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Development of beverages based on temperate fruits

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Abstract
Due to their perishable nature, fruit and vegetables typically have a relatively short shelf life. They are transformed into ready to serve (RTS) beverages to preserve them. RTS beverage is a non-fermented beverage made from variously concentrated fruits and vegetables along with sugar, water, and additions. These organic RTS drinks are prized for their medicinal qualities, nutritive value, refreshing quality, and pleasant flavour. Thus, it is believed that blending of natural RTS beverage is a viable alternative for the usage and preservation of fruits. The current review came to the conclusion that storage was observed to modify the physiochemical characteristics of RTS drinks, such as pH, acidity, and total soluble solids. Finally, the data show that fresh juices are high in antioxidants such ascorbic acid, making them a possible source of different. Finally, it can be inferred from the results that fresh juices are potential sources of various bioactive compounds that can be used for value addition in the food industry because they are high in antioxidants like ascorbic acid. The current study therefore concentrated on developing and standardizing the recipe for blended RTS based on apple, kiwi, and Strawberry juice.

Keywords: RTS beverages, physiochemical properties, shelf life

1. Introduction
Fruit juice has long been regarded as one of the essential drinks. Due to the natural quantity of carbohydrates, important vitamins, minerals, and other elements in fruit juice and juice-based beverages, they are increasingly being marketed on a health platform and are consumed worldwide (Chandra *et al*., 2014) [2]. Fruit juice consumption has increased recently, largely due to growing consumer knowledge of the value of making good food choices to lower the risk of contracting diseases and enhance quality of life (Carbonell-Capella *et al*., 2015) [1]. A resource that the industry can use to create distinctive drinks, such as those with novel flavours, improved colour, and consistency, is the production of mixed fruit juice or nectar. A non-alcoholic drink product known as a functional beverage is made with ingredients such raw fruits, herbs, vitamins, minerals, amino acids, and other bioactive compounds that have been shown to have specific health advantages. Functional beverages have grown in popularity over the past few years because of their numerous particular health advantages. The focus is on diverse fruit-based functional beverages, their advantages for human health in terms of nutrition, physiology, and functionality (Sarma *et al*., 2014) [2]. Fruits and vegetables are known for promoting human health and are one of the key components of a balanced diet. Due to their abundance in numerous micronutrients such phenolic compounds (known particularly for their antioxidant potential), minerals, and vitamins, they are frequently referred to as "functional food. Numerous epidemiologic studies have demonstrated a link between fruit consumption and the prevention of a number of diseases, including cancer, neurological diseases, obesity, and diabetes (Sana M'hir and Moktar Hamdi; 2020) [3]. Diets based on vegetable or fruit juice have become increasingly popular recently. Juice production from fruits and vegetables predates agriculture by at least 100 years. Simply said, juice is the fluid that can be extracted from cells or tissues. It is described as juice that is fermentable but unfermented, meant for immediate consumption, collected mechanically from healthy, ripe fruits, and solely maintained by physical means. The juice could be clear or muddy. A diverse and complex substance group category of foods includes fruits and vegetables. Carbohydrates, acids, minerals, polyphenols (Tannins), including the vibrant anthocyanins, water-soluble vitamins, amino acids, fragrance compounds, carotenoids, fibres, and other substances are pertinent substance groupings.

Vegetable/fruit juice is consumed when fasting to give necessary nutrients and to increase compliance (Henning *et al*., 2017) [52]. Juices made from fruits, vegetables, or herbs may be an effective way to improve people's health (Pushpa *et al*., 2016) [53]. Fruit-based beverages have far more nutritional content than the synthetic drinks that are sold around the nation. Fruit growers and customers would both benefit if artificial drinks could be replaced with fruit juice. Juice preparation and other fruit-based beverages have a lot of potential given the demand for natural beverages (Gupta *et al*., 2015) [5]. A balanced diet requires that one consume fruit and vegetables on a daily basis, either in their complete form or as part of a salad.

The most widely consumed fruit worldwide is apple. This fruit is well-known for its diverse nutritional and therapeutic qualities in addition to its distinctive flavour. Antibacterial, anti-diabetic, anti-cancer, anti-inflammatory, anti-hypertensive, and cardioprotective are only a few of this fruit's key medical attributes. According to Drogoudi and Pantelidis (2011) [6], apples are the second most popular fruit in the world and are rich in phenolic compounds that are good for human health (Wolfe *et al*., 2003) [8]. According to some sources, phenolics provide protection from cancer, cardiovascular disease, and various other age-related disorders due to their strong antioxidant capacity (Knekt *et al*., 1997; Kris-Etherton *et al*., 2002; Ju *et al*., 2012) [9, 10, 54]. Kashmir is hthe main apple-producing region in India. The soil, climate, and environment, which are extraordinarily beneficial and unequalled in the province of Kashmir, are the essential factors that affect temperate fruit-bearing trees. The state produced 77.7% of the apples consumed in India during the fiscal years 2017–18, according to data from the National Horticultural Board, making India the world's fifth-largest producer of apples, after Russia and ahead of Brazil. Apple can be grown anywhere with a moderate environment, including both the northern and southern hemispheres, although it cannot be done in South Asia's tropical climate. Many antioxidant components, such as phenolic compounds, carotenoids, anthocyanins, and tocopherols, are abundant in fruits and vegetables (Naczk and Shahidi, 2006) [12]. The bioavailable polyphenols flavonols, monomeric and oligomeric flavonols, dihydrochalcones, anthocyanidins, and others are all abundant in apple (Escarpa and Gonzalez, 1998) [13]. Chlorogenic acid, phloretin glucosides, and quercetin glucosides are the most prevalent polyphenols in apples (Wijngaard *et al*., 2009) [14]. Since they are only found in relatively modest concentrations, other polyphenolic substances like catechins and procyanidins have also been identified (Foo and Lu, 1999) [16]. Generally speaking, due to their phenolic chemicals and fibre content, apples have been demonstrated to protect against human chronic diseases. These bioactive substances are scarcely available, having the potential to affect the host's physiology and regulate the balance of bacterial populations in the gut and colon (Delzenne *et al*., 2011; Moco *et al*., 2012) [17-18]. The health advantages of apples include The combination of fibre and phenolics with gut bacteria is, in part, what gives apples their health benefits. Short chain fatty acid (SCFA) activity and production fluctuate as a result of fibre fermentation and phenolic bioavailability. Apples' dietary fibre is mostly made up of cellulose, hemicellulose, lignin, and pectin (Yan and Kerr, 2012) [19].

Table 1: Nutritional composition of apple

% Macronutrients, %	Units/100g
Fat	0.16–0.18
Protein	0.24–0.28
Total carbohydrate	13.81
Simple carbohydrates, %	
Fructose	5.8–6.0
Glucose	2.4–2.5
Complex carbohydrates, %	
Total fiber	2.1–2.6
Insoluble fiber	1.54
Soluble fiber	0.67
Major minerals, mg/100 g	
Sodium	0.9–1.1
Potassium	104.8–109.2
Calcium	5.7–6.3
Phosphorus	10.7–11.3
Magnesium	4.9–5.1
Trace elements, mg/100 g	
Iron	0.11–0.13
Zinc	0.0036–0.0044
Copper	0.026–0.028
Manganese	0.033–0.037

Strawberry (*Fragaria sp.)* is a perennial herbaceous member of the "Rosaceae" family that is grown around the world, but is especially popular in the USA, Japan, Mexico, Italy, and Lebanon (Childer, 1983). Including grapes, it is more extensively available than any other fruit (Childer, 1980). Due to its minimal cooling needs, strawberries can be cultivated successfully in tropical and subtropical climates. The fruit is perishable and should be eaten soon after being picked because it grows quickly (30 to 40 days). Because there is a danger that the fruit can deteriorate while being transported to the distant market, it must be handled properly (Amin, 1996). The demand for the fruit is rising not only in Pakistan but also in other parts of the world due to its mouthwatering flavour and lovely colour and shape structure. In addition to being utilised in processed forms like cooked and sweetened preserves, such as jams or jellies, and frozen whole berries, fruit is typically consumed fresh. The flavours or juice extracts that have been sweetened are utilized to create a range of additional processed goods (Galletta and Bringhoist, 1955). The fruit is delicious, firm, and has crimson flesh. Glucose makes up more than half of the sucrose in strawberries. The fruit's main acids are citric and malic, in that order. A pigment called anthocyanin is what gives the apple its crimson colour. There are numerous volatile esters that give the flavour. In terms of nutrition, strawberries are higher in vitamin C than oranges and contain low-calorie carbohydrates, fibre, and the possibility of vitamin C. The primary components of the fruit include vitamin C (64.0 mg), water (91.75 g), protein (0.61 g), fat (0.37 g), carbohydrate (7.02 g), fibre (2.3 g), calcium (14.0 mg), potassium (166.0 mg/160 g), potassium (166.0 mg/160 g), and vitamin-A (27 IU), with a pH range of 3.27 to 4.

