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EXCESS NITRATE IN GROUNDWATER MAINTAINS BY USING AGRICULTURE COTTON RESIDUE WASTE IN MOTALA AREA, BULDHANA, (MS), INDIA

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Abstract:

The Indian economy wholly depends upon the agriculture thus agricultural is the backbone of our country. In India particularly in Motala area there are number crops be taken from farmers for cultivation. Cotton is one of the most important cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. India has emerged as the second largest producer of cotton in the world and occupies the first position in terms of total area under crop production at over 9.44 million hectares. The production level is still below the world average. In addition to meeting the cotton consumption demands by domestic textile industry, India has surplus cotton available for exports. The productivity level of cotton in India varies from zone to zone. In India, there are nine major cotton growing states which fall under three zones viz. the North Zone (Punjab, Haryana and Rajasthan), the Central Zone (Maharashtra, Madhya Pradesh and Gujarat), and the Southern Zone (Andhra Pradesh, Karnataka and Tamil Nadu). Nearly 65 percent of the cotton crop is cultivated under rain fed conditions in the country. It is found that a cotton residue destroys by burning from farmers. So due to burning environments gets polluted and also there is loss of energy i.e. composting of cotton stalks in soil. From composting cotton plants get nutrients so composted fertilizer is very essential for plant life. By composting farmers are used a very less quantity of nitrogenous fertilizers.

Keywords:

Cotton Residue, Composting, Soil applications, Sustainability, NPK Fertilizer, Energy source etc.

I. INTRODUCTION

Energy is considered the basis for the progress and prosperity of nations and societies. An availability and consumption level of energy is the best indicator of economic and social development. In many developing countries energy from crop residues (CR) has been the main source of energy, mostly in its traditional forms designed to meet the demands of domestic uses. In Vidharbha region also cotton crop residue is one of the most important energy for crops. In industrialized countries, the use of 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 an energy resource in developed and developing countries.

There is large variability in crop residues generation and their uses in different regions of Motala region depending on the cropping intensity, productivity and crops grown. In this paper attempted to assess the quantity of recoverable biomass from cropland, grassland, forest, roadsides, and agro-forestry. They estimated total available crop residues in India as

523.4 Mt/year and surplus as 127.3 Mt/year. The annual surplus crop residues of cotton stalk, pigeon pea stalk, jute & mesta, groundnut shell, rapeseed & mustard, sunflower were 11.8, 9.0, 1.5, 5.0, 4.5, and 1.0 Mt/year, respectively.

In agriculture large quantities of chemical fertilizers, pesticides and insecticides have been used to enhance the yield from crop. In many areas, overuse of irrigation water and chemical fertilizers besides monoculture type of cropping pattern have started which depleting ground water and deteriorating its quality including soil. These factors in combination have lead to degradation of overall soil environment. 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. 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.

II. METHODOLOGY

Most of the cotton growing tracts in the country are characterized by low to medium levels of available Nitrogen (N) and Phosphorous (P) and medium to high levels of available Potassium (K). Organic matter content varies between 0.3 – 0.56%. Needless to say, the fertility index of cotton growing soils is not very encouraging. Furthermore, the extraction of nutrients is enormous as cotton is a deep rooted crop. Again the nutrient uptake varies with the soil type. Cotton is generally grown in vertisols of varying depth (shallow, medium deep and deep soil) in the rain fed regions of the central zone. More than 67% of the cotton growing areas fall under shallow and medium deep soil.

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

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.

Total fifteen survey numbers are selected in Motala region. Also Sample of water is collected from well these respective 15 survey numbers 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. This paper concludes that there is a alternative for NPK chemical fertilizer by agricultural cotton waste.

III. RESULTS AND DISCUSSION

In Motala region 15 survey numbers are selected. All these farmers take cotton crops on their fields in large

scale. Also collected the cotton residue in their crops and measure the collected average residue of cotton

Table–2: Composting fertilizer from Cotton stalk

Average Cotton Residue per Acre in Kg	Average Total Weight of Composting fertilizer in Kg	Maximum Use of NPK Fertilizer in Kg
2000	1000	112

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.

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 + U rea	700+350=1 050	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
8	7	20:20:00 + Urea	700+350 =1050	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

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
	N	10+23=3	33	40

3		3		
	P	10	10	20
	K	00	00	20
4	N	20+23=43	43	40
	P	20	20	20
	K	00	00	20
5	N	10+23=33	33	40
	P	26	26	20
	K	26	26	20
6	N	30+38=68	68	40
	P	30	30	20
	K	00	00	20
7	N	10+23=33	33	40
	P	10	10	20
	K	00	00	20
8	N	20+23=43	43	40
	P	20	20	20
	K	00	00	20
9	N	20+23=43	43	40
	P	20	20	20
	K	00	00	20
10	N	20+23=43	43	40
	P	20	20	20
	K	00	00	20
11	N	20+23=43	43	40
	P	20	20	20
	K	00	00	20
12	N	20+23=43	43	40
	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

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

3.1Crop residue management:

The cotton stalks after harvest are largely wasted (either burnt) or inefficiently used (as firewood). The stalk can either be used as briquette (densified and energized) or as organic manure after composting.

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.

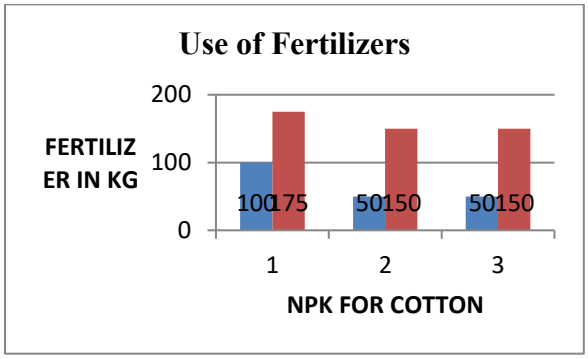
Otherwise, with the help of a rotavector, a tractor driven machine, the stubbles/stalk can be chopped in the field and residues can be incorporated into the soil, as it can till the soil up to 6 inches. This operation should be taken up well before the rainy season so as to permit faster decomposition 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 briquetter to form briquettes. These briquettes can be used as a renewable source of energy in substitution to fossil fuel.

3.2Economics 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.

NPK ratio for cotton crop for survey-1:



Graph-1: Nitrite Content in Well Water

IV. CONCLUSIONS:

Better Management Practices (BMPs) are agricultural practices which optimize the three pillars of sustainability: social responsibility, environmental integrity and economic viability by binding together, the financial requirements for agriculture, such as high yield with environmental and social concerns, such as water and pesticide use.

From above graph it is observed that the nitrogen is used for cotton is 75% more than the required nitrogen recommended by Dr. 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. In only one sample of well number-12 nitrite content is less than desirable limit by 1.42%. In other well samples it is more than 2.76% to 33.11% desirable limit. In post monsoon season it is observed that it increases by 1.07% to 16.40%.

Although chemical fertilizers are needed to increase food production, serious water pollution is occurring in countries with a high level of fertilizer use, as the result of excess applications of fertilizers. Farmers are generally afraid of a yield reduction if they apply less fertilizer. In practice, excessive fertilizer use tends to result in yield losses, rather than the maximum yield.

From above study it is also concluded that in Motala region excessive use of chemical fertilise has increased nitrite level in ground water. Excessive use of chemical fertiliser not only pollutes soil and ground water but also decreases yield from crop also. Excessive nitrate content in drinking water affects human health also. Awareness camp of farmers was arranged that how farmers can used composted fertilizer in place of use of excessive chemical fertiliser.

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