Standardization of extraction methods and preservation techniques of hill lemon juice

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Hill lemon (Citrus pseudolimon Tan.) fruits were harvested at appropriate maturity and juice was extracted to study storage life. Hill lemon fruits pressed through screw type extractor gave highest juice (44.28%) as compared to other methods. Freshly extracted juice was preserved by pasteurization, potassium metabisulphite (KMS) @ 700 ppm of SO₂ and sodium benzoate (0.05%) to study keeping quality at room temperature. KMS showed lower losses in quality and was found effective in preservation of juice for 180 days with least browning. Physiochemical attributes remained almost stable during storage except ascorbic acid contents.

Keywords: Extraction methods, Hill lemon juice, Preservation techniques, Standardization

Introduction

Hill lemon (Citrus pseudolimon Tan.) is grown extensively in plains and sub-mountainous region of northwestern Himalayan ranges of country¹. In Himachal Pradesh, it is grown well in low and mid hills² (Una, Kangra, Dhaulakuan areas of Sirmour districts and some parts of Mandi and Bilaspur districts). Hill lemon is a hardy plant and a prolific bearer once a year with an average yield of 30-40 tonnes per acre³. Hill lemons are used for pickles and squashes in homes and in small scale factories²,⁴. It is good source of vitamin C, minerals and salts⁴. Hill lemon fruits are processed into lemonade and essential oils, besides juice concentrate, juice powder and appetizer have also been prepared experimentally⁵. Its juice is an excellent and economical acidulants to enhance taste and flavour of different fruit products⁵. This study standardizes methods for extraction and preservation of hill lemon juice.

Materials and Methods

Fruits were harvested at appropriate maturity in January in orchard of Nalagarh area of district Solan (HP) and collected at Fruit Processing Research laboratory of the Department. Fruits were sorted, washed thoroughly in water to remove foreign materials.

Extraction of Hill Lemon Juice

Different equipments and methods [pulper (juice extracted after peeling), screw type (fruits were cut into 8 pieces without peeling), hydraulic press (fruits were cut into 16 pieces without peeling) and burr machine (fruits were cut horizontally into two equal halves without peeling)] were used for extraction of juice from hill lemon fruit (12 kg used in each equipment). Best method obtained was used for further extraction.

Juice Preservation and Analysis Studies

Extracted juice was divided into three parts, each part preserved with pasteurisation [potassium metabisulphite (KMS) @ 700 ppm of SO₂ and sodium benzoate (0.05%)], which were replicated thrice. Treated juice was filled in sterilized bottles (head space, 2 cm), sealed and stored at room temperature for 6 months. Preserved juice was analyzed for physico-chemical attributes at different storage intervals⁶,⁷. Total soluble solids (TSS) were measured with hand refractometer (Erma). Data was analysed by Complete Randomized Design⁸.

Result and Discussion

Physical characteristics of hill lemon fruits were found as follows: weight, 450.9 ± 3.7 g; vertical diam, 10.6 ± 0.2
cm; horizontal diam. 9.3 ± 0.2 cm; volume, 478.4 ± 3.5; peel weight, 110.2 ± 2.1 g; and number of segments, 9.2 ± 0.4. Thus, fruits were slightly heavier in weight and large in size. Recovery of juice by using different equipments was 36.28 - 44.28 % (Table 1). Maximum yield (44.28%), TSS and titratable acidity were recorded in juice extracted by screw type method. Juice obtained from hill lemon fruit by different extraction methods were mixed and filtered through muslin cloth and used for further storage studies.

**Effect of Preservation Methods on Quality Characteristics of Juice**

**Total Soluble Solids (TSS)**

TSS contents (Table 2) of hill lemon juice were 7.41-7.56°B during 180 days. A significant increase in
TSS was found with sucrose in storage time. Increase in TSS during storage for 6 months might be due to hydrolysis of polysaccharides into soluble saccharides. These results are in conformity with earlier studies in citrus juice\(^9\), and lemon juice\(^10\).

**Titrateable Acidity (TA)**

TA of hill lemon juice (Table 2) was 4.81-5.03 % during 180 days of storage. On preparation day, maximum value (5.03%) was recorded in juice treated with sodium benzoate and KMS, which were non-significant with TA value of pasteurized juice. Whereas, after 60 and 120 days, KMS treated juice showed highest TA, which were at par with rest of the treatments. TA decreased to 4.87 % after 180 days irrespective of treatments. Little loss of TA was observed in sample preserved with KMS as compared to pasteurization and sodium benzoate treatments. TA decrease in juice could be attributed to chemical interaction between organic constituent of juice induced by temperature and action of enzymes. These results are in conformity with studies in citrus juice\(^9\), lemon juice\(^10\) and aonla pulp and juice\(^11\).

**Total Sugars**

Total sugars content (Table 2) were 2.01-2.37 % during 180 days of storage. On preparation day and after 60 and 120 days of storage, total sugars contents were statistically at par with each other in all treatments. Total sugars increased significantly during storage period of 180 days. Increase was more in pasteurized juice as compared to other samples, might be attributed to hydrolysis of starch into sugars. Present results are in conformity with studies in kinnow juice\(^9\), and citrus juice\(^9,11\).

**Ascorbic Acid**

Ascorbic acid content of hill lemon juice (Table 2) was 15.23-34.16 mg/100ml during storage of 180 days. On preparation day, all treatments showed same value (34.16 mg/100 ml) for ascorbic acid content. After 60, 120 and 180 days of storage, highest value of ascorbic acid content was found in juice treated with KMS (29.96 mg/100 ml), followed by pasteurized (22.53 mg/100 ml) and sodium benzoate (22.44 mg/100ml) treated juice. Mean value of ascorbic acid content in hill lemon juice decreased significantly during storage period of 180 days from 34.16 to 18.66 mg/100ml irrespective of treatments. These findings are in conformity with study in aonla juice\(^11\) during storage period of eight months.

**Conclusions**

Hill lemon juice preserved for six months with potassium metabisulphite @700ppm of SO\(_2\) was found better than juice preserved with sodium benzoate and pasteurization.

**References**