Table 2: Nutritional composition of strawberry

Type	Nutrient Per 100 g
Water (g)	90.95
Energy (kcal)	32
Protein (g)	0.67
Ash (g)	0.4
Total lipid (g)	0.3
Carbohydrate (g)	7.68
Dietary fiber (g)	2
Sugars (g)	4.89
Sucrose (g)	0.47
Glucose (g)	1.99
Fructose (g)	2.44
Minerals	
Sodium (mg)	1
Calcium (mg)	16
Iron (mg)	0.41
Magnesium (mg)	13
Phosphorus (mg)	24
Potassium (mg)	153
Zinc (mg)	0.14
Copper (mg)	0.048
Manganese (mg)	0.36
Selenium (mg)	0.4
Vitamins	
Vitamin C (mg) 58.8	58.8
Thiamin (mg) 0.024	0.024
Riboflavin (mg) 0.022	0.022
Niacin (mg) 0.386	0.386
Pantothenic acid (mg) 0.125	0.125
Vitamin B6 (mg) 0.047	0.04
Folate (mg) 24	24
Choline (mg) 5.7	5.7
Betaine (mg) 0.2	0.2
Vitamin B12 (mg)	0
Vitamin A, RAE (mg)	1
Vitamin E, a-tocopherol (mg)	0.29
b-tocopherol (mg)	0.01
g-tocopherol (mg)	0.08
d-tocopherol (mg)	0.01
Vitamin K, phylloquinone (mg)	2.2

The fruit of the woody vine Actinidia is called a kiwifruit. The two most often consumed Actinidia cultivars are *Actinidia chinensis* (gold kiwifruit) and *Actinidia deliciosa* "Hayward" (green kiwifruit). The A. deliciosa is commercially farmed in a number of nations, including Italy, New Zealand, Brazil, the United States, and Chile. It has a soft texture and a distinctive flavour. Although kiwifruit output has climbed by over 50% globally over the past ten years, it still still makes up around 0.22% of the world's fruit bowl, which is dominated by apple, orange, and banana. The health benefits of kiwifruit, including their effects on metabolism, iron nutrition, digestion, antioxidant activity, and immunological function, are supported by an increasing body of scientific research. Despite the fact that kiwifruits have a number of health benefits, its juice is not frequently drunk for a variety of reasons. Many elements, such as excessive browning, the development of haze or precipitate, and changes in the favourable conditions, have an impact on the creation of high-quality kiwifruit juice or extract. Due in large part to the difficulty in developing goods that maintain the appealing aroma, green hue, and beneficial ingredients in kiwifruit juice, this market does not currently exist. Kiwifruits' phenolic compounds play a significant role in the age, colour, flavour, and health benefits of fruit products including juice and extract. The juice of kiwifruit often has a low pH (3.0-3.5) and is susceptible to browning when exposed to air. Oxalic acid is present in kiwifruit juice, however the amounts vary depending on the processing method. Just a few individuals seem to be allergic to the fruit. A unique aqueous kiwifruit extract that is bioactive, free of inactive ingredients, and has a considerably longer shelf life was created in order to avoid all of these issues. A juice or pulp fraction was further modified throughout the extraction process by being boiled, centrifuged, filtered, delipidated, and desugarized.

As consumers become more health conscious, their choices for ready-to-eat and ready-to-drink products, particularly beverages, are diversifying. This raises the need for new product creation that has nutritional benefits and is popular with all consumer groups, which puts food processors up against a significant task (Eurostat, 2016). One of a kind products that capitalise on consumer interest in health and fitness are functional beverages. They desire all the positive effects of a drink since they are becoming more health conscious. The demand for soft drinks is continually on the rise, and there is a lot of room for creating beverages with additional value by incorporating wholesome foods with therapeutic qualities. According to reports, the soft drink industry's therapeutic beverage sector is the one with the quickest growth. 2009 (Roberts) In order to meet customer needs and to support the expansion of the food processing industry, novel RTS blends must be developed. An developing market in the food industry is beverages made by mixing fruits, vegetables, and products from medicinal plants. The nutritional benefits of fruits and vegetables are immense. A ready to serve drink using blended juice of fruit and vegetable will be highly convenient to grab nutrition in your day-to-day life.

Table 3: Nutritional composition of kiwi

Nutrient Proximates	Units/100 g
Water	83.1g
Energy	61Kcal
Protein	1.14g
Total lipid(fat)	0.52g
Ash	0.47g
Carbohydrate, by difference	14.7g
Fiber, total fiber	3g
Sugars, total	9g
Minerals	
Calcium, Ca	34Mg
Iron, Fe	0.31Mg
Magnesium, Mg	17Mg
Phosphorous, P	34Mg
Potassium, K	312Mg
Sodium, Na	3Mg
Zinc, Zn	0.14Mg
Copper, Cu	0.13Mg
Manganese, Mn	0.098Mg
Selenium, Se	0.2µg
Vitamins	
Vitamin C, total ascorbic acid	92.7Mg
Vitamin B1, Thiamin	0.027Mg
Vitamin B2, Riboflavin	0.025Mg
Vitamin B3, Niacin	0.231Mg
Vitamin B5, Pantothenic Acid	0.183Mg
Vitamin B6, Pyridoxine	0.063Mg
Vitamin B9, Folate	25µg, DFE
Choline	7.8mg
Vitamin B12	0µg
Vitmain A, RAE	4µg
Vitamin A	87IU
Vitamin E (alpha tocopherol)	1.46Mg
Vitamin k	40.3µg

2. Categories of fruit juice beverages

Fruit pulp or juice that has undergone minimal processing, such as filtering, clarifying, and pasteurisation, is used to make these beverages. Fruit juice or pulp is blended with other ingredients, such as sugar, acid, stabilisers, vitamins, and preservatives, to make drinks and beverages. Many subcategories of beverages and drinks created using fruit juice or pulp are included in the list below. Natural fruit juices, sweetened juices, ready-to-serve drinks, nectar, cordial, squash, crush, syrup, fruit juice concentrate, and fruit juice powder are all included in the category of non-alcoholic and non-carbonated beverages. The main groups of fruit beverages are listed below.

