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Research Article

DISTILLERY WASTAGE SPENT WASH USED FOR MODERN AGRICULTURE

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ABSTRACT

Extensive use of chemical fertilizers contributes largely to soil degradation and adversely impacted agricultural productivity deteriorating the environment. The lack of sustainability in production in recent years is becoming a major concern. The chemical which are not only soil degradation an also it will be created the loss of nutrients from the soil. Proper management of waste can produce good quality organic manure which can act as soil conditioners. Spent wash produced from distillery industries is rich in organic material and characteristically less toxic and easily amenable for microorganisms. An attempt is made to use the spent wash as an ameliorant to enhance the organic manure form composting and also the direct apply of the cultivating field. Bioassay study results of many plant has proved the productive character of distillery spent wash as an ameliorant for composting and using. The present result also advocates a new eco-friendly, economical and environmentally safe strategy to utilize the distillery effluent for producing valuable organic fertilizer that reduces environmental hazards to meet the needs of the agriculturalists and the industrialists. This is also rich viable and healthy bio fertilizer.

Keywords: Fertilizers, Distillery Wastage, Modern Agriculture, Environment, Maize.

INTRODUCTION

One of the most conspicuous features of the modern consumerist's society is the generation of massive quantities of waste. This is both costly and difficult to dispose off through conventional methods. Environmental degradation due to the indiscriminate use of modern agricultural techniques such as the use of synthetic fertilizers is a major threat confronting the world. It leads to loss of soil fertility due to imbalanced use of fertilizers that has adversely impacted agricultural productivity and causes soil degradation. Now there is a growing realization that the adoption of ecological and sustainable farming practices can only reverse the declining trend in the global productivity and environment protection (Wani and Lee, 1992; Wani *et al.,* 1995). India is a major producer of sugar in the world and sugar industry offers employment potential and contributes substantially to economic development. There are about 579 sugar mills and 285 distilleries in India. The alcohol industry produces a huge amount of wastes every day, which is rich in organic material and characteristically less toxic and easily amenable for microorganisms. Alcohol is produced in India by the fermentation of molasses. The mother liquor left after the sugar production is spent wash. It is dark brown in colour, with high temperature, low pH and high ash content (Chauhan and Dikshit, 2006). The distillery spent wash do not contain any toxic compound, but rich in plant nutrients, organic carbon and proteinaceous substances There is an increasing interest in the agricultural use of industrial wastes because of the possibility of recycling valuable components such as organic matter, nitrogen (N), phosphors (P), potassium (K) and other nutrients and their suitability for land application (Ramasamy *et al*., 2007). India being agriculture based country; it could easily produce millions of liters of spent wash and considerably reduce the use of chemical fertilizers. (Rajendran *et al.,*2008). The current paper reveals the advantages of utilizing distillery industrial wastes. Attempt is made to use distillery spent wash as an ameliorant for conventional composting processes. The macro and

micronutrient content of compost is analyzed and the results are discussed.

MATERIALS AND METHODS

Distilleries spent wash for the study was collected from Trichy Distillers & Chemicals Pvt. Ltd., situated at Tiruchirapalli District, Tamilnadu, India. The physico-chemical characters were analyzed in factory lab. The macro (Nitrogen, Phosphorous and Potassium) and micronutrient (Iron, Manganese, Zinc and Copper) contents of pre-digested compost and were analyzed at soil testing centre, Trichy. Phosphate in soil is determined by Olsen's method (Olsen *et al*., 1954) for neutral-alkaline soils and Bray and Kurtz P1 method (Bray and Kurtz, 1945) for acid soils. Raw effluents were freshly diluted viz. 25, 50, 75, 100% v/v with water for experimental studies. The soil samples from the experimental site were collected at 25cm depth, air dried, powdered and analyzed for physicochemical properties.

