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Crop Residue Management for Pollution Free Agriculture

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After harvesting various crops, the remaining stalks and the remaining straw, bhusa, stems and leaves lying on the ground, etc., are called crop residues. The use of machines in farming has increased for the last one decade. Also, it has become a necessity because of the shortage of farming labourers. The prevalence of combing harvesters for harvesting and depth has increased very fast, causing large quantities of crop residues to remain in the field which is a challenge of proper management. The farmers manage it by burning it for their convenience. The farmers have their own arguments behind pointed out that some crops like paddy and wheat are not decomposed in the soil quickly. At the same time, the workers ' feet are gathered on the edges of the field at the time of paddy plantation. Separate residue management requires money, labourers, time, etc., and they are also compelled to do so due to lack of proper time between the two crops. They also say that burning of crop residues clears the field. But, in this way, the farmers are not guessing how lethal it is for crop residue management, farm soil, environment and health of human beings and animals.

Annually, our country is producing about 630-635 MT of crop residue. Out of which, 58% is derived from cereal crops, 17% from sugarcane, 20% fibre crops and 5% from oilseeds crops. Most of the crop residue burning reports are from Punjab, Haryana and western Uttar Pradesh. The farmers remain ignorant even though they are not aware of the methods of crop residue management. Today, only 10 per cent of the farmers in the developed states of agriculture are able to manage the residue.

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Soil losses due to burning of crop residue

- The fertility of the land is a loss of 100%, 25% phosphorus, 20% potash and 60% sulphur from burning residues.
- Damage to the structure of land when nutrients are not transferred properly and excess water drainage is not achieved.
- Deterioration of organic matter of land.
- Soil is deprived of nutrients from crop residues.
- Allied insects and earthworms, etc., living on the upper surface of the ground, are also destroyed.

Side effects on human health

- Patients with respiratory ailments like asthma and asthma have to face a lot of trouble and the number of patients of these diseases is increasing rapidly.
- Irritation in the eyes due to sulphur dioxide and nitrogen oxide.
- The complaint of skin disease increases.
- In recent years, the number of cancer-like disease patients has increased due to burning of crop residues.

Environmental Effects

- It enhances global warming.
- There is a situation like smog which leads to accidents on the road.
- Along with crop residues, trees along the banks of the field are also damaged by fire.
- Depletion of ozone layer.
- Loss of emission of large quantities of CO_2.
- High emission of greenhouse gases promotes global warming.

Residue Management Options

Now, the rest is being burnt mainly after collecting some residue for cattle feed, causing loss of environment, human and animal health. Residue management options can be as follows:

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- To collect residues for cattle feed or industrial use.
- To mix residues into the soil.
- Lay on the surface of the land of the remains.

1. Collecting residues for cattle feed or industrial use

- Use of paddy straw as cattle feed (though it has a high amount of silica) is the use of paddy straw as animal feed by treatment of urea calcium hydroxide or by protein promotion.
- Use straw as fodder by improving quality by using brown white and soft rot fungi.
- Straw can be cut into small pieces and treated with vapour and used as forage.
- Use in fodder by creating a block of crop residue lying in the field by the straw baler and storing it in less space.
- To make a straw using reaper.
- Crop residues can be used meaningfully in mushroom cultivation.
- Production of energy by gasification of paddy residues: Many companies are generating electricity from paddy straw. It is an effective management of crop residue. It needs to be widely disseminated in the major rice producing States of the country.
- The need to explore new alternative uses such as effective use of crop residues such as cardboard making etc.

2. Blending residue into soil

- After harvesting, ploughing with rotavator and putting water in the soil, the crop residue is found in the soil and then the next crop can be easily sown or transplanted.
- It is possible to manage that paddy and wheat residue can be puddled and succumb to decompose quickly by applying 20-35 kg Urea. The process of decomposing residues becomes faster by Biochar, through carbonized paddy residues leads to increases the fertility of the soil as well as production efficiency.
- In the fields itself, the techniques for making compost by chemical methods should be developed and provided to the farmers.

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Benefits of crop residue management

- Crop residue management is possible by sowing a zero-tillage machine or a tub happy seeder with a moong or daincha in the standing crop after harvesting of wheat.
- After harvesting, crop residue can be effectively managed by sowing with zero tillage technique of wheat.
- After harvesting sugarcane, the rotary disc drill can be used to manage effective residues in the sugarcane crop by making wheat sowing.
- In the standing cotton crop, the crop residue can be effectively managed by the relay cropping of wheat and the relay of coral in the standing wheat crop. This method will help in preventing the practice of burning residues.
- The outbreak of weeds in various crops can also be reduced by using the residue in cultivation and improving the health of the soil.
- Placing crop residues on the surface requires less water.
- The ability of water to enter the soil improves.
- Reduction in erosion of soil.
- Optimize of temperature *i.e.* keeps the temperature low in summer and increases the temperature in winter.
- Keeps the canopy of the crop cool, which does not affect the temperature.
- Conservation is an essential requirement for agriculture to keep one-third of crop residue on the soil surface.