2.1 Ready to serve (RTS) Beverages

Beverages that are ready to drink and made from natural and clarified fruit juices. In addition to around 0.3 percent acid, it has a minimum of 10% fruit juice and 10% total soluble solids. No dilution is done before serving (Srivastava and Kumar, 2004). A beverage made with 10% of watermelon juice that hasn't been clarified had 15.0 oBrix, 12.0 g of total sugar, 7.26 g of reducing sugar, and 3.5 pH per 100 g. (Chakraborthy *et al*., 1993). Clarified juice was transformed into RTS beverage with 12.5% juice, 15.0% Brix, and 0.3% acidity (as citric acid). To create a carbonated or non-carbonated RTS beverage, chilled soda or water was utilised for dilution. In one, two, and three volumes, respectively, three stages of carbonation were performed with CO2 gas pressures of 0.775, 2.092, and 3.685 kg/cm2. (1993; Jacob and Narasimham). The chemical components of cleared banana RTS made from Rasthali, Poovan, and Rasthalai and Poovan varieties were examined by Chitra (2000) [55]. Per 100 ml of juice, the created RTS beverage had a pH of 4.88 to 4.95, 0.26 to 0.28g acidity, 1.58 to 1.75g reducing sugar, and 9.84 to 10.66g total sugar. The increase in the amount of reducing sugar may be the result of the fruit's acid hydrolyzing the total sugar, which may have degraded the disaccharides into monosaccharides.

The MPCa-3 (mango 85%, pineapple 15%, and cardamom 0.006%) and LAS10 (lime 95%, aonla 5%, 2% ginger, 1% salt, 0.25% cardamom, 0.25% cumin, 0.5% curry leaf, 0.4% mint, and 0.1% pepper) RTS beverages were made and tested by Deka. The highest Brix: acid ratio (43.48) and the lowest Brix: acid ratio (30.30) were obtained from these (2000). 18oBrix TSS, 5.74–5.75 pH, 0.25–0.25g acidity, 15.67–15.89g total sugar, 5.81–5.87g reducing sugar, 5.85–5.91mg ascorbic acid, and 15.0–17.50g beta-carotene were all present in the prepared jackfruit (Artocarpus heterophyllus) RTS beverage per 100ml (Krishnaveni *et al*., 2001). Pomegranate RTS was made by Singh *et al*. (2005) using various ratios of juice, TSS, and acidity. They claimed that recipes with 11o Brix TSS, 12 percent juice, and 0.3 percent acidity were the most successful, recipes containing 12 percent juice, 12o brix TSS and 0.30 percent acidity respectively.

Tamarind pulp was used by Lakshmi *et al*. (2005) to flavour RTS drinks. The juice (8.0 litres of 12 o Brix) was combined with a syrup of 70 o Brix jaggery at a ratio of 1:1, along with salt (1.0 g/liter). The cumin flavour and cardamom flavour

(4% essential oils dissolved in propyleneglycol) were added after the liquid had been boiling for 2–3 minutes. The mixture was done correctly, the bottle was placed in a hot environment (at least 85°C), and the cap was on tightly. The bottles were then pasteurised in a steam-jacketed kettle at 100°C for 15 minutes. The prepared beverage was deemed to be quite good.

A recipe for generating a whey-based mango-herbal (lemon grass) beverage was devised by Sahu*et al*. (2005). Heat was used to dissolve the sugar (8%) in the whey (32%) and water (38%) mixture. The aforementioned combination was thoroughly combined with the mango pulp (12%) before being strained as a whole. Lemon grass distillate (LGD) in varying percentages of 1, 1.5, and 2.5 percent was added. Glass bottles with the juice inside were filled, sealed, and sterilised for 10 minutes at 121°C. The RTS created with LGD at 1.5 percent had the highest score (8.58/9.0), according to the results. Bangalore Blue and Gulabi kinds of blended grape RTS beverage were used in Bhuvaneswari and Gowda's (2006) work (1:1). The sensory acceptable indicated a 7.5 out of 9.0 score. The jaggery-sweetened beverage was For colour, flavour, taste, and general acceptability, it was determined to be acceptable. Grape blended RTS beverages, such as grape purple grape blend (clarified grape juice was blended with purple grape juice 2:1) and grape phalsa blend (clarified grape juice was blended with phalsa grape juice 1:1), were prepared by Balaswamy *et al*. (2011) [49] and prepared. They were then bottled in the form of plain (by heat preservation) and carbonated.

2.2Juices

A variety of extraction methods are used to obtain the juice, which is mostly composed of sugars, acids, vitamins, minerals, and other ancillary components. They are preserved by freezing and thermal processing. It's common to find fruit juices like apple, pineapple, citrus, grapes, pomegranate, and mango. The juices that have been sweetened are mixtures that contain at least 85% juice and 10% TSS. Acids and sugar are added to balance the acid-to-sugar ratio while increasing the TSS concentration. Several fruit juices are utilised for this. In order to make a pleasant, energising beverage with increased flavour and nutritional balance, two or more juices may occasionally be blended. Fruit juices often have low pH levels, which vary from 2.0 to 4.5. The pH of limes or lemons is the lowest. The fruit's low pH is due to presence of organic acids which varies with different fruit juices.

As fruit juices don't contain any fat and have high potassium and low salt content, they are healthy for the cardiovascular system and help to maintain normal blood pressure. Fruit juices may prevent the development of cancer and the advancement of Alzheimer's disease, according to a number of studies (Delichatsios and Welty, 2005; Matthews, 2006; Rico *et al*., 2007; Dai *et al*., 2006; Cutler *et al*., 2008; Kyle *et al*., 2009; Holt *et al*., 2009) [56-61]

Fruit juices can be clarified or left unclarified (cloudy and pulpy), but clear juices are the most widely consumed. Citrus juices would be the exception to this rule because they are currently manufactured with varied amounts of pulp based on market demand. Fl oats, which are juices or juice blends with big fruit particles floating in them, are another well-liked category of juice products in Asian and Middle Eastern markets. Fruit juices are frequently concentrated to lower shipping costs and stabilise the final product. As less water is used while making concentrates, there is more flexibility in the product formulation process and they are frequently more convenient for goods that contain juice. To restore concentrated juice to its original single strength, dilute it once more. There are many standardized juice products available on the market, including apple, orange, and mango juice, depending on the type of fruit used in production

2.3 Nectar

Fruit nectar has a reputation for being healthier in supermarkets than many of the processed juices available there for a number of years now. This is because it is important to create fruit nectar with an eye on its market value and health advantages. Processing nectar is fairly simple, and according to the Fruit Products Order (FPO) or Food Safety and Standards Authority of India (FSSAI) standard, nectar should have 20% fruit juice, 15% sugar, and 0.3% acidity (Ahmad, 2012) [21]. Tropical fruit pulp, including mango, litchi, guava, papaya, citrus fruits, and pineapple, is used to make nectar by adding sugar, acid, and other components. More than 3.5% of the nectar's acidity should be in the form of anhydrous citric acid. Sorbic acid at 50 ppm is the maximum permitted level of preservative in nectar. The sodium or potassium salt of sorbic acid is used to add the sorbic acid. Additionally, nectar isn't diluted before being consumed. Nectar also has a thick texture and a hazy look. Nectar and other beverages are cloudy because they include polysaccharides like pectin, cellulose, and hemicellulose and starch.

