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Natural Preservative Idiosyncrasy of Kuji Thekera (*Garcinia cowa*)-A Minor Fruit of Assam

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ABSTRACT

Kuji thekera (*Garcinia cowa*) is a very popular minor fruit of Assam which is orange in colour when ripe and requires almost about 3 ½ month to attain maturity after the fruit set. The fruit is highly acidic and sour in taste. Traditionally the people of Assam use this fruit in various pickles to increase the shelf-life of the pickles. In the present study three different pickles were prepared with different concentrations of *Garcinia cowa i.e.,* sample A (75%), sample B (50%) and sample C (25%) respectively and the microbial study and sensory evaluation were carried out on the samples for three months to observes the storage properties. The study reveals that the pickle prepared with a high concentration of *kuji thekera* (Sample A) showed shelf preservative properties both in terms of microbial growth and in retrieving the sensory qualities of the pickle during the studied storage period. Therefore, *Garcinia cowa* can be considered a natural preservative and can replace chemical preservatives to extend the shelf-life of value-added products.

Keywords: Preservative, *Kuji thekera* (*Garcinia cowa*), shelf-life, microbial study, sensory evaluation.

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INTRODUCTION

There are various minor and underutilized fruits, out of which only a few are commonly known. Most of the fruits are still confined to their area of origin. Based on the spread of cultivation, the volume of production and trade, fruits can be divided into four main categories. Major fruit crops which are fruits like mango, banana, citrus fruits etc. which are regularly produced, cultivated commercially, adapted widely and have been selected purposefully by humans for development and have been systematically grown and marketed (Ghosh *et al,* 2018), whereas minor fruits is another category of crops that have been domesticated but not so extensively cultivated, consumed and trade tend to be move limited, geographically and quantitatively, than those of the major fruits, these crops are consumed relatively in less quantity, have less marked demand and are not cultivated in organised plantations.

Underutilized fruits are those which are not yet fully exploited, require low external inputs for production and are produced and consumed only in localized areas. Wild fruits refer to species that are neither cultivated nor domesticated, but they come from their wild natural habitat and are used as one of the sources of food (Sauco, 2008; Gaikwad *et al,* 2018). Assam is a land in North East India which is surrounded by rich sources of flora which are a stockpile of various protective properties. *Kuji thekera* (*Garcinia cowa*) is one of such minor fruit of Assam which is accredited with lots of useful properties such as nutritious, health benefits and preservative properties. Patiri and Borah (2007) reported that the people of Assam use to develop dehydrated *kuji thekera* as preserved products. This preserved product is used therapeutically to treat dysentery, diarrhoea and other gastro intestinal-related problems. *Kuji thekera* (*Garcinia cowa*) are traditionally used in various pickles and is believed that the addition of this fruit help in preserving the pickles. This information about the properties and uses of *Kuji thekera* is conveyed from generation to generation without any scientific evidence. In view of this information, the research work of the present paper elaborates on the natural preservative properties of *kuji thekera* that can retain the edible qualities of the developed products.

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MATERIALS AND METHODS

The matured fruits of *Kuji thekera* (*Garcinia cowa*) were collected from the market and sundried after cutting the fruits into thin slices. The dried fruits were then stored in air tied container to be used to prepare the vegetable pickle (sample A, B & C). To attain the aim of study, three mix-vegetable pickles were prepared with different concentration of *Kuji thekera* and in sample C chemical preservative was added to be able to compare the preservative properties of *Kuji thekera* with that of a chemical preservative (Table 1). Each sample was then packed into three different plastic bottles and sealed properly i.e. sample A was packed into three separate bottles and levelled as samples A, A_1 & A_2 similarly samples B, B_1 & B_2 and C, C_1 & C_2 were packed and levelled from sample B and C respectively.

