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23 TROPICAL WILD EDIBLE FRUITS OF WESTERN GHATS AND PREPARATION OF THEIR VALUE-ADDED PRODUCTS AND CULINARY



MAHALAKSHMI. M

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**CENTRAL ACADEMY FOR STATE FOREST SERVICE
COIMBATORE**

2024

FOREWORD

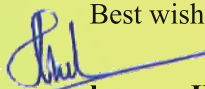
As the Principal of CASFOS, Coimbatore, it is my pleasure to introduce the work of our talented trainee, Ms. Mahalakshmi M., who has explored the fascinating topic of **"23 TROPICAL WILD EDIBLE FRUITS OF THE WESTERN GHATS, THEIR VALUE-ADDED PRODUCTS, and CULINARY USES"**. This research not only highlights the rich biodiversity of the Western Ghats but also emphasizes the cultural and nutritional significance of these fruits.

The Western Ghats, a UNESCO World Heritage Site, is renowned for its unique flora and fauna. The edible fruits that thrive in this region offer a plethora of benefits, both for local communities and for the broader ecological system. Ms. Mahalakshmi. M has meticulously researched these fruits, showcasing their nutritional value, traditional uses, and potential for value addition through innovative processing methods. This work is a testament to her dedication to understanding and preserving our natural heritage.

In a world increasingly focused on sustainability, the exploration of wild edible fruits holds promise not just for enhancing food security, but also for promoting biodiversity conservation. The culinary applications discussed in this book provide a glimpse into the rich culinary traditions of the region, encouraging a revival of interest in indigenous foods.

I commend Ms. Mahalakshmi M., for her thorough research and passion for this subject. I hope this work inspires further exploration and appreciation of our local biodiversity, fostering a greater understanding of the importance of sustainable practices in our food systems.

Best wishes,



V. Thirunavakarasu, IFS
APCCF & Principal, CASFOS, Coimbatore

PREFACE

The Western Ghats, a UNESCO World Heritage Site, is a treasure trove of biodiversity, harboring a remarkable variety of wild edible fruits. In this book, I explore 23 of these unique fruits, celebrating their ecological significance and cultural heritage. Each page delves into the traditional uses with a modern touch of culinary, nutritional benefits of these fruits, while also highlighting innovative value-added products that can be crafted from them.

Through this journey, I aim to inspire a deeper appreciation for these often-overlooked natural resources and to promote sustainable practices that empower local communities. Whether you are a forager, a food enthusiast, or simply curious about the wonders of nature, this book invites you to discover the flavors and potential of the Western Ghats' wild fruits. Join me in celebrating the rich culinary and cultural tapestry woven through these extraordinary gifts of nature.

Ms. Mahalakshmi M
Officer Trainee, 2022-24 SFS-II batch
CASFOS Coimbatore

ACKNOWLEDGEMENT

I would like to express my sincere gratitude to the Principal CASFOS Shri V. Thirunavakarasu, IFS for the invaluable opportunity to write this book. Your unwavering support and encouragement have been instrumental in bringing this project to life. Thank you for believing in my vision and for fostering an environment that inspires creativity and growth.

I would like to extend my heartfelt thanks to Course Director sir, Shri Anisha Kalkoor M, IFS for your guidance and direction throughout this writing process. Your insights and encouragement were crucial in shaping this book, and I am deeply grateful for the opportunity to explore my ideas under your mentorship.

I extend my heartfelt thanks to Shri Dr. Anandh, IFS for his guidance over the past year and a half. His support has been instrumental in shaping myself for this book and inspiring my journey.

My sincere gratitude to the esteemed faculty members Dr. V S Senthil Kumar IFS, Dr. C. Vidyasagar IFS, Dr. Ramkrishnan R., Scientist-C, and Shri Muniasamy for their technical guidance and the mentorship provided.

I would like to extend my heartfelt gratitude to Dr. Hanumantha. M, Assistant Professor, College of Forestry Sirsi, University of Agricultural Sciences, Dharwad, Karnataka whose unwavering support and mentorship have profoundly shaped my journey. His encouragement to pursue the research and publishing has been invaluable.

I would like to express my thanks to my Parents, Family members for their continuous moral support and guidance and also to my dear friends Ms. Hasta Shetty, Mr. Sorab Kumar, Ms. Meghana H, and Ms. Manjula S.N. for their constant encouragement in writing this book.

Mahalakshmi M.

CONTENTS

Sl.No	Subject	Page No.
	Preface	
	Foreword	
	Acknowledgement	
	Abstract	1
I	Introduction	2
1.	<i>Aegle marmelos</i>	4
2.	<i>Anonna squamosa</i> L	6
3.	<i>Artocarpus heterophyllus</i> Lam.	8
4.	<i>Artocarpus hirsutus</i> Lam	10
5.	<i>Capparis decidua</i> (Ker)	12
6.	<i>Carissa carandus</i> L.	14
7.	<i>Carissa spinarum</i> L	16
8.	<i>Citrusaurantium</i> L	18
9.	<i>Cucumis dipsaceus</i>	20
10.	<i>Flacourtia Montana</i>	22
11.	<i>Garcinia gummi-gutta</i>	24
12.	<i>Garcinia indica</i>	26
13.	<i>Grewia asiatica</i>	28
14.	<i>Grewia subinaequalis</i>	30
15.	<i>Hibiscus sabdarifa</i>	32
16.	<i>Mangifer indica</i> L.	34
17.	<i>Phyllanthus emblica</i> L.	36
18.	<i>Physalis peruviana</i> L.	38
19.	<i>Syzygium cumini</i> L.	40
20.	<i>Syzygium jambos</i> (L.)	42
21.	<i>Tamarindus indica</i>	44
22.	<i>Ziziphu srugosa</i> Lam	46
23.	<i>Zizyphus mauritiana</i> Lam	48
II	Results and Discussion	50
III	Conclusion	53

