotational use of available resources and sustainable productivity in the long run. While Conservation Agriculture farming techniques capable of increasing productivity have been created in the region, farmers face a perceived and sometimes genuine danger of failure when switching to a new system and new ways of doing business. As a result, the Guide identifies two essential components for the establishment of effective Conservation Agriculture systems: first, the development of multidisciplinary scientific and technical capacity; and second, and most importantly, close collaboration with farming communities – rather than just farmers – to leverage their existing and traditional knowledge.

Principles of Conservation Agriculture

In conservation agriculture have three principles that are (a) minimum soil disturbance (no-tillage and minimum traffic for agricultural operations), (b) Permanent soil cover (leave and manage crop residue on the soil surface as cover/mulch), and (c) diversified crop rotations including a legume. Now a day one more principle was added which is reduced traffic management. Maintaining the soil in a fit state for the active life processes of the entire soil-plant–water nutrient system is a vital aspect in increasing soil biotic self-recovery capacity, preserving land productivity and allowing safe intensification of land use.

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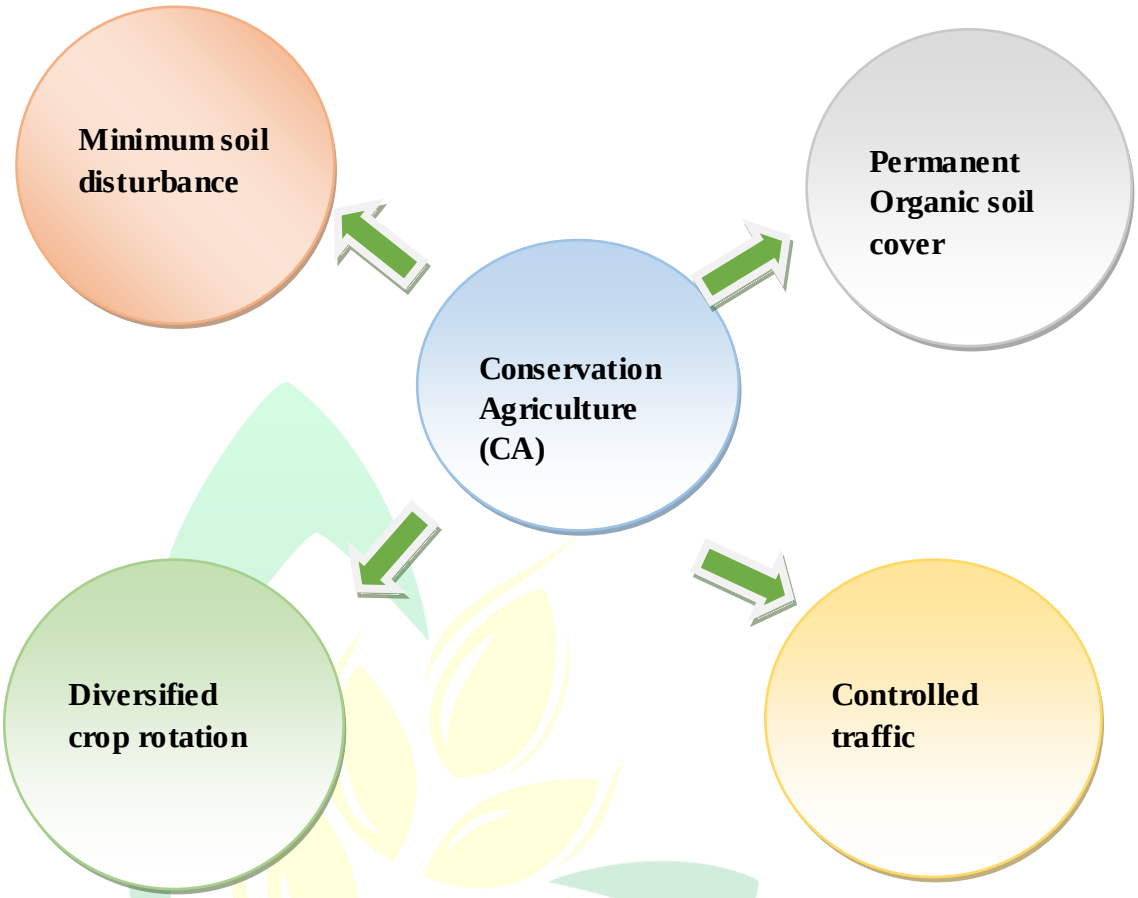

