



Popularizing resource conservation technologies for sustainable agriculture in Punjab

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Agriculture is the backbone of Indian economy, over two-third of the population is dependent upon agriculture in a direct or indirect way for its subsistence. As a result of hard work of the farmers and adoption of the recommended agricultural technologies, the production of food grains has improved. The increase in the production is due to the adoption of recommended agricultural practices and over exploitation of the natural resources without caring the law of nature. In the name of progress forests were fallen, lakes poisoned with hazardous chemicals and air polluted with obnoxious gases. The present cropping system is no more sustainable in Punjab. Sustainable agriculture aims at meeting the needs of present generation without hindering the natural resource base of future generation. To achieve sustainability, available inputs and natural resources must be used most efficiently with minimal damage to the environment. Efficient input use can be achieved by assessment of available inputs and conservation against possible losses, integrated use of inputs, maximizing input use efficiency by developing suitable site specific technologies (Abrol and Sangar, 2006). Further, constantly rising food demand and highly stressed production environment demand for infusion of technologies on a massive scale for resource conservation, improving input use efficiency diversification, post harvest processing, value addition and energy management to accelerate agricultural growth rate, enhance farmer's income and generate employment.

Continuously deteriorating resources, wide spread problem of soil and water contamination and eroding ecological foundation, sustainability of agriculture is becoming highly questionable. Enhancing

agricultural productivity while maintaining and improving the environment and living conditions of our villages is the key to sustainable development. The key question, therefore is how to reverse processes of resource degradation of resource base and unsustainability of production systems. Sustainable agriculture relies on practices that encourage natural regenerative processes (e.g. nutrient cycling, soil regeneration and protection of natural enemies of pests and diseases and maintain ecological equilibrium, preserve biodiversity and safeguard the environment. Issues of resource conservation have assumed greater importance in view of widespread resource degradation problems need to reduce production costs, increase profitability and make agriculture more competitive and sustainable.

Conservation technologies meet the increasing demand for food and fibre, promote sustainable utilization of natural resources, protect or restore the environment enhance, economic viability of farms and rural livelihoods lastly improve quality of life for farmers and society as a whole.

Different resource conservation technologies are as under :

Mulching:

Mulching is one of the simplest and most beneficial practices. Mulch is simply a protective layer of a material that is spread on top of the soil. Mulches can either be organic – such as grass clippings, straw, bark chips and plastic. Both organic and inorganic mulches have numerous benefits. It protects the soil from erosion, reduce compaction from the impact of heavy rains, conserves moisture,

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reducing the need for frequent watering, maintains a more even soil temperature, prevents weed growth, keeps fruits and vegetables clean, keeps feet clean, allowing access to garden even when damp and provides a “finished” look to the garden. Organic mulches also improve the condition of the soil. As these mulches slowly decompose, they provide organic matter which helps keep the soil loose. This improves root growth, increases the infiltration of water, and also improves the water-holding capacity of the soil. Organic matter is a source of plant nutrients and provides an ideal environment for earthworms and other beneficial soil organisms. While inorganic mulches have their place in certain landscapes, they lack the soil improving properties of organic mulches.

Green manuring:

Green manuring is the ploughing under or soil incorporation of any green manure crops while they are green or soon after they flower. Green manures are forage or leguminous crops that are grown for their leafy materials needed for soil conservation.

Green manuring improves the soil fertility, adds nutrients and organic matters, improves the soil structure, and soil aeration, helps to control insect/mite pests, nematodes and diseases, helps to control weeds, promotes habitat for natural enemies and increases soil's biodiversity by stimulating the growth of beneficial microbes and other soil organisms.

Recharging of ground water:

Ground water is a vital resource for agriculture, domestic water supply and industry. It is also single largest and most productive source of irrigation water and plays a critical role in maintaining agricultural production during droughts. Although ground water is a replenishable resource which gets replenished due to percolation of rain water and storage of water in ponds and lakes yet due to fast urbanization.

Zero tillage:

Reducing tillage is important for a number of reasons. The cover of crop residue helps prevent soil erosion by water and air, thus conserving valuable top soil. Soil structure improves because heavy machinery (which causes soil compaction) is not used and soil tilt is not tampered artificially.

Ridge/Bed planting:

– Ridge/Bed planting saves water about more than 30 per cent in wheat and rice crops.

- It helps in judicious use of fertilizers.
- More radiation interception.
- Better crop growth and development and higher yields.

Leaf colour chart:

Leaf colour chart (LCC) is an ideal tool to optimize N use irrespective of soil N supply and source of N applied. It will help farmers realize high yields and achieve high N-use efficiency in rice. Several field experiments have been conducted to evaluate need-based fertilizer N management in transplanted rice by using LCC in Punjab, during ‘*Kharif*’ season for three years (2000 to 2002).

Tensiometer-based irrigation:

Tensiometer is used to determine soil water status. A three colour strip displayed on the outer tube of the tensiometer indicates the water level in the inner tube. If the water level inside the inner tube remains within the green strip and there is no need to irrigate the rice field. The irrigation to rice field is recommended when the water level enters the yellow strip.

Laser leveller:

Use of laser leveler for precision leveling of fields before puddling saves water by cutting irrigation time by 25-30 per cent. This practice also helps in increasing crop yields by improving the efficiency of applied fertilizers and herbicides.

Although all these technologies were developed by PAU but still these are not being adopted by the farmers to the desired extent due to some reasons. It may be due to lack of awareness, socio-economic factors and factors related to technologies. Therefore, there is a need to popularize these technologies among the farmers of Punjab through different educational interventions. Field demonstrations can be organized at farmer's field jointly by the State Department of Agriculture and University Scientists. During the camps organized by Department of Agriculture at village level, Block level and District level, expert lectures should be organized to impart knowledge regarding different resource conservation technologies. Exhibitions in the villages can be organized on the theme of resource conservation technologies. In *Kisan Mela*, farmers may be made aware of these technologies through live demonstrations in the field. Awareness campaign may be organized during the *Kharif* and *Rabi* seasons. Through radio and T.V., talks of experts may be organized for the farmers. Efforts should be made to prepare literature in simple, easy understandable and

local language should be prepared and distributed among the farmers free of cost.

Conclusion:

To meet the demand of increasing population, there is need to produce more food grains but not at the cost of our future generations. For achieving the production targets without damaging the environment, focus should be on minimizing input cost and increasing input use efficiency. Emphasis should be given on using the natural resources judiciously. For this, the resource conservation technologies can be of great help. Since the adoption of resource conservation technologies is not up to the desired extent, therefore, there is need to popularize them through

different educational interventions among the farming community of the state.

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