ABSTRACT

India harbors more than 600 species of fruit plants, which are minor, cheap and readily available with vibrant taste appeal. Their potential in nutritional, medicinal, therapeutic and industrial values is well recognized and utilized by the indigenous communities. Many value-added products can be obtained from these indigenous minor fruits. Fruits play predominant role in the diet and they contain broad-spectrum of essential nutrients including phenolic antioxidants that impart protective role against several diseases. In general, they are accepted as being rich in vitamins, minerals and dietary fibre. Fruits obtained from *Syzygium cumini*, *Aegle marmelos*, *Phyllanthus emblica*, *Garcinia indica*, *Ziziphus mauritiana*, *Annona squamosa*, *Cordia allamanda*, *Artocarpus heterophyllus*, *Flacourtia montana* and *Grewia asiatica* species are highly perishable, edible and have high potential for their value addition and culinary.

India is one of the mega diversity tropical countries that comprise rich vegetation and biodiversity and also harbours many wild fruit yielding species. There are more than 60 wild edible fruits available in entire Western Ghats region. Majority of these wild edible fruits belong to *Anacardiaceae*, *Apocynaceae*, *Euphorbiaceae*, *Moraceae* and *Sapotaceae* families.

Moreover, in recent past several underutilized fruits are gaining prominence and have been successfully utilized for preparation of value-added products and functional foods, thus creating its own niche in the food industry and nutraceuticals. This substantial increase in sustainable utilization of bio-resources has made a tremendous impact on the livelihoods of tribal and rural communities, creating wide array of job opportunities and as a source of income and awareness among major populations.

I. Introduction

Rural areas are the habitat of the world's three-quarter poorest people who are dependent for their livelihoods in one way or another on agriculture and access to natural resources due to its diverse climate, India possesses more than 600 species of fruit plants. Most of these are minor, cheap and readily available with vibrant taste appeal. Their potential in nutritional, medicinal, therapeutic and industrial values is well recognized and utilized by the indigenous communities (Raiet al., 2005). Fruits play predominant role in the diet; consumption of fruits tends to contain broad-spectrum essential nutrients including phenolic antioxidants that impart protective role against several diseases. Western Ghats, one among eight “hottest hot-spots” of biodiversity in world harbor many wild, unexploited and minor fruits which are edible and unfamiliar to large proportion of the global population. There are more than 60 wild edible fruits available in entire Western Ghats region. Wild edible fruits are important source of food and income for rural communities (Mundaragiet al., 2017).

Apart from nutritive, therapeutic and medicinal values quite a few of these tropical fruits have excellent flavor and very attractive colour. Fruits like jamun and phalsa are highly perishable. Bael fruit is not an easy to eat out of hand item. Many people because of its strong astringent taste do not like fresh Aonla fruit. However, these fruits have unlimited potential in the processed form and consumers all over world can get opportunity to enjoy the fruits in the form of their processed products (Rao, 1994.). However not less than six to eight plant species will be in fruiting in each month and majority of these wild edible fruits belong to Anacardiaceae, Apocynaceae, Euphorbiaceae, Moraceae and Sapotaceae families (Uthaiiah, 1994). This substantial increase in sustainable utilization of bioresources has made a tremendous impact on the livelihoods of tribal and rural communities, creating wide array of job opportunities and as a source of income and awareness among major populations.

Available literature indicates initiation of some systematic work though not detailed and complete. This article has compiled

information from more than 30 research and review articles and has scanned the information on the present theme from them. A systematic attempt was made in the present review article in light of similar results collected from the available literature which are presented under the following heads:

- ❖ Wild edible fruits widely used in Karnataka
- ❖ Utilization of wild edible fruits
- ❖ Value added products from wild edible fruits

1. *Aegle marmelos* L.



Dry fruit, Powder,pulp,squash/slab

1. *Aegle marmelos* L.

Scientific name	: <i>Aegle marmelos</i>
Family	: Rutaceae
Common name	: Bel, Beal, Beli fruit, Wood apple, Stone apple
Products	: Vitamin C, Micronutrients like potassium, magnesium and sodium were present in adequate amount. febrifuge, antiscorbutic, stimulant and antipyretic (Sharma <i>et al.</i> , 2016)
Pulp	: cure scurvy which is due to deficiency of vitamin C (Sharma <i>et al.</i> , 2016)
Fruit powder	: In Ayurveda used in the treatment of asthma and similar diseases
Dry fruit	: cure dysentery, diarrhea, hepatitis, tuberculosis and dyspepsia whereas roots are reported to have anti-inflammatory and wound healing properties (Joshi <i>et al.</i> , 2006)

2. Annona squamosa L.



JAM



ICE CREAM

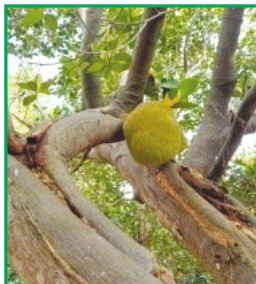


WINE

2. *Annona squamosa* L.

