MARUMEGH

Kisaan E- Patrika

Available online at www.marumegh.com
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ISSN: 2456-2904

CROP RESIDUE BURNING: THE ALTERNATIVE SOLUTION

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Introduction

India achieved recordfoodgrain production 291.95 million tonnes in 2019-20 which is 2.3% higher than the production of foodgrain of 285.21 million tonnes achieved during last year. The major crops rice, wheat contributes higher grain yield and also produced higher crop residue. In India average crop residue generated 500 million tonnes per year. Annual crop residue surplus of India is 141 million tonnesapprox 70% crop residue burnt by the farmers. Rice-wheat dominant cropping system is in India that covered about 11 million hectares area and produced highest crop residue. In rice-wheat cropping system rice contributed 34% and wheat contribute 22% crop residue of total surplus and cereal crops (rice, wheat, maize and millets) contribute 70% crop residue. The burnt crop residue generate higher amount of gasses that cause environmental pollution and global warming. The one tonne of crop residue burning release 1515 kg Co_2, 92 kg CO, 0.4 kg SO_2 kg, 3.83 kg NOx, 2.78 kg CH_4 and 15.7 kg non-volatile compound (Andreae and Marlet., 2001). Burning of crop residue potentially has adverse effects on soil health including huge loss of nutrients (carbon, nitrogen, sulphuretc) and the destruction of beneficial soil microflora (Shan *et al*., 2008). Globally India contributes around 34% of the total crop residue burned. The major problem of crop residue burning is in Punjab, Haryana and western Uttar Pradesh because farmer's have low knowledge about losses and detrimental effect of crop residue burning.

Crop residue: source of plant nutrient

The crop residue is major source of plant nutrient and organic matter added in the soil and developed sustainable agricultural ecosystem. It is play important role in nutrient recycling, organic matter and maintain microbial activity in soil. Crop residue of cereals contains about30-40% nitrogen, 25-35% phosphorus, 70-80% potassium and 35-45% sulphur. One tones of rice straw contain about 5-8 kg nitrogen, 0.7-1.2 kg phosphorus, 15-25 kg potassiun, 0.5-1 kg sulphur, 3-4 kg calcium and rice and wheat also contains 9-11 kg sulphur, 100 g zinc, 777 g iron, 745 g manganese. The crops absorbed nutrients from the soil that contributes in formation of plant parts.

Problems of crop residue burning

- The negative impact of crop residue burning on environment like emission of green house gasses, increase particulate matter in air, global warming.
- The crop residue burning cause loss organic matter and plant nutrients (80% nitrogen and sulphur, 10-20% other plant nutrients).
- Increase the temperature of upper layer of soil (10-15 cm) that cause death of beneficial microbes and affect the nutrient recycling in soil.

Options of crop residue burning

The rice-wheat in north western India or many others regions harvested by combine harvester leaving crop residue in the field. Rice straw management is serious problem due to lack of proper technology for recycling and it affecting wheat sowing because little gap between rice harvesting and wheat sowing. Among management options available for crop residue-

Conservation agriculture (CA)

Conservation agriculture is recognized as **"agriculture of the future, the future of agriculture".** CA is based on optimizing yields and profits to achieve a balance of agricultural, economics, and environmental benefits for maximizing yields while exploiting the soil and agro-ecosystem resource. CA includes some concepts for crop residue management like zero tillage, minimum tillage and bed planting. Three implements (double disc furrow opener, turbo happy seeder and rotary powered disc drill) are available that are capable of seeding the seed when surface residue cover soil surface.

Turbo Happy Seeder

The Turbo Happy Seeder is a tractor-mounted machine that cuts and lifts rice straw, sows wheat seed in soil where field covered by mulch. The turbo happy seeder is developed for direct drilling of seeds in the presence of crop residues (up to 10 t/ha). The turbo happy seeder very useful managing crop residues for conserving moisture, nutrient, weed and moderating soil temperature. The farmers not need to burn the crop residues, sowing of next crop with the help of turbo happy seeder even with the heavy residue loads in high yielding crops harvested using combines. The turbo happy seeder direct drilling operations saved water, energy, reduce cost of production, labour, and facilitate timely sowing of crop which improves crop productivity and ultimately the soil heath.

Crop residue baling

Baling is the process in which reduce the volume of crop residue. The balers pick up straw from rice and wheat field densify into bales. The baling machine isdensifying the crop residue into round or square shape bales. The baling overcome the problems open field burning of crop residues and to meet the current demand of livestock feed, fuel and industrial uses. The bailing is viable options for straw management in combine harvested field of rice and wheat.

Composting- The process of decomposing organic waste is called composting and organic decomposed material is called compost. Composting is a microbial process of decomposition in which material used organic waste collected from rural and urban areas (straw, vegetables

waste, and agriculture based industry waste). The rural compost contains 1-2% nitrogen, 1% phosphorus and 1.5% potassiumalso rural compost contains0.4-0.8% nitrogen, 0.3-0.6% phosphorus and 0.7-1% potassium.

Pusa decomposer

The scientists of Indian Agricultural ResearchInstitute, New Delhi developed a 'decomposer capsules' and also called pusa decomposer. The pusa decomposer capsules is composition of eight microbes and it is reducing the time to decompose padd y straw, reduce burning which erodes the soil quality, this option also makes the land fertile. The Dr YV Singh, principal scientist, division of microbiology IARI New Delhi, recommended "The formulation prepared 25 litre with four capsules used on one hectare or 2.5 acres of field. This capsule will help in curbing the practice of crop burning." The formulation prepared by water, 150 gram, jaggery, gram flour, pusa decomposer capsule.

Preparation of pusa decomposer solution

Pusa decomposer is easily prepared at home and agriculture farm. First take 5 liter clean and fresh water in bucket or tub add 150 gram jaggery boil it. Remove all dirt and waste material from the solution that comes after boiling of jaggery with water. After cooling adds about 50gram flour mix it. Add pusa decomposer four capsules in the solution well mix it. The solution left for preparation covered with cloth and after 7-8 days a solid layer formed. The layer is mix in the solution and make 25 liter solution spray on one hectare land.After spray pusa decomposer solution on crop residue in the field it takes about 20 days to decompose crop residue.

Benefits

- The pusa decomposer is easilydecomposedthe crop residue in the field and reduce the burning crop residue.
- It is improving the fertility and productivity of the soil and crop residue works as manure and compost.
- It is an efficient and cost effective, cheaper, solution to stop stubble burning.
- It is an environmentaly safe technology used to reduce crop residue burning and reduce air pollution.

References

Kaur A. 2017. Crop Residue in Punjab Agriculture- Status and Constraints. *J. Krishi Vigyan*. **5**(2): 22-26. DOI:10.5958/2349-4433.2017.00005.8

Andreae M. O., and Merlet P. 2001. Emission of trace gases and aerosols from biomass burning. *Global biogeochemical cycles*, **15**(4), 955-966.0

Shan Y. H., Johnson-Beebout S. E., and Buresh R. J., 2008. Crop residue management for lowland rice-based cropping systems in Asia. *Advances in agronomy*, **98**, 117-199.