A review on value-added goodies from different major and minor fruits from the perspective of India

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Abstract  
Nutrition and health are gaining significant focus as people seek convenient, nutrient-rich food options. Food processing must be efficient, cost-effective, and durable to meet these demands. Transforming fruits into diverse products using affordable technology can boost the economy for farmers and the nation. Fruit-based goods with high potassium and low salt offer substantial dietary benefits, making them valuable to health-conscious consumers. The present study aimed to study different value-added products from fruits and to increase their shelf life. Perishable fruit has losses during postharvest changes. Different strategies are required to avoid such losses. One method is to transform fruits into value-added goods. The transition of a raw resource or commodity into a processed product by combining raw materials, labour, time, and technology to produce a higher financial return is known as value addition in fruit processing. It focuses on ending hunger, achieving food security, improving nutrition, and promoting sustainable agriculture. Value-added fruit products can contribute to food security by achieving sustainable goals of good health and well-being. The study concluded that value-added fruit products play a vital role in the food industry, benefiting both producers and consumers. They reduce food waste, provide economic opportunities for farmers, and offer consumers convenient, nutritious, and flavourful options. The value-added fruit product market will likely further contributing to the agricultural sector’s sustainability and worldwide consumer well being. This review details the value-added products in fruits.

Keywords: Fruits, Major, Minor fruits, Processing, Product, Value addition

INTRODUCTION  
Fruits are a great source of vitamins and minerals in general. Utilising a variety of seasonal fruits helps people stay healthy and strong by meeting their diverse needs (Lopes et al., 2023). There are, however, a handful of underappreciated fruits with excellent therapeutic properties (Mutlu-Ingok et al., 2020). Future studies into the benefits of these fruit trees for treating human ailments will be enriching. The demand for nutrient-rich, finely flavoured, aesthetically pleasing, and naturally appealing meals with high therapeutic value may be largely met by tropical fruits, which are now underutilised (Ganesh et al., 2022). Fruits that are less well known and less often used have historically been used as a staple food for therapeutic purposes (Aqilah et al., 2023). Due to their therapeutic qualities, fruits, including Jackfruit (Artocarpus heterophyllus), Lasoora (Cordia myxa), Custard Apple (Annona reticulata), Bael (Aegle marmelos), Aonla (Phyllanthus emblica), and Phalsa (Grewia asiatica) are of considerable importance. In certain pharmaceutical firms, just a few of these fruits are used. Since they constitute the poor's primary source of dietary fibre, these fruits are crucial in
the world's fruit output is rising. Inadequate postharvest management results in a substantial percentage of fruit being lost or discarded despite rising worldwide fruit output (Etefa et al., 2022). Focusing research efforts on diversifying and promoting such underutilised fruit crops is an urgent necessity. This might be done by developing suitable processing and marketing techniques for these underutilized fruits, turning them into marketable items (Aqilah et al., 2023; Shrestha et al., 2021). Processing is the most effective way to use excess fruit output during seasonal gluts. Processing's benefits include enabling the transformation of perishable fruit into a valuable form. Different strategies are required to avoid such losses (Osabohien, 2022). To decrease postharvest losses and encourage the consumption of fruits, one strategy is to process fruits into value-added products. Fruits that are very challenging to eat by hand can be processed into various highly palatable fruit products, reducing waste by adding value (Kumar et al., 2020). The underutilized fruits have a lot of potential for food processing and value addition to various goods such as jam, jelly, preserved squash, sweets, pickles, dried goods, etc. A value chain approach is used to find potential avenues for increasing the value of food exports. Fruits are among the earliest foods ingested by humans prehistorically (De Corato et al., 2018). Fruits, whether fresh, dried, or processed, have long been a component of the human diet. Developing nations are urged to expand the variety of food items they export by creating new ones and enhancing the value of current ones. Changing production and processing technologies is only one aspect of expanding the value of food exports; another is connecting to the right marketing networks (Kumar et al., 2020; De Corato et al., 2018). Fruits are undeniably crucial for nutritional security and have a strong potential for value addition and foreign exchange gains. All products that increase the value of raw materials. As a result, the market value rises. A simple physical modification has been used to boost the market value of raw agricultural goods. Cleaning, cutting, drying, packing, smoking, freezing, and preserving are examples of usual value additions. Fruit is not a byproduct but a seasonal product (Srivastava et al., 2017). So, the development of the plant produces fruit. In the fruit processing industry, value addition refers to converting a raw material or commodity into a processed good by utilizing a combination of labour, technology, time, and raw materials that yields a higher profit. Value-added goods include pulp, jams, jellies, pickles, chutneys, fruit juices and concentrates, canned and dried goods, and juice concentrates. Here are some suggestions for adding value to farms. Nowadays, adding value to agricultural goods is common. Using agricultural goods, producers may produce value-added products in addition to jams and jellies (Gupta et al., 2018). Fruit farmers may fry the fruit and use it to make wines, juices, vinegar syrups, and preserves. Grain farmers may also manufacture cereal combinations and infant food. Fruit value addition reduces post-harvest losses of fresh products, increases the storage time of fresh produce, and has fruits throughout the offseason (Sharma et al., 2017). The present work highlights value-added fruit products, which have health benefits and are available during all seasons.