Scientific name	: <i>Annona squamosa</i> L
Family	: Annonaceae
Common name	: Custard apple, Sita pala
Value addition Products	: Jams, Nectar /syrup, juice, Wine, ice creams, milk shakes and soft drink
Custard apple Jam	: Custard apple jam is made by mixing custard apple juice with a sweetener, partially dehydrating it, adding additives, and boiling it.
Ice cream	: Blend ripe custard apples with cream, sugar, and a bit of lemon juice, then churn the mixture in an ice cream maker until creamy.
Wine	: Ferment the fruit pulp with sugar and water using yeast, then age the mixture in a sealed container. After fermentation and aging, strain and bottle the liquid for a smooth, fruity wine.

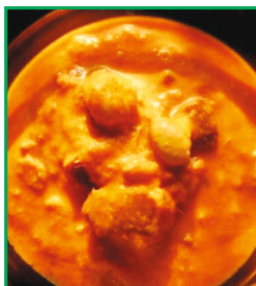
3. *Artocarpus heterophyllus* Lam.



3. Artocarpus heterophyllus Lam.

Scientific name	: <i>Artocarpus heterophyllus</i> Lam.
Family	: Moraceae
Common name	: Jack fruit, Halsu, palaa
Products	: Pickles, salting, canned and curried vegetables
Pickle	: Slice the jackfruit and mix it with salt, turmeric, and spices. Pack the mixture into sterilized jars and let it ferment at room temperature for a few days to develop flavor.
Canned	: Cook the jackfruit pieces until tender, then pack them into sterilized cans with a light syrup or brine. Seal the cans and process them in a pressure canner to ensure preservation and safety.
Chips	: Slice the jackfruit thinly, then season with salt and optional spices. Fry the slices in hot oil until crispy, or bake them at a low temperature until they reach a crunchy texture.

4. *Artocarpus hirsutus* Lam



4. *Artocarpus hirsutus* Lam

Scientific name	: <i>Artocarpus hirsutus</i> Lam
Family	: Moraceae
Common name	: Jack fruit, Halsu, palaa
Products	: Pickle, salting other culinary preparations, canned chutney, honey, jam, jelly, paste, candies
Pickle	: slice the fruit and mix it with a blend of spices, salt, and vinegar. Pack the mixture into sterilized jars and let it marinate for a few days to develop the flavors.
Curry	: Curry, sauté onions, garlic, and spices in a pan, then add cubed chempedak and cook until tender. Stir in coconut milk and simmer until the flavors meld together.



5. *Capparis decidua* (Ker)



5. Capparis decidua (Ker)

Scientific name	: <i>Capparis decidua</i> (Ker)
Family	: Capparaceae
Common name	: Bare caper, Caper beery, Chippuri
Products	: Pickle, curries, flower buds, floral nectar, dried seeds.
Fruit	: The fruit can be eaten raw or used in vegetables, pickles, and curries.
Flower buds	: The flower buds can be used as potherbs.
Floral nectar	: The nectar from the flowers can be eaten
Dried seeds	: In Rajasthan, people eat dried and roasted seeds as a diet.



6. *Carissa carandus* L.



6. *Carissa carandus* L.

Scientific name	: <i>Carissa carandus</i> L.
Family	: Apocynaceae
Common name	: Kavali hannu (kannada) Kalakai(tamil), karakka(Kerala)
Products	: Pickle, squash, wine, jam jelly, squash, syrup, tarts and chutney
Pickle	: Combine chopped karanda berries with salt, turmeric, and red chili powder. Pack the mixture into sterilized jars, seal tightly, and let it ferment for a few weeks for a tangy, spicy condiment.
Squash	: Cook the chopped berries with sugar and a touch of lemon juice until thickened. Pour into sterilized jars and let it cool before sealing for a sweet and tangy spread.
Jelly	: Simmer the berries with sugar and lemon juice until the mixture thickens and reaches a gel-like consistency. Strain, pour into sterilized jars, and allow it to set before sealing.



7. *Carissa spinarum* L



7. *Carissa spinarum* L

Scientific name	: <i>Carissa spinarum</i> L
Family	: Apocynaceae
Common name	: Wild Karanda, Chikka Kavali (kannada) Chirukila(tamil)
Products	: Pickling, salting and other culinary preparations, wine
Curry	: First sauté onions, garlic, and spices until fragrant, then add chopped <i>Carissa spinarum</i> fruit and cook until tender. Simmer with coconut milk or a tomato base, adjusting seasoning to taste.
Salting:	: Mix halved <i>Carissa spinarum</i> fruit with salt and spices, then let it sit for several days in a sealed container to develop flavors. Stir occasionally and ensure the fruit is fully submerged in the brine for even pickling
Wine	: Ferment crushed fruit with sugar and yeast, allowing it to ferment for several weeks. Strain the mixture, then age it in a cool, dark place for several months to develop flavor before bottling.

