

4.6 VEGETABLE CROPS

Vegetables include edible parts of plants such as leaves (Amaranthus), stems (Asparagus), roots (carrots), flowers (broccoli), bulbs (Onion), seeds (Pulses) and fruits such as cucumber, squash, pumpkin, capsicum, etc. Botanically, fruits are the reproductive parts of plants (ripened ovaries containing one or many seeds), whereas vegetables are the vegetative parts of plants which sustain the growth and survival of plant. Vegetables are consumed in varieties of ways such as part of main meal or as snacks. The nutrients stored in different types of vegetable vary considerably. With the exception of pulses, vegetables provide little protein and fat. Vegetables contain water soluble vitamins like vitamin B and vitamin C, fat-soluble vitamins including vitamin A and vitamin D and also contain carbohydrates and minerals. Many root or non-root vegetables that grow in the subsurface of soil can be stored through winter in a root cellar or other similarly cool, dark and dry place to prevent mold, greening and sprouting. Care should be taken in understanding the properties and vulnerabilities of particular kinds of roots to be stored. These vegetables can last through to early spring and be nearly as nutritious as when they are fresh. During storage, leafy vegetables lose moisture and vitamin C degrades rapidly. They should be stored for as short a time as possible in a cool place using proper containers.

Table 14: Traditional and hybrid vegetable crops grown in Coastal Karnataka

Taluks	Coast		Inland		Foot hills	
	Traditional	Hybrids	Traditional	Hybrids	Traditional	Hybrids
Mangalore	39	11	58	17	63	10
Bantwala	45	13	47	13	59	10
Belthangadi	43	12	54	18	68	8
Udupi	49	14	41	8	43	8
Karkala	48	18	39	16	49	11
Kundapur	36	12	38	10	39	8
Bhatkal	47	14	43	7	41	7
Honnavar	48	13	38	9	39	9
Ankola	41	16	43	16	42	8
Kumta	52	16	46	14	43	12
Karwar	23	8	38	13	27	7
TOTAL	73	23	86	18	90	12

Note: Traditional varieties of vegetable crops cultivated in coastal, inland and foothill regions are 73, 86 and 90 respectively. Hybrid varieties of vegetable crops cultivated in coastal, inland and foothill regions are 23, 18 and 12 respectively. Cultivation of traditional and hybrid varieties of vegetable crops in each coastal taluk varies depending on the climatic and edaphic factors besides the choice of crop varieties available to farmer.

There are 46 major kinds of vegetables documented with good number of sub varieties under Kesu tuber (*Remusatia vivipara*) namely Kari kesu, Goi kesu, Heggesu, Bena kesu, Bili kesu, Pathrode, Mara kesu, motte kesu, Bombay kesu, mund kesu, etc., as shown in 4.6.1. Vegetables are among one of the most diverse domesticated crops in the coastal region of Karnataka. Highest diversity of traditional varieties (90 varieties) has been recorded in the foothill ecological region followed by inland coast (86 varieties) and coastal (73 varieties) eco-regions. Intervention of hybrids is in reverse trend as shown in table 14. Traditional varieties are believed to have higher nutritional content. Very high genetic diversity has been found in Brinjal, green leafy vegetable, Kesu, Ladies finger, Capsicum,

etc., with higher local diversity in foothills and comparatively higher improved varieties along the coast as shown in table 14. Bhatkal badne is a big fruit each weighing about 500-700 grams. Gokarna badne is slender, long, white fruit with distinct taste. Bhatkal gulla is round medium sized brown fruit with white stripes on the fruit. Udupi gulla is medium to large sized with purple coloured fruits. These gullas are specially used for cooking special dishes of food. Urbadane kai, Matti gulla, Nilavara badne, Benagal gulla, Alendgulla, Udupi gulla are other brinjal varieties. Higher diversity of traditional vegetable varieties has been recorded along the foothill region and more hybrid varieties were grown along coastal ecological region.

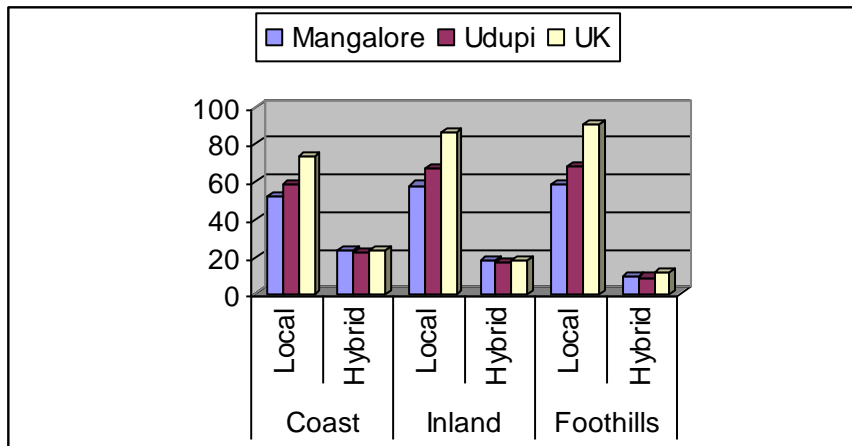
Chillies are distinct in characters like Gokarna badne which is white, medium sized fruit, very hot and in great demand locally. Ghandari/Sooji menasu is very small, very hot, very short fruit and highly medicinal. Even bigger chilli fruit is used for making fried items like Bajji.

Red and white coloured sweet potatoes are grown and also Tapioca (Mara genasu) is used as both vegetable and for preparation of chips. There are three kinds of Ladies finger, which include bigger, larger white fruits with less fiber in the fruit. Medium sized, white, fiber-less and small sized green fruit with distinct taste are also grown. Raw jackfruits are also used as vegetable. Among cucumbers Mullu sauthe is a local tasty cucumber with small soft spines on the fruits, nati southe is green slender taste fruit. Variability observed among Sambar sovuthe or Mangalore sovuthe is with respect to size, colour pattern and taste. Location specific tasty fruits of ash guard are found. Beetle leaves are the attractive climbers in home gardens. Ambadi, Honnavar Rani betel leaf, Calcutta betel leaf are the prominent betel wines grown only in taluks of Uttara Kannada, but absent in Udupi and Dakshina Kannada districts. Honnavar Rani betel leaf is famous for its taste and has high demand in national and also in international market. Higher diversity of vegetables recorded in Uttara Kannada (122 varieties) district followed by Udupi (91 varieties) and Dakshina Kannada (85 varieties) district are as shown in table 15.

