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## RENEABLE ENERGY FROM AGRICULTURAL COTTON WASTE AS A NUTRIENT TO PLANTS GROWTH

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**Abstract** — Agricultural is the major source of earnings of farmers in our country. The Indian economy wholly depends upon the agriculture. There are number crops be taken from farmers for cultivation in Motala area. In Motala area Cotton, Chilly, Soyabean, Jawar and Maize are the regular crops are taken by farmers. But Cotton is one of the most important cash crops of India and plays a leading role in the industrial and agricultural economy of the country. For all the crops farmers are used excess quantity of fertilizers are used. Day by day due to high use if nitrogenous fertilizers nitrate present in groundwater increases than the permissible limit. When farmers are used agricultural cotton waste as a nutrient to plants growth in place of nitrogenous fertilizers as a renewable energy. By composting farmers are used a very less quantity of nitrogenous fertilizers.

**Keywords:** Agricultural Cotton Residue, Composting, Soil applications, NPK Fertilizer, Renewable Energy etc.

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## INTRODUCTION

Renewable energy is one of the source of plants nutrients for the progress and prosperity of nations and societies. An availability and consumption level of energy is the finest indicator of economic and social development. In many developing countries energy from crop residues (CR) has been the most important source of energy, mostly in its traditional forms designed to get together the demands of domestic uses. In Vidharbha region also cotton crop residue is one of the most important renewable energy for crops. In industrialized countries, the use of cotton crop residues for energy production has been propagated as a substitute for fossil fuels. The limited availability of fossil fuels and the growing awareness of the detrimental environmental consequences resulting from greenhouse gas emissions have reinforced the importance of crop residues as a renewable energy resource in developing countries. In Vidharbha region farmers are used a very excess amount of nitrogenous fertilizers for their higher yield. In this research paper it is concluded that by composting the cotton residue we can minimize the excess nitrate from groundwater and soil also. This study alerts about the problem and necessitates to aware the farmer's disadvantages of excessive use of chemical fertilizers. Excessive use of chemical fertilizer than recommended optimum level not only reduce yield from crop but pollute environment and soil also. Excessive use of NPK fertilizer affects health also. This literature study had been the motivation to study option in place of NPK fertilizers of Motala region. Motala region in Buldhna District is located in the northern part of Maharashtra State. The study area is physio-graphically divided into plane area and Nalganga valley. The plane area is hard massive basaltic rocks and Nalganga valley is a rift valley having in situ salinity. Geographically Buldhana District lies between 19 51' North to 2 17' North latitude and 75 57' to 76 59' East longitude. Total geographical area of the district is 9661 sq. km.

## II. METHODOLOGY

For plants NPK are the main nutrients are necessary for their growth. From nitrogenous fertilizers farmers can maintain the NPK ratio in soil. But for higher yield farmers used about 2-3 times required NPK for plant growth recommended by Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Following table shows the quantity of NPK nutrients for different soils.

**Table-1 The nutrient uptake of cotton in different soil:**

Soil Type	N uptake (kg/ha)	P uptake (kg/ha)	K uptake (kg/ha)
Deep	55	20	57
Medium deep	44	13	43

Shallow	44	12	45
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It is therefore important to replenish the soil nutrients through balanced fertilization for long term sustainability. In order to enhance the nutrient use efficiency it is important that the nutrients are applied at the right times, in right quantities and using appropriate methods. For this research work we choose total fifteen survey numbers in Motala region. Also water sample of respective survey numbers are collected from well in Pre Monsoon and Post Monsoon seasons. From samples some parameters are analyzed. This collected samples are analyze Nitrite content also. Depth of Ground water table is also measured for Pre Monsoon and Post Monsoon season. Also collected the cotton residue in their crops and measure the collected average residue of cotton stalks. Compare the collected composted cotton stalks with NPK fertilizer. It is seen that composted fertilizer is most suitable in compared to NPK fertilizer. Following are the data collected from farmers.

Average Cotton Residue per Acre in Kg	Average Total Weight of Composting fertilizer in Kg	Maximum Use of NPK Fertilizer in Kg
1800	1200	112

**Table-2: Composting fertilizer from Cotton stalk**

**Table-3: Fertilizer data collected from farmers for cotton**

	Acres	Name of Fertilizer	Quantity in Kg	Fertilizer used in kg/acres
1	12	10:26:26 + Urea	3000+1200= 4200	350
2	3	20:20:0 + Urea	1000+300 =1300	433.33
3	3	20:20:00 + Urea	150+150 =300	100
4	7	20:20:00 + Urea	700+350=1050	150
5	7	10:26:26+ Urea	700+350 =1050	150
6	12	20:20:00 + Urea	1800+1000= 2800	233.33

7	6	20:20:00 + Urea	600+300 =900	150
9	2	20:20:00 + Urea	200+100 =300	150
10	3	20:20:0 + Urea	300+150 =450	150
11	6	20:20:00 + Urea	600+300 =900	150
12	6	20:20:00 + Urea	600+300 =900	150
13	5	12:32:16 + Urea (46:00:00)	500+500 =1000	200
14	5	15:15:15 + Urea	500+500 =1000	200
15	3	12:32:16 + Urea	300+300 =600	200

From above table it is concluded that all the farmers are used more fertilizers than the required NPK. Due to that high level of nitrate is occurred in groundwater and soil also. When farmers can use high quantity of fertilizer soil becomes hard. Due to hard strata of soil cultivation is becomes very difficult.