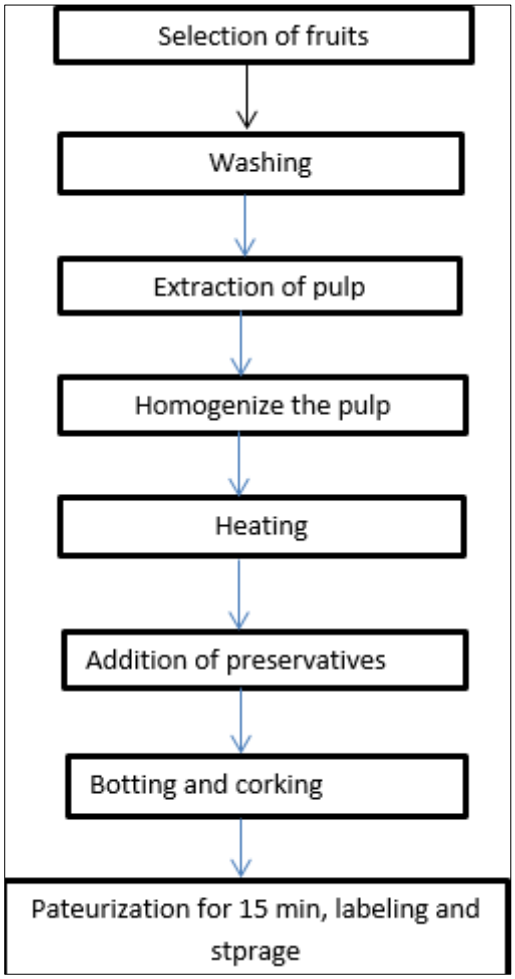

Fig 1: Process of nectar

Dilutable Drinks

Dilutable beverages are those that can be taken after being mixed with appropriate diluents, such as water, alcoholic beverages, or milk. Making these drinks follows a procedure that is relatively similar to that used to make syrup for fizzy beverages. Here, we'll talk about two popular items that fall under the category of dilutable beverages. Cordial Fruit juice cordial is a sparkling, clear, sweetened fruit beverage in which all pulp and other suspended elements have been entirely removed. Clarified fruit juice is combined with sugar syrup, acid, and other components to make cordial. The cordial's acidity shouldn't be higher than 3.5% in the form of anhydrous citric acid. 350 ppm of sulphur dioxide or 600 ppm is the maximum permitted level of preservative in cordial.

Squashes and Crushses Squash is the result of combining a precise amount of fruit juice or pulp with sugar, acid, and other components. According to FSSA requirements, squash must have a minimum of 25% fruit content in the finished product and a minimum of 40 Brix for the total soluble solids content. These beverages use sodium benzoate.

3. Benefits of beverages based on temperate fruits

The worldwide recommendations for fruits and vegetables range from 100 to 450 grammes per day, yet a vast majority of people do not meet these requirements. According to the WHO's minimal guideline, just 55% of the world's population had access to average fruit and vegetable availability in 2015. Fruit includes bioactive components that protect against chronic diseases, cancer, early death, coronary heart disease, and reduce the risk of strokes, which helps lower the risk of disease. Fruit juices contain little potassium and sodium, which helps to keep blood pressure within normal range. Due to their minimal fat content, they are also heart healthy. Functional foods are those that, when regularly consumed, "Have potential positive effects on health beyond basic nutrition," when included in a diversified diet and at effective amounts.

According to Jiménez-Moreno, Esparza, Bimbela, Ganda, and AncnAzpilicueta and Peng *et al*. (2020) [20], functional foods have added value due to their increased content of health-promoting compounds, decreased amount of undesirable components, and/or addition of new ingredients with technological properties. In reality, since they include large amounts of bioactive substances that prevent various harmful physiological processes including metabolic and cardiovascular disorders, fruits and vegetables alone can be termed functional foods (Peng *et al*., 2020) [22]. Functional foods can be divided into three categories: foods with bioactive substances naturally present (such as dietary fibre); foods with bioactive substances added (such as probiotics); and derived food ingredients added to conventional foods (e.g. prebiotics).

Prebiotics are "non-viable dietary components that bestow health benefit(s) on the host linked with regulation of the microbiota," while probiotics are "living bacteria that, when taken in an acceptable number, confer a health advantages on the host," according to the WHO. As a result, creating functional fermented fruit drinks or using fruits as probiotic carriers is a tempting alternative for people who are vegan, lactose intolerant, or allergic to milk.

The Rosaceae family includes the peach (*Prunus persica* (L.) Batsch), which has roots in China dating back to 1100 B.C. (2013) (Davidovi, S. M.; *et al*.), It trails only apples and pears in terms of commercial importance within this family (Font I Forcada; Gradziel; *et al*., 2014) [62]. It is one of the most variable species of fruit, with the most commercial cultivars, assuming various shapes, sizes, flesh (red, white, or yellow flesh), types of skin, and the seed, among other variable elements of this well-liked fruit, representing a varied worldwide germplasm. (M. Faust and B. Timon 1995) According to how much flesh adheres to the stone, it can be split into two categories: freestone and clingstone. Mesocarp states that both can have flesh that is either white or yellow.

This fruit is a significant source of the antioxidants chlorogenic and neochlorogenic acids, catechin, epicatechin, cyanidin, and derivatives of quercetin, as well as vitamins A, B, and C, carotenoids, and phenolic compounds. O. E. Campbell, O. I. The type and quantity of these phytochemicals, as well as the chemical makeup of the peach, are undoubtedly influenced by and vary depending on a number of variables, including genotype, geographic and climatic conditions, seasonal and weather patterns, agronomic practises, maturity stage, storage conditions, and processing methods. (2015) Liu, H., Cao, J., and Jiang Also, it has been established over time that phytochemicals are not evenly distributed throughout the tissue of the fruit, with the majority of them concentrated in the peel, notably in the epidermal and subepidermal layers. (Cantn, C.M.; Moreno, M.A.; Gogorcena, Y. *et al*., 2014) [62] In conclusion, peel has larger concentrations of phenolic compounds and other antioxidants than flesh tissue, which is consistent with the protective function given to the peel. (Gil, M. I., F. A. Tomás-Barberán, *et al*., 2002) The peach is a fruit that is enjoyed all over the world and has already been categorised based on its phenolic content.

Despite the peach being exceptionally nutrient-dense and popularly consumed worldwide, little is known about it. The phenolic profile of peach cultivars can be used to categorise them, and this profile also indicates how healthy a particular cultivar is. Due to their anti-inflammatory, antibacterial, and antioxidant capabilities, phenolic compounds have long been the focus of several investigations. The nutritional and phytochemical qualities of the peach will be discussed throughout this review, along with any potential health benefits. We'll concentrate mostly on phenolic chemicals and their advantages for health. They are crucial in some diseases cancer, metabolic and cardiovascular pathologies, Parkinson's and Alzheimer's illnesses, and others that are quite prevalent nowadays can all be prevented. In this article, we'll start with a discussion of the fruit's chemical components, including its macro- and micronutrients, phytochemicals, and phenolic compounds, which will be highlighted later on in relation to their potential health advantages.

Pears have been used for a variety of medical purposes in East Asia, including Korea, Japan, and China, including the relief of respiratory symptoms, the control of fevers, the treatment of inflammation, and the relief of alcohol hangovers. (2013) Min TS, Park MJ, *et al*. Pears have been used specifically for meat digestion, such as a beef tenderizer in cooking and as a dessert after eating Bulgogi, a type of Korean barbecue. In addition, new scientific research has supported the traditional use of pears for treating alcohol hangovers. That is, investigations conducted in both vitro and *in vivo* revealed that Korean pears (P. pyrifolia cv. Shigo) stimulate key enzymes involved in alcohol metabolism and reduce body burdens of alcohol and aldehyde (Lee H, Isse T, Kawamoto T,

Woo H, Kim AK, Park JY, *et al*. 2012). Also, clinical investigations showed that the pears reduce hangover signs (Lee H. Isse t, Kawamoto T, Baik HW, Park JY, Yang M, 2013) [54]. Also, a number of investigations involving chemical analysis, nutritional variables, *in vitro*, *in vivo*, and human studies have lately revealed new medical uses for pears (Reiland H, Slavin J, 2015) [63]. Pears may have novel medical uses if their historical uses and regional applications are well understood. In order to present current information about functional studies of pears, together with historical and regional uses, we therefore carried out a thorough review.

Pears are described as being chilly, sweet, slightly sour, and safe in a Chinese pharmacological encyclopaedia, but excessive eating can make individuals weak and cause diarrhoea. Pears also have a wide variety of purposes in China. The book continues, "For major treatment, they treat fever, stifle cough, and quench thirst." Slices of pears are applied to burn burns to relieve pain and stop decomposition. They are helpful for urine and defecation, as well as for dysarthria brought on by irregular fever, stroke, and hypothermia. They also help to reduce ague-related fever. They relieve the emotional and physical symptoms of hyperpyrexia, such as dyspnea and chest tightness. They also detoxify abscesses and alcohol poisoning and further moisturise the lungs, cool the heart, eliminate sputum, and remove mucus. Pear flowers were said to cleanse dirt on a face, A decoction of pear tree bark is beneficial for treating seasonal illnesses brought on by the cold weather. The leaves were utilised for scrotal hernia treatment, while crushed leaf extracts were used to cure mushroom poisoning (Li S Ben Cao Gang Mu, 2018). characteristics of pears and their many uses in China, specifically that pears.