Table 15: Local and hybrid vegetable crops grown in Coastal Karnataka

Districts	Coast		Inland		Foothills		TOTAL	
	Local	Hybrid	Local	Hybrid	Local	Hybrid	Local	Hybrid
DK	52	23	58	18	59	10	61	24
Udupi	59	22	67	17	68	9	69	22
UK	73	23	86	18	90	12	96	26

Figure 6: Graphical representation of local and hybrid vegetable crops grown in Coastal Karnataka



Highest diversity of traditional vegetables has been documented in Uttara Kannada followed by Udupi and Dakshina Kannada districts. Among the improved vegetable varieties not much variability was found between the districts but shows higher trend in coastal eco-region followed by inland coast and foothill eco-regions as shown in Fig. 6

Among tubers, Kesu is having high diversity. Kari kesu, bena/Bili kesu, Goi kesu, Pathrode, etc., are among the major ones. Pathrode variety is famous for its leaves rather than its tuber, used as traditional wrap material to prepare some tasty, delicious food. Leaf stalk of Kari kesu is black and Bili kesu is silver white. Goi kesu is bitter and stringent in taste; therefore cut pieces are soaked for few hours in water to remove the chemicals responsible for bitterness through leaching.

Radish and green leafy vegetables are grown and used extensively. Green leafy vegetables form one of the important components of kitchen. Bili arive (Amaranth) is having greenish or silver white colored leaves with distinct taste. Red arive (Amaranth) is having light red or dark brown to reddish leaves. Among few of the Amaranth species/varieties are harvested for leaves and some others are harvested for tender, soft and tasty stem.

As Basale (Bassella) has high medicinal value apart from nutritive value, it is grown with care. Bili Basele dantu is having green leaves and stem, where as Kempu Basele is having red stem and leaves. Bombay Basale is also grown in the region.

Beetroot, Noolkol, Thonde kai, Carrot, green chilly, beans, Cauliflower, cabbage, red chilly, tomato etc., are grown outside Western Ghats region in Deccan plateau and brought to local market for sale.

4.6.1 Description of vegetable crops

Sl. No.	Scientific name	Local name	Description
1	<i>Cyamopsis tetragonaloba</i>	Bili chouli (photo sheet 4.6.2 plate 9)	Grown in small quantity for domestic use for both human and cattle consumption.
2	<i>Remusatia vivipara</i>	Kesugadde (photo sheet 4.6.2 plate 18)	<u>Kari kesu</u> , Big, long fruit and <u>Bena kesu</u> : Medium sized, white, long fruit used as vegetable. <u>Bil kesu</u> : It is a climber; both leaf and tuber are used. <u>Pathrode</u> : Tuber is bitter and not used for consumption. Only leaves are used for preparation of special dish called Pathrode.
3	<i>Cucumis spp.</i>	Ibbudle	Like magikai, it is sweet but having less keeping quality, grown during summer and monsoon seasons. Good for health especially for body cooling.
4	<i>Ipomoea batatas</i>	Genasu	Both white (plate 14) and red coloured (plate 12) tubers are local varieties sweet in taste and both are preferred equally. Thuppa genasu : Both fruit and tubers are consumed.
5	<i>Capsicum annum</i>	Chilly	<u>Ankola menasu</u> (plate 13); red fruit and very hot, <u>Gokarna menasu</u> : Green, small fruit with medium hot, <u>Sugi menasu</u> ; Very small, green/red fruit, very hot, used in traditional medication. Udupi bili menasu (plate 7): White fruits having distinct and very hot taste
6	<i>Cucurbita pepo</i>	Kumbla	Alu kumbla (plate 11) is small sized, green fruit, where as Sweet kumbla (plate 10) is yellowish red sweet fruit used for making Curry.
7	<i>Hibiscus esculentus</i>	Bende kai	<u>Bili bende</u> : Long type, 5 to 10 inches long and small types around 4-5 inches long, less fiber content and tender to eat. <u>Kasthuri bendi</u> : Very tasty, whitish green fruit. Long duration crop with fewer yields. <u>Hasiru bende</u> : Green coloured fruits with moderate fiber content.
8	<i>Moringa oliefera</i>	Nugge kai (photo sheet 4.6.2 plate 20)	Local varieties are tasty and nutritious when tender but fibrous when mature.
9	<i>Lufa acutangula</i>	Ere kai (photo sheet 4.6.2 plate 17)	Local varieties are tasty and nutritious when tender but fibrous when mature. There are two types based on length and size of fruit.
10	<i>Cucumis spp</i>	Mangalore southe (photo sheet 4.6.2 plate 16)	Medium sized greenish-yellow, yellowish-orange fruit commonly used for preparing curry.
11	<i>Brassica oleracea</i>	Elekosu	Introduced from plains, grown in commercial scale. Needs chemical insecticides for crop protection.
12	<i>Spondias pinnata</i>	Amte kai	Small fruit from tree with light sour taste used for making pickle.
13	<i>Solanum melangana</i>	Bhatkal badne (photo sheet 4.6.2 plate 1)	Medium sized long fruits with brown strips on the fruit.
14	<i>Solanum</i>	Bargi badne	White, round, big sized fleshy fruit, tasty.