8. *Citrus aurantium* L



8. *Citrus aurantium* L

Scientific name	: <i>Citrusaurantium</i> L
Family	: Rutaceae
Common name	:
Products	: Sauce and juice
Candies	: First peel and slice the fruit into thin strips. Boil the strips in a sugar syrup until translucent and tender, then cool and coat with sugar or crystallize before serving.
Sauce	: Juice with sugar, vinegar, and a pinch of salt in a saucepan. Simmer until the mixture thickens to your desired consistency, then strain and cool before using as a zesty glaze or condiment.
Wine	: Juice the bitter oranges and mix with water and sugar, then ferment with suitable yeast. After primary fermentation, age the wine for several months before bottling.



9. *Cucumis dipsaceus* Ehrenb. Ex Spach



9. *Cucumis dipsaceus* Ehrenb. Ex Spach

Scientific name	: <i>Cucumis dipsaceus</i> Ehrenb. Ex Spach
Family	: Cucurbitaceae
Common name	: Arabian Cucumber Hedgehog Gourd Teasel Gourd
Products	: Starter dish, soup
Starter	: Combine diced cucumbers with yogurt, garlic, and fresh herbs like mint or dill. Season with lemon juice, salt, and pepper for a refreshing and flavorful dip or side dish.
Soup	: Sauté onions and garlic, then add diced cucumbers and vegetable broth. Simmer until cucumbers are tender, blend until smooth, and season with salt, pepper, and a touch of lemon juice.

10. *Flacourtia Montana* J.Graham



10. *Flacourtia Montana* J.Graham

Scientific name	: <i>Flacourtia Montana</i> J.Graham
Family	: Salicaceae
Common name	: Mountain Sweet Thorn Chalirpazham (Malayalam), Gajale, Hennu sampige (Kannada)
Products	: Jam, jelly, pickle
Jam	: Simmer the fruit with sugar and lemon juice until it reaches a thick, gel-like consistency. Pour into sterilized jars and seal while hot.
Jelly	: Cook the fruit with water, strain to extract the juice, then mix with sugar and pectin. Boil until it reaches the gel stage, pour into sterilized jars, and seal while hot.
Pickle	: Cut the fruit into pieces and soak them in a mixture of vinegar, sugar, salt, and spices. Pack the fruit into jars, pour the brine over it, and let it ferment for several weeks before enjoying.

11. *Garcinia gummi-gutta* L



11. *Garcinia gummi-gutta* L

Scientific name	: <i>Garcinia gummi-gutta</i> L
Family	: Clusiaceae
Common name	: Malabar tamarind, Brindle berry, Kudam puli: (pot tamarind), Gamboog
Products	: Sour sauce, pickling, salting other culinary preparations, kachampuli, Edible oil and Edible fat
Sour sauce	: Slice the fruit in half and scoop out the translucent, juicy segments. These can be eaten fresh or added to smoothies, desserts, or savory dishes for a tangy flavor.
Edible oil	: Extract the oil from the fruit's rind or seeds using a cold-press or solvent extraction method. The resulting oil can be used for its tangy flavor in dressings, marinades, or as finishing oil.
Edible fat	: Extract the fat from the fruit's rind through a process of rendering or infusing. This fat can be used in cooking or baking to impart a distinctive sour and fruity flavor to dishes.
Kachampuli	: boil the fruit's juice with spices until it reduces into a thick, tangy syrup. This traditional vinegar-like condiment can be used in marinades, dressings, and as a flavor enhancer in various dishes.

12. *Garcinia indica* (Thours) Choisy



12. *Garcinia indica* (Thours) Choisy

Scientific name	: <i>Garcinia indica</i> (Thours) Choisy
Family	: Clusiaceae
Common name	:
Products	: Kokum juice, Edible oil, Butter, Edible fat, rind dried and preserved
Kokum juice	: Soak dried kokum rinds in water for several hours or overnight. Strain the mixture to obtain a tangy, deep-red juice that can be used in beverages, culinary dishes, or as a flavoring agent.
Butter	: Extract the fat from the kokum seeds through a process of cold pressing or solvent extraction. The resulting butter can be used in cosmetics for its moisturizing properties or in culinary applications for its rich, tangy flavor.

13. *Grewia asiatica*



13. *Grewia asiatica*

Scientific name	: <i>Grewia asiatica</i>
Family	: Tiliaceae
Common name	:
Products	: Juice, jams, pies, squashes chutneys
Jam	: Cook the fruit with sugar and a bit of lemon juice until it thickens into a spreadable consistency. Once cooled, jar the jam for a sweet, tangy treat.
Pies	: Prepare a filling by cooking the Phalsa fruit with sugar and a hint of lemon juice until thickened. Spoon the filling into pie crusts, top with a second crust or lattice, and bake until golden brown and bubbly.
Squashes	: blend the cooked fruit with sugar, water, and a splash of lemon juice until smooth. Strain to remove any solids, then bottle the mixture for a re freshing, tangy beverage.
Juice	: blend the fruit with water and strain the mixture to remove pulp and seeds. Sweeten to taste, chill, and serve for a refreshing, tangy drink

14. *Grewia subinaequalis* L.



14. *Grewia subinaequalis* L.

