

## **Indigenous Knowledge on Animal Health Care Practices in Kendrapara District of Odisha, India**

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**ABSTRACT** The objective of this work was to register and document the traditional knowledge of plant resources used in ethnoveterinary practices in Kendrapara district of Odisha, India. Investigation was carried out in the interior of the district, to explore the therapeutic uses of plants by local inhabitants. Information was gathered from traditional healers, elderly people and farmers by using participant observation, open-ended conversations and semi-structured questionnaires. Plants used as veterinary medicines were collected and identified by botanical classification. Fifty five plant species, distributed among 34 families, were indicated for 27 different medicinal uses. The family Solanaceae had the largest number of reported species followed by Mimosaceae, Fabaceae and Apocynaceae. Prominent diseases treated by plant remedies were wounds, diarrhea, constipation, snake bite, skin ailments and rheumatism. Leaves were more commonly utilized for the preparation of ethnoveterinary medicine than other plant parts. Documentation of traditional knowledge related ethnoveterinary information and identification of potential species for prioritization of conservation through sustainable management is essential for the benefit of future generations. The present study contributed to the construction of an inventory of ethnoveterinary plants, which might provides a better database for future scientific validation studies.

### **1. INTRODUCTION**

Medicinal plants have a long history of use in the treatment of human and animal diseases. The Rig Veda, the Atharva Veda and eight divisions of the Ayurveda are the most ancient documents of the world having evolved in India around 5000 BC and practiced thereon. It provides information about curative properties of plants on human and animal and a detailed prescription for disease prevention and treatment. Many other studies also verify the high utilization of Ayurveda by Indian community [1]. But many traditional medicines have been abandoned following the discovery of the modern allopathic medicine. The resurgence of interest in the traditional system of medicine and growing importance of therapeutic uses of active medicinal plants become a part of human culture in recent years and are widely practiced in almost every part of the world [2, 3]. Although over the last 20 years, most research on the subject focuses on the use of plants in human medicine, knowledge of the curative utilization of bioresources is not limited to humans, and also extends to the treatment of animal conditions [4]. This increasing interest in traditional practices has been encouraged by the recognition of some efficacious ethnoveterinary medicinal products. Ethnoveterinary practices, is growing, and is highly developed in some countries, for example Spain [5]. Recent research communications from different countries of the world such as Argentina [6]; Austria [7]; Bangladesh [8]; Brazil [9]; Canada [10]; China [11]; Ethiopia [12]; Italy [13]; Kenya [14]; Pakistan [15]; Spain [16]; Switzerland [17] and Uganda [18,19] are testimony of this growing interest. A number of recent works also discuss plants used in veterinary medicine in the Indian subcontinent [20-25] but a few studies are available in Odisha in the last decade [26, 27]. Since no comprehensive and elite attempt has been made so far to survey the use of plants in veterinary practices in Odisha, the present survey was undertaken to identify, collect and document the medicinal plants and their utilization for primary health care of animals in Kendrapara district of Odisha, India.

## 2. MATERIALS AND METHODS

### Study area

The current study was carried out in Kendrapara district of Odisha, India. It is situated in central coastal plain zone of the Odisha at 20° 21' - 20° 47' N and 86° 14' - 87° 03' E (Fig.1) and covers an area of 2644 sqkm with a population of 15.582 lakhs (2011 Census). The district is bordered by Bhadrak district in the north, Jagatsinghpur in the south, Bay of Bengal in the east and Cuttack and Jajpur district in the west. The land in the study area is mainly by used for agriculture and livestock. A substantial numbers of the people are villagers (94.2%). The study area represents 1.7% of the state's territory and shares 3.5% of the state's population. The climate is tropical with rainfall of 1500-1550 mm per year and a mean annual temperature of 17–44°C. Three distinct seasons i.e. rainy, winter and summer are felt during the year. Rainfall distribution is of monsoon type, with monsoon occurring from June to September. The district is located in the deltaic region near the Bay of Bengal and has all the features of a costal climate, i.e. maritime weather influence, coastal winds and cyclones.