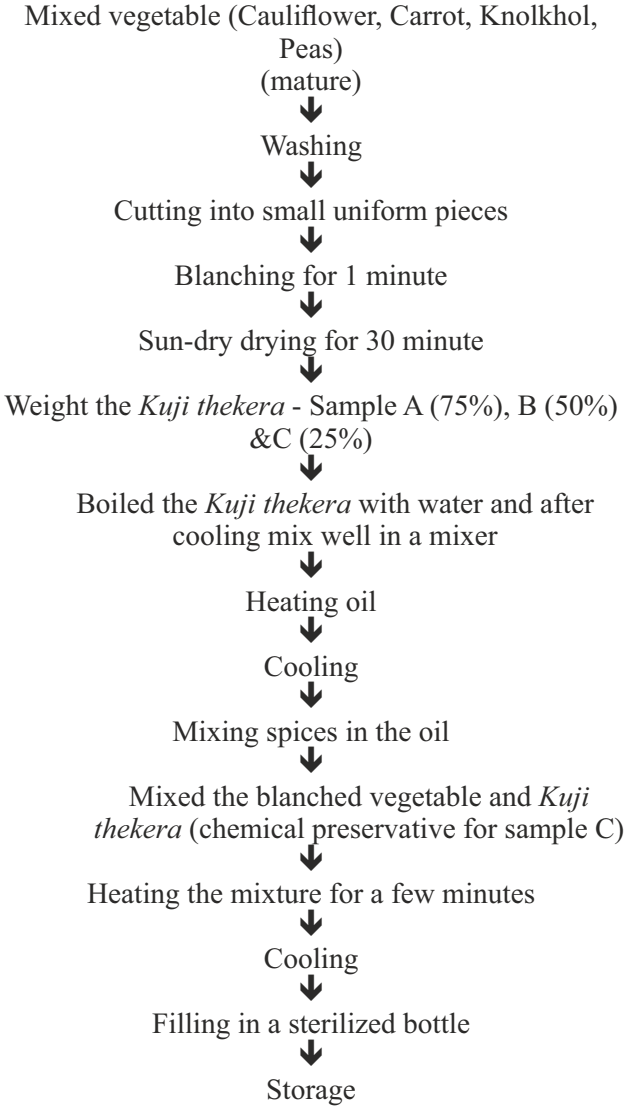

Fig. 1: Flow chart for pickle preparation

To study the preservative activity of *kuji thekera* the storage quality of the samples was evaluated in terms of microbial and sensory quality of the pickles. The storage quality of the developed products was carried out from 0 to 90 d at an interval of 30 d. All the analytic works were done following standard methods. The microbial growth of the samples was investigated in the Department of Plant Pathology, Assam Agricultural University, Jorhat by using hemocytometer method (Absher, 1973). And the sensory evaluation was carried out in the Department of Food Science and Nutrition, College of Community Science, Assam Agricultural University, Jorhat by referring to the 9 point Hedonic scale evaluation sheet.

RESULTS AND DISCUSSION

Microbial study across storage

Sample A, B, C were taken for the first month (30 d) study and samples A_1, B_1, C_1 were considered for the second month (60 d) investigation respectively. All the six samples showed negative microbial growth indicating that the pickles are in good quality during the two month storage (Table 2) period. For the third month (90 d) storage study of the pickles the samples A_2, B_2, C_2 were evaluated and found that except B_2 sample the other two samples were free from microbial growth. The result (Table 2) shows that the pickle (sample A) prepared with *Kuji thekera* as a natural preservative and the pickle (sample C) prepared with chemical preservative could retain their storage quality in terms of microbial growth. Whereas sample B with a low concentration of *Kuji thekera* could not prevent microbial growth and the pickle storage quality reaches beyond edible condition after the second month (60 d) of studies. The B_2 sample showed bacterial growth with $1.0 * 10^5$ CFU/ ml (Fig. 2) and spherical and diplococcoid-shaped bacteria (Fig. 3) were found in the sample which proves that the sample has become unedible. Thus, the result indicates that *Kuji thekera* acts as a resistance agent against microbial growth. The preservative properties of *Kuji thekera* fruit may exist due to the high acidic content of the fruit as Marg (2004) has mentioned about *Garcinia cowa* (*Kuji thekera*) a minor fruit of Assam is edible and acidic in nature. Barua (2015) recorded that the acid content of *Kuji thekera* (*Garcinia cowa*) ranges from 4.78 to 5.74%. Srivastava and Kumar (2007) in their book mentioned that in a high acidic media the growth of a majority of un-derisible organisms is inhibited. Again, a number of researchers have also enlightened the fact that *Kuji thekera* fruit is rich in various phytochemicals. Phytochemicals that exhibit