Scientific name	: <i>Grewia subinaequalis</i> L.
Family	: Tiliaceae
Common name:	
Products	: Juice, pulp
Juice	: First wash and clean the fruits thoroughly. Then, blend the fruits with water and strain the mixture to remove any solids, resulting in a smooth, refreshing juice. Adjust sweetness as needed, and serve chilled.
pulp	: To prepare pulp from <i>Grewia subinaequalis</i> , start by washing and peeling the fruit if necessary. Blend the fruit to a smooth consistency, then strain it to remove any seeds and fibrous material, resulting in a thick, flavorful pulp ready for use in various recipes or as a base for beverages.

15. *Hibiscus sabdarifa* L



15. *Hibiscus sabdarifa* L

Scientific name	: <i>Hibiscus sabdarifa</i> L.
Family	: Malvaceae
Common name	:
Products	: Sauces, Chopped and added to fruit salads. Roselle syrup, Jelly
Sauces	: First boil the calyces until they soften, then blend them into a smooth puree. Simmer the puree with sugar, lemon juice, and any desired spices until it reaches the desired thickness and flavor. Cool before using as a tangy, vibrant sauce.
Roselle syrup	: Simmer the cleaned calyces in water with sugar until the mixture reduces and thickens to a syrupy consistency. Strain out the solids, add lemon juice if desired, and allow the syrup to cool before bottling.
Jelly	: Boil the calyces with water and sugar until the mixture thickens. Strain out the solids, then mix in pectin and boil again until the syrup reaches a jelly-like consistency. Cool before transferring to jars.

16. *Mangifera indica* L.



16. *Mangifera indica* L.

Scientific name	: <i>Mangifera indica</i> L.
Family	: Anacardaceae
Common name	:
Products	: Pickle, curry, mango powder, chutney, cool drinks, slab, toffee, beverages such as nectar, squash
Toffee	: cook sugar, butter, and a pinch of salt over medium heat until the mixture reaches 300°F (150°C). Stir in mango puree and continue cooking until it reaches 310°F (155°C). Pour onto a parchment-lined tray, let cool, and break into pieces.
Squash	: blend ripe mangoes with sugar and a little water until smooth. Strain the mixture, then dilute it with water to your desired strength, and add a splash of lemon juice for extra freshness. Serve chilled.
Curry	: sauté onions, garlic, and ginger with spices like turmeric and cumin. Add diced mangoes and simmer with coconut milk until the mango is tender and the sauce thickens. Garnish with fresh cilantro and serve.

17. Phyllanthus emblica L.



17. *Phyllanthus emblica* L.

Scientific name	: <i>Phyllanthus emblica</i> L.
Family	: Phyllanthaceae
Common name	:
Products	: Pickle, preserve, candy, jam, syrup, dried shreds, murabba wine
Candy	: cook gooseberries with sugar and a bit of lemon juice until the mixture thickens and reaches a jam-like consistency. Pour onto a parchment-lined tray, let it cool, and cut into pieces or roll in sugar for a sweet treat.
dried shreds	: thinly slice fresh gooseberries and dehydrate them using a dehydrator or oven at a low temperature (around 140°F or 60°C) until they are crisp and fully dried. Store in an airtight container for a crunchy, tangy snack.
Murabba	: Cook gooseberries with sugar and a bit of water until the mixture thickens into a syrupy consistency. Add cardamom and other spices if desired, then cool and store in sterilized jars. Enjoy as a sweet and tangy preserve.

18. *Physalis peruviana* L.



18. *Physalis peruviana* L.

- Scientific name : *Physalis peruviana* L.
- Family : Solanacece
- Common name:
- Products : Sauce, Cream
- Sauce : Simmer fresh *Physalis peruviana* (cape gooseberries) with sugar, lemon juice, and a touch of water until the berries break down and the mixture thickens. Blend until smooth if desired, then cool and store in a jar.
- Salad : Toss halved *Physalis peruviana* (cape gooseberries) with mixed greens, cucumbers, and a light vinaigrette. Add a sprinkle of nuts or seeds for extra crunch and flavor.
- Cream : Blend *Physalis peruviana* (cape gooseberry) pulp with a base cream like shea butter or coconut oil. Heat gently and stir until well combined, then allow it to cool before use.

19. *Syzygium cumini* L.



19. *Syzygium cumini* L.

Scientific name	: <i>Syzygium cumini</i> L.
Family	: Myrtaceae
Common name:	
Products	: Jam, jelly beverages, wine, juice
Jam	: Cook mashed jamun fruit with sugar and a splash of lemon juice until the mixture thickens and reaches a jam-like consistency. Stir frequently to prevent burning, then pour into sterilized jars and let cool.
Jelly beverages	: Extract juice from ripe jamun fruit and strain it. Heat the juice with sugar and a gelling agent like agar-agar until it dissolves completely. Pour the mixture into molds, let it set in the refrigerator, and serve chilled.
Wine	: Ferment ripe jamun fruit by crushing it and mixing with water, sugar, and yeast. Allow the mixture to ferment for several weeks in a sealed container, then strain and bottle the liquid. Let it age for a few months before tasting.