	<i>melangana</i>	(photo sheet 4.6.2 plate 2)	
15	<i>Solanum melangana</i>	Gokarna badne (photo sheet 4.6.2 plate 3)	Medium sized, long fruits with pink strips on the fruit..
16	<i>Solanum melangana</i>	Hangal gulla (photo sheet 4.6.2 plate 4)	Small, short, round brown fruits with distinct taste
17	<i>Solanum melangana</i>	Karbadne (photo sheet 4.6.2 plate 5)	Medium sized oblong dark brownish to black fruits with distinct taste
18	<i>Solanum melangana</i>	Matti gulla (photo sheet 4.6.2 plate 6)	White, round fruit with brownish thick strips on big sized fleshy fruit, tasty.
19	<i>Solanum melangana</i>	Musuku badne	White, long, big sized fleshy fruit, tasty.
20	<i>Solanum melangana</i>	Kasargood badne	Brown, long, big sized fleshy fruit, tasty.
21	<i>Solanum melangana</i>	Bargi badne	Blue colored stiff and used for frying.
22	<i>Solanum melangana</i>	Mullu badne	Medium sized greenish white/ brownish fruit with spines on the petiole.
23	<i>Solanum melangana</i>	Udda badne	Thin, long in black and white colors.
24	<i>Solanum melangana</i>	Gund badne	Brown colored short, round and big fruit.
25	<i>Amarphophalus spp</i>	Suvarna gadde (photo sheet 4.6.2 plate 23)	Big tuber with nutrient rich carbohydrates, used as special vegetable and also for making chips.
26	<i>Manihot esculenta</i>	Mara genasu (photo sheet 4.6.2 plate 19)	Tuber with fiber rich tasteless carbohydrates and minerals.
27	<i>Coccinia grandis</i>	KarwarThonde (photo sheet 4.6.2 plate 24)	Like small pumpkin, but green coloured used as good vegetable.
28	<i>Dolichos spp</i>	Avare sadde	Seeds with cover is boiled with salt and eaten in some traditional ceremonies.
29	<i>Lufa cylindrica</i>	Snake guard	Local ones are slender, long with green and white stripes. Hybrids are bigger, short, with powdery white colour.
30	<i>Benincasa hispida</i>	Bood kumbla (photo sheet 4.6.2 plate 8)	Big white pumpkin with different size and shape called by different names.
31	<i>Momordica charantia</i>	Bitter guard (photo sheet 4.6.2 plate 21)	Fruits are greenish white and dark green coloured. Local varieties have good medicinal value.
32	<i>Raphanus sativus</i>	Mulangi (photo sheet 4.6.2 plate 22)	Tuber crop grown extensively. Both tuber and leaves are used as vegetable.

Photo sheet 4.6.2: Vegetable crops



Plate 1 *Solanum melangana*
(Bhatkal Badne)



Plate 2 *Solanum melangana*
(Bargi badne)



Plate 3 *Solanum melnagana*
(Gokarna Badne)



Plate 4 *Solanum melangana*
(Hangal gulla)



Plate 5 *Solanum melangana*
(Karbadne)



Plate 6 *Solanum melangana* (Matti
gulla)



Plate 7 *Capsicum annum* (Udupi
bili menasu)



Plate 8 *Benincasa hispida*
(Boodkumbla)



Plate 9 *Cyamopsis tetragonoloba*
(Chouli kai)



Plate 10 *Cucurbita spp* (Sihi
Kumbla)



Plate 11 *Cucurbita pepo*
(Alukumbla)



Plate 12 *Ipomoea tuberosa*
(Gokarna genasu)



Plate 13 *Capsicum annum*
(Ankola menasu)



Plate 14 *Ipomoea tuberosa* (Bili genasu)



Plate 15 *Luffa cylindrica*
(Padavalakai)



Plate 16 *Cucumis sativus*
(Bogekai)



Plate 17 *Luffa acutangula* (Erekai)



Plate 18 *Colacasia esculenta*
(Kesdu gadde)



Plate 19 *Manihot utiatissima*
(Maragenasu)



Plate 20 *Moringa oliefera* (Nuggekai)



Plate 21 *Momordica charantia*
(Agalakai)



Plate 22 *Raphanus sativus*
(Mulangi)



Plate 23 *Amorphophalus spp*
(Suvarnagadde)



Plate 24 *Coccinia grandis*
(Karwar Thonde)

4.6.3 Description of green leafy vegetable crops

Sl. No.	Scientific name	Local name	Description
1	<i>Amaranthus spp</i>	Red arave; Gattarave (photo sheet 4.6.4 plate 2)	Good quality leaves with stiff, solid stem used as vegetable very healthy.
2	<i>Amaranthus spp</i>	Otlarave (photo sheet 4.6.4 plate 3)	Green leaves very tasty with hallow stem.
3	<i>Amaranthus spp</i>	White arave (photo sheet 4.6.4 plate 6)	Powdery white-green leaves very tasty.
4	<i>Amaranthus spp</i>	Dodda dantu arve (photo sheet 4.6.4 plate 12)	Grows tall with tender edible stem. Generally stem is in major use than leaves. Powdery white-green leaves very tasty.
5	<i>Amaranthus spp</i>	Gokarna arve (photo sheet 4.6.4 plate 5)	Short plants with green and pink mixed coloured leaves very tasty.
6	<i>Amaranthus spp</i>	Kempu ottarve (photo sheet 4.6.4 plate 8)	Pinkish leaves very tasty with hallow stem.
7	<i>Amaranthus spp</i>	Sabbakki soppu (photo sheet 4.6.4 plate 9)	Green foliage. Medium sized plants with distinct fragrant aroma. Foliage is very nutritious.
8	<i>Amaranthus spp</i>	Sanna dantu (photo sheet 4.6.4 plate 10)	Grows medium sized with tender edible stem. Generally stem is in major use than leaves. Powdery white-green leaves very tasty.
9	<i>Amaranthus spp</i>	Kempu Otlarave (photo sheet 4.6.4 plate 11)	Grows tall with tender edible stem. Generally stem is in major use than leaves. Pinkish - redgreen leaves very tasty.
10	<i>Basella alba</i>	Green basale (photo sheet 4.6.4 plate 4)	Dark green coloured Basale rich in nutrients and commonly seen in most of homestead gardens.
11	<i>Basella alba</i>	Red basale	Red coloured Basale rich in nutrients and commonly seen in most of homestead gardens.
12	<i>Basella alba</i>	Bombay basale	Light green coloured basale rich in nutrients and plant having good coppicing ability, propagated through cuttings and also by seeds.
13	<i>Coriandrum sativum</i>	Kottambari soppu (photo sheet 4.6.4 plate 1)	Fragrant foliage used as spicy component in small quantity.