**PRODUCTION STATUS, PROCESSING AND MARKET POTENTIAL**

India ranks behind China as the world's second-largest fruit grower. Fruits are accessible in all seasons due to the country's diversified geography and temperature. In 2018-19, India produced 107.10 million tonnes of fruits (NHB, 2019). In 2021-2022, fruits were 7.09 million hectares and vegetables were 11.28 million hectares. In addition, India is the world leader in banana (Musa spp), papaya (Carica papaya), mango (Mangifera indica) and guava (Psidium guajava) production. Indian fruit production and exports have grown recently (Kumar et al., 2020). India exported fresh goods of US$1.527.60 million in 2021 and 2022, of which US$750.7 million was spent on fruits and US$767.01 million was spent on vegetables. The majority of India's exports go to its neighbours, particularly the UAE, Bangladesh, Pakistan, Saudi Arabia, Sri Lanka, and Nepal. India only makes up around 1% of the global market, but its horticulture products are becoming more and more popular because of advancements in cold chain infrastructure, research, contemporary postharvest technologies, supportive governmental regulations, and quality control techniques (Komesu et al., 2023; Sánchez et al., 2021). According to the Food and Agriculture Organization of the United Nations (FAO, 2019), India was the world's second-largest fruit grower. The largest fruit-producing states in India include Andhra Pradesh, Maharashtra, Madhya Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, and Gujarat. India's fruit output will increase at a CAGR of 3.0% from 97.97 million tonnes in 2018–19 to 107.10 million tonnes in 2021–22 (FAO, 2019). Table 1 represents the production of major and minor fruits. India has enormous export potential because of its huge industrial base. It exported fresh commodities at Rs. 11,412.50 crore (US$ 1,527.60 million) in 2021 and 2022, including fruits valued at Rs. 5,593 crore (US$ 750.7 million). The primary fruits exported are oranges (Citrus sinensis), bananas (Musa spp), pomegranates (Punica granatum), mangoes (Mangifera indica), and grapes (Vitis vinifera) (Sánchez et al., 2021).

Horticulture crops produced around 314.67 million...
The juice part of the fruit is utilized to produce different value-added juice products, ready-to-serve beverages, and syrups. The pulp and seed portion is utilized to make jam, jellies, candies, and preserves (Komesu et al., 2023; Sánchez et al., 2021). These different portions of fruits are comprised of vitamins, antioxidants, minerals, and active constituents and provide health benefits.

**VALUE ADDED PRODUCTS OF FRUITS**

Fruits are divided into major and minor fruit crops based on their added value. Major fruit might be considered the most significant category of fruit. Minor fruits or minor fruit crops are the other significant group of fruit crops. The other important group of fruit crops is minor fruits or minor fruit crops. The most consumed fruits are major and minor fruits are less utilized (Sodhi et al., 2022). Examples of major fruits include mango (*Mangifera indica*), apple (*Malus spp*), banana (*Musa spp*), papaya (*Carica papaya*), peach (*Prunus persica*), and pear (*Pyrus communis*). Minor fruits include Aonla (*Embilica officinalis*), Custard Apple (*Annona squamosa*), Avocado (*Persea americana*), etc. The classification of different fruits on the major and minor basis with their value-added products are explained below.

