

## UTILIZATION OF DILUTED DISTILLERY SPENTWASH AS LIQUID FERTILIZER FOR ENHANCING SOIL FERTILITY

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**ABSTRACT:** India is a major producer and consumer of sugar in the world. Effluent originating from distilleries known as spentwash. The aqueous distillery effluent, spentwash is a dark brown highly organic effluent. It is one of the most complex, troublesome and strongest organic effluent. A huge amount of spent wash has been produced by the distilleries in India whose disposal into water bodies or land causes a number of environmental problems. Now-a-days emphasis is laid on waste minimization and revenue generation through byproduct recovery. The distillery spentwash can be utilized in agriculture for irrigation purposes, as fertilizer, a source of renewable energy and as manure. Hence a laboratory study was conducted at Department of Agronomy, Annamalai University to know the quality (pH and EC) of effluents for the purpose of proper treatment and dilution of effluent before discharge into water or field. The various dilutions of spentwash and water was taken in a ratio of 1:0, 1:10, 1:20, 1:30, 1:40, 1:50. The pH and EC were analyzed using pH meter and electrical conductivity meter. The dilution of spentwash and water at a ratio of 1:0 (untreated) showed a pH of 4.2 and EC of 38 dS m<sup>-1</sup> which indicated as acidic in nature. A ratio of 1:50 showed pH of 7.57 and EC of 33.45 dS m<sup>-1</sup> which is neutral and it is used in agriculture as fertigation and also served as fertilizers without any adverse effects.

**KEYWORDS:** Distillery Spentwash, Water Dilution, pH, Electrical Conductivity (EC), Fertigation and Eco-Friendly.

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### INTRODUCTION

Today, it is necessary to emphasize that the **wastes are resources** and therefore their management and utilization is must in an eco-friendly approach. Waste products are originated from industries, Agriculture and urban localities. The industrial by-products which are otherwise known as wastes contain an array of plant nutrients and these nutrients are dumped un-utilized. Now, large scale efforts are directed towards agro based industrialization to utilize the agro wastes. Sugar industries are the most important agro based industries in India. There are 579 sugar industries in the country produce 19.0 million tonnes of white sugar with daily cane crushing capacities varying from 800-10,000 tonnes per day. Apart from the sugar, these sugar industries discharge a large amount of by- products and waste materials with tremendous pollution load.

Effluent originating from distilleries known as **spentwash**. The aqueous distillery effluent, spentwash is a dark brown highly organic effluent. It is one of the most complex, troublesome and strongest organic effluent. It contains large amount of organic carbon, k, Ca, Mg, Cl, So<sub>4</sub> and moderate amount of N and P and traces of Zn, Cu, Fe and Mn. Its application to soil through fertigation and as manures has been reported to be beneficial to increase the quality

of the produce without adversely affecting soil fertility, seed germination and crop productivity. Thus saving the irrigation water and solve the problem of waste disposal as well as source of nutrients for crop production and finally saving the chemical fertilizer required for crops. Diluted spent wash increases the growth of shoot length, leaf number per plant, leaf area and chlorophyll content of crops. Increased concentration of spentwash causes decreased seed germination, seedling growth and chlorophyll content of crops. Harnessing the nutrients from biological and industrial wastes is of prime importance for maximizing production. They are valuable source of plant nutrients. Hence it reduces environmental (air, water and soil) pollution from both effluent and chemical fertilizers.

Therefore, the main objective of the present study is to evaluate the dilution effect of distillery spentwash.

## MATERIALS AND METHODS

The laboratory study was conducted in Department of Agronomy, Annamalai University, during 2017. The effluent samples were collected from EID Parry (I), Pvt, Ltd., Nellikuppam, Tamilnadu. The samples were stored in dark place and the pH and EC were analyzed.

Treatment (dilution)

|                |   |                               |  |
|----------------|---|-------------------------------|--|
| S <sub>1</sub> | - | 1:0 ratio (No water)          | Different proportions of spentwash and water diluted samples are |
| S <sub>2</sub> | - | 1:10 ratio (Spentwash: water) |  |
| S <sub>3</sub> | - | 1:20 ratio (Spentwash: water) |  |
| S <sub>4</sub> | - | 1:30 ratio (Spentwash: water) |  |
| S <sub>5</sub> | - | 1:40 ratio (Spentwash: water) |  |
| S <sub>6</sub> | - | 1:50 ratio (Spentwash: water) |  |

The pH and EC of these samples were analyzed using pH meter and Electrical Conductivity meter according to internationally accepted procedures and standard methods.

## RESULTS AND DISCUSSION

The data revealed the great variation at different dilution levels of spentwash.

### pH

The results of the study revealed that the 1:50 ratio sample showed the neutral pH of 7.57 and at control (1:0 ratio), the pH was acidic (4.2) and its disposal is harmful for both land and water bodies. The pH of the spentwash was acidic in nature i.e., 4.2 (the raw spentwash is acidic in nature and the pH values of distillery waste water ranges from 3.5 to 5). When it was diluted with different dilutions, it changed into neutral. It showed that the pH increased / changed with dilution.

**EC**

The results of the study revealed that the 1:50 ratio sample showed an EC value of 33.45 dS m<sup>-1</sup> (neutral value) and at control the EC was 38 dS m<sup>-1</sup> which showed acidic in nature as similar to that of pH. The EC of the distillery spentwash was high but when it was diluted, value decreased with increased dilution.

| Parametes                     | Values of different samples |              |              |              |              |              |
|-------------------------------|-----------------------------|--------------|--------------|--------------|--------------|--------------|
|                               | 1 : 0 ratio                 | 1 : 10 Ratio | 1 : 20 Ratio | 1 : 30 ratio | 1 : 40 ratio | 1 : 50 ratio |
| <b>pH</b>                     | <b>4.2</b>                  | 5.13         | 5.86         | 6.35         | 6.98         | <b>7.57</b>  |
| <b>EC (dS m<sup>-1</sup>)</b> | <b>38</b>                   | 37.18        | 36.54        | 35.72        | 34.20        | <b>33.45</b> |

**CONCLUSION**

One of the most important environmental problems faced by the world is management of wastes.

The laboratory study revealed that the pH and EC of 1:50 ratio sample showed a neutral value of 7.57 and 33.45 dS m<sup>-1</sup>. It was proven that the raw spentwash turned to neutral from acidic when it was diluted with water. Hence it is recommended for sustainable agriculture as a cheap source of nutrients to crop plants by means of fertigation in order to increase the soil fertility, to get a better quality produce and also to get higher productivity of crops. Therefore, this is an easy way of disposal of the distillery spentwash without polluting the environment in a better way by diluting with water.

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