Photo sheet 4.6.4: Green leafy vegetable species

		
<p>Plate 1 <i>Coriandrum sativum</i> (Kottambari soppu)</p>	<p>Plate 2 <i>Amaranthus spp</i> (Kempu arvesoppu)</p>	<p>Plate 3 <i>Amaranthus spp</i> (Hasiru Arvesoppu)</p>
		
<p>Plate 4 <i>Basella alba</i> (Hasiru basale soppu)</p>	<p>Plate 5 <i>Amaranthus spp</i> (Gokarna arvesoppu)</p>	<p>Plate 6 <i>Amaranthus spp</i> (Bili Arve soppu)</p>
		
<p>Plate 7 <i>Amaranthus spp</i> (Karwar bili dantu soppu)</p>	<p>Plate 8 <i>Amaranthus spp</i> (Kempu ottarve soppu)</p>	<p>Plate 9 Sabbakki soppu</p>
		
<p>Plate 10 <i>Amaranthus spp</i> (Sanna dantu soppu)</p>	<p>Plate 11 <i>Amaranthus spp</i> (Kempu otlareve soppu)</p>	<p>Plate 12 <i>Amaranthus spp</i> (Dodda dantu soppu)</p>

4.7 PLANTATION CROPS

Areca nut, Coconut and Cashew are the major cash crops in the region as shown in Annexure 4. As paddy cultivation has become unprofitable the farmers have switched over to cultivation of cash crops. As areca nut grows well under moist soil condition having good drainage, there is tendency of farmers to encroach the forestland, streams and valleys to raise the areca nut gardens. Encroachment of forestland has resulted in the decline of Myristica swamps and severely affecting the climax of vegetation. Watershed values of streams, valleys and catchments have also been affected negatively. Sugarcane, groundnut, betel leaves are grown as major crops of Uttara Kannada district but are rarely grown in Udupi district.

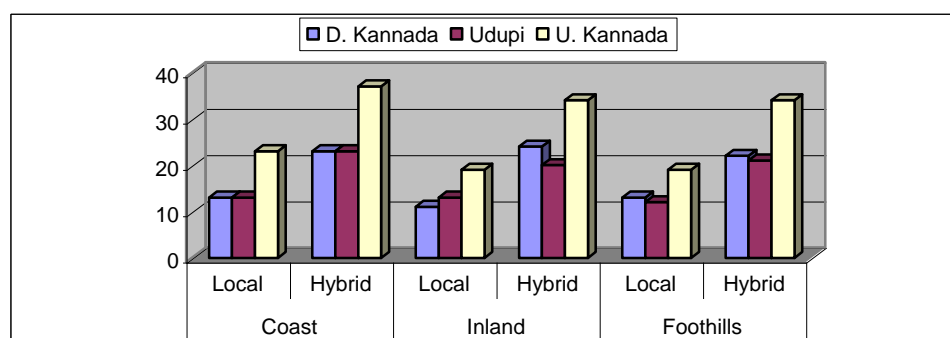
There are 12 varieties of areca nut documented in the region; the important varieties like Mangala, Srimangala, Coimbatore, Moorur, Aradhana, Mohit nagar, Ratnagiri, Vitla, Singapur and SAS are grown. Majority of them are local varieties.

Daskabbu, Kemp kabbu, Kari kabbu, Bili kabbu are sugarcane varieties grown only in Uttara Kannada district. Cashew is one of the cash crops grown along the coast. Ullal-1, Ullal-3 varieties, Vengurla, etc are the major varieties. There are 11 cashew varieties recorded in the region. There are 13 hybrid and local coconut varieties recorded in the region as given in table 4.6.3. Areca nut, Coconut, cashew, pepper and rubber are the important commercial crops grown in the coastal Karnataka. More hybrid varieties are cultivated than local varieties but the area under cultivation varies. Local varieties of Areca nut and coconut is in larger extent than improved varieties. Higher improved varieties have been recorded in Uttara Kannada district (39 varieties) than in Dakshina Kannada (26 varieties) and Udupi (25 varieties) districts as documented in table 16.

Table 16: Local and hybrid commercial crops grown in Coastal Karnataka.

Districts	Coast		Inland		Foothills		TOTAL	
	Local	Hybrid	Local	Hybrid	Local	Hybrid	Local	Hybrid
DK	13	23	11	24	13	22	14	26
Udupi	13	23	13	20	12	21	15	25
UK	23	37	19	34	19	34	24	39

Figure 7: Graphical representation of local and hybrid commercial crops grown in Coastal Karnataka



4.7.1 Description of commercial crops

Sl. No.	Scientific name	Local name	Description
1	<i>Areca catechu</i>	Adike (photo sheet 4.7.2 plate 3)	<u>Local variety and Kadu adike</u> : resistance to some diseases, yield for longer period, <u>Mangala, Srimangala, Aradhana</u> : Comparatively yield is higher, sensitive to diseases, yields for longer period. <u>Mohit nagar, Ratnagiri, Vitla, Singapore</u> : Improved selection varieties with enhanced yield, competitively resistant to pests and diseases.
2	<i>Cocos nucifera</i>	Tengina kai (photo sheet 4.7.2 plate 4)	Malbar tall - Tall tree with medium sized nut, yields for longer period. Fruit with thick kernel, high oil content, <u>Kochi kai</u> – Small fruit in large numbers, <u>Kundiri</u> – Small fruit with thick kernel, bears less number of fruits. <u>Seethali, Deevi, Singapur, Philippines and T.N.T varieties</u> : Introduced varieties yield is good but sensitive to pests and diseases. Tall tree with medium sized brown nut, this variety is preferred to grow for its sweet tender nut yield is till 30-40 years. <u>Arkanji kenda</u> : Same fruit with mixed orange and green colour. <u>T X D</u> : Dwarf tree with medium sized green nut, it is grown for its sweet tender nut, yield continues for till 30-40 years.
3	<i>Piper nigrum</i>	Kalu menasu (photo sheet 4.7.2 plate 2 & 7)	It is a local variety having comparatively small fruits on short panicle with strong aroma. <u>Paneeur</u> ; Comparatively bigger fruits arranged longed panicle <u>Mallisara</u> : Fruits longer, arranged neatly on a long panicle. <u>Gidda kare</u> ; Fruits are short, round, arranged in medium sized panicle.
4	<i>Piper betel</i>	Vilyadele (photo sheet 4.7.2 plate 5)	<u>Honnava rani ele/Kari ele</u> : Black leaves spicy and hot in taste, <u>Ambadi</u> , White leaves spicy hot. <u>Calcutta</u> : White leaves with mild spicy flavour.
5	<i>Vanilla planifera</i>	Vanilla (photo sheet 4.7.2 plate 6)	Introduced from outside plant yields good quantity of fruits of commercial importance.
6	<i>Anacardium occidentale</i>	Cashew (photo sheet 4.7.2 plate 1)	Fruit is fleshy and edible. Kernal is high nutritious and tasty and have high demand. Kernal is commercial part and size of hybrid varieties are good