**DIFFERENT FRUIT PARTS USED FOR VALUE-ADDED PRODUCTS**

Different fruit parts are used to add value to new, innovative products. The different parts of fruits include whole fruit, peel, juice, seed, and pulp. etc. These different portions of fruits have health benefits and antioxidant activities. The whole fruit has vitamins, minerals and active compounds that provide health benefits (Ganesh et al., 2022). The whole fruit is utilized to make different value-added products such as jam, jelly, preserves, candies, and cakes. etc. The peel portion of fruit is rich in vitamins, antioxidants, and minerals and is used to have value-added products, including candies, marmalade, chips, and juice powder (Sodhi et al., 2022).

### Table 1. Statistics on production of major and minor fruits in India

<table>
<thead>
<tr>
<th>Major fruits</th>
<th>Production (000 MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango</td>
<td>20912</td>
</tr>
<tr>
<td>Pineapple</td>
<td>1706</td>
</tr>
<tr>
<td>Grapes</td>
<td>2920</td>
</tr>
<tr>
<td>Banana</td>
<td>30808</td>
</tr>
<tr>
<td>Citrus fruits</td>
<td>12546</td>
</tr>
<tr>
<td>Pomegranate</td>
<td>2845</td>
</tr>
<tr>
<td>Papaya</td>
<td>5989</td>
</tr>
<tr>
<td>Orange</td>
<td>3266</td>
</tr>
<tr>
<td>Guava</td>
<td>4054</td>
</tr>
<tr>
<td>Minor fruits</td>
<td>Production (000 MT)</td>
</tr>
<tr>
<td>Avocado</td>
<td>401</td>
</tr>
<tr>
<td>Jackfruit</td>
<td>1764</td>
</tr>
<tr>
<td>Palm</td>
<td>89</td>
</tr>
<tr>
<td>Aonla</td>
<td>1075</td>
</tr>
<tr>
<td>Phalsa</td>
<td>196</td>
</tr>
<tr>
<td>Total Fruits</td>
<td>96447</td>
</tr>
</tbody>
</table>

Source: FAO, 2019

... tonnes from an area of 25.87 million hectares in 2018-19. According to the National Horticulture Board’s National Horticulture Database, the total area under fruit cultivation is 6664.17 Mha, with a production of 99069.26 million tonnes in 2018-19 (NHB, 2019). Table 1 and Figure 1 show the statistical output of major and minor fruits.

**MAJOR FRUITS**

The main fruit crops produced in India are significantly significant to the Indian economy. The primary fruit varieties are Mango (*Mangifera indica*), Banana (*Musa spp*), Pineapple (*Ananas comosus*), Guava (*Psidium guajava*), Orange (*Citrus sinensis*), Strawberry (*Fragaria × ananassa*), Grapes (*Vitis vinifera*), Cherry (*Prunus avium*), and Passion Fruit (*Passiflora edulis*). In industrial orchards, these fruit trees are raised on a large scale (Sodhi et al., 2022). In India, there are a lot of orchards with a huge number of fruit plants. Major fruits are important and grown to have value-added products that provide nutrients and improve human health (Trigo et al., 2022). Some of the...
major fruits with value-added products are explained in Table 3 and below:

**Mango (Mangifera indica)**
Mango has mostly been utilized as a value-added product, such as drinks and as a source of delectable pulp for jams, pickles, chutneys, juices, and wines, among other products. In order to add value to mangoes, it is necessary to properly manage the fruit after harvest, process all of its waste, and export it for high returns (Ballesteros-Vivas et al., 2019). Kids love mango ice cream and mango toffees so much. Vitamins A and C are abundant in mangos. Any period between harvest and the finished product can be used to increase value. A common summertime beverage, "mango pana" is produced from green mangoes and is a thick concoction of sugar, salt, citric acid, and spices (Kaur et al., 2022). Mango leather, created by mixing mango pulp with deep sugar, is widely considered extremely dry. Mango trash may also be turned into goods with value-added. Examples include kernel flour, pectin enzyme from the peel, kernel starch, and the ability to make biogas from the peel (Singh et al., 2021).

**Pineapple (Ananas comosus)**
Pine apples are often eaten fresh or in cans. The globe currently consumes pineapple through concentrated juice, dehydrated sugar, tinned slices, dry chips, cocktails, wine, etc (Aruna et al., 2019). Canned pineapple, dried pineapple, nectar, sauce, jam, vinegar, and toffees are a few examples of pineapple value-added goods (Chaudhary et al., 2019).

