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Popular Article

## Ecological and environmental benefits of Dhaincha for sustainable Agriculture

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The dhaincha is a green manure crop; which improves soil productivity as well as supplies nutrients too for economic agricultural crops. This mainly includes legumes that can fix nitrogen by rhizobia. This is a major crop for green manuring in India.

### The role of Dhaincha during green manuring: -

- Dhaincha releases Carbonic acid release during the rotting; which decomposes the soil minerals and do available for plants.
- During the decomposition several organic acids formed; which enhance the availability of certain plant nutrients like phosphorus, calcium, potassium, magnesium and iron.
- It improves the soil structure, moisture holding capacity and infiltration of water, thus decreasing the runoff and erosion.
- Fix atmospheric nitrogen to the soil that becomes available to the succeeding crop.
- Dhaincha also improve soil permeability and soil pH of acidic soil after 4-5 season cultivation.
- Dhaincha fix Nitrogen @ 134 Kg/ha through their nodules in root. In this way soil fertility level increases without adding any chemical fertilizer which is a great role of dhaincha for environmental concern.

The increasing level of greenhouse gases in the atmosphere is the serious causes of global warming, among which the contribution rates of CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> to the greenhouse effect are 76.7%, 7.9%, and 14.3%, respectively. The Paddy soil is the main source of greenhouse gas emissions, accounting for approximately 10–12% of the total global



agricultural emissions sources. The dhaincha improves the soil carbon upto the content of 20-30 % of its total value.



The dhaincha planting has many advantages in rice tillage. Its planting as green manure in paddy fields can reduce soil erosion and improve soil properties, such as soil bulk density, water conductivity, soil porosity, water-holding capacity, enzyme activity, water-stable aggregates, and pH. Different fertilizer application methods and different tillage practices have different effects on soil nutrient availability and mixed fertilizer application methods and no-till rotations are more likely to improve agro-ecosystem. It also has a significant effect on the emissions of the three main greenhouse gases. The application of dhaincha in combination with fertilizer in the form of mulch to the field reduces CO<sub>2</sub> emissions, whereas the C/N ratio of green manure had a significant effect on CH<sub>4</sub> and N<sub>2</sub>O emissions, with a low C/N ratio reducing CH<sub>4</sub> emissions but increasing N<sub>2</sub>O emissions, and reducing N<sub>2</sub>O emissions from paddy fields during flooding. The planting of dhaincha reduces herbicide residues and suppresses weeds in paddy fields and enriches and transfers specific heavy metals, such as Cd, Pb, and Zn, thereby remediating the soil. During the growth of dhaincha crop, the improvement in soil properties and nutrient supply varies with the growth stage.



In reference to these findings, The Krishi Vigyan Kendra, Tirap conducted the Front-Line Demonstrations during 2016- 2022 at farmers field to popularize the Dhaincha cultivation and its benefits at farmers' field.

The Krishi Vigyan Kendra- Tirap demonstrated the technology of green manuring (Dhaincha) at farmer's field. The seeds of dhaincha @ 60 Kg/ha were free distributed among farmers and sown by them accordingly. The dhaincha crops were incorporated in field after 40 days. During first year (2016) total five demonstration were demonstrated at farmers field in an area of 1.40 ha. The increase in paddy was reported 30.76 %. Similarly, 26.67 %, 37.02 %, 28.06 %, 32.26 %, and 22.47 % respectively were reported from 2017 to 2022. The average impact of paddy yield through Dhaincha was 26.09 %; which is very impressive, eco-friendly and sustainable for future point of view.

**Table :1 Demonstration details**

S.N.	Year	Nos of demonstration of Dhaincha at farmers field	Area of Demonstrations (ha)	Average Paddy yield (Q/ha)		Increase in Paddy yield at farmers field (%)
				Without Dhaincha	With dhaincha	
1.	2016	05	01.40	18.56	24.27	30.76
2.	2017	08	02.60	19.90	25.21	26.67
3.	2018	14	05.80	18.37	25.86	37.02
4.	2019	19	08.50	20.45	26.19	28.06
5.	2020	27	12.40	21.99	28.34	28.77
6.	2021	32	16.80	17.60	24.62	32.26
7.	2022	38	19.44	23.54	28.83	22.47
			<b>66.94 ha</b>	<b>20.84 ha</b>	<b>26.19 ha</b>	<b>26.09 %</b>