Photo sheet 4.7.2: Commercial crops



Plate 1 *Anacardium occidentale* (Cashew)



Plate 2 *Piper nigrum* (Kalu menasu)



Plate 3 *Areca catechu* (Arecanut)



Plate 4 *Cocos nucifera* (Coconut)



Plate 5 *Piper betel* (Betel leaves)



Plate 6 *Vanilla planifera* (Vanilla)



Plate 7 *Piper nigrum* (Black pepper)

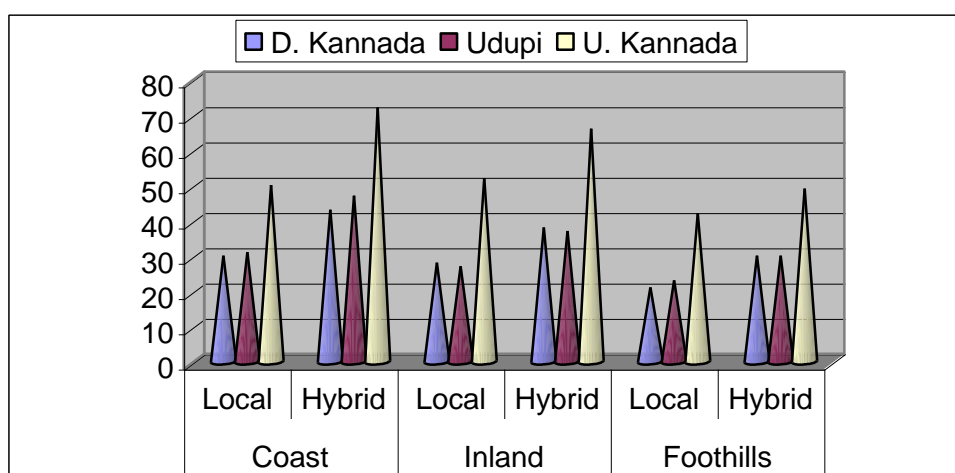
4.8 ORNAMENTAL CROPS

Majority of the ornamental plants are of improved varieties, which include *Hibiscus*, Rose, *Anthurium*, Crotons, Kariveer hoovu, Hulimise hoovu, etc. There is a good diversity of species and varieties among the local ornamental plants like *Euphorbia pulcherima*, rose, *Hibiscus*, Abbalga, etc. Higher diversity of ornamental plants is concentrated in the ecological regions of towns and big villages. Hibiscus, Abbalga, Crotons, Rose, palms, etc., are among the major ornamental species. 34 species of ornamental plant species and 38 agro-forestry tree species documented from the region are as described in 4.64. Higher diversity of ornamental plants found in Uttara Kannada district (135 varieties), followed by Udupi (85 varieties) and Dakshina Kannada (78 varieties) as given in table 17. Higher distribution of local ornamental species found along Inland eco-region followed by foothill region. Diversity of improved ornamental species and varieties occurring along the coastal region are as shown fig 8.

Table 17: Local and hybrid ornamental plants grown in Coastal Karnataka

Districts	Coast		Inland		Foothills		TOTAL	
	Local	Hybrid	Local	Hybrid	Local	Hybrid	Local	Hybrid
DK	30	43	28	38	21	30	32	46
Udupi	31	47	27	37	23	30	34	51
UK	50	72	52	66	42	49	56	79

Figure 8: Graphical representation of local and hybrid Ornamental plants grown in Coastal Karnataka



4.8.1 Description of ornamental plants

Sl. No.	Scientific name	Local name	Description
1	<i>Mammia surugi</i>	Surugi	Fragrant flower used for manufacture of perfume. The tree has got medicinal properties.
2	<i>Polyalthia longifolia</i>	Ashoka	Ornamental tree having medicinal properties.

3	<i>Cestrum nocturnum</i>	Ratri raani	Grown around by houses and gardens for its fragrant flowers.
4	<i>Jasminum spp.</i>	Jagi hoovu (photo sheet 4.8.2 plate 1)	White flower used for worship and also in ceremonies
5	<i>Euphorbia pulcherrima</i>	(photo sheet 4.8.2 plate 2)	Shrubby plants with red coloured young leaves and old green leaves. Looks very attractive.
6	<i>Crossandra infundibuliformis</i>	Abbalge(photo sheet 4.8.2 plate 3)	Brick red coloured attractive flowers. Regularly used as ornamental flower and also for ceremonies
7		Kanda hoovu photo sheet 4.8.2 plate 4)	White coloured attractive flowers from local plants used for ceremonies
8		Kudichendu mallige hoovu (photo sheet 4.8.2 plate 5)	White coloured attractive flowers from local plants used for ceremonies
9	<i>Mimosops elangi</i>	Ranjalu (photo sheet 4.8.2 plate 6)	Dried brownish flowers from local tree used for ceremonies as dry flower
10	<i>Hibiscus rosa-sinensis</i>	Dasavala (photo sheet 4.8.2 plate 8)	Multipurpose plants grown commonly in gardens. Bears attractive, variegated flowers.
11	<i>Hibiscus spp</i>	Dasavala (photo sheet 4.8.2 plate 9)	Multipurpose plants grown commonly in gardens. Bears attractive, variegated flowers
12	<i>Calotropis gigantean</i>	Ekkada hoovu (photo sheet 4.8.2 plate 10)	Dirty white pinkish attractive flowers from local medicinal plants used for ceremonies
13	<i>Ixora coccinia</i>	(photo sheet 4.8.2 plate 11)	Bright brick red attractive flower head grown in gardens
14	Jasmine	(photo sheet 4.8.2 plate 12)	White flower used for worship and also in ceremonies
15	<i>Coleus spp</i>	(photo sheet 4.8.2 plate 13 & 14)	Plants with attractive variegated foliage grown in gardens
16	<i>Bryophyllum spp</i>	(photo sheet 4.8.2 plate 15)	Plants with attractive variegated fleshy foliage grown in gardens
17	<i>Rosa multiflora</i>	Rose (photo sheet 4.8.2 plate 16)	Spiny plants grown commonly in gardens for attractive, beautiful variegated flowers
18	<i>Jantigina hoovu</i>	(photo sheet 4.8.2 plate 17)	White flower used for worship and also in ceremonies
19	<i>Bambusa vulgaris</i>	Yellow Bamboo (photo sheet 4.8.2 plate 18)	Bamboo with golden yellow coloured culms and a attractive thin dark green strip on the stem grown in gardens