**Guava (Psidium guajava)**
This is mostly consumed as fresh fruit. As value-added goods, guavas come in a broad range. Jelly, juice, concentrate, cheese, toffee, and other value-added guava items include these (Gavhane et al., 2022). Other value-added goods include guava wine, powder, and ice cream toppings. Vitamin C is abundant in guavas, which have a delicious flavour and significant nutritional value (Islam et al., 2022).

**Orange (Citrus sinensis)**
Citrus fruits, like oranges, have several added-value products that have numerous advantages. Cold-pressed orange oil plays a significant role. Pressing the orange peel removes this. Another byproduct of the juice extraction process is dried orange peel, which is used in sauces, baked goods, and cereals (Cypriano et al., 2018). As a byproduct of obtaining juice, the orange pulp is frozen. These can be processed to create items for animal feed. By fully smashing fresh fruits, the orange puree is created. These are used in baking meals and making frozen sweets. Alcohol is present in orange wine. For dessert wines, it is used worldwide (Zacarias-Garcia et al., 2023).
MINOR FRUITS
Minor fruits are those that, while still edible to humans, are substantially less appealing than other common fruits, have lower market demand, are often cultivated to a limited degree and without the use of inputs, and are not usually grown in organized plantations (Kandegama et al., 2022). These fruits are also referred to by other names, such as lesser-known, underutilised, less attractive, underexploited, prospective, stray, wild, etc. Minor fruit species are tolerant of living in adverse climate conditions and operate as life-support species in extreme environmental circumstances and vulnerable environments (Viswanath et al., 2018; Ranjan et al., 2022). Minor food crops may help with food security, nutrition, health, revenue creation, and environmental services if they are used effectively. Minor fruits include Avocado (Persea americana), Wood Apple (Limonia acidissima), Jackfruit (Artocarpus heterophyllus), Palm (Areca spp), Karonda (Carissa carandas), Aonla (Embilica officinalis), Phalsa (Grewia asiatica), And Custard Apple (Annona squamosa) (Meena et al., 2022). Some of the minor fruits with value-added products (Table 4) are explained below:

Avocado (Persea americana)
The use of avocado oil is popular worldwide. It is used in cooking and cosmetics. Ripe avocados’ flesh is used to make avocado oil. Briquettes are an alternative to charcoal. These are made of various compressed waste materials (Páramos et al., 2020). The peels from avocados make a great product. Another byproduct with usage is avocado seeds. They might be made into a powder. In the cosmetics sector, this powder is used. The avocado paste may be used to produce smoothies and drinks (Rodríguez-Martínez et al., 2022).

Wood apple (Limonia acidissima)
It is also known as Bael, and it is a prominent indigenous fruit of India that belongs to the Rutaceae family. Bael fruit is a subtropical deciduous tree with globose fruit and a grey or yellowish hard woody shell (Kumar et al., 2022). Within this is a delicate yellow or orange mucilaginous flesh with many seeds. These can even be eaten uncooked. Jujubes, sweets, juice, sauce, and other value-added items are examples of wood apples (Mohapatra et al., 2022).