Apricots are a type of stone fruit that are high in carbohydrates and a good source of fibre, minerals, and vitamins. According to Leccese *et al*. (2007) [68], fresh apricots contain between 11 and 13 percent carbohydrates and offer 50 kcals of energy per 100g. Also, it is abundant in bioactive phytochemicals, which have specific roles in the biological system and are useful in reducing oxidative stress (Leccese *et al*., 2007) [68]. Moreover, apricots have a respectable quantity of dietary fibre, which ranges from 1.5 to 2.4 grammes per 100 grammes of fresh weight. In animal model experiments, apricot fibre dramatically increased faecal output, stimulating proper stomach motility and giving the meal consumed the appropriate roughage and volume (Akin *et al*. 2007; Tamura *et al*. 2011) [69]. Fiber also helps people stay regular and reduces constipation. Soluble fibre decreases blood cholesterol, keeps blood sugar levels stable, and aids in weight loss. Various levels of necessary minerals are present in apricots. Potassium, phosphorus, calcium, magnesium, iron, and selenium are the main elements (Munzuroglu *et al*., 2003; Ali *et al*., 2011) [70, 71], with little levels of sodium, manganese, zinc, and copper also being present (Lichou *et al*., 2003; USDA, 2010) [72]

The pro-vitamins A, C, K, E, thiamin (B1), riboflavin (B2), niacin (B3), pyridoxine (B6), folic acid (B9), and pantothenic acid are also present in apricots. Malic acid (500-900mg/100g) and citric acid (30-50mg/100g) are the two main organic acids found in apricots (Gurrieri *et al*. 2001) [73], although tartaric, succinic, oxalic, galacturonic, quinic, malonic, acetic, and fumaric acids have also been noted (Hasib *et al*., 2002) [74]. From a dietary perspective, organic acids keep the intestine's acid-base balance in check and enhance iron's absorption. In the flesh, proteins and lipids are present in very small levels, but the apricot kernel contains significant amounts of both-20–30% and 40–52%, respectively (Alpaslan and Hayta, 2006) [75]. The apricot fruit's typical protein and fat content is 1.4-2.0% and 0.4-0.6%. Between 40 and 52 percent of a seed's weight contains oil, which is high in unsaturated fatty acids (Alpaslan and Hayta, 2006) [75].

4. Processing of fruits

One of the most significant segments of the whole processed fruit sector is juice and juice products. With an increased focus on usefulness, health benefits, novel tastes or blends, and in some cases fortification with vitamins and minerals, juice products are being sold as chilled, shelf-stable, and frozen, in a variety of containers. A supply of premium raw materials is necessary for high-quality juice production.

Fruit juices are frequently employed in the brewing of various libations. Fruits' structure and composition will influence how their juice is extracted, which will vary from fruit to fruit. Typically, fresh fruit is crushed and pressed to obtain the juice from it. When juice is extracted from fruits that include sacs or cells containing the juice, the other fruit tissues that contain the sacs or cells are also fractured or crushed. By using a suitable extraction technique, it is best to prevent the mingling of these extraneous substances with the juice (Shah and Nath, 2006) [64]. Enzyme-assisted fruit juice extraction, clarity, liquefaction, and maceration were examples of modernized fruit juice processing procedures for the full extraction of fruit juices are offered (Kadam *et al*., 2014) [65].

The natural juice is processed to create squash and RTS. Fruits with excessive pulp and pectin, such as sapota, guava, banana, jamun, apple, and noni, require pretreatments to hydrolyze pectin components in order to maximise juice recovery (Srivastava and Kumar, 2004). Fruits were introduced to the pectinase and cellulose enzymes together with hot water during the extraction of apple pomace, which increased the juice yield by up to 37%. Apple mush is initially treated with pectinases to produce the premium juice; this is followed by pomace liquefaction action created with a combination of several pectinases and cellulases for the entire drawing out of the juice process (Will *et al*. 2000) [66]. The noni fruits were stored in a freezer. Intercellular chemicals in noni fruits were producing ice crystals, which were then used to crush the fruits when they thawed and extract the juice from the cells. It works well and yields premium noni juice. As comparison to fresh noni juice, the extracted noni juice has a higher concentration of antioxidants, total phenolics, and ascorbic acid. Depending on the fruit type, the freeze-juicing procedure yields a total juice yield of 45–47 percent by weight; the sugar content is roughly that same. content and pH value of the juice are 8 - 11 percent and 3.8 - 4.0 respectively (Thirukkumar *et al*., 2017) [67].

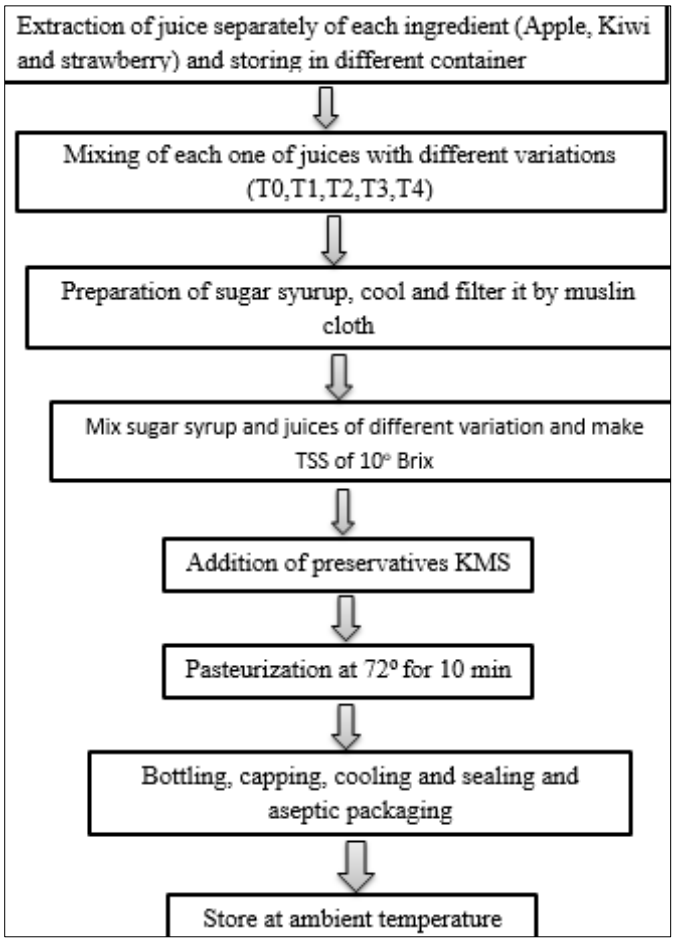

Fig 2: Processing of fruit juices

5. Physiochemical properties of RTS beverage

pH

For the blended beverage made with aloe vera and bael fruit, it was found that pH drops as titrable acidity rises (Sashikumar 2015) [24]. The palmyrah RTS beverage had a pH of 3.7%. (Nilugin and Mahendran 2011) [25]. According to Sasi Kumar *et al*. (2013) [26], as storage time increases, the pH of medicinal blended beverages drops wih increase in storage time.

pH changes as a result of changes in chemical characteristics. The pH of the coconut blended beverage is lowered by the addition of lemon juice (Chauhan *et al*. 2014) [27]. The pH of a blended beverage including various amounts of guava, papaya, pineapple, and karonda juices ranges from 3.03 to 4.48 and decreases as karonda juice concentration rises (Shaheel *et al*. 2015) [28]. According to Hamid *et al*. (2014) [29], there is no discernible difference between the pH and titrable acidity of the beverage made from an aloe vera blend. Researchers discovered that the pH of a nutritious beverage made from medicinal herbs falls as storage time increases (Hirdyani 2015) [30]. At refrigeration temperatures, it was discovered that the pH of cashew apple beverage remained unaltered (Tamuno and Onyedikachi 2015) [31].

