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A Study on Microbial Evaluation and Preservation of Neera

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ABSTRACT

The Government of Bihar has completely banned the consumption of alcoholic drink for the welfare of citizens. Hon'ble Chief Minister of Bihar has started a campaign in mission mode to promote Palmyrah-Palm products in the state. The Bihar Agricultural University has actively participated in this programme for technical backstopping to the Govt. The BAU, Sabour and TNAU, Coimbatore jointly conducted a sample survey in Nalanda, Patna, Bhagalpur & Gaya district. Simultaneously the state govt. has also collected information related to Palmyrah. Study conducted to stop the fermentation of neera so that it may not be converted into Ethyl alcohal and can be consumed in the form of nutritive Neera. When Potassium Metabisulphite (KMS) @ 500 ppm i.e. 1.0 g per liter of neera: was added no growth of microbes was observed up to 6 hours. Similarly, when Lime was applied @ 2 g per liter of neera no growth of microbes up to 3 hours was observed.

Keywords: Microbial Evaluation, Preservation of Neera, Palm nectar

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INTRODUCTION

Neera, also called palm nectar, is a sap extracted from the inflorescence of various species of toddy palms and used as a drink extraction of Neera is generally done before sunrise. It is very sweet, translucent in colour and are highly susceptible to natural fermentation at ambient temperature within a few hours of extraction. After fermentation it is also known as palm wine. Once fermented, Neera becomes toddy. Neera is widely consumed in India, Sri Lanka, Africa, Malaysia, Indonesia, Thailand, and Myanmar. Toddy neera is the rich source of sucrose (16.19 g/ 100 mL), minerals like K-68.4 mg/ 100 mL, Na-90.6 mg/ 100 mL, P-3.9 mg/ 100 mL, vitamins. Neera is nearly neutral in pH, with specific gravity ranging from 1.058-1.077. Several workers have studied the composition of palm sap (Fararusi and Bassir, 1972; Okafor, 1978). The chemical percentage composition of Neera varies, depending on various factors, namely, place, type of palm, mode and season of its collection. The sugar has low glycemic index (GI-35) which make it safe to drink for diabetic person Hebbar et al.,2018 (Table 1). In addition, the natural sap is the source of indigenous microorganisms such as Bacillus, Lactobacilli, Micrococci, Enterobacter, Leuconostoc, Saccharomyces, Candida, and Pichia (Alonso et al., 2018) These microbes ferment the neera in a rapid way, and affected the palatability by producing the astringency, unpleasant volatile, cloudy appearance which gives economic loss to the neera entrepreneurs (Arias and Murray, 2012)..Pasteurization (Anonymous 2005) is the commonest method to preserve any liquid food but the pasteurization may leads to deterioration in taste and microbial quality of Neera as it is rich in natural prebiotic. So, study was done with KMS and lime and it found to be an effective method of preservation without loss of its natural microbial quality.

Table 1: Composition of Neera

Substance	Concentration (g/100 mL)
Sucrose	12.3 – 17.4
Total ash	0.11 – 0.41
Protein	0.23 – 0.32
Ascorbic acid	0.016 – 0.030
Total solids	15.2 – 19.7

MATERIAL AND METHODS

Study was conducted in the Bihar Sarif (Nalanda District) of Bihar in the Laboratory of College of Horticulture, Noorsarai. Sample was collected from adjoining area of the college campus. Neera is highly sensitive to the light so as soon as it collected into the earthen pot its fermentation should be stopped. Since the time taken from earthen pot to reach the laboratory allows fast fermentation and it leads to quick formation of Ethyl alcohol, it must be stop till it reaches to laboratory for its microbial evaluation. A team of 15 Scientist from B.A.U Sabour and SGIDT, Patna has conducted research on preservation of neera and evaluated microbial quality at different interval of time. Following points have been covered during the investigation. An on-plant experiment was conducted using different concentrations of SO_2(100, 300, and 500 ppm i.e. 0.2, 0.6, and 1.0 g KMS/L of neera) and Lime (1, 2, and 3 g/ L of Neera). The potassium metabisulphite (KMS)was used as source of SO_2. Different quality parameters like TSS, pH, acidity, and microbial analysis (SPC, Yeast, Molds, and *E. coli*) were observed at 0, 3, and 6 hours at room temperature.