Jackfruit (Artocarpus heterophyllus)
It is an essential underutilised fruit, sometimes referred to as the poor man's fruit due to its low cost and abundance during the season. The fruit helps impoverished people’s lives since it may be gathered from wild or locally accessible trees. Furthermore, planting in agroforestry and home garden systems can potentially improve local revenue (Manthare et al., 2022). The fruit is high in carotene, potassium, carbohydrates, and a small amount of ascorbic acid. It also includes minerals such as calcium and potassium and vitamin B complexes such as thiamin, riboflavin, and Niacin (Zhang et al., 2022; Khang et al., 2020). Chips and pickles made from unripe jackfruit are value-added goods. Pickles are made from unripe jackfruit. Bulb and seed are used to make small pieces, combined with oil, salt, and spices and packed (Antonisamy et al., 2022). Unripe jackfruit was also available as a brined product and jackfruit that was ready to cook (RTC). Ripe Jackfruit is used to make jelly from the rind. Fully ripe jackfruit is used to make jackfruit leather. The jackfruit's pulp is used to make nectar (Pathak et al., 2022). The pulp may also be used to flavour ice cream, custard, beverages, and baked goods and to make various value-added products.
<table>
<thead>
<tr>
<th>Fruits</th>
<th>Value added products</th>
<th>Nutrient Composition</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango (Mangifera indica)</td>
<td>Beverages, Mango jams, Mango pickles, Mango chutney, Mango juices Mango wines, Mango toffees, Mango ice cream, Mango pana</td>
<td>Lipid 0.38g, Protein 0.82g, Carbohydrate 14.98g, Dietary Fibre 1.6g, Energy (Kcal) 60</td>
<td>Kaur et al., 2022; Aggarwal et al., 2017; Cheng et al., 2022; Musyoka et al., 2020</td>
</tr>
<tr>
<td>Banana (Musa spp)</td>
<td>Banana wine, Jam, Chips, Juice, Banana sauce, Powder, Drinks</td>
<td>Fat 0g, protein 1g, carbohydrate 28g, Sugar 15g, dietary fibre 3g, Potassium 450 mg.</td>
<td>Mengstu et al., 2021; Sogi et al., 2020; Gupta et al., 2022; Liu et al., 2023</td>
</tr>
<tr>
<td>Pineapple (Ananas comosus)</td>
<td>Concentrated juice, Tinned slices, Dry chips, Cocktails, Canned pineapple, Dried pineapple, Nectar, Juice, Sauce, Jam, Vinegar, Toffees</td>
<td>Fat 0.1g, Protein 0.5g, Carbohydrate 13g, Dietary Fibre 1.4g, Sugar 15g, Energy (Kcal) 50</td>
<td>Aruna et al., 2019; Dhar et al., 2023; Abraham et al., 2023; Sarangi et al., 2022; Rico et al., 2020</td>
</tr>
<tr>
<td>Guava (Psidium guava)</td>
<td>Jelly, Juice, Concentrate, Cheese, Toffee, Guava wine, Powder, Ice cream toppings</td>
<td>Fat 1.6g, Protein 4.2g, Carbohydrate 23.6g, Dietary Fibre 8.9g, Sugar 14.7g, Energy (Kcal) 112</td>
<td>Gavhane et al., 2022; Pathak et al., 2020; Bandaru and Bakshi, 2021; Angulo-López et al., 2021; Pereira et al., 2021</td>
</tr>
<tr>
<td>Orange (Citrus sinensis)</td>
<td>Sauces, Baked goods, Juice, Orange puree, orange wine, Dessert</td>
<td>Fat 0.2g, Protein 1.3g, Carbohydrate 16.5g, Dietary Fibre 2.8g, Sugar 10g, Energy (Kcal) 73</td>
<td>Zacarias-Garcia et al., 2023; Cypriano et al., 2018; Pereira et al., 2021; Mohsin et al., 2022</td>
</tr>
<tr>
<td>Strawberry (Fragaria×ananassa)</td>
<td>Juices, Strawberry jam, Strawberry smoothies, Strawberry milkshakes</td>
<td>Fat 0.3g, Protein 0.67g, Carbohydrate 7.68g, Dietary Fibre 2g, Sugar 4.89g, Energy (Kcal) 32</td>
<td>Kumar et al., 2022; Salimi et al., 2022; Bandaru and Bakshi, 2021; Shrestha et al., 2021</td>
</tr>
<tr>
<td>Grapes (Vitis vinifera)</td>
<td>Raisins, Wine, Juices, Vinegar, Jelly, Jam, Marmalade</td>
<td>Fat 0.2g, Protein 0.7g, Carbohydrate 18.1g, Dietary Fibre 0.9g, Sugar 15.5g, Energy (Kcal) 69</td>
<td>Muhlack et al., 2018; Sindhu et al., 2019; Ilyas et al., 2021; Kokkinomagoulos, and Kandylis, 2023.</td>
</tr>
<tr>
<td>Papaya (Carica papaya)</td>
<td>Marmalade, Sweets, Pickles, Chocolate, Canned papaya, Juices, Cupcakes.</td>
<td>Fat 0.26g, Protein 0.47g, Carbohydrate 10.82g, Dietary Fibre 1.7g, Sugar 7.82g, Energy (Kcal) 43</td>
<td>Kumar et al., 2019; Abdel-Hameed et al., 2023; Fontes-Zepeda et al., 2023; Madhuvanthi et al., 2022.</td>
</tr>
<tr>
<td>Cherry (Prunus avium)</td>
<td>Fresh, Frozen, Canned Juices, Wine, Cakes</td>
<td>Fat 0.3g, Protein 1g, Carbohydrate 12.2g, Dietary Fibre 1.6g, Sugar 8.5g, Energy (Kcal) 50</td>
<td>Adlakha et al., 2022; Kannah et al., 2020; Dumitrascu et al., 2020.</td>
</tr>
<tr>
<td>Passion fruit (Passiflora edulis)</td>
<td>Fruit juice, Chocolate, Passion fruit tea, Sweets such as ice cream, Cordial, Jam, Cake</td>
<td>Fat 0.7g, Protein 2.20g, Carbohydrate 23.38g, Dietary Fibre 10.4g, Sugar 8.5g, Energy (Kcal) 97</td>
<td>Biswas et al., 2021; Ding et al., 2023; Kobo et al., 2022; Ganesh et al., 2022</td>
</tr>
</tbody>
</table>
such as squash, ready-to-serve (RTS) drinks, chutney, and toffee. Ripe jackfruit bulbs are also used to make ready-to-eat (RTE) products (Kalse et al., 2022).