Acidity

It was noted that the aloe vera and bael fruit blended beverage's increased acidity was caused by the inclusion of a particular amount of citric acid (Sashikumar 2015) [24]. It has been demonstrated that the titrable acidity rises as palmyrah pulp concentration rises (Nilugin and Mahendran 2011) [25]. Therapeutic blended beverages' acidity diminishes as storage duration increases (Sasi Kumar *et al*. 2013) [26]. When orange blended date squash is stored, its titrable acidity drops from 1.02 to 0.86%. (Khan *et al*. 2018) [32]. An underused fruit called Ceylon olive was used to make RTS beverage, and its qualities were investigated. According to the study, there is a modest increase in acidity at room temperature (Priyanthi *et al*. 2008) [33].

Total soluble solids

Blended beverages showed the least rise in TSS as a result of the hydrolysis of polysaccharides into mono- and disaccharides (Sashikumar 2015) [24]. The content of palmyrah pulp increases from 8 to 16% Brix, but the total soluble solids stay the same (Nilugin and Mahendran 2011) [25]. TSS value for orange blended date squash increases with storage from 48.58 to 51.31 Brix (Khan *et al*. 2018) [32]. The healthy beverage's TSS was found to have increased by 2.4 Brix after being made with kinnow juice, basil extract, and ginger (Hirdyani 2015) [30]. According to a 2018 study by Punde *et al*., TSS diminishes after 120 days of pomegranate RTS storage.

Ascorbic acid

When combined with other fruits for RTS preparation, bael fruit was found to improve their nutritional quality in terms of ascorbic acid (Sashikumar 2015) [24]. When analysing the ascorbic acid content of eight different drinks, it was shown that splash blend retains the most ascorbic acid after 20 days of storage (Castro-Lopez *et al*. 2016) [35]. According to Chauhan *et al*. (2014) [27], when mature coconut water and lemon juice are combined, the ascorbic acid level reduces by 5%. After a two-year term of storage, the ascorbic acid in orange date blended squash decreases by up to 60%. (Khan *et al*. 2018) [32]. For 90 days of storage, an RTS beverage made with aloe vera completely lost all of its ascorbic acid (Talib *et al*.2016) [37]. It has been demonstrated that the effects of high pressure processing on ascorbic acid in fruit juice drinks (Jayachandran *et al*. 2015) [38]. Throughout its four-month period of storage, the Aonla fruit RTS beverage's ascorbic acid level declined (Kumar 2018) [39].

Microbial loading of natural RTS beverage

The juice mix ratio of (60:40 aloe vera, bael fruit) was found to have the lowest range in total-viable count (Sashikumar 2015) [24]. The findings of the microbiological test demonstrated that microbial contamination had not damaged the quality of the palmyrah RTS drinks. After conducting a microbiological investigation on an aloe vera juice blend, it was discovered that the 40% juice blend had a lower microbial burden than the other blends during storage for three months (Hamid *et al*. 2014) [29]. Mishra *et al*. (2012) [40] identified that the microbial load for amla-grape juice is very low below the safety level. A matured tropical almond RTS beverage was made, and many qualities were researched. It was discovered that no microbial colonies had formed even after six months of storage (Weerasekara *et al*. 2015) [41]. Cape gooseberries were investigated for their storage stability at room temperature and under refrigeration in 2018 by (Hemalatha *et al*). It was discovered that the microbiological content was within acceptable ranges and that the fruit was safe to eat.

Sensory quality of RTS beverages

The results of the blended beverage show that as the storage period advances, the colour and organoleptic taste ratings decline (Sashikumar 2015) [24]. According to Nilugin and Mahendran (2011) [25], there are some noticeable differences across treatments in terms of various physical characteristics. Six months of storage was observed to result in a decline in the aloe vera blend's sensory qualities (Sasi Kumar *et al*. 2013) [26]. It was discovered that adding lemon juice to mature coconut water improves the drink's sensory appeal (Chauhan *et al*. 2014) [27]. With increased storage and temperature, orange-date squash loses some of its sensory appeal (Khan *et al*. 2018) [32]. It is discovered that the mixed beverage made with litchi has a superior sensory score and a high acceptance (Jayachandran *et al*. 2015) [38]. The sensory attributes is examined, and it is shown that the cashew-pineapple-mango blend has a good sensory rating (Roy *et al*. 2016) [43]. Total soluble solids (14.26), acidity (0.34%), total phenols (21.75, 22.59, and 39.10 mg%), as well as vitamin C and amino acids, were determined to have a high level of sensory acceptability in the healthy functional beverage (Sharma *et al*. 2014) [44].

Shelf-life studies of RTS beverages

Studies on shelf-life are carried out by keeping the beverage at various temperatures, including ambient and chilled. The shelf life of the product is also influenced by the packaging. Glass bottles, PET bottles, tin, and tetra packs are the most often used packaging materials. The functional beverage from Aonla and Bael was suggested for use by kids, teenagers, and the elderly and was extended to 90 days of storage in PET bottles at a chilled temperature (Sashikumar 2015) [24]. The palmyrah RTS beverage can be kept at a temperature of 30 to 28C for six months (Nilugin and Mahendran 2011) [25]. Aloe vera gel, aonla, and ginger juices were combined to make a blended RTS beverage that could be kept for four months without losing any of its chemical or sensory properties. Sasi Kumar and others (2013) [26]. The flavoured drink prepared from mature coconut water and lemon juice At low, normal, and high temperatures (37_C), have a shelf life of six months, which is adequate for household use as well as export (Chauhan *et al*. 2014) [27]. Aloe vera and pear juice-based RTS drinks can be consumed for 60 days when kept cold (Talib *et al*. 2016) [37]. The shelf life of the cashew-based beverage was discovered to be 60 days (Roy *et al*. 2016) [43]. At refrigeration temperature, it was discovered that the health beverage made from a beetroot-orange combination had a shelf life of more than 30 days (Dambalkar *et al*. 2015) [4]. It was determined that the shelf life of RTS beverage manufactured from medicinal plants (Kinnow juice, Basil extract, and ginger) is 10 days, after which time its acceptability declines (Hirdyani 2015) [30].

Conclusion

Fruits are a good source of many necessary nutrients that are an important part of our daily diet, including minerals, vitamins, phytochemical compounds, and many more. Daily fruit consumption helps build the strongest immune system and keeps illnesses at bay. Of the other nations, India is the one that produces the most fruits and vegetables. Produced fruits are subsequently processed into various sorts of value-added products in order to prevent post-harvest losses. According to the results of the experiment, apple, kiwi, and strawberry can be effectively used in the creation of blended RTS beverages with possible health benefits. A sensory assessment of storage indicated that blended RTS beverages kept in refrigeration were generally well-liked. Finally it could be suggested that the developed blended fruit based RTS beverage can be explored for commercial utilization.