20. *Syzygium jambos* (L.) Alston



20. *Syzygium jambos* (L.) Alston

Scientific name	: <i>Syzygium jambos</i> (L.) Alston
Family	: Myrtaceae
Common name:	
Products	: Juice, jam, jelly, beverages.
Juice	: Blend ripe rose apples with water until smooth, then strain to remove pulp. Sweeten to taste if desired, and chill before serving.
Jam	: Cook mashed rose apples with sugar and a bit of lemon juice until the mixture thickens and reaches a jam-like consistency. Stir frequently, then pour into sterilized jars and let it cool before sealing.
Jelly	: Cook rose apple juice with sugar and pectin until it thickens. Pour into sterilized jars and let it set at room temperature before sealing and storing.



21. *Tamarindus indica* L



21. *Tamarindus indica* L

Scientific name	: <i>Tamarindus indica</i>
Family	: Caesalpiniaceae
Common name	: Tamarind, Imli, Hunse, Indian date
Products	: Sauces, chutney, Jam, jelly/ marmalade
Sauces	: Start by soaking tamarind pulp in warm water for about 30 minutes. Once softened, strain and mash the pulp to extract the juice, and then simmer it with sugar, salt, and spices (like cumin and chili powder) until thickened. Adjust seasoning to taste.
Chutney	: Blend tamarind pulp with jaggery or brown sugar, a bit of water, and spices such as cumin, coriander, and black salt. Simmer the mixture until it thickens to a sauce-like consistency, then cool and adjust the sweetness or seasoning as needed.
Jam	: Simmer tamarind pulp with sugar and a splash of lemon juice until it reduces to a thick, jam-like consistency. Stir frequently to prevent sticking and adjust sweetness to taste before letting it cool and set.
Marmalade	: Cook tamarind pulp with sugar and lemon zest or juice until it thickens and reaches a gel-like consistency. Stir frequently to prevent burning, and let it cool before transferring to jars.



22. *Ziziphus rugosa* Lam



22. *Ziziphus rugosa* Lam

Scientific name	: <i>Ziziphus rugosa</i> Lam
Family	: Rhamnaceae
Common name	: zunna berry, Wild Jujuba, Totari(Tamil), Belahadu (Kannada)
Products	: Juice, pulp and dosaJuiceblend the fruit with water and strain to remove the solids. Add sugar or honey to taste, then chill and serve.
Pulp	: boil the fruit until soft, then blend it into a smooth consistency. Strain to remove any seeds and fibrous bits, and use the resulting pulp as needed in recipes or for further processing.
Dosa	: Soak and grind the fruit into a smooth paste, then mix it into your dosa batter. Cook on a hot griddle until crispy and golden, and serve with chutney or sambar.



23. *Zizyphus mauritiana* Lam



23. *Zizyphus mauritiana* Lam

Scientific name	: <i>Zizyphus mauritiana</i> Lam
Family	: Rhamnaceae
Common name:	
Products	: Pulp, juice, Candy, pulp wine, jam, Squash, preserve.
Pulp	: Cook the fruit until tender, and then blend it into a smooth paste and strain out any seeds and fibrous material.
Juice	: Blend the ripe fruit with water, then strain to remove the solids and adjust sweetness if desired.
Candy	: cook the fruit pulp with sugar and a bit of lemon juice until it thickens to a jam-like consistency, then pour into molds and let it cool and set.
Jam	: Cook the fruit pulp with sugar and lemon juice until it reaches a thick, spreadable consistency, stirring frequently.

II. Results and Discussion

Karnataka is very rich diversity of plant species and which includes wild edible fruits also. In different articles reviewed about 24 wild edible fruits which are wildy used for the different purposes are recorded. Among these wild edible fruits *Anonna squamosa*, *Artocarpus heterophyllus*, *Carissa carandus*, *Garcinia gummi-gutta*, *Garcinia indica*, *Grewia asiatica*, *Phyllanthus emblica*, *Syzygium cumini*, *Tamarindus indica*, *Zizyphus mauritiana* are widely used for edible purpose, for manufacture of value-added products and also to improve the Economy of the local people (Table 1).

Value added products such as chips, pickles, canning products (*Artocarpus heterophyllus*), cool drinks, pickles, squashes (*Mangifera indica*), jam, juice, ice cream, milk shakes (*Anonna squamosa*), kokum juice, butter, edible fat and oil (*Garcinia indica*), edible fat and oil (*Garcinia gummi-gutta*), pickle, candy, jam, chavanprash (*Phyllanthus emblica*), jam, jelly, juice, wine (*Syzygium cumini*) and juice, candy, jam, squash (*Flacourtia Montana*) are manufactured from these species (Table.2). In addition to these wild fruits are also been used in cosmetics industry, ice cream industry, dying, tanning industries, beverage industry and even in order to cure diseases and improves the health.

Works related to documentation of different wild edible fruits and value-added products was carried out by several scientists from different parts of India. Karun and his coworkers in 2013, recorded that, most fruits were consumed fresh when ripe. The tender fruits used for pickling, salting and other culinary preparations were from *Artocarpus hirsutus*, *Artocarpus heterophyllus*, *Carissa carandas*, *Carissa spinarum*, *Phyllanthus emblica*, *Garcinia gummi-gutta*, *Mangifera indica*, *Margaritaria indica* and *Spondias pinnata*. Wine was made from *Syzygium cuminii*, *Carissa carandas*, *Carissa spinarum*, and *Phyllanthus emblica* (Karun et al.,2013).