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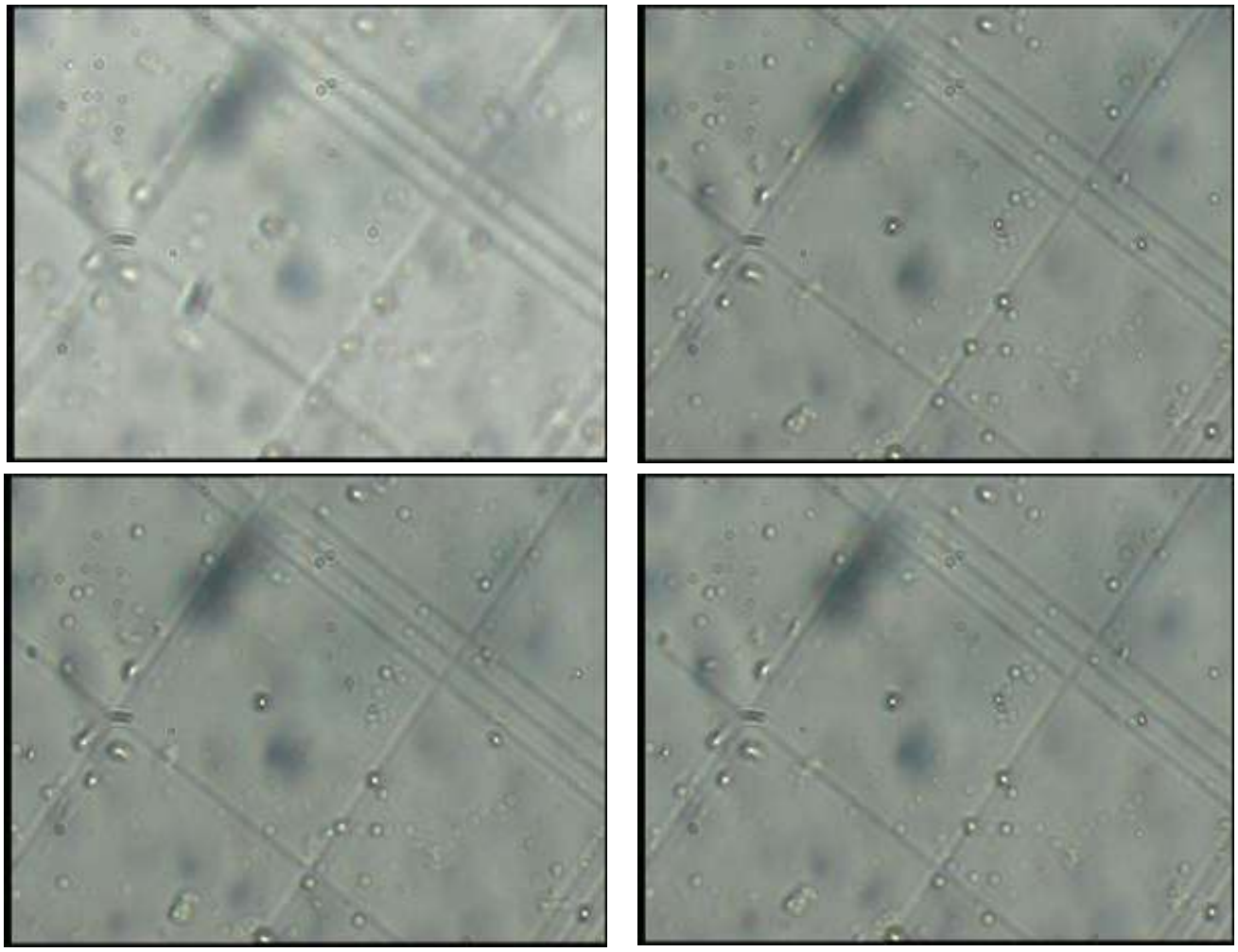

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Fig. 2: The four squares under the microscope were average was counted for the total bacterial growth using hemocytometer method

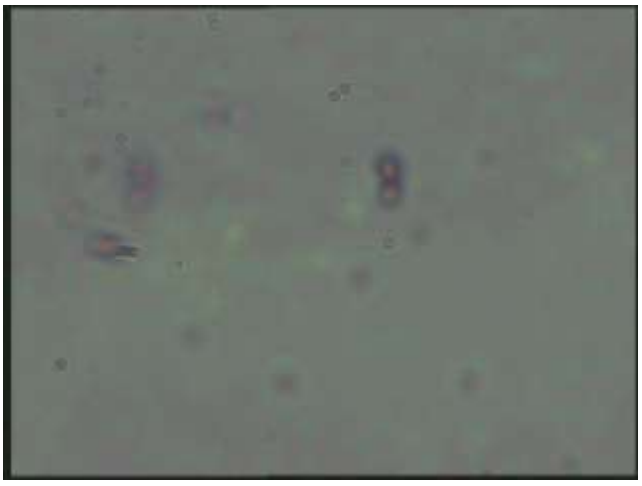

Fig. 3: The shape of Bacteria under a microscope (spherical and diplococcoid)