7. References

1. Carbonell-Capella JM, Buniowska M, Esteve MJ, Frigola A. Effect of Stevia rebaudiana addition on bioaccessibility of bioactive compounds and antioxidant activity of beverages based on exotic fruits mixed with oat following simulated human digestion. Food Chemistry. 2015;184:122-130.
2. Chandra N, Hegde K, Dhillon GS, Sarma SJ. Fruit based functional beverages: Properties and health benefits. Agricultural Research Updates; c2014.
3. Ayed L, M'hir S, Hamdi M. Microbiological, biochemical, and functional aspects of fermented vegetable and fruit beverages. Journal of Chemistry; c2020. p. 1-12.
4. Pathak B, Abrol G, Verma S. Studies on development of honey Malta ready-to-serve beverage and its quality evaluation during storage. Journal of Hill Agriculture. 2018;9(3):352-355.
5. Gupta R, Malav M, Kushwaha NK, Pandey A. Studies on organoleptic qualities of orange based blended ready-to-serve (Rts) beverages. Studies. 2015;10(3):1041-1043.
6. Drogoudi PD, Pantelidis G. Effects of position on canopy and harvest time on fruit physico-chemical and antioxidant properties in different apple cultivars. Scientia Horticulture. 2011;129(4):752-760.
7. Kanchan SS, Agarkar BS, Sawate AR. Studies on standardization of blended RTS based on apple and orange juice; c2020.
8. Wolfe K, Wu XZ, Liu RH. Antioxidant activity of apple peels. Journal of Agricultural Food Chemistry. 2003;51:609-614.
9. Knekt P, Helibvaara M, Ja Yvinen R, Sepp Snen R, Teppo L, Pukkala E *et al*. Dietary flavonoids and the risk of lung cancer and other malignant neoplasm. American Journal of Epidemiology. 1997;146:223-230.
10. Kris-Etherton PM, Hecker KD, Bonanome A, Coval SM, Binkoski AE, Hilpert KF, *et al*. Bioactive compounds in foods: their role in the prevention of cardiovascular disease and cancer. American Journal of Epidemiology. 2002;113:71-88.
11. Rathod PS, Machewad GM, Deshpande HW. Storage study of prepared probiotic beverage by blending apple and orange juice. Journal of Pharmacognosy and Phytochemistry. 2017;6(6):2372-2375.
12. Naczk M, Shahidi F. Phenolics in cereals, fruits and vegetables: Occurrence, extraction and analysis. Journal of pharmaceutical and biomedical analysis. 2006;41(5):1523-1542.
13. Escarpa A, Gonzalez MC. High-performance liquid chromatography with diode-array detection for the determination of phenolic compounds in peel and pulp from different apple varieties. Journal of chromatography A. 1998;823(1-2):331-337.
14. Wijngaard HH, Rößle C, Brunton N. A survey of Irish fruit and vegetable waste and by-products as a source of polyphenolic antioxidants. Food Chemistry. 2009;116(1):202-207.

15. Lu Y, Foo LY. The polyphenol constituents of grape pomace. Food chemistry. 1999;65(1):1-8.
16. Foo LY, Lu Y. Isolation and identification of procyanidins in apple pomace. Food Chemistry. 1999;64(4):511-518.
17. Delzenne NM, Neyrinck AM, Cani PD. Modulation of the gut microbiota by nutrients with prebiotic properties: Consequences for host health in the context of obesity and metabolic syndrome. Microbial Cell Factories. 2011;10:1475-2859.
18. Moco S, Martin FPJ, Rezzi S. Metabolomics view on gut microbiome modulation by polyphenol-rich foods. Journal of proteome research. 2012;11(10):4781-4790.
19. Yan H, Kerr WL. Total phenolics content, anthocyanins, and dietary fiber content of apple pomace powders produced by vacuum-belt drying. Journal of the Science of Food and Agriculture. 2012, 19(10).
20. Roberts W. Benefitting beverages. Prepared Foods. 2009;56:32-35.
21. Kausar H, Saeed S, Ahmad MM, Salam A. Studies on the development and storage stability of cucumber-melon functional drink. J. Agric. Res. 2012;50(2):239-248.
22. Peng M, Tabashsum Z, Anderson M, Truong A, Houser AK, Padilla J, *et al*. Effectiveness of probiotics, prebiotics, and prebiotic-like components in common functional foods. Comprehensive reviews in food science and food safety. 2020;19(4):1908-1933.
23. Springmann M, Mason-D'Croz D, Robinson S, Wiebe K, Godfray HCJ, Rayner M, *et al*. Mitigation potential and global health impacts from emissions pricing of food commodities. Nature Climate Change. 2017;7(1):69-74.
24. Sashikumar R. Studies on effect of processing quality and storage stability of functional beverages prepared from aloe vera, blended with bael fruit. Int. J Food Qual. Safety. 2015;1:39-44.
25. Nilugin S, Mahendran T. Preparation of ready-to-serve (RTS) beverage from palmyrah (*Borassus flabellifer* L.) fruit pulp. J Agri Sci. Sri Lanka. 2011;5(2):80-88.
26. Sasi Kumar R, Ray R, Paul P, Suresh C. Development and storage studies of therapeutic ready to serve (RTS) made from blend of Aloe vera, Aonla and ginger juice. J Food Process Technol. 2013;4(232):2.
27. Chauhan O, Archana B, Singh A, Raju P, Bawa A. A refreshing beverage from mature coconut water blended with lemon juice. J Food Sci. Technol. 2014;51(11):3355-3361.
28. Shaheel S, Swami D, Kumar BP, Krishna KU. Effect of blending of Karonda (*Carissa carandas* L) juice with guava, papaya and pineapple juices on its quality and organoleptic evaluation. Plant Arch. 2015;15(1):187-192.
29. Hamid GH, El-Kholany EA, Nahla EA. Evaluation of Aloe vera gel as antioxidant and antimicrobial ingredients in orange carrot blend nectars. Middle East J Agri Res. 2014;3(4):1122-11340.
30. Hirdyani H. Development and quality evaluation of RTS (ready to serve) beverages made from traditional Indian medicinal plants. J Nutrit Food Sci. 2015;S13:1.
31. Tamuno ENJ, Onyedikachi EC. Effect of packaging materials, storage conditions on the vitamin C and pH value of cashew apple (*Anacardium occidentale* L) juice. J Food Nutrit Sci. 2015;3(4):160-165.
32. Khan MA, Hashmi MS, Muhammad A, Muneeb M, Bilal H, Wali G. Development and storage study of orange date blended squash. Sarhad J Agri. 2018;34(3):509-515.
33. Priyanthi H, Thilakarathne B, Prasanna P. Development of a Ready to Serve (RTS) Drinking Using Veralu/Ceylon Olive (*Elaeocarpus serratus*) M.Sc. Thesis. Rajarata Universuty, Sri Lanka; c2008. p. 35-56.
34. Punde M, Gadhe K, Shere D. Studies on storage stability of sugar beet (Beta vulgaris) Jaggery added pomegranate RTS beverage. J Pharmacog. Phytochem. 2018;7(3):755-758.
35. Castro-Lo´pez C, Sa´nchez-Alejo E, Saucedo-Pompa S, Rojas R, Aranda-Ruiz J, Martı´nez-Avila G. Fluctuations in phenolic content, ascorbic acid and total carotenoids and antioxidant activity of fruit beverages during storage. Heliyon. 2016;2(9):e00152.
36. Khan MI, Harsha PS, Chauhan A, Vijayendra S, Asha M, Giridhar P. Betalains rich *Rivina humilis* L berry extract as natural colorant in product (fruit spread and RTS beverage) development. J Food Sci. Tech. 2015;52(3):1808-1813.
37. Talib MI, Wayal RR, Parate VR. Development of Aloe-vera based Ready to Serve Soft drink. In: Souvenir, Int. Conference on Global Trends in Engineering, Tech. Mgt; c2016. p. 216-233.
38. Jayachandran LE, Chakraborty S, Rao PS. Effect of high pressure processing on physicochemical properties and bioactive compounds in litchi based mixed fruit beverage. Innov Food Sci. Emerg. Technol. 2015;28:1-9.
39. Kumar R. Studies on process standardization and storage behaviour of ready to serve (RTS) beverage prepared from aonla cultivars. J Pharma Phytochem. 2018;7(6):74-77.
40. Mishra V, Puranik V, Singh V, Verma M, Yadav N, Rai G. Development of vitamin C rich value added beverage. Am J Food Technol. 2012;7(4):222-229.
41. Weerasekara W, Rathnayaka R, Saranandha K. Preparation of ready-to-serve beverage from tropical almond (*Terminalia cattappa*) fruit pulp. Trop Agri Res Extens, 2015, 15(4).
42. Hemalatha R, Kumar A, Prakash O, Supriya A, Chauhan A, Kudachikar V. Development and quality evaluation of ready to serve (RTS) beverage from cape gooseberry (*Physalis peruviana* L.). Beverages. 2018;4(2):42.
43. Roy A, Kumar BP, Swami D, Subbramamma P. 'Cashew apple' juice blend with mango, pineapple and sapota for improving quality of RTS beverages and economic feasibility thereof. J Horti Sci. 2016;11(1):37-43.
44. Sharma SK, Yadav VK, Rao VK, Dixit AK. Enhancement of healthpromoting properties while substituting exogenous citric acid by seabuckthorn (H *ippophae salicifolia*) pulp in preparation of sweet orange (citrus sinensis) ready to serve beverage. J Food Process Preserv. 2014;38(4):1427-1438.
45. Dhaliwal M, Hira C. Effect of storage on physico-chemical and nutritional characteristics of carrot-spinach and carrot-pineapple juices. J Food Sci. Technol. 2004;41(6):613-617.
46. Kale R, Sawate A, Kshirsagar R, Mane R. Studies on development and organoleptic evaluation of beetroot-tamarind RTS beverage. Int. J Chem. Studies. 2018;6(2):2974-2976.
47. Dambalkar V, Rudrawar B, Poojari V. Study of physicochemical properties and sensory attributes of beetroot-orange RTS drink. Int. J Sci. Res.