### Data collection

Data collection was carried out between October 2014 and September 2015, following established and standard procedures [28, 29]. The resource group included males and females who depended on plant resources for managing animal illnesses in nine blocks of the districts— Aul, Derabis, Garadpur, Kendrapara, Mahakalpada, Marshaghai, Pottamundai, Rajkanika and Rajnagar. We performed a number of preliminary questionnaires in places such as primary schools, adult education centers and pharmacies, through which we acquired information about where to locate informants and conduct interviews. The experienced rural folk, traditional herbal medicine practitioners who were having knowledge of traditional healing were interviewed about the use of plants for different ailments. Prior informed consent was obtained from the informants during the field survey. Participant observation, open-ended conversations and semi-structured questionnaires were conducted with 69 local informants (55 men and 14 women) in their local dialect (i.e. Odia). Their ages ranged between 21 and 70 years. Information regarding the local name of the plant, part of the plant used, preparation and mode/route of application, and treated diseases were documented from knowledgeable persons or medicine men, Kaviraj, experienced and aged persons, local healers of the villages. In addition, we made frequent field trips with our informants for *in situ* identification and collections of ethnobotanical specimens. A feedback session with respondents revealed some valuable and specific information about the plants, which were further validated by crosschecking [31]. The consensus criterion used to validate the data gathered was based in having at least two informants identify the same part of the same medicinal plant for the identical medicinal use. The plants cited were photographed, collected directly in the field with the informants during the interviews, and identified by authors following Haines [32], Saxena and Brahmam [33]. Specimens were deposited at the Herbarium of Botany Department, Chandbali College, Chandbali.

## 3. RESULTS

A total of 55 plant species of ethnoveterinary importance were documented through out the study period (Table 1; Fig. 2-5). Our study area mainly covered the grass fields, nearby bushes, river bank, and little forest. These medicinal plants were distributed among 34 families. The most important medicinal plant families were Solanaceae (5 species), Mimosacease (4 species), and Fabaceae and Apocynaceae (3 species each). The plant growth forms that were more frequently used to prepare ethnoveterinary medicines were the herbs with 20 species (36.4%), followed by 18 trees (32.7%), 9 shrubs (16.4%), and 8 climbers (14.5 %). Most of the medicinal plant resources (72.7%) were collected from forest and grassland areas; only a few (10.9%) were collected from cultivated areas (Fig.7), which reveals that local inhabitants mostly rely upon wild resources than cultivated lands. However, in recent years, increase in world population, urbanization, overgrazing, habitat loss and degradation and agricultural land expansion has depleted many natural resources

and threatened the existence of many medicinal plants and the associated indigenous knowledge. Although some plant species are available for a particular period in a year but the villagers do not collect and preserve it. Rather, they generally looked for medicinal plants when animals become ill. Leaves were the plant parts most frequently used, constituting 28.4%, followed by root and bark (13.3%) each, seed (11.7%), fruit and whole plant (10%) each and the remainders were stem, latex, rhizome, resin and gum (Fig. 8). The percentage of use of aerial plant parts were higher than that of underground parts. The animal diseases treated with plant remedies were wounds, foot and mouth disease, gynaecological ailments, diarrhea, fever, constipation, lactation, hematuria, rheumatism, skin ailments and sores (many sores resulting from skin conditions) [Table 1]. Plant medicines were processed either using single species or as mixtures of two or more species. The use of salt, jaggery, milk, oil and ghee were reported for preparing ethnoveterinary herbal medicines, however, water was the main ingredient mentioned for preparative use. During the period of investigation, it was found that besides traditional herbal healers, some elderly person (age group 50-70 years) both man and woman in the villages had sound knowledge and understanding about medicinal use of some plants, especially those species which are often used for curing common diseases like fever, poisoning, cough, wounds, cuts etc. In the present study different methods of preparation of medicine such as grinding, crushing and squeezing, drying and immediate use of medicinal plants were used.