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Method of Application

The capacity of *Labni* (earthen pot) was known to decide the amount of lime or KMS for required concentration. *Labni* was washed properly every time to avoid possible contamination and was covered with the mosquito net on the plant. Required amount of KMS was dissolved in the 1/4th glass (50 mL of clean water) of water and was poured in to the *Labni* before placing on the tree. Likewise, Lime powder was applied on the inside surface (just like face powder) of *Labni* before placing on the tree.

pH

pH meter was used for measuring the acidity of each sample of Neera at different temperature and average was prepared for final result (Table 2).

Table 2: pH of Neera with different treatment at different interval of time

Treatments	Storage Interval (Hrs) at Room Temp.		
	0	3	6
Control	4.63	3.64	3.13
Lime powder (1g/L sap)	6.53	4.76	3.60
Lime powder (2g/L sap)	8.00	6.85	5.81
Lime powder (3g/L sap)	10.28	10.03	10.08
SO_2 (100 ppm) (0.2 g KMS/L sap)	6.01	4.83	3.43
SO_2 (300 ppm) (0.6 g KMS/L sap)	6.15	5.38	3.74
SO_2 (500 ppm) (1.0 g KMS/L sap)	6.98	6.78	4.68

TSS

100 ml of each sample was passed through a prepared, pre weighed filter paper. The filter is dried at 104 ± 1°C. After drying the filter is reweighed and the TSS was calculated (Table 3).

Standard plate count

One ml sample of each lot was taken and diluted up to 10^4-10^5. Nutrient agar media was prepared and poured into Petri plates to solidify. 1 ml diluted sample was inoculated on the solid Petri plates and observed after 24 hr of incubation. Any transparent colony was noted and colony was counted using formula as no of colony x dilution factor.

Yeast and mold count

Potato dextrose agar was used for this method. Diluted sample was poured on to the solified PDA plate and any visible growth was noted after 48-72 hr of incubation.

Table 3: TSS of Neera at different interval of time

Treatments	Storage Interval (Hrs) at Room Temp.		
	0	3	6
Control	4.63	3.64	3.13
Lime powder (1g/L sap)	6.53	4.76	3.60
Lime powder (2g/L sap)	8.00	6.85	5.81
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***E.Coli* count**

EMB plate was prepared and diluted sample was poured on to the Solidified plate. Metallic lustrous growth was observed and counted using bacteriological formula in Cfu/ml.

RESULTS AND DISCUSSION

The treatments had positive effects on freshness of Neera. No Visible growth was seen in a treated Neera sample except for SPC as it contains natural microflora of lactobacilli but the untreated sample was heavily loaded with microorganisms. Similar study was done by COMFED in the same year with the pasteurized Neera sample and noted almost similar results. Rakesh *et al.* (2019) also conducted experiment on Neera and observed the various probiotic microorganism in the Sap of Neera. To isolate functional probiotic bacteria, samples of a natural fermented drink – Neera – were collected and different morphotypes were identified with their probiotic characteristics in every sample. Growth of *E. coli* was nil and yeast and mold never appear. This can be explained by the antibiotic property of natural lactobacilli present in the Neera who never allows these microorganisms to grow. The study was supported by Eckburg *et al.* (2005), Bartkiene *et al.* (2018) with a similar study and similar result. The SPC count shown slight decrease after applying the both chemical and it was found to be most effective when Potassium Metabisulphite (KMS) @ 500 ppm i.e., 1.0 g per liter of Neera: was applied No growth of microbes was observed up to 6 hours. Similarly, when Lime was applied @ 2 g per liter of neera No growth of microbes upto 3 hours was observed.

CONCLUSION

At the recommended dose KMS @ 500 ppm i.e. 1.0 g per liter

Table 4: Microbial Evaluation of Neera

Treatments	Storage Interval (Hrs) at Room Temp.								
	SPC			Yeast & Mold			*E. coli*		
	0	3	6	0	3	6	0	3	6
Control	2000	2500	2800	nil	Nil	Nil	Nil	Nil	Nil
Lime powder (1g/L sap)	1500	1550	1580	Nil	Nil	Nil	Nil	Nil	Nil
Lime powder (2g/L sap)	1300	1400	1450	Nil	Nil	Nil	Nil	Nil	Nil

of Neera, no growth of microbes up to 6 hours was observed similarly when Lime was applied @ 2 g per liter of Neera: No growth of microbes upto 3 hours was observed Therefore preservation of Neera at this concentration taste and nutrition was found to be good and microbial contamination was almost nil.

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