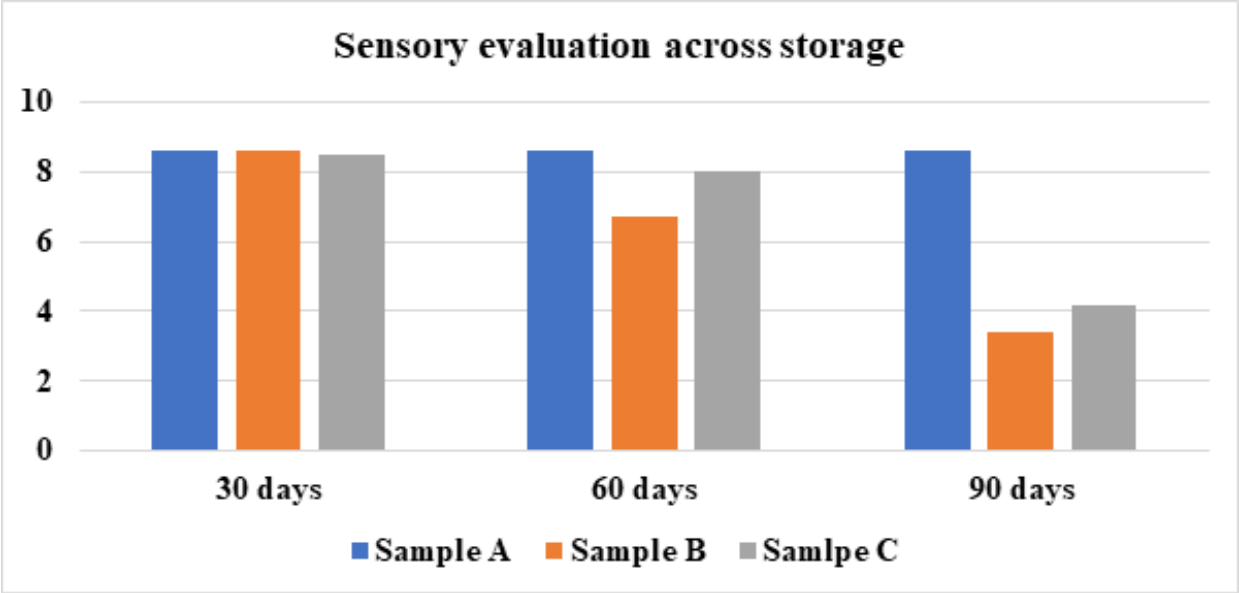

Fig. 4: Sensory evalution of the prepared pickles across storage

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antioxidant properties (Green and Shallal, 2020) may also hinder the growth of microorganisms in the prepared pickle. Phytochemicals act as hurdle agents by cutting the oxygen supply that hampers microbial growth. Limtharakul *et al* (2013) stated that *Garcinia cowa* is accredited with an abundant amount of bioactive phytochemicals. Barua (2015) and Firdusi (2017) in their work also found that *Garcinia cowa (Kuji thekera)* is a rich source of Flavonoids- a type of phytochemical. Thus, it can be said that *Kuji thekera* as a natural preservative idiosyncrasy showed effective preservative properties for retaining the shelf-life of the product by hindering microbial growth.

Sensory analysis across storage

The sensory evaluation which was done using 9 points Hedonic scale evaluation sheet among expert penal members from the Department of Food Science and Nutrition, Assam Agricultural University, Jorhat is presented as a graph in Fig. 4. The data collected from the penal as presented in the graph showed that the pickle prepared with a high concentration (75%) of *Kuji thekera* retains its overall acceptability throughout the storage period. But in the case of sample B the storage quality deteriorated beyond edible condition after one month of storage (Sample B_1) and in sample C it was observed that the sample loses its edible property after 60 d of storage. From this observation, we could conclude that even sensory evaluation across the storage of the studied samples enlighten the fact that *Kuji thekera* could be considered a natural preservative.

CONCLUSION

From the microbial study across storage it can be said that *Kuji thekera* as a natural preservative idiosyncrasy showed effective preservative properties for retaining the shelf-life of the product by hindering microbial growth. Also from the sensory analysis across storage can give justification to the fact that *Kuji thekera* can be considered a natural preservative and can replace chemical preservatives without any side effects due to its preservative behaviour both in terms of preventing microbial growth as well as retaining its sensory properties throughout its storage life.

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