#### 4. DISCUSSION

Farmers and traditional healers in several countries use medicinal plants in maintenance and conservation of the livestock health care. Agriculture and animal husbandry are the two most important sectors of the Kendrapara district. Majority of the inhabitants live in rural areas and they directly or indirectly linked with the above two sectors for their subsistence. The importance of domestic animals in rural economy may be realized from the fact that most of the rural populations are engaged in livestock raising, having household holdings of 2–3 cattle/buffalo and 5–6 sheep/goat per family which help them to derive nearly 30-40% of their income from it. Women are dedicated observers and closely linked and involved in livestock management activities due to their association with cleaning, feeding, milking, care of new born and sick animals and they are often the first to notice signs of ill health in animals. Some of the medicinal plant species mentioned in this study are also documented by the previous researchers in different parts of India including Odisha [34-43]. An analysis of the growth life forms/habits of plants used by traditional animal healthcare providers in livestock health management in Kendrapara district revealed that herbs constitute the largest category of the total recorded plant species. Such an observation draws support from other studies [39, 44, 45]. This shows that the most widely used plant habit in the study area are herbs and this may be attributed the high level of abundance of these forms in the studied area and hence easily accessed. Leafy part of the plant rank first, among the other plant parts used for the treatment of various diseases of livestock. Such an observation draws support in other studies at different parts of India [46-49]. Such widespread harvesting of leaves is important for plant survival and continuity of valuable medicinal plants and has indications for sustainable plant utilization. Large scale use of whole plant and root threatens the survival of valuable medicinal plants. Most medicinal plant resources are collected wild from grassland areas; only a few are collected from cultivated areas. This indicates that the people of Kendrapara district depend on wild sources to procure medicinal plants. Some of the plants commonly used for treatment of animals are also being used for similar condition affecting human. For example; *Cissus quadrangularis* L. is used to cure bone fracture in both human being and animal. This overlap may be a reflection on transfer of local knowledge between the folk veterinary and the ethnomedicinal domains[50]. The tribes/people belonging to different states of the country differing in their language, religion and culture also use some of the medicinal plant species of the present study, however, purposes and methods of uses are different. For example, *Acacia nilotica* flower is used in jaundice by the people of Tikamgarh District of Bundelkhand, Central India [51]; *Annona squamosa* leaf is used to cure indigestion, flatulence and gas trouble in abdomen by the folk

communities of Andhra Pradesh [52]; *Brassica campestris* seed oil is administered orally to calves suffering from indigestion and weakness [53]; *Albizia lebbeck* fruits are fed to the animals to increase milk production by the local people of Dang district of south Gujarat [54]; *Bombax ceiba* leaves and flowers is used in stomach disorders [55]; *Withania somnifera* root decoction is drenched once daily to buffaloes to treat cold and cough by the people of Tosham block of district Bhiwani (Haryana), India [56]; rhizomes of *Zingiber officinale* is used to cure poisoning by traditional herbal healers (Pashu Vaidyas) in various remote valleys of the Alaknanda catchment of Uttarakhand [39]; paste of the entire plant of *Ocimum sanctum* is used to treat snakebites in Villupuram district of Tamil Nadu [57]. Similarly, some of the plants documented in this survey such as *Ananas comosus*, *Cannabis sativa*, *Carica papaya*, *Brassica Campestris* and *Zingiber officinale* are already covered in ethnoveterinary surveys of Bangladesh [58], Uganda [19], Pakistan [59], Canada [4] and Brazil [9]. The uses of these plants provide credibility of folk claims and clues for pharmacological screening. The young generation (age group 30-40 years) has less information about the traditional medicines while the elder people (age group 50-70 years) know much more about the traditional knowledge to treat livestock ailments. This suggests a preeminence of modern medicines over herbal medicines, in younger people, however the traditional medicinal system is still prevalent in remote villages of Kendrapara district. The results showed that the studied population retains ethnoveterinary knowledge that has been used for treating animal diseases. The primary ailments of livestock are wound, diarrhea, injury, fever, gastrointestinal problems and gynecological problems, which are commonly treated with medicinal plants. Nevertheless, in some situations, such as, sterility, uterus disorder etc., conventional medicines and synthetic drugs are the best choices. The studied population demonstrated more belief in ethnoveterinary medicine than the veterinary allopathic medicine due to easy acquisition and effectiveness of some native plants. The poor economic condition and lack of veterinary services are factors that influence people for choosing ethnoveterinary medicine. However, these age-old practices developed by the people in the field are transferred to their successive generations by words of mouth rather than writings. This time tested folk knowledge is in the verge of extinction. There is no authentic record to refer. People simply learn the system from their forefathers, seniors and traditional healers orally. In this context, a standard database is to be prepared which can be easily accessible. The efficacy of all medicinal formulas mentioned in the treatment methods is not yet ascertained. Hence documentation of this knowledge is valuable for future generations so that the scientists can explore new drugs from the traditional medicinal plants for the treatment of domestic animals.