Photo sheet 4.8.2: Ornamental plants



Plate 1 *Jasminum* spp(Mallige)



Plate 2 *Euphorbia pulcherrima*



Plate 3 *Crossandra infundibuliformis* Abbalge



Plate 4 Kanda hoovu



Plate 5 *Tegetes erecta* (Kudichendu mallige hoovu)



Plate 6 *Mimusops elengi* flower



Plate 7 *Hibiscus rosa-sinensis* Dasavala



Plate 8 *Chrysanthemum indicum* Karwar Sevanti hoovu



Plate 9 *Hibiscus* spp. Dasavala



Plate 10 *Calotropis gigantea* Ekkada hoovu (*Caloropsis*)



Plate 11 *Ixora coccinia*



Plate 12 *Jasminum* spp (Jasmine)



Plate 13 Coleus spp



Plate 14 Coleus spp



Plate 15 Bryophyllum spp



Plate 16 Rosa multiflora (Rose)



Plate 17 Jantigina hoovu



Plate 18 Bambusa vulgaris Yellow Bamboo

4.9 MEDICINAL PLANTS AND AGRO-FORESTRY

From time immemorial the medicinal plants have provided relief to many ailments. There is a vast reserve of medicinal plants in the region. Due to increase in population, change in the standard of living and the potential carcinogenic hazardous substances possessed by the synthetic chemicals, the medicinal plants form an important ingredient of modern system of medicine. About 90% of medicinal plants used by the pharmaceutical industry are collected from the wild. While over 800 species are used in the manufacture and production of drugs by industries, less than 20 species of plants are under commercial cultivation. Over 70% of the plant collections involving destructive and unsustainable method of harvesting have made several medicinal plants to become endangered, vulnerable and threatened. The medicinal plant diversity documented in the three ecological regions at taluk level is as shown in table 18.

Table 18: Occurrence of medicinal plants and agro-forestry species in Coastal Karnataka

District	Medicinal plant species			Agro-Forestry tree species		
	Coast	Inland	Foothills	Coast	Inland	Foothills
D. Kannada	108	105	123	39	47	53
Udupi	110	113	120	37	41	50
U. Kannada	166	168	178	40	47	51
TOTAL	172	182	189	48	53	62

Even though the modern system of medication is the principal healing system of ailments, people are using local medicinal plants in their primary health care. People are having traditional knowledge on the usage of medicinal plants for human and veterinary ailments. Old and aged people are having good knowledge of medicinal plants than younger generation. The usage of medicinal plants is through some traditional foods like drinking of good number of thambli (Spicy butter milk). Different medicinal plants are used for preparation of different types of thambli in different seasons. Some of the medicinal plants are used as a part of tradition and also as primary health care measures.

Higher diversity of medicinal plants has been documented in the foothill ecological region than in other eco-regions. Farmers in the region are using more than 100 species of medicinal plants for their need but we have documented around 190 medicinal plant species from the farmlands as shown in table 4.9.1. Higher diversity was found along the foothill (189 species) eco-region as compared to inland (182 species) and 172 species in coastal eco-regions as shown in table 18. Higher diversity of agro-forestry tree species was found along the foothill (62 species) eco-region as compared to inland (53 species) and 48 species in coastal eco-region as shown in table 18. Introduction of some species like teak and silver oak are found along the coast.

4.9.1 Description medicinal plant species

Sl. No.	Scientific name	Local name	Description
1	<i>Mucuna pruriens</i>	Kuli belu	Leguminous, trifoliolate straggler weed plant with hairy leaves. Bears white hairy pods. The hairs cause itching and irritation of skin when in contact. Plant is used as medicinal plant, seeds as aphrodisiac in ayyurveda.
2	<i>Wattakaka valubilis</i>	Katsi	Leaves, flowers, and the rind of unripe fruits are boiled and eaten as vegetable or used in preparation of curry. Seeds are eaten. Roots and tender stalks are emetic and purgative. Plant yields a strong fiber. Alcoholic extract of the plant showed activity against sarcoma 180 in mice. Leaves used in the treatment of boils and abscess.
3	<i>Beynia retusa</i>	Hooli (photo sheet 4.9.2 Plate6)	Young twigs are used against Jaundice and it is a fruit plant.
4	<i>Calotropis gigantea</i>	Yekkada gida (photo sheet 4.9.2 plate1)	Latex contain high concentrations of alkaloids used for many curatives
5	<i>Ocimum spp.</i>	Luvunga tulsi (photo sheet 4.9.2 plate2)	Grown as traditional plant and have high medicinal properties. Leaves used against fever, cold etc.
6	<i>Atalantia spp</i>	Armunde kai (photo sheet 4.9.2 plate3)	Citrus smelling leaves and also fruit is used in traditional medication
7	<i>Hygrophila spinosa</i>	Kanti mullu gida (photo sheet 4.9.2 plate4)	Though it is a local weed used against skin ailments
8	<i>Cordia oblique</i>	Challeannu (photo sheet 4.9.2 plate5)	Fruit pulp having high medicinal properties
10	<i>Sauvrapusandrogynus</i>	Chakramuni (photo sheet 4.9.2 plate 7)	Leaves are highly nutritious and contain high vitamins so commonly called Multi Vitamin plant
11	<i>Clitoria ternatea</i>	Shankapushpa (photo sheet 4.9.2 plate8)	Bears attractive blue flower and whole plants used for stomach ailments and also against fever.
12	<i>Capsicum anum</i>	Gandhari menasu (photo sheet 4.9.2 plate 9)	Very short and small fruit, very hot and used as medicinal plant. Used both in human and also veterinary curative.
13	<i>Cassia occidentalia</i>	(photo sheet 4.9.2 plate 10)	Leaf- laxative, vermicide; seed- laxative. Root for snake bite, skin diseases, sores, scabies; leaf for skin diseases, bone fracture, indigestion; seed for skin diseases, ringworm, eczema.
	<i>Xanthoxylum retusi</i>	Jummana kai (photo sheet 4.9.2 plate 11)	Plant is used against diabetes and have other medicinal properties
	<i>Myristica malabarica</i>	Rampatre	Brick red coloured network structure covered on

