PRELIMINARY STUDIES ON EFFECT OF TEXTILE INDUSTRIAL EFFLUENT ON SEED GERMINATION OF PADDY (Oryza sativa L.)

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Abstract:

Industrialisation is believed to cause inevitable problems of pollution of soil, water and atmosphere based on the type of industry, nature of raw material, processes involved and types of equipment used. For the past two decades extensive research work has been done on various aspects of pollution like air, water, soil, biological assesment of pollution of industries and Industrial wastes on agricultural commodities.

Literature survey reveals that little attention has been paid towards biological assessment of pollution, especially agricultural commodities and textile waste water. Interview of this, an attempt has been made to investigate the effect of textile industrial effluent on seed germination of Paddy (Oryza sativa L.). It was observed that the textile waste water did not have any drastic inhibitory effect on the rate of seed germination of paddy but showed delayed germination, decrease in shoot and root lengths of raw and treated effluent over control.

INTRODUCTION

Industrialization is known to cause inevitable problems right from soil pollution to air then ultimately water pollution. For the past two decades extensive research work has been done on various aspects of pollution like air, water, soil, biological assessment of pollution of industries and industrial wastes on agricultural commodities. But, very little attention has been paid towards biological assessment of pollution especially agricultural commodities and textile effluent water.

In view of this , an attempt has been made to investigate the effect of textile industrial effluent on seed germination of paddy **(Oryza ativa.L.).** Textile mills are biggest consumers of water and consequently one of the largest industry carrying water pollution

Table -1

RAW COTTON	CONSERVATION TO CLOTH	DESIZING	SCOUR ING	BLEACH ING	MERCERI ZING	DYEING	PRINTI NG	FINISH
CHARC TERISTI CS OF WET WASTES	HIGH BOD NEUTRA LP[N] HIGH	HIGH BOD ALKALINIT Y TOTAL SOLIDS TOTAL SOLDS	HIGH BOD ALKALI NITY SOLIDS TEMPE RATURE	LOW BOD ALKALINI TYLOW SOLIDS				

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The following **table 2** shows the major process where in release of large amount of effluent.

Raw Cotton --> Conversion to cloth sizing -->---> Desizing

Carboxyl methyl cellulose Sizing gums, softeners, etc	Sizing ingredients deposited Can be removed by enzyme desizing methods
NO EFFLUENTS	1100-1150 m3/day

--> Bleaching **--> Mercerisation**

Application of oxidising chemicals like peroxides, hypochlorities. 220-250 m3/day.	Fabric is treated with strong-Caustic soda solution. Then it is Washed by a counter current system to recover the soda.

-->Dyeing ---> --> Printing

Vat dyes, napthol dyes, Sulphur dyes, etc, are used.400-420m3/day	Various colours are used f fixation of the print, then washed to remove unfixed dye 50-60 m3/day

MATERIALS AND METHODS

For the present study different paddy cultivars namely Jaya, Mandya Vijaya, IR-20, IR-30864, Prakash and IET-8116 samples were obtained from VC Farm, Research Station at Mandya

The effluent of both treated as well as raw effluent water was collected from Textile mill.

The effluents were analyzed for various physico-chemical characteristics in the laboratory by using standard methods (APHA, 1976).

To study the effect of textile milll wate water that is effluent on seed germination experiments were carried out according to ISTA (1976)

OBSERVATIONS AND DISCUSSION

The physico - chemical characteristics analyzed for both raw and treated effluents were represented in the table 3. In comparison almost all the characters have higher concentration in raw effluent than the treated effluent.

The second main objective of the present investigation is to observe the impact of textile industrial effluent on seed germination. The observation clearly indicates

that percentage of germination of paddy treated with different dilutes of both raw and treated effluents (25%, 50%, 75% and 100%) on different cultivators (Jaya, Mandya Vijaya, Prakash IR-20, IET-8116 and IR-30846) following different laboratory methods (Between Paper (BP), Top of Paper (TP) and Soil (S) method) did not show considerable variations. The recorded readings have been presented in table 4,5 and 6.

It has been observed that no such drastic effect of effluent on seed germination however, There is a critical difference in growth between treated and control and there is a overall decrease in shootlength and root length in some cultivars.

CONCLUSION

Somashekar et. al, 1984 in their study on the effect of various industrial effluents observed that paper mill waste water has inhibiting effect in the germination of crop. but, Sahai et. al., 1983 reported that germination percentage of rice seeds decreased with increase in the distillery effluent concentration. Thabaraj et al., 1964 reported that, biologically treated effluent improved germination percentage of tomato seed.

Thus, the present investigation is an attempt to know effect of textile industrial effluent on seed germination of paddy. It was observed that, textile waste water did not have any drastic inhibitory effect on the rate of germination of paddy although there was little delayed germination and decrease in shoot length and root length of raw and treated effluent over control.