## 5. CONCLUSION

The results of our study demonstrate the importance of traditional knowledge on medicinal plants and their uses in the treatment of livestock among the people of Kendrapara district of Odisha, India. Ethnoveterinary alternatives (based on medicinal plants) are an option for livestock farmers who cannot use allopathic drugs or for those whose economic circumstances prevent the use of veterinary services for health problems of livestock. This research will hopefully help in improving, monitoring and management of various animal ailments and can provide a basis for the integration of folk uses in the conventional veterinary medicine. Moreover, providing modern medical healthcare especially in developing countries is beyond the reach of the dairy farmers in view of their high cost thereof coupled with their own financial restraints. Therefore, it is necessary to look for new discovery and development of more efficacious drugs and to make use of the vast resources of indigenous phytotherapy which can provide viable complements to western-style veterinary medicine. Hence wider survey, interactions with the natives and collection of data are essential for proper preservation of this popular traditional medicinal knowledge and to enhance the relationship between human society and nature. So it has become a necessity to evaluate pharmacologically useful alkaloids, tannins, resins and any other beneficial plant product available from the local flora for the enhanced posterity of mankind.

## CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

## ACKNOWLEDGEMENTS

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**Table 1. Plant species used in ethnoveterinary practices in Kendrapara district, Odisha**

Botanical name, family & local name	Parts used	Disease/condition	Mode of application
<i>Abutilon indicum</i> (L.) Sweet. (Malvaceae), 'Pedipedika'	Leaf	Diarrhea	Powdered leaves mixed with cattle feed is given to cattle for diarrhea.
<i>Acacia nilotica</i> (L.) Delile. (Mimosaceae), 'Babula'	Gum	Skin	Powdered gum (15g) mixed with egg white of an egg is made into a paste and applied over the affected skin of cattle.
<i>Alangium salvifolium</i> (L.f) Wang. (Alaginaceae), 'Ankul'	Root	Snake bite	Aliquot of 10 ml of root juice is given orally to cattle in case of snake bite.
<i>Albizia lebbbeck</i> (L.) Benth. (Mimosaceae), 'Sirisa'	Stem bark	Wound of rat bite	Bark paste is applied over the wound of rat bite.
<i>Annona squamosa</i> L. (Annonaceae) 'Atta'	Leaf, seed	Skin, foot diseases	20-25 seeds of <i>Annona squamosa</i> L. are powdered and applied topically over the infected area of the skin. Leaf paste is applied topically over hooves of infected animal to cure foot diseases.
<i>Arachis hypogea</i> L. (Fabaceae), 'Badam'	Seed	Infertility in cow, twitching	The raw nuts are ground with fresh milk. This mixer is drenched to cow once a day, for 3-5 days to cure infertility in cow. Seed oil of <i>Arachis hypogea</i> mixed with common salt is given twice daily in twitching of animal.
<i>Artocarpus heterophyllus</i> L. (Moraceae), 'Panasa'	Root	Diarrhea	Decoction of root (10ml) mixed with fruit juice (10ml) of <i>Averrhoa carambola</i> L. is given thrice daily to cure diarrhea.
<i>Barleria prionitis</i> L. (Acanthaceae), 'Daskeranta'	Leaf	Hump sore	Leaf extract of <i>Barleria prionitis</i> and leaf extract of neem ( <i>Azadirachta indica</i> A.Juss.) are mixed together and applied externally over the infected part.
<i>Basella alba</i> L. (Basellaceae), 'Poi'	Leaf, stem	Wounds	Leaf and stem paste is applied on wounds.
<i>Bombax ceiba</i> L. (Bombaceae), 'Simili'	Stem bark	Dislocated bones, gynaecology	Stem bark paste mixed with turmeric powder is applied on dislocated bones. Slime obtained from crushing the stem bark is applied to vaginal ostium to facilitate delivery.