		(photo sheet 4.9.2 plate 12)	the seed called mase. It is used as medicine, seed is also have high medicinal value
14	<i>Monochoria vaginalis</i>	Neerabasle (photo sheet 4.9.2 plate)	Root chewed to relieve toothache; bark eaten to relieve asthma.
15	<i>Celosia argentia</i>	Bendole arve	Seed- aphrodisiac. Seeds for eye diseases, clearing the eyes, treat mouth sores and blood diseases, diarrhea.
16	<i>Emblica officinalis</i>	Nelli kai	<u>Raj nelli</u> : Introduce from outside fruits with ridges. <u>Bettada nelli</u> : Locally improved with round big fruit best suited for pickle making and ayurvedic medicine.
17	<i>Costus speciosus</i>	Kori juttu	Rhizomes used for diabetes.
18	<i>Apama siliquosa</i>	Chakrani beru	Fruits used for fever.
19	<i>Averrhoa bilimbi</i>	Bimbuli huli	Fruits are sour in taste and rich in Vitamin C.
20	<i>Hemidesmus indicus</i>	Sugandhi beru	Whole plant used as medicine.
21	<i>Gymnema sylvestre</i>	Janki beru	Plant is used against diabetes and has other medicinal properties.
22	<i>Ventilago madraspatna</i>	Aithal	Large climber used as aphrodisiac.
23	<i>Strychbos nux-vomica</i>	Kasarka	Fruit is poisonous used as fish poison, bark for veterinary medication and whole plant has high medicinal value.
24	<i>Aristolochia tagala</i>	Ishwara beru	Plants have highly medicinal properties.
25	<i>Salacia chinensis</i>	Ekanayakana beru	Fruit is used as medicine.
26	<i>Glochidion malabaricum</i>	Madyal soppu	Large tree yields good timber.
27	<i>Cyclea peltate</i>	Padrande	Crushed leaves used for hair treatment and the plant is highly valued for its medicinal properties.
28	<i>Gnetum ula</i>	Nokate	Kernels yield oil, which is used in the treatment of rheumatism and as an illuminant; also to a small extent for edible purpose.
29	<i>Sida acuta</i>	Bala	Root- tonic, antipyretic; leaf- demulcent, diuretic, emollient. Root for nervous and urinary diseases; leaf on elephantiasis, haemorrhoids.

Photo sheet 4.9.2: Medicinal plants










 <p>Plate 1 <i>Calotropis gigantea</i> (Yekkada gida)</p>	 <p>Plate 2 <i>Oscimum spp.</i> (Luvunga tulsi)</p>	 <p>Plate 3 <i>Atalantia spp</i> (Armunde kai)</p>
 <p>Plate 4 <i>Hygrophila spinosa</i> (Kanti mullu gida)</p>	 <p>Plate 5 <i>Cordia oblique</i> (Challeannu)</p>	 <p>Plate 6 <i>Brania rehmnoidies</i> (Hooli)</p>
 <p>Plate 7 <i>Sauvrapusandrogynus</i> (Chakramuni)</p>	 <p>Plate 8 <i>Clitoria ternatea</i> (Shankapushpa)</p>	 <p>Plate 9 <i>Capsicum annum</i> (Gandhari menasu)</p>
 <p>Plate 10 <i>Cassia occidentalia</i></p>	 <p>Plate 11 <i>Xanthoxylum retusi</i> (Jummana kai)</p>	 <p>Plate 12 <i>Myristica malabarica</i> (Rampatre)</p>

Table 19: Uses of agro forestry species in Coastal Karnataka

Sl. No.	Scientific names	Local names	Uses
1	<i>Dalbergia latifolia</i>	Beete mara	Highly valued timber species rarely found
2	<i>Pterocarpus marsupium</i>	Hooru honne	Local timber yielding tree, left in the farm bund. Gum extracted from the bark of the tree is used for anemia.
3	<i>Pterocarpus spp.</i>	Kadu honne	Local timber yielding tree, left in the farm bund
4	<i>Sapindus emarginatus</i>	Antuwala	Important NTFP tree mainly for soap nut. Fruits are used as an alternative detergent to soap and for treatment of hair.
5	<i>Caryota urens</i>	Bayne mara	Local tree rarely used for tapping of toddy. Fruits are used for preparation of medicines.
6	<i>Tamarindus indica</i>	Hunse mara	Fruits are used as souring agent
7	<i>Lagerstroemia lanceolata</i>	Nandi mara	Timber yielding tree on the bunds of farm lands
8	<i>Acacia auriculiformis</i>	Akesia	Introduced tree used as small timber, pulpwood and for furniture.
9	<i>Casuarina equisetifolia</i>	Gali mara	Tree used as small timber, pulpwood and for furniture. It is also a good soil binder.
10	<i>Bambusa spp.</i>	Bamboo	Multipurpose woody grass used for making basket, mats etc.,
11	<i>Emblica officinalis</i>	Nelli	Vitamin rich fruit yielding tree and also used in medication
12	<i>Vateria indica</i>	Bili dhupa	Roadside plants yields resin from wounded bark as room freshener and insect repellent
13	<i>Ficus recemosa</i>	Hatti mara	
14	<i>Ficus bengalensis</i>	Alada mara	Large evergreen tree, worshiped by the people.
15	<i>Psidium gujava</i>	Guava	Fruit tree cultivated in the garden. Local fruits with seeds and hard to eat. Hybrids yield soft seeded fruits.
16	<i>Carissa carandas</i>	Kavle kai	Round green fruits, turns pinkish-brown when ripe. Latex oozes from the wounded parts of plant. Fruits are believed to contain iron
17	<i>Zingiber spp.</i>	Kukkase gida	Stem like Zinger with mango smell. Highly valued tuber used for medicinal purpose
18	<i>Careya arborea</i>	Anchuvalli	Local tree left in the farm bund
19	<i>Bombax ceiba</i>	Silk cotton	Soft wood tree yielding silk cotton. Wood is used for making match sticks and packing boxes
20	<i>Xanthoxylum rhetsa</i>	Jumma	Medium sized tree found in most of the farms produce aromatic fruits commonly used in the district.