2015;4(10):589-594.
48. Renuka B, Kulkarni S, Vijayanand P, Prapulla S. Fructooligosaccharide fortification of selected fruit juice beverages: Effect on the quality characteristics. LWT-Food Sci. Tech. 2009;42(5):1031-1033.
49. Balaswamy K, Prabhakara Rao P, Nagender A, Akula S. Preparation of sour grape (*Vitis vinifera*) beverages and evaluation of their storage stability. J Food pro Tech. 2011;2(3):105-104.
50. Aware D, Kotecha P. Studies on properties and storage of muskmelon RTS beverage. Bioinfolet-A Quart J Life Sci. 2018;15(2):223–225.
51. Ghimire S. Development of Watermelon Based Aloe Vera Ready-To-Serve (RTS) Beverage (Doctoral dissertation, Centre of Food Science and Technology Institute of Agricultural Sciences Banaras Hindu University Varanasi; c2017.
52. Henning B, Lu X, Melia T, Murayama H. 2, 84, 30, 993, 560, 15456, 11962, 261485,.: higher dimension operators in the SM EFT. Journal of High Energy Physics. 2017 Aug;2017(8):1-24.
53. Pushpa BR, Anand C, Nambiar PM. Ayurvedic plant species recognition using statistical parameters on leaf images. International Journal of Applied Engineering Research. 2016;11(7):5142-7.
54. Ju BX, Yu M, Fu J, Yang Q, Liu XQ, Zheng X. A novel porous *Magneto rheological* elastomer: preparation and evaluation. Smart Materials and Structures. 2012 Feb 2;21(3):035001.
55. Chitra R, Kotliar G. Effect of long range coulomb interactions on the Mott transition. Physical review letters. 2000 Apr 17;84(16):3678.
56. Delichatsios HK, Welty FK. Influence of the DASH diet and other low-fat, high-carbohydrate diets on blood pressure. Current atherosclerosis reports. 2005 Nov;7(6):446-54.
57. Matthews G, Emo AK, Funke G, Zeidner M, Roberts RD, Costa Jr PT, Schulze R. Emotional intelligence, personality, and task-induced stress. Journal of experimental psychology: applied. 2006 Jun;12(2):96.
58. Rico D, Martin-Diana AB, Barat JM, Barry-Ryan C. Extending and measuring the quality of fresh-cut fruit and vegetables: a review. Trends in Food Science & Technology. 2007 Jul 1;18(7):373-86.
59. Dai A. Precipitation characteristics in eighteen coupled climate models. Journal of climate. 2006 Sep 15;19(18):4605-30.
60. Cutler JA, Sorlie PD, Wolz M, Thom T, Fields LE, Roccella EJ. Trends in hypertension prevalence, awareness, treatment, and control rates in United States adults between 1988-1994 and 1999-2004. Hypertension. 2008 Nov 1;52(5):818-27.
61. Kyle RA, Rajkumar SV. Criteria for diagnosis, staging, risk stratification and response assessment of multiple myeloma. Leukemia. 2009 Jan;23(1):3-9.
62. Font i Forcada C, Gradziel TM, Gogorcena Y, Moreno MÁ. Phenotypic diversity among local Spanish and foreign peach and nectarine [*Prunus persica* (L.) Batsch] accessions. Euphytica. 2014 May;197:261-77.
63. Reiland H, Slavin J. Systematic review of pears and health. Nutrition today. 2015 Nov;50(6):301.
64. Shah NS, Nath N. Effect of calcium lactate, 4-hexyl resorcinol and vacuum packing on physico-chemical, sensory and microbiological qualities of minimally processed litchi (*Litchi chinensis* Sonn.). International journal of food science & technology. 2006 Nov;41(9):1073-81.
65. Kadam ST, Kumar R. Twenty first century cooling solution: Microchannel heat sinks. International Journal of Thermal Sciences. 2014 Nov 1;85:73-92.
66. Will J, Mitterdorfer A, Kleinlogel C, Perednis D, Gauckler LJ. Fabrication of thin electrolytes for second-generation solid oxide fuel cells. Solid State Ionics. 2000 Jun 1;131(1-2):79-96.
67. Thirukkumar S, Vennila P, Maheswari TU. Investigation of total antioxidant activity and phenol in Indian noni fruit (*Morinda citrifolia* Linn.) juice extraction. Journal of Pharmacognosy and Phytochemistry. 2017;6(2):241-3.
68. Leccese A, Bartolini S, Viti R. Total antioxidant capacity and phenolics content in apricot fruits. International Journal of Fruit Science. 2007 Dec 17;7(2):3-16.
69. Tamura K, Peterson D, Peterson N, Stecher G, Nei M, Kumar S. MEGA5: molecular evolutionary genetics analysis using maximum likelihood, evolutionary distance, and maximum parsimony methods. Molecular biology and evolution. 2011 Oct 1;28(10):2731-9.
70. Munzuroglu O, Karatas F, Geckil H. The vitamin and selenium contents of apricot fruit of different varieties cultivated in different geographical regions. Food Chemistry. 2003 Nov 1;83(2):205-12.
71. Ali S, Champagne DL, Spaink HP, Richardson MK. Zebrafish embryos and larvae: A new generation of disease models and drug screens. Birth Defects Research Part C: Embryo Today: Reviews. 2011 Jun;93(2):115-33.
72. Lichou J, Jay M, Vaysse P, Lespinasse N. Recognising apricot varieties. Recognising apricot varieties. 2003.
73. Gurrieri F, Audergon JM, Albagnac G, Reich M. Soluble sugars and carboxylic acids in ripe apricot fruit as parameters for distinguishing different cultivars. Euphytica. 2001 Feb;117(3):183-9.
74. Hasib A, Jaouad A, Mahrouz M, Khouili M. Hplc determination of organic acids in Moroccan apricot determinación por hplc de ácidos orgánicos en albaricoque marroquí determinación por hplc de ácidos orgánicos en albaricoque marroquí. CYTA-Journal of Food. 2002 Jul 1;3(4):207-11.
75. Alpaslan M, Hayta M. The effects of flaxseed, soy and corn flours on the textural and sensory properties of a bakery product. Journal of Food Quality. 2006 Dec;29(6):617-27.