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TABLE - 3

Physico-chemical characteristics of Raw/Treated effluent

Parameters	RAW	TREATED
Total Hardness	28	15
Calcium	8.5	6.5
Magnesium	6.5	2.5
Chloride	460	340
Sulphate	6250	1535
Free Carbondioxide	-	-
Bicarbonate	10	5
Dissolved Solids	5070	2475
Suspended Solids	140	70
Biological Oxygen Demand	540	290
Chemical Oxygen Demand	220	212
Ammonical Nitrogen	76	59
PH	8.6	7.9
Temperature	30 C	27 C

TABLE - 4

TP readings of germination and vigour index (Raw effluent)

SAMPLES	MSL	MRL	% GERMINATION	MSL	MRL	VIGOUR INDEX
Jaya	3.4	5.5	100	5.1	7	705.1
Control	4	8	100	7	9.8	987
Mandya Vijaya	1.3	2.9	92	4.3	8.2	758.7
Control	3	4.5	99	7	7.5	749.5
Prakash	2.5	4	80	5.2	7.4	597.2
Control	3.3	5.5	98	12.5	8.5	845.5
IR-20	2.5	4	90	4	6.2	562
Control	3	4.5	100	5.8	6.5	655.8
IET-8116	1.2	2.8	98	6.2	9.5	937.2
Control	3.2	5	100	10	13	1310
IR-30864	1.3	3.5	90	4.5	7.5	679.5
Control	3.5	4.5	100	7.5	8	807.5

TP readings of germination and vigour index (Treated effluent)

SAMPLES	MSL	MRL	% GERMINATION	MSL	MRL	VIGOUR INDEX
Jaya	3	4.5	100	5.1	7	705.10
Control	4	8	100	7	9.8	987.00
Mandya Vijaya	1.5	4.3	98	4.3	8.2	807.90
Control	3	4.5	99	7	7.5	749.50
Prakash	3	5	92	5.2	7.4	686.00
Control	3.3	5.5	98	12.5	8.5	845.50
IR-20	2.5	2.5	98	4	6.2	611.60
Control	3	4.5	100	5.8	6.5	655.80
IET-8116	3.5	6	98	6.2	9.5	937.20
Control	3.8	8	100	10	13	1310.00
IR-30864	2	4	98	4.5	7.5	739.50
Control	3.5	4.5	100	7.5	8	807.50

TABLE - 5

BP reading of germination and vigour index (Raw effluent)

	First count			Second Count		
SAMPLES	MSL	MRL	% GERMINATION	MSL	MRL	VIGOUR INDEX
Jaya	4.5	3	100	7	5.1	517.00
Control	8	6	100	10	12	1210.00
Mandya Vijaya	4.3	1.5	92	8.2	4.3	403,80
Control	6	6.5	99	9.5	11.2	1118.30
Prakash	5	3	80	7.4	5.2	423.40
Control	9	6	98	12.5	14.2	1404.10
IR-20	2.5	2.5	90	6.2	4	366.20
Control	5.8	6	100	7.8	9.2	927.80
IET-8116	6	3.5	98	9.5	6.2	617.10
Control	9.5	5.9	100	12.2	9.9	1002.20
IR-30864	4	2	90	7.5	4.5	412.50
Control	7	6.2	100	10.5	12	1210.50

BP readings of germination and vigour index (Treated effluent)

	First Count			Second Count		
SAMPLES	MSL	MRL	% GERMINATION	MSL	MRL	VIGOUR INDEX
Jaya	6	4	100	8	5.5	558.00
Control	8	6	100	10	12	1210.00
Mandya Vijaya	3.5	4.8	98	6	7.2	711.60
Control	6	6.5	99	9.5	11.2	1118.30
Prakash	8.2	4.2	92	11	8.2	715.40
Control	9	6	98	12.5	14.2	1404.10
IR-20	4.5	3	98	7.5	5.2	5171.10
Control	5.8	6	100	7.8	9.2	927.80
IET-8116	7.5	4.3	98	10.2	7.4	735.40
Control	9.5	6.9	100	12.2	9.9	1002.20
IR-30864	6.5	5.5	98	9.2	7.1	705.00
Control	7	6.2	100	10.5	12	1210.50

TABLE - 6

S readings of germination and vigour index (Raw effluent)

SAMPLES	MSL	MRL	% GERMINATION	MSL	MRL	VIGOUR INDEX
Jaya	3.90	5.40	100	5.60	7.50	755.60
Control	5.50	7.00	100	8.50	11.30	1138.50
Mandya Vijaya	1.80	3.30	92	4.50	8.70	804.90
Control	4.50	6.00	99	8.50	9.00	899.50
Prakash	3.00	4.50	80	5.70	7.90	637.70
Control	4.80	6.30	98	14.00	10.00	994.00
IR-20	3.00	4.50	90	4.50	6.70	607.50
Control	4.50	6.00	100	7.30	8.00	807.30
IET-8116	1.70	3.20	98	6.70	10.00	986.70
Control	4.70	6.20	100	11.50	14.50	1461.50
IR-30864	1.80	3.30	90	5.00	8.00	725.00
Control	5.00	6.50	100	9.00	9.50	959.00

S readings of germination and vigour index (Treated effluent)

	First Count			Second Count		
SAMPLES	MSL	MRL	% GERMINATION	MSL	MRL	VIGOUR INDEX
Jaya	4.90	6.40	100	6.60	8.50	856.60
Control	5.50	7.00	100	8.50	11.30	1138.50
Mandya Vijaya	2.80	4.30	92	5.80	9.70	898.20
Control	4.50	6.00	99	8.50	9.00	899.50
Prakash	4.00	5.50	80	6.70	8.90	718.70
Control	4.80	6.30	98	14.00	10.00	994.00
IR-20	4.00	5.50	90	5.50	7.70	698.50
Control	4.50	6.60	100	7.30	8.00	807.30
IET-8116	2.70	4.20	98	7.70	11.00	1085.70
Control	4.70	6.20	100	11.50	14.50	1461.50
IR-30864	2.80	4.30	90	6.00	9.00	816.00
Control	5.00	6.50	100	9.00	9.50	959.00