**Palm (Areca spp)**

The palm tree is highly significant and plays a significant part in the daily lives of impoverished and landless farmers. To make fresh juice (sweet toddy), fermented beverages (toddy, wine, and arak), syrup (sometimes known as "honey"), brown sugar (jaggery), or refined sugar, palm trees have been tapped for generations (Sarma et al., 2022). The majority of tapped palm trees are multifunctional (producing edible fruits, construction materials, fuel, fibres, wax, etc.), and for the rural poor, their socioeconomic value may be enormous. It is a good source of iron, calcium, and phosphorus (Diyanilla et al., 2020). Some vitamins include vitamin A, niacin, thiamin, and riboflavin. Toddy, palm sugar, palm honey, toddy palm wine, palm spread, palm toffee, palm burfi, palm pickle, and canned palm are examples of value-added palm goods. Pulp from mature palm fruit may also be turned into jam, soft drinks, and other delectable foods and treats (Sarma et al., 2022).

**Karonda (Carissa carandas)**

It is an indigenous fruit that is widely used as a medicinal plant by tribal people in India. It is well-liked in several traditional medical systems, including Ayurveda, Unani, and homoeopathy. It also makes a tasty appetizer (Sankaran and Dinesh 2020). Karonda fruits are high in iron and high in vitamin A, C, and B complex, fibre, carbs, and minerals. However, it has a lot of promise in processed forms. When mature, the fruits can be consumed as a dessert or used to make fruit goods like sweets, jam, squash, and chutney (Rawat and Das, 2020). Furthermore, due to its fragile skin and high moisture content, karonda has a relatively short storage life. When collected at maturity, unripe fruit may be kept at room temperature for 5 to 7 days, but when it is ripe, it can only be kept for 2 days (Rafique et al., 2023). Despite recent value added commercial preparations developed for local consumption and export by food processing firms, the plant has remained an underutilised species. Karonda has a lot of potential for value addition, and both unripe and mature fruits may be used to make various value-added goods (Rawat and Das, 2020). Karonda sweets, karonda jam, karonda pickles, karonda powder, karonda drinks, karonda syrup, canned karonda, karonda-flavoured ice cream, and karonda-flavoured milk are a few examples of value-added karonda goods. It is also a natural colourant (Mamoona et al., 2023).

**Aonla (Embilica officinalis)**

The fruit is very nutritious and a good source of pectin and polyphenols, apart from ascorbic acid. Aonla fruits are sour and tangy and have long been used to produce juices, jams, and pie fillings. The medicinal properties of Aonla fruits are widely established (Jat et al., 2021). Additionally, it includes essential vitamins like thiamine, riboflavin, and niacin as well as minerals like calcium, phosphorus, and iron (Hingba, and Chaurasiya, 2023). On the other hand, fruits are perfect for processing into value-added goods since they have significant nutritional and therapeutic worth. Because of its very acidic and astringent quality, the fruit is unsuitable for consumption fresh or as a table fruit. It is also a key component of chyavanprash and triphala powder (Jat et al., 2021.i). However, Aonla fruits are also used to make a variety of culinary items, including preserves, sweets, jam, toffee, pickles, sauce, squash, juice, RTS (ready-to-serve) beverage, cider, shreds, dry powder, ladoo, and others (Kour et al., 2018).