Tropical fruits are now considered as an important item of commerce as they have gained enormous market potential. Tropical

fruits, which are at present under-utilized, have an important role to play in satisfying the demand for nutritious, delicately flavoured and attractive natural foods of high therapeutic value. Apart from nutritive, therapeutic and medicinal values quite a few of these tropical fruits have excellent flavour and very attractive colour. Fruits like jamun and phalsa are highly perishable. Bael fruit is not an easy to eat out of hand item. Many people because of its strong astringent taste do not like fresh Aonla fruit. However, these fruits have unlimited potential in the processed form and consumers all over world can get opportunity to enjoy the fruits in the form of their processed products (Rao, 1994.).

Karun et al 2013, was recorded 45 different native wild edible fruit trees from coffee plantations in 40 villages and considerable local knowledge among farmers on the utility of these resources. Amla and ber fruits in its whole, pulp and juice forms were utilized for the preparation of value-added products like preserve jam and squash respectively (Goyal *et al.*, 2008.). Research on the utilization aspect will help to identify new uses, improve production of already known products and also promote welfare of the local community. Unfortunately, little research has been done on identification and utilization. The information available on minor indigenous fruit or wild fruit species is also scanty (Mahato&Chhetri, 2015). Through processing activities and through diversifying the product range of Garcinia, women's groups could earn regular income throughout the year. This may strengthen their linkages and networks with other value chain stakeholders and service providers such as banks, traders and co-operatives. The skill levels of women's groups in preparing various products would increase (Vasudeva *et al.*, 2016). These results are in line with The average annual household income from Uppage of the fifty-one households was Rs 104,229 (US\$ 2,316), which is higher than the average annual household income of Uttara Kannada district Rs 38,745 (Rai & Christopher, 2004). Annona juice, being the highly nutritious food product that it is, merits closer attention because of its health obvious benefits and its economic potential for farmers, entrepreneurs and consumers. It is used for curing scurvy and

diarrhea, and it is effective in preventing cholera. Hence the value-added products from annona are a new area of research for food technologist, industrialist and farmers and of course these products are a definite alternate solution for nutritional source(Sinthiya and Poornima, 2017).

III. Conclusion

Karnataka is very rich diversity of plant species and which includes wild edible fruits also. In different articles reviewed about 24 wild edible fruits which are wildy used for the different purposes are recorded. Among these wild edible fruits *Anonna squamosa*, *Artocarpus heterophyllus*, *Carissa carandus*, *Garcinia gummi-gutta*, *Garcinia indica*, *Grewia asiatica*, *Phyllanthus emblica*, *Syzygium cumini*, *Tamarindus indica*, *Zizyphus mauritiana* are widely used for edible purpose and for the manufacture of value-added products which improves the Economy of the local people.

In recent past several underutilized fruits are gaining importance and have been successfully utilized for preparation of value-added products and functional foods, thus it is playing its own importance in the field of food industry and nutraceuticals. This made a tremendous impact on the livelihoods of tribal and rural communities, creating wide array of job opportunities and as a source of income and awareness among major populations. By value addition of wild fruits we can produce more products and we can enhance the economic status of rural local folk and even increase the employment for rural people. Hence, there is a wide scope for value addition and utilization of wild fruits in Karnataka.



Table 1. Widely utilized wild edible fruits of Karnataka

Sl. No.	Scientific Name	Kannada Name	Family	References
1	<i>Aegle marmelos</i> L.	Bael	Rutaceae	Rao, 1994 & (Sharma <i>et al.</i> , 2016)
2	<i>Annona squamosa</i> L.	Seetaphala	Annonaceae	Sinthiya&Poornima, 2017; Jagtap&Bapat, 2004.
3	<i>Artocarpus heterophyllus</i> Lam.	Halasinahannu	Moraceae	Bhatet <i>al.</i> , 2004; Rao, 1994; Karun <i>et al.</i> , 2013.
4	<i>Artocarpus hirsutus</i> Lam.	Hebbalasu	Moraceae	Jagtap&Bapat, 2004; Karun <i>et al.</i> , 2013.
5	<i>Capparis decidua</i> (Ker)	Chippuri	Capparaceae	Narainet <i>al.</i> , 2005.
6	<i>Carissa carandus</i> L.	Kaulihannu	Apocynaceae	Narainet <i>al.</i> , 2005; Karun <i>et al.</i> , 2013; Waniet <i>al.</i> , 2013.
7	<i>Carissa spinarum</i> L.	Kavali	Apocynaceae	Karun <i>et al.</i> , 2013.
8	<i>Citrus aurantium</i> L.	Kaipuli	Rutaceae	Greeshma& Sridhar, 2016.
9	<i>Cucumis dipsaceus</i> Ehrenb. Ex Spach	Pavakke	Cucurbitaceae	Greeshma&Sridhar, 2016.
11	<i>Flacourtia montana</i> J.Graham	Sampigehannu	Salicaceae	Karun <i>et al.</i> , 2013.