Fig.1. Principles of Conservation agriculture

Policy and institutional role in supporting the adoption and spread of Conservation Agriculture - While conservation agriculture-based approaches to sustainable intensification are very promising, the specific technologies differ depending on local conditions and farmer needs. It is critical that governments and institutions give the essential assistance as well. They must be dynamic, able to respond not only to the varying and changing needs of farmers, but also to mitigate any risks that may arise throughout the transition phase. The following are areas where policies should be focused:

- Facilitating national development initiatives aiming at scaling up Conservation Agriculture and adapting it to the needs of farmers
- Using national and regional venues to encourage stakeholder participation
- Bringing together providers and buyers to collaborate with government field employees and others to meet the needs and requirements of farmers

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- Farmer Field Schools, which play a key part in achieving the objective of Conservation Agriculture by encouraging farmers to band together and informing providers (of inputs and technical advice) about prospective prospects
- Promoting technologies and capacity building through technical extension programs (to guarantee that the essential inputs and equipment are more easily accessible and affordable)
- Using credit lines to make purchase easier.

Supporting the adoption and uptake of Conservation Agriculture in the region should remain a top priority in the efforts of FAO, funders and local partners for the foreseeable future.

Practices of Conservation Agriculture –

1. **Laser Land Leveling –** Laser-assisted precision land leveling, often known as laser land leveling, is a prerequisite for implementing CA methods such as zero tillage and bed planting.
2. **Conservation Tillage –** Conservation tillage is a broad word that encompasses zero-tillage, direct-drilling, minimum-tillage, and ridge tillage, and denotes that the practice meets some resource conservation goals.
3. **Bed Planting (Furrow and Narrow Beds) –** Crops are planted on raised beds separated by furrows in bed planting. Beds are typically 0.6-1 m broad, with 2-3 rows of crops planted on top and irrigation water provided in the furrows.
4. **Brown Manuring with Sesbania –** Rice and sesbania are sown together and left to grow for 25-30 days in brown manuring. Rice is planted in rows with a seed drill, and sesbania is disseminated over wet soil. Sesbania plants are killed with 2, 4-D at a rate of 250-500 gm/ha.

Advantages of Conservation Agriculture

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- Conservation agriculture has various agricultural benefits, including the accumulation of organic carbon and the halting of factor productivity declines, as well as the reduction of soil erosion and the preservation of top fertilized soil from erosion.
- No-tillage allows for faster planting and better crop stand, leading in increased yields.
- Because no-till uses less diesel fuel, it emits less carbon dioxide, which is one of the pollutants that contribute to global warming.
- In conservation agriculture, the population of weeds is reduced by 50-60%.
- CA is popular among farmers since it is a low-cost and time-saving technology.
- Residue mulch encourages more solid soil aggregates; pore space filled with water, microbial activity, and improved soil surface protection.

Causes of failure of Conservation Agriculture –

- Conservation agriculture is highly machine dependent and management intensive practices.
- Crop residues vary in their nature, effect as well as on the ingredient they contain.
- Annual grassy and broad-leaved weeds are a big constraint in the initial years of practicing conservation agriculture.
- Nutrients application under residue retention faces another challenge, particularly in the basal application of P and K.
- Crop residues differ in their effects and ingredients, triggering weed dynamics in crops, need to be characterized and quantified.

Conclusion

For eco-friendly sustainable crop production, conservation agriculture is a complex combination of technologies that includes intelligent soil manipulation, retention of crop leftovers as soil cover, planned and diversified crop sequences, and effective weed management. Conservation agriculture has proven to be advantageous in terms of productivity, income, and land-use sustainability, farming ease, and the timeliness of ecological services and cropping methods. Conservation agricultural systems are becoming more popular around the world, although in certain areas, adoption is slow or non-existent. Through the provision of needed services for farming communities and certain incentives, sustained governmental policies and institutional support may play a vital role in the

promotion of CA. Participatory research and demonstration trials on farms could help speed CA adoption.