<i>Brassica compestris</i> Hook. f. & Thomas. (Brassicaceae), 'Sorisha'	Seed	Skin	The seeds are crushed and the paste is applied over the body of the animal to cure skin infections.
<i>Caesalpinia bonduc</i> (L.) Roxb. (Caesalpiniaceae), 'Gila'	Seed	Rheumatism	Seed paste mixed with goat urine is applied once daily for a week for rheumatism.
<i>Cannabis sativa</i> L. (Cannabaceae)	Stem	Inflammation	Stem is cut into small pieces and fed to livestock to treat inflammation.
<i>Carica papaya</i> L. (Caricaceae)	Latex	Eczema	Latex is applied topically over the skin to cure eczema.
<i>Cassytha filiformis</i> L. (Lauraceae), 'Nipattia'	whole Plant	Lactation, diarrhea	Plant mixed with fodder grass is given to cow to increase milk yield .Plant decoction is given to cow to treat diarrhea problem.
<i>Cartharanthus roseus</i> (L.) G.Don. (Apocynaceae), 'Sadabihari'	Whole plant	Wound	Whole plant extract is applied topically to cure wounds.
<i>Cissus quadrangularis</i> L. (Vitaceae), 'Hadbhanga'	Whole Plant	Wound	Paste of whole plant bandaged over bone fractured area with support by means of bamboo pieces. Decoction of plant is applied locally on wounds of for early healing.
<i>Cleome gynandra</i> L. (Cappadidaceae), 'Anasorisha'	Leaf	Wound	Leaf paste is applied over the affected part of goat for early healing of wounds.
<i>Coriandrum sativum</i> L. (Apiaceae), 'Dhania'	Seed	Diarrhea, fever	Seed powder of the plant, leaf of <i>Lawsonia innermis</i> and water is kept in a pitcher over night. The extract is given to animal twice daily for loose motion. Leaves of the plant with equal quantity of leaves of <i>Pergularia daemia</i> are grinded to make a bolus. 50g bolus is given twice daily for two days to cure fever.
<i>Cucumis sativus</i> L. (Cucurbitaceae)	Fruit	Swallowed leech	Fruit paste is given to expel accidentally swallowed leech from the stomach.
<i>Curcuma amada</i> Roxb. (Zingiberaceae), 'Amba-Haldi'	Rhizome	Fever	A paste of fresh rhizomes is given to cure fever.
<i>Dalbergia sisso</i> Roxb. (Fabaceae)	Whole plant	Leg sore.	Leaf paste of the plant mixed with water is given to animal to cure blisters and leg sore.
<i>Entada rheedii</i> Spreng. (Mimosaceae)	Bark	Dysentery	Bark decoction is given to cattle for dysentery.
<i>Gloriosa superba</i> L. (Liliaceae), 'Dasaraphula'	Leaf	Bone fracture	Leaf paste is applied over the bone fracture part of cattle with support by means of bamboo pieces.
<i>Hibiscus rosa-sinensis</i> L. (Malvaceae), 'Mandar'	Bark	Twitching	Bark decoction is given twice daily to prevent twitching of animal.