Sl. No.	Scientific Name	Kannada Name	Family	References
12	<i>Garcinia gummi-gutta</i> L.	Mandahuli	Clusiaceae	Vasudevaet <i>al.</i> ,2016; Karun <i>et al.</i> ,2013.
13	<i>Garcinia indica</i> (Thours) Choisy	Kakemara	Clusiaceae	Vasudevaet <i>al.</i> ,2016.
14	<i>Grewia asiatica</i>	Phalsa	Tiliaceae	Muhammadet <i>al.</i> ,2013.
15	<i>Grewia subinaequalis</i> L.	Phulsha	Tiliaceae	Rao, 1994.
16	<i>Hibiscus sabdarifa</i> L.	Kempupundrike	Malvaceae	Rao, 1994.
17	<i>Mangifera indica</i> L.	Kaadmavu	Anacardaceae	Greeshma& Sridhar, 2016; Rao, 1994; Karun <i>et al.</i> ,2013.
18	<i>Phyllanthus emblica</i> L.	Bettanelli	Phyllanthaceae	Rao, 1994;karunet <i>al.</i> ,2013.
19	<i>Physalis peruviana</i> L.	Buddehannu	Solanacece	Greeshma& Sridhar, 2016.
20	<i>Syzygium cumini</i> L.	Doddanerale	Myrtaceae	Rao, 1994; Karun <i>et al.</i> ,2013.
21	<i>Syzygium jambos</i> (L.) Alston	Pannerale	Myrtaceae	Greeshma& Sridhar, 2016.
22	<i>Tamarindus indica</i> L.	Hunismara	Caesalpinaceae	Rao, 1994.
23	<i>Ziziphus rugosa</i> Lam.	Mulluhannu	Rhamnaceae	Greeshma& Sridhar, 2016
24	<i>Zizyphus mauritiana</i> Lam	Yelchiannu	Rhamnaceae	Rao, 1994;Goyal <i>et al.</i> ,2008

Table 2. Value added products produce from Wild edible fruits

Sl. No.	Scientific Name	Value added Products
1	<i>Aegle marmelos</i> L.	Pulp, Nectar, squash/slab, Powder
2	<i>Annona squamosa</i> L.	Jams, Nectar /syrup, juice, Wine, ice creams, milk shakes and soft drink
3	<i>Artocarpus heterophyllus</i> Lam.	Pickles, salting, canned and curried vegetables
4	<i>Artocarpus hirsutus</i> Lam.	Pickle, salting other culinary preparations, canned chutney, honey, jam, jelly, paste, candies
5	<i>Capparis decidua</i> (Ker)	Pickle
6	<i>Carissa carandus</i> L.	Pickle, squash, wine, jam jelly, squash, syrup, tarts and chutney
7	<i>Carissa spinarum</i> L.	Pickling, salting and other culinary preparations, wine
8	<i>Citrus aurantium</i> L.	Sauce and juice
9	<i>Cucumis dipsaceus</i> Ehrenb. Ex Spach	Starter dish, soup
10	<i>Cucumis sipsaceus</i> Ehrenb. Ex Spach	Starter dish, soup
11	<i>Flacourtia montana</i> J.Graham	Jam, jelly, pickle

Sl. No.	Scientific Name	Value added Products
12	<i>Garcinia gummi-gutta</i> L.	Sour sauce, pickling, salting, other culinary preparations, Edible oil and Edible fat
13	<i>Garcinia indica</i> (Thours) Choisy	Kokum juice, Edible oil, Butter, Edible fat, rind dried and preserved
14	<i>Grewia asiatica</i>	Juice, jams, pies, squashes chutneys
15	<i>Grewia subinaequalis</i> L.	Juice, pulp
16	<i>Hibiscus sabdariffa</i> L.	Sauces, Chopped and added to fruit salads. Roselle syrup, Jelly
17	<i>Mangifera indica</i> L.	Pickle, curry, mango powder, chutney, cool drinks, slab, toffee, beverages such as nectar, squash
18	<i>Phyllanthu sembblica</i> L.	Pickle, preserve, candy, jam, syrup, dried shreds, murabba wine
19	<i>Physalis peruviana</i> L.	Sauce, Cream
20	<i>Syzygium cumini</i> L.	Jam, jelly beverages, wine, juice
21	<i>Syzygium jambos</i> (L.) Alston	Juice, jam, jelly, beverages.
22	<i>Tamarindus indica</i> L.	Sauces, chutney, Jam, jelly/ marmalade
23	<i>Ziziphus rugosa</i> Lam.	Juice, pulp and dosa
24	<i>Ziziphus mauritiana</i> Lam	Pulp, juice, Candy, pulp wine, jam, Squash, preserve.



Aegle marmelos



Annona squamosa



Artocarpus heterophyllus



Artocarpus hirsutus



Capparis deciduas



Carissa carandus



Citrus aurantium



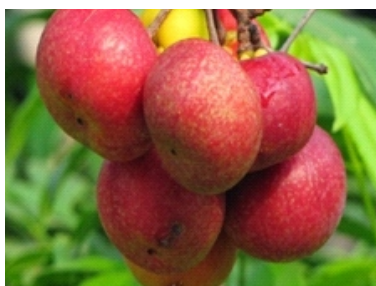
Cucumis dipsaceus



Flacourtia montana



Garcinia gummigutta



Garcinia indica



Grewia asiatica



Mangifera indica



Phyllanthus emblica



Syzygium cumini



Syzygium jambos



Tamarindus indica



Ziziphus mauritiana

Plate 1. Wild Edible Fruits Widely Used in Karnataka

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