**Table-4: Comparison between actual fertilizers used with recommended ratio of nitrogenous fertilizers by PKV for cotton crops**

Survey No.	Ratio	Fertilizer ratio used by farmer in kg/acres	Total N/P/K Used	Recommended ratio by PKV in kg/acres
1	N	25+46=71	71	40
	P	65	65	20
	K	65	65	20
2	N	66+46=112	112	40
	P	66	66	20
	K	00	00	20
3	N	10+23=33	33	40
	P	10	10	20

	K	00	00	20
	N	20+23=43	43	40
<b>4</b>	P	20	20	20
	K	00	00	20
	N	10+23=33	33	40
<b>5</b>	P	26	26	20
	K	26	26	20
	N	30+38=68	68	40
<b>6</b>	P	30	30	20
	K	00	00	20
	N	10+23=33	33	40
<b>7</b>	P	10	10	20
	K	00	00	20
	N	20+23=43	43	40
<b>8</b>	P	20	20	20
	K	00	00	20
	N	20+23=43	43	40
<b>9</b>	P	20	20	20
	K	00	00	20
	N	20+23=43	43	40
<b>10</b>	P	20	20	20
	K	00	00	20
	N	20+23=43	43	40
<b>11</b>	P	20	20	20
	K	00	00	20
	N	20+23=43	43	40
<b>12</b>	P	20	20	20

	K	00	00	20
13	N	12+46=58	58	40
	P	32	32	20
	K	16	16	20
14	N	15+46=58	58	40
	P	15	15	20
	K	15	15	20
15	N	12+46=58	58	40
	P	32	32	20
	K	16	16	20

### 2.1 Cotton residue as renewable energy:

Cotton stubbles contain more than 1.11% of Nitrogen, 0.1% of Phosphorous, and 3.98% Potash. This means that the grown crop can supplement 1.5 tons of Carbon, 20-25 Kgs of Nitrogen, 72 Kgs of Potash from the cotton stubbles collected from one hectare of cotton cultivated area. The stubbles can be chopped through a chipper to chips or powder. The chips can be used as a feeding material for composting process, or in vermicompost preparation and other compost pits. Commercial microbial cultures can be used on the chips/ powder of stubbles to hasten the decomposition process. Otherwise, with the help of a rotavector, a tractor driven machine, the stubbles/stalk can be chopped in the field and residues can be incorporated into the soil, as it can till the soil up to 6 inches. This operation should be taken up well before the rainy season so as to permit faster decomposition of the chopped stubbles. This operation improves the soil porosity and productivity. It also helps in leveling of the soil, and retains the moisture. There is another way of utilizing the cotton stubbles by forming briquettes. Cotton stubbles inherently have substantial energy content. The energy content varies from 17 MJ/kg to 18 MJ/kg. The stubbles can be chopped and then processed mechanically in a briquette to form briquettes. These briquettes can be used as a renewable source of energy in substitution to fossil fuel.

### 2.2 Economics and Profitability:

It has been found that undertaking these Better Management Practices results in financial benefits for the farmers, in addition to maintaining soil sustainability. From analysis of yield it is

seen that by using compost farmers are get more yield and there is no effect on environment. Below table concludes that when farmers used compost fertilizer from cotton residue then they got higher yield. Also due to composting the soil gets improve their quality. That means soil gets more and more fertility to get yield.

**Table-6: Maximum yields from different crops:**

Crop Name	Yield from NPK Fertilizer Quintal/Acre	Yield from Composting Fertilizer Quintal/Acre
Cotton	8-10	13-20
Chilly	40-50	60-80
Soyabean	6-8	8-12
Maize	15-20	25-30
Jawar	10-15	15-20

### III. Results and Discussion

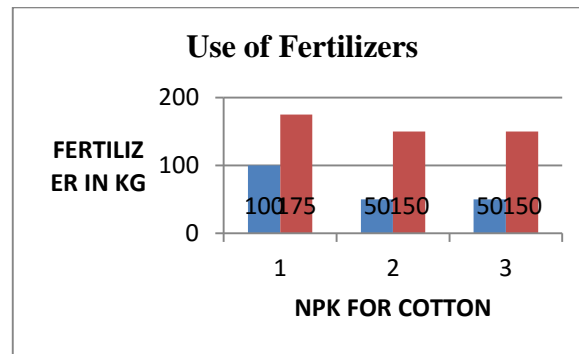
From Table-6 it is concluded that when farmers used composted fertilizer yield of each crop increases about 50-60%. So it is more effective than the NPK fertilizer.

**Table-5: Nitrate level in Post-Monsoon and Pre Monsoon period**

Sample No.	Nitrite (mg/L) Desirable Limit	Post-Monsoon	Pre-Monsoon
1	45	52.20	48.25
2		68.30	61.59
3		59.10	58.47
4		76.90	64.29
5		72.60	60.94
6		71.80	64.34
7		78.20	67.28
8		56.82	49.20
9		62.15	55.24
10		69.25	62.39
11		51.23	46.28

12	48.29	44.36
13	58.74	49.76
14	56.24	48.48
15	53.16	46.21

**NPK ratio for cotton crop for survey-1:**



**Graph-1: Nitrite Content in Well Water**

**CONCLUSIONS:**

It is observed that the nitrogen is used for cotton is 75% more than the required nitrogen recommended by Panjabrao Deshmukh Krishi Vidyapeeth, Akola. Also from Table-5 it is observed that nitrate content in groundwater is more than desirable limit 45mg/lit in pre monsoon. It is also concluded that all the farmers in India they must use compost material from cotton waste or agricultural residue. When farmers are used composed fertilizer they got about 50% extra yield from all different crops. From above study it is also concluded that in Motala region excessive use of chemical fertilise has increased nitrite level in ground water. For that government has give the awareness camps for the farmers to minimise the nitrogenous fertilizer. In place of NPK fertilizer farmers used composted fertilizer made by cotton residue or agricultural waste.

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