<i>Holarrhena pubescens</i> (Buch.-Ham.) Wall. ex G. Don. (Apocynaceae), 'Kurchi'	Fruits	Worm infection	Powder of unripe fruits with edible oil is applied to the neck of the cattle to cure worm infection.
<i>Ipomea aquatica</i> Forssk. (Convolvulaceae), 'Kalamasaga'	Leaf	Blood urine	Leaves are given once daily for 15 days against blood urine.
<i>Litsea glutinosa</i> (Lour.) Robins. (Lauraceae), 'Gobindagaradu'	Leaf	Indigestion	Crushed leaves is given with cattle feed to treat indigestion of domestic animal.
<i>Luffa acutangula</i> (L.) Roxb. (Cucurbitaceae), 'Pitataradi'	Leaf	Hump sore	Leaf paste is applied over the affected part of the cattle.
<i>Lycopersicon esculentum</i> Mill. (Solanaceae), 'Tamato'	Fruit, leaf	Eye problem	Fruit and leaf juice is administered twice daily for 3 days against eye problem.
<i>Mangifera indica</i> L. (Anacardiaceae), 'Amba'	Fruit.	Constipation	10ml juice of ripe mango mixed with 10ml extract of <i>Centella asiatica</i> is given for constipation.
<i>Morinda citrifolia</i> L. (Rubiaceae), 'Achhu'	Bark	Intestinal disease	Stem bark decoction is prescribed for the treatment of intestinal disease of domestic animals.
<i>Moringa oleifera</i> Lam. (Moraginaceae), 'Sajana'	Bark	Rheumatism	Bark is massaged over the affected parts of the animal to relief arthritis pain.
<i>Nicotiana tabacum</i> L. (Solanaceae)	Leaf	Ectoparasite	Leaf leachate is applied on skin against ectoparasite.
<i>Ocimum sanctum</i> L. (Lamiaceae), 'Tulasi'	Leaf	Wound	Leaf paste (5teaspoonfuls) with <i>Piper nigrum</i> (5gms.) is applied over the wounds.
<i>Ocimum canum</i> Sims. (Lamiaceae), 'Bantulsi'	Whole Plant	Cough	Crushed plant mixed with fodder grass given to cattle for treating cough.
<i>Paederia foetida</i> L. (Rubiaceae), 'Prasaruni'	Leaf, root	Intestinal diseases	Fresh leaves are crushed into a paste and applied on the dislocated junction of cattle. Chopped root mixed with cattle feed given to cow to treat intestinal diseases.
<i>Pergularia daemia</i> (Forsk.) Chiov. (Asclepiadaceae), 'Utrudi'	Latex	Eye complaints	Plant latex mixed with a pinch of salt is used as an eye wash in domestic cattle.
<i>Rauvolfia serpentina</i> (L.) Benth. ex Kurz. (Apocynaceae)	Root	Snake-bite	About 20 gm powder of root bark is administered orally as antidote to snake-bite
<i>Setaria verticillata</i> (L.) P. Beauv. (Poaceae)	Root	Wound	Root powder is applied over the septic wounds of cattle for early cure.
<i>Shorea robusta</i> Gaertn. f. (Dipterocarpaceae), 'Sal'	Resin	Wound	An ointment is prepared from resin powder of <i>Shorea robusta</i> , powder of <i>Cinnamomum camphora</i> with coconut oil is applied for early healing of wounds.

<i>Solanum surattense</i> Burm.f. (Solanaceae)	Seed	Sinusitis	Powder prepared from the seeds is mixed with hand squeezed juice of <i>Leucas aspera</i> and 3-4 drops of this extract is dropped into nostrils of the cattle for 10-15 days to cure sinusitis.
<i>Solanum nigrum</i> L. (Solanaceae)	Whole plant	flatulency	The whole plant is made into paste is mixed with 500 ml of goat milk. 50 ml of this extract is given orally thrice daily for 5-6 days to cure flatulency in cattle, sheep and goats.
<i>Spondias mangifera</i> Willd. (Anacardiaceae), 'Salama'	Bark	dysentery	Bark is crushed and given to cattle for dysentery.
<i>Streblus asper</i> Lour. (Moraceae)	Leaf, fruit	Eye, gynaecology	Leaves are given as feed after delivery to hasten removal of placenta. 10g leaf and 10g fruit are pounded and the paste and is applied on eyes for 4 days in conjunctivitis