**Phalsa (Grewia asiatica)**

It is an indigenous member of the Tiliaceae family. The fruits of the phalsa plant are acidic, an excellent source of ascorbic acid and vitamin A, and abundant in other nutrients (Mehmood et al., 2020). Fruit must be used within 24 hours of being picked since it is extremely perishable. The appealing colouration of phalsa fruit, which ranges from crimson red to dark purple and its delicious flavour are the main reasons for its popularity. When extracted, the juice is highly regarded and has a rich blood-red to dark purple hue. It is well-regarded in the local medical system (Khan et al., 2019). The juice is thought to have a cooling effect and is incredibly refreshing, especially in the summer heat. Fruits have an edible portion that ranges from 69 to 93 % and includes 50 to 60 % juice. Its fruits are often eaten raw. The fruit has stomachic and astringent properties. Phalsa fruit is said to reduce inflammation when it is unripe and is used to treat blood, pulmonary, and heart conditions and lower fevers. Fruits are used to make delicious juice, squash, syrup, and crush that have a cooling impact on the body (Khan et al., 2019; Ray and Bala, 2019).

**Custard apple (Annona squamosa)**

It is one of the most delicious tropical and subtropical fruit trees. The fruits are mostly consumed by the lowest and middle classes in India. Custard apple is picked in stages, but the optimal time to harvest is when the fruit begins to acquire colour (Sharma et al., 2020). It is normally harvested when the segments become pale yellow and begins to fracture somewhat. Custard apples are perishable and cannot be preserved for an extended time. The sugar content of the ripe fruits is high. Its pulp is around 13% moisture, 14.5% sugars, 0.3% fat, 1.0% iron, and 0.7% mineral content (Jain et al., 2019). It has a high calcium, phosphorus, and iron content. The fruit is very sweet and...
tasty; thus, it is utilised in cooking. It is soft to the touch and readily taken out when completely ripe (Jain et al., 2019; Pielak et al., 2020). The meat can be scooped off the skin and eaten on its own or with light cream and sugar sprinkled on top. Custard apples may be used to make shakes, smoothies, and even natural ice cream. It is frequently squeezed through a sieve and blended into milkshakes, custards, or ice cream. Blending the seeded flesh with mashed banana and a little cream yields a lovely sauce for cakes and puddings (Kumar et al., 2018).

**Conclusion**

Fruits are used not only as a stable food source but also for their desirable additional health advantages. Though fruits suffer substantial quantitative and qualitative losses during postharvest marketing, processing,

