e-ISSN:2319-9857
p-ISSN:2347-226X

Research & Reviews: Journal of Agriculture and Allied Sciences

RESOURCE CONSERVATION AGRICULTURE (RCA) - A STEP TOWARD SUSTAINABLE DEVELOPMENT

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Editorial

Received date: 04/01/2015
Accepted date: 10/01/2015
Published date: 15/01/2015

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INTRODUCTION

Global food supply has kept pace with demand in the past four decades due to impressive economic growth and linking global markets. During the second half of the 21st century, achievements of agriculture in South Asia in general and India in particular are among major global success stories. But, the real challenges have surfaced in the recent years with ever increasing food demand due to burgeoning populations, degradation of land and natural resources and changing climatic conditions. To compound the challenges further, global climate change is likely to impact crop and livestock production, hydrologic balances, input supplies and other components of agricultural systems, making production much more variable than at present. Climate change is contributing to shift in growing seasons for major crops such as rice, production of which could fall by 40% and decrease the acreage of favorable wheat growing areas in the country. The current food crisis witnessed a dramatic increase in world food prices, causing political and economical instability and social unrest in both poor and developed nations.

Therefore for food and livelihood security, agricultural think tanks and United Nations have prioritized four major areas i.e. natural resources, climate change, water and food (Jat et al., 2011).

What is Conservation Agriculture?

Conservation agriculture (CA) is scientific practice of agriculture utilizing resource conservation/efficient technologies to save and conserve the natural resources, increase the production and productivity while concurrently conserving the environment. Principle of conservation agriculture can be stated considering the three main processes as described by FAO.

1. Minimal soil disturbance: disturbed area must be less than 15 cm wide or 25% of cropped area (whichever is lower). No periodic tillage that disturbs a greater area then aforementioned limits.

2. Soil cover: Ground cover must be more than 30%.

3. Crop rotation: Rotation should involve at least three different crops. However, monocropping is not an exclusion facto.

Conservation Agriculture (CA) aims

1. To conserve, improve and make more efficient use of natural resources.

2. To integrate the management of available soil, water and biological resources combined with external inputs.

3. It contributes to environmental conservation as well as to enhanced and sustained agricultural production.

4. It can also be referred to as resource-efficient/resource effective agriculture.

Forms of conservation agriculture

Major forms of conservation agriculture includes Minimum, reduced or no tillage; Crop and pasture rotation; Contour farming and strip cropping; Cover and green manure cropping; Fertility management; Erosion control; Agro-forestry and alley cropping; Organic and biodynamic farming; Stubble mulching; Integrated nutrient management (INM); Integrated pest management (IPM) and Irrigation management.

Benefits of conservation agriculture

Benefits of CA are of several folds. Direct benefits to farmers include reduced cost of cultivation through savings in labour, time and farm power, fuel and improved use efficiency resulting in reduced use of inputs. More importantly, CA practices reduce resource degradation. Gradual decomposition of surface residues improves soil organic matter status, biological activity and diversity and contributes to overall improvement in soil quality. CA is a way to reverse the processes of degradation inherent in conventional agricultural practices involving intensive cultivation, burning and/or removal of crop residues, etc. CA leads to efficient use of water and nutrients by improving nutrient balance and availability, infiltration and retention by the soil, reducing water loss due to evaporation and improving the quality and availability of ground and surface water.

Conservation agriculture and resource conservation technologies (RCTs)

Conservation agriculture and RCTs are meaningly same with little difference. RCTs are those practices applied in agriculture which enhance resource or input-use efficiency. For example new varieties that use nitrogen more efficiently may be considered RCTs. Zero or reduced tillage practices that save fuel and improve plot-level water productivity may also be considered RCTs, as may land leveling practices that help save water. In contrast, conservation agriculture practices will only refer to the RCTs with the following characteristics:

- Soil cover, particularly through the retention of crop residues on the soil surface
- Sensible, profitable crop rotations
- A minimum level of soil disturbance

Obstacles to adoption of conservation agriculture by farming community

- SOC sequestration requires input of crop residues/biosolids and fertilizers/manures to enhance biomass production. However there is an alternate competing demand of these inputs

- Sometimes it becomes difficult to handle crop residues during sowing and other farm operations. The distinction is important because some RCTs, while attractive in the near-term, may be unsustainable in the longer-term. An example of this is the use of zero tillage without residue retention and without suitable rotations which, under some circumstances, can be more harmful to agro-ecosystem productivity and resource quality than a continuation of conventional practices (Sayre, 2000).

- Farmers may have to incur extra expenditure, at least at the initial stage, while adopting conservation agricultural practices
- There are challenges to manage weeds under conservation agricultural practices
- Increased cost for herbicides are involved to control weeds and there may involvement of additional expenditure
- There are challenges to update farm machinery to cater to the need of conservation agricultural practices

CONCLUSION

Conservation agriculture offers a new paradigm for agricultural research and development different from the earlier one, which mainly aimed at achieving specific food grains production targets. A shift in paradigm has become a necessity in view of widespread problems of resource degradation, which accompanied the past strategies to enhance production with little concern for resource integrity. Integrating concerns of productivity, resource conservation and quality and environment is now fundamental to sustained productivity growth. Developing and promoting CA systems will be highly demanding in terms of knowledge base. This will call for greatly enhanced capacity of scientists to address problems from a systems perspective; be able to work in close partnerships with farmers and other stakeholders and strengthened knowledge and information-sharing mechanisms. Conservation agriculture offers an opportunity for arresting and reversing the downward spiral of resource degradation, decreasing cultivation costs and making agriculture more resource – use-efficient, competitive and sustainable. 'Conserving resources – enhancing productivity' has to be the new mission.

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