



IMPACT OF POSTMETHANATED DISTILLERY SPENT WASH ON THE GROWTH, YIELD AND QUALITY OF BHINDI CROP (*ABELMOSCHUS ESCULENTUS*)

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ABSTRACT

Eco-friendly utilization of distillery effluent in agriculture may serve as one of the nutrient management practices for enhancing crop yields besides reducing fertilizer cost. However, it has to be used judiciously and cautiously on a limited scale because of very high organic and chemical loads. A field experiment was conducted at Amaravathy sugars, Udumelpet to study the effect of spent wash on Bhindi crop. Results revealed that one time application of 100% spent wash in the field increased yield of Bhindi. The highest fruit yield of 9,884.00 kg ha⁻¹ and dry matter production of 2,341.00 kg ha⁻¹ were recorded in one time application. The per cent increase over the control was 15 and 28 per cent, respectively. The enormous quantities of plant nutrients present in spent wash offers an excellent opportunity to use it as a liquid fertilizer along with irrigation water, thus enabling the farmers to save cost incurred on fertilizers and at the same time achieve higher yields of crops.

Key words: Distillery effluent, Spent wash, Bhindi, Fertilizers

INTRODUCTION

Spent wash is an agro-industrial waste generated during alcohol production in distilleries. At present in India, there are 319 distilleries with the capacity of producing 3.29 billion litres of alcohol which in turn generates 49.35 billion litres of wastewater (Kumar and Chopra 2013). Utilization of industrial effluent in agriculture either for irrigation or cultivation of the crop with the nutrients in spent wash has been increased in recent times (Tharakeshwari and Jagannath 2011). Most of the crops showed higher yield with respect to different concentration of effluent application. Since spent wash contains organic and inorganic nutrients exceeding the normal level; proper treatment of the wastes is emphasized before using it for either irrigation or composting. Hence spent wash undergoes biomethanation process to reduce the high bio-chemical oxygen demand and chemical oxygen demand and the resulting product is called as post-methanated distillery effluent which can be utilized in agriculture. When the applications are repeated in the small area, it leads to salinization of land and even lead to surface and groundwater contamination. The application of diluted spent wash to soil

was reported beneficial and increased sugarcane growth attributing parameters (Haroon and Bose 2004). Recent research results suggested that one time application of spent wash is safe and eco-friendly (Selvakumar 2006). On the other hand, extensive use of inorganic fertilizer not only degrades the soil quality but also affects the productivity of the crop. The application of post-methanated spent wash (PMDSW) for crop production reduces the environmental impact of inorganic fertilizer on soil properties which in turn reduces the need of inorganic fertilizer. This research was carried out to study the effect of post-methanated effluent application on crop growth, yield and quality.

MATERIALS & METHODS

Field experiment was conducted using Bhindi var. CoBhH1 as a test crop at Research and Development Farm, M/s Amaravathi Co-operative Sugar Mills Ltd., Krishnapuram, Udumalpet, Tirupur District, Tamil Nadu to assess the effect of different doses of PMDSW on the physico-chemical properties and microbial properties of soil, growth, yield and quality of Bhindi. Calculated quantity of PMDSW was uniformly applied in each plot. It was mixed with soil by

thorough ploughing in order to provide better soil aeration and consequent reduction of BOD level in the soil system. On 25th day of PMDSW application, the plots were ploughed. Subsequently ridges and furrows were formed by adopting a spacing of 45 cm between the two ridges. Bhindi seeds were sown by adopting a spacing of 45 cm between the two ridges and 30 cm apart. All the cultural practices including gap filling, thinning, weeding and plant protection measures were carried out as per the crop production guide.

Treatment Details

T₁ – Control (Recommended NPK)

T₂ – 25% N through PMDSW + 75 % N through Inorganic Fertilizers

T₃ – 50 % N through PMDSW + 50 % N through Inorganic Fertilizers

T₄ – 75% N through PMDSW + 25% N through Inorganic Fertilizers

T₅ – 100% through PMDSW

T₆ – Absolute Control

RESULTS AND DISCUSSION

Impact of PMDSW on Bhindi crop

Consistent growth and yield was observed at different dosages of spent wash application. Application of PMDSW favoured yield attributes of Bhindi by enhancing the availability of nutrients. The growth attributes *viz.*, plant height, plant girth, number of leaves plant⁻¹, leaf area index and yield attributes *viz.*, fruit length, single fruit weight, fruit yield and dry matter production were relatively high in the treatment that received 100% through PMDSW. The highest fruit yield of 9,884.00 kg ha⁻¹ and dry matter production of 2,341.00 kg ha⁻¹ were recorded in the same treatment. The per cent increase over the control was 15 and 28 per cent, respectively. Similar results were obtained by continuous application of spent wash for 5 to 10 years registered significantly higher growth, yield and quality parameters of sugarcane like millable cane height, diameter of cane, number of internodes, intermodal length, number of millable canes, single cane weight, dry matter, yield, brix per cent, pol per cent and purity per cent (Kamble & Hebbara 2015). In case of dry matter production, treatment PMDSW @ 20.83 KL/ha showed an increase of 19% from control which is almost similar to the findings of Gahlot et al. (2011), which showed an increased yield in Red gram due to spent wash application.

Table 1. Effects of PMDSW on Yield and Yield attributes of Bhindi

Treatments	Fruit length (cm)	Single fruit weight (g)	Fruit yield (kg ha ⁻¹)	DMP (kg ha ⁻¹)
T ₁	13.00	22.00	8608.00	1833.00
T ₂	13.50	22.80	9067.00	1904.00
T ₃	14.80	23.50	9353.00	2094.00
T ₄	15.40	24.10	9592.00	2202.00
T ₅	16.30	24.80	9884.00	2341.00
T ₆	14.60	23.44	9300.80	2074.80
SE d	0.36	0.56	221.99	52.72
CD (0.05)	0.79	1.22	483.67	114.87

CONCLUSIONS

This study reveals efficiency of utilizing post methanated distillery spent wash for Bhindi cultivation in combination with different dosage of spent wash application. The different treatments followed showed sustainable growth and yield out of which 100% Basal N (20.83 KL ha⁻¹) through PMDSW showed prominent growth, yield and quality.

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