Table-1: Chemical Composition of Distillery Spent Wash -1

Chemical Parameters	**Mgl-1**
pH	7.23
Electrical Conductivity(µs)	28700
Total Solids	35340
Total Dissolved Solids	27240
Total Suspended Solids	9980
Settleable Solids	9860
COD	30520
BOD	15300
Carbonate	Negligible
Bicarbonate	12200
Total Phosphorus	28.36
Total Potassium	6500
Calcium	920
Magnesium	753.25
Sulphate	5100
Sodium	420
Chlorides	5626
Iron	6.3
Manganese	1429
Zinc	1.09
Copper	0.265
Cadmium	0.036
Lead	0.19
Chromium	0.067
Nickel	0.145
Ammonical	636.25
Nitrogen	
Total Phosphorus	29.28
Total Potassium	7300
Sulphur	75.6

That Distillery spent wash was spread the soil in the two methods. 1) The liquid form 2) Dried form. Both are in the same amount of nutrient and viability. The liquid form of bio fertilizer was used in the field before cultivation. In the form of dried was used in the field after the cultivation.

RESULTS

To the practice of distillery spent wash in the taming filled the crops, plants and the seedlings are on the rise as much as fast in nature. Which are used for the Bio fertilizer, can help to the particular crops. The distillery spent wash are the natural by products so that are not destroyed the environments as well as the soil. To this scenario the plants or the crops are utilized the distillery spent wash to increase the height, leaf length, stem girth of the plants. We have to use the experimental study in the Maize (*Zea mays*).

Table-2: Effect of distillery spent wash on the height of the plant (cm)

Days	Percentage to treat the crops					Average of Height Increase **(cm)**
	Con-trol	25 %	50 %	75 %	100%	
30	25	30	35	35	25	31.25
60	60	60	70	70	50	62.5
90	80	90	105	90	75	90
120	90	120	140	120	100	120

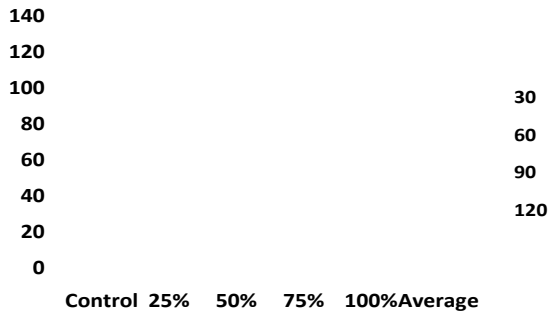

Fig. 1 Effect of distillery spent wash on the height of the plant (Cm)

Table-3: Effect of distillery spent wash on the leaf formation of the plant (No)

Days	Percentage to treat the crops					Average of leaf formation **(No)**
	Cont-rol	25 %	50%	75 %	100 %	
30	5	7	9	7	6	7
60	12	14	15	12	10	13
90	15	20	22	19	14	19
120	19	25	27	23	19	23

Table-4: Effect of distillery spent wash on the formation of Young cobs of the plant (No)

Days	Percentage to treat the crops					Average of Height Increase **(No)**
	Cont-rol	25 %	50 %	75 %	100%	
30	0	0	0	0	0	0
60	0	0	3	2	1	2
90	3	5	7	6	5	6
120	4	6	8	7	6	7

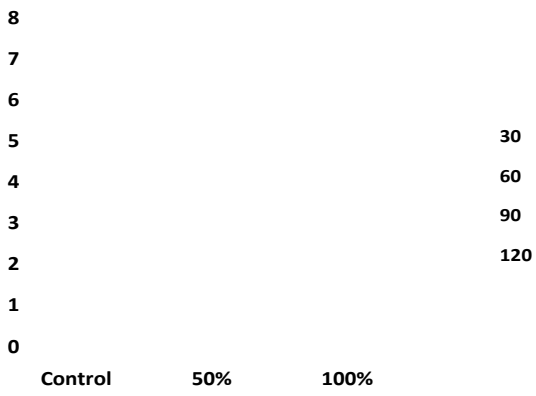

Fig.2 Effect of distillery spent wash on the formation of Young cobs of the plant (No)