<table>
<thead>
<tr>
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<th>Value added products</th>
<th>Nutrient Composition</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avocado <em>(Persea americana)</em></td>
<td>Smoothies, drinks, Juices, Bakery goods, Food powder</td>
<td>Fat 29g &lt;br&gt; Protein 2g &lt;br&gt; Carbohydrate 8.55g &lt;br&gt; Dietary Fibre 6.7g &lt;br&gt; Sugar 1g &lt;br&gt; Energy (Kcal) 160</td>
<td>Rodriguez-Martínez et al., 2022; Páramos et al., 2020</td>
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<tr>
<td>Wood apple <em>(Limonia acidissima)</em></td>
<td>Jujubes, Sweets, Juice, Sauce, Cakes, Pies, Puddings</td>
<td>Fat 1.45g &lt;br&gt; Protein 8g &lt;br&gt; Carbohydrate 7.45g &lt;br&gt; Dietary Fibre 4g &lt;br&gt; Energy (Kcal) 134</td>
<td>Mohapatra et al., 2022; Affifah et al., 2023; Shrvanabelagola et al., 2022</td>
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<tr>
<td>Jackfruit <em>(Artocarpus heterophyllus)</em></td>
<td>Chips, Pickles, Brined product, Jelly, Nectar, Flavour ice cream, Custard, beverages, Baked goods, Squash, Ready-to-serve (RTS) drinks, Chutney, Toffee, Ready-to-eat (RTE) products</td>
<td>Fat 1.1g &lt;br&gt; Protein 2.8g &lt;br&gt; Carbohydrate 38.3g &lt;br&gt; Dietary Fibre 2.5g &lt;br&gt; Sugar 32g &lt;br&gt; Energy (Kcal) 157</td>
<td>Pathak et al., 2022; Aswin et al., 2022; Hamid et al., 2020; Srivastava, and Singh, 2020</td>
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<td>Palm <em>(Areca spp)</em></td>
<td>Sweet toddy, Fermented beverages (toddy, wine, and arrak), Syrup, Palm sugar, Palm honey, Toddy palm wine, Palm spread, Palm toffee, Palm burfi, Palm pickle, Canned palm, Palm Jam, Soft drinks</td>
<td>Fat 0.20g &lt;br&gt; Protein 8.3g &lt;br&gt; Carbohydrate 38.3g &lt;br&gt; Dietary Fibre 8.1g &lt;br&gt; Sugar 1.78g &lt;br&gt; Oil 49</td>
<td>Sarma et al., 2022; Diyanilla et al., 2020; Sakulkit et al., 2020; Diyanilla et al., 2020; Ahmad et al., 2020</td>
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<td>Karonda <em>(Carissa carandas)</em></td>
<td>Dessert, Squash, Karonda sweets, Karonda jam, Karonda pickles, Karonda powder, Karonda drinks, Karonda syrup, Canned karonda, Karonda-flavoured ice cream, Karonda-flavoured milk</td>
<td>Fat 2.9g &lt;br&gt; Protein 1.1g &lt;br&gt; Carbohydrate 2.9g &lt;br&gt; Dietary Fibre 2.5g &lt;br&gt; Sugar 32g &lt;br&gt; Energy (Kcal) 42</td>
<td>Rawat and Das, 2020; Sankaran, and Dinesh 2020; Rafique et al., 2023</td>
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<td>Aonla <em>(Emblica officinalis)</em></td>
<td>Juices, Jams, Pie fillings, Preserves, Sweet, Toffee, Pickles, Sauce, Squash, RTS (ready-to-serve) beverage, Cider, Shreds, Dry powder, Ladoo</td>
<td>Fat 0.1g &lt;br&gt; Protein 0.5g &lt;br&gt; Carbohydrate 14g &lt;br&gt; Dietary Fibre 3.4g &lt;br&gt; Sugar 8.8g &lt;br&gt; Energy (Kcal) 40</td>
<td>Jat et al., 2021; Kour et al., 2018; Garg et al., 2022; Meena et al., 2022; Devi et al., 2020</td>
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<td>Phalsa <em>(Grewia asiatica)</em></td>
<td>Delicious juice, Squash, Syrup, Crushers</td>
<td>Fat 0.1g &lt;br&gt; Protein 1.6g &lt;br&gt; Carbohydrate 21.1g &lt;br&gt; Dietary Fibre 5.53g &lt;br&gt; Sugar 5g &lt;br&gt; Energy (Kcal) 72</td>
<td>Mehmood et al., 2020; Khan et al., 2019; Ray and Bala, 2019</td>
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<tr>
<td>Custard apple <em>(Annona squamosa)</em></td>
<td>Milkshakes, Custards, Ice cream, Sauce, Cakes, Puddings, Seed oil</td>
<td>Fat 0.7g &lt;br&gt; Protein 1.6g &lt;br&gt; Carbohydrate 17.7g &lt;br&gt; Dietary Fibre 3g &lt;br&gt; Sugar 20.6g &lt;br&gt; Energy (Kcal) 75</td>
<td>Jain et al., 2019; Kumar et al., 2018; Kumar, 2020; Panadare et al., 2020</td>
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and storage, individuals’ health and diet are receiving much attention these days. Consumers today seek food items that are both wholesome and practical to use. Food items with added health advantages have received more attention than regular goods. Food powders can be used as natural food additives since they have a natural flavour and health advantages compared to artificial food flavourings. Food is processed in ways that consumers favour, have a long shelf life, and are inexpensive to produce. Appropriate processing at times of gluts may benefit farmers and make nutrients available to Indian diets, ensuring the population’s nutritional security. Value-added products that align with the Sustainable Development Goals (SDGs) are a powerful way to address global challenges while promoting economic growth and innovation. By focusing on sustainable practices and resource efficiency, value-added products contribute to SDGs related to environmental sustainability. This includes reduced waste, lower carbon footprints, and responsible materials sourcing. Value-added products provide health benefits and provide important nutrients to the body. Value addition of fruits is a valuable technique for producing fruit products for a long time, even during the off-season.

Conflict of interest
The authors declare that they have no conflicts of interest.

REFERENCES

Artocarpus heterophyllus


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