4.10 FODDER AND WEEDS

Table 20: Occurrence of weeds and fodder specie in Coastal Karnataka

District	Weeds			Fodder plants		
	Coast	Inland	Foothills	Coast	Inland	Foothills
D. Kannada	14	15	21	28	31	39
Udupi	16	17	19	27	36	36
U. Kannada	23	24	28	34	34	41
TOTAL	25	27	31	37	41	47

Agricultural residues like paddy straw and shoots of pulse crop are the major source of fodder for livestock. Numerous wild plant species like local grass (kharda grass), shoots of pulse crops like cow pea, black gram, green gram, ground nut, jowar, etc., are used as fodder. Majority of fodder species are herbs and shrubs. Highest diversity among fodder crops recorded in the foothill ecological region (47 species) followed by inland (41 species) and coastal (37 species) eco-region is as given in table 20.

WEEDS

Weeds are nothing but the plants grown other than intended species in the farmland. Local weeds occurring in paddy fields after the harvest of crop are good fodder species like Nore, garaga, Huidi gidda, karki gidda, etc. Veterinary department is promoting the improved varieties of grass and other fodder crops like Guinea grass, Rhodes grass, NB21, etc. Highest diversity of weeds has been recorded in the foothill ecological region (31 species) followed by inland (27 species) and coastal (25 species) eco-region as given in table 20.

Table 21: Uses of weeds occurring in Coastal Karnataka

Sl. No.	Scientific names	Local names	Uses
1	<i>Mimosa pudica</i>	Muttidare muni	Common plant young leaves are used as fodder and also as medicine
2	<i>Cassia tora</i>	Chagta	Leaf- laxative, vermicide; seed- laxative. Root for snake bite, skin diseases, sores, scabies; leaf for skin diseases, bone fracture, indigestion; seed for skin diseases, ringworm, eczema.
3	<i>Parthenium hysteroporus</i>	Parthenium	Introduced from outside major weed commonly known as Congress weed. Whole plant- febrifuge, tonic, emmenagogue, analgesic. Whole plant used to treat fever; root in treatment of dysentery.
4	<i>Chromolaena odorata</i>	Eupatorium	Introduced weed from outside commonly called as Communist weed; research is in progress for using the plant as green manure. Leaf for dysentery and treatment of bleeding
5	<i>Leucas aspera</i>	Thumbe	Whole plant- antipyretic, antiseptic, carminative, vermifuge, febrifuge; anorexia, cough, dyspepsia, fever, intestinal worms, respiratory diseases, jaundice, skin diseases; leaves used to treat eye diseases, snake bite, veneral diseases, headache.
6	<i>Clerodendron viscosum</i>	Thaggi	Leaf- tonic. Leaf on sores and tumors
7	<i>Breynia spp.</i>	Hooli	Young twigs are used against Jaundice and it is a fruit plant
8	<i>Typha angustifolia</i>	Nore	Weed in Paddy field and can be used as fodder
9	<i>Eclipta prostrata</i>	Garga	Weed in Paddy field and can be used as fodder
10	<i>Eleucina indica</i>	Huida jaddu	Weed in Paddy field and can be used as fodder

Photo sheet 4.10.1: Fodder species



Plate 1 *Mollugo lotoides* (Alballi)



Plate 2 *Pennisetum* spp (NB21 grass)



Plate 3 *Vigna unguiculata* (Alsande soppu)



Plate 4 *Grangea maderaspatna* (Dose soppu)



Plate 5 *Panicum* spp (Guinea grass)



Plate 6 *Portulaca oleracea* (Anne soppu)



Plate 7 *Amaranthus viridis* (Kari Arge soppu)



Plate 8 *Cymbopogon citratus* (Grass)



Plate 9 *Leucenea leucocephala* (Subabul)



Plate 10 *Crotalaria juncea*



Plate 11 *Cymbopogon* (Local kardas)



Plate 12 *Gliricidia sepium* (Gobbarada gida)

4.11 ACTIVITIES RELATING TO ECOSYSTEM AND USE OF NATURAL RESOURCES IN THE REGION

Activities that link the residents of the region impinging on ecosystems and natural resources include collection of Non-Timber Forest Produce (NTFP), medicinal herbs, firewood, small timber for making implements, cane for making basket, tapping of toddy from toddy palm (*Caryota urens*), making charcoal, weaving baskets, mats, drawing water from streams, diverting stream water for irrigation of agricultural and plantation crops, domestic use, fishing in streams and rivers, grazing of livestock in forests and grasslands, using leaf litter as manure, use of areca stems for channelizing the flow of water, use of coconut shells for making spoons, use of cashew and rubber plant twigs as fuel, etc.

Other activities to be noted in the study are activities of trading in rubber and areca nut, collection and local purchase of areca leaves, working in agricultural fields, maintaining plantations of rubber, areca, coconut, etc. marketing of areca leaf sheath plates, trading in NTFPs, enjoying aesthetic values while visiting or passing through the scenic areas, wildlife reserves, etc.

Comprehensive information on availability and knowledge of local biological resources, their medicinal or any other use or any other traditional knowledge associated primarily in the context of management of natural resources; the process is just a beginning and as yet only a small number of documents have been compiled. It is only the superficial documentation of activities and still elaborate recording of diversity of cultivars and also professional ethno-botanical knowledge. Scientific corroboration of this data is a challenge that remains to be addressed.

In the long run we have every hope that Information System would become a useful tool supporting a process of community-based management of natural resources and contribute towards conservation and rewarding of folk knowledge. This would greatly facilitate information flow with the use of CDs and web based resources. The media can also be used to build the human capability to undertake such exercises. Finally, the information system process should assist in building people's capacity for sound management of natural resources.