Table-5: Effect of distillery spent wash on the yield of the plant (gm)

Days	Percentage to treat the crops					Take the cobs in randomly 5 Nos in various plants. Yield**(g)**
	Con -trol	25 %	50 %	75 %	100%	
120	500	625	750	675	625	669

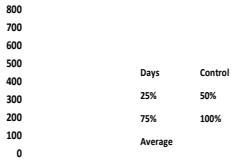

Fig.3 Effect of distillery spent wash on the yield of the plant (gm)

DISCUSSION

We are using the example plant for maize. To the experimental study the concentration of 50% which are good result. That highly expressing the height of the plant and length of the leaves so that we propose the concentration of both 50% is good in modern agriculture method.

The fertility status of the soil reveals low available nitrogen, medium phosphorous and potassium content. The characteristic of distillery spent wash is presented in Table 1. It is dark brown in color with unpleasant odour of burnt sugar. The brown colour could be ascribed to the presence of melanoidin, the reaction products of sugar amine condensation [2]. The unpleasant odour is due the presence of skatole, indole and other sulphur compounds which are not effectively decomposed by yeast or methane bacteria [3]. Among the nutrients, potassium was present in larger amount than nitrogen and phosphorous in general. Distillery spent was contained large amount of potassium and sulphate, followed by nitrogen and phosphorous [4].The calcium content was higher than magnesium content.

The presence of calcium in considerable amounts makes the spent wash a potential amendment in reclaiming the sodic soils [5]. The BOD and COD content is very high. This may be due to the soluble form of organic matter present in it. Very high concentration of chlorine, bicarbonate and sulphate were observed.

Different concentration distillery spent wash application caused a significant increase in average height of the plants, length of leaves, breadth of leaves, leaf area index, girth of stem and the parameters like number of leaves/plant, number of tillers/plant, the increase is non significant. This scenario has saved such beneficial warms and insects for the germination and nutrients. The large amount of nitrogen and other minerals are fixed in the soil.

The physico-chemical character of the spent wash sample collected from the distillery industry is loaded with high carbon content since it is plant origin. The distillery of effluent contains fairly high amounts of plant nutrients viz., N, P, K, Ca, Mg, S and appreciable amounts of micronutrients, which the sugarcane crop has absorbed from the soil as well as organic matters (absorbed from atmosphere). The available K status of the soil increased to the tune of two to three times from the initial soil test value in spite of the crop removal, which might be due to the higher K contents of the effluent (Soundarrajan *et al.*, 2007).

CONCLUSION

We are using the example plant for maize. To the experimental study the concentration of 50% which are good result. That highly expressing the height of the plant and length of the leaves so that we propose the concentration of both 50% and 75% is good in modern agriculture method.

Earthworms are the natural fertilizer factories which serve as bio-catalytic agents to enhance the soil fertility through physical chemical and biological processes. Earthworms can be called as biological indicators of soil fertility because soil with earthworms supports the healthy population of a variety of organization essential for maintaining a healthy soil. (Khan, 2008). Recycling of agro-industrial wastes using earthworms has become an important component of sustainable agriculture which has a multidirectional impact in terms of safe disposal of wastes, preventing environmental pollution besides providing nutrient rich materials. The produced form the above procedure can replace the chemical fertilizer and pave the way for the utilization of large quantities of distillery spent wash and domestic wastes.

The distillery spent wash was only the plant and water containing explanation. So those are not harmful to the plant growth and the cultivation. That was containing lot of beneficial and harmful nutrients which are present in the distillery. To this distilleries can increase the amount of the minerals, ions and vitamins. That was not depending up on the season. Applicable for all kinds of the plant varieties. No need for the glasshouse for culturing. Soil viable more than years of 5-6. So for this distillery spent wash method was good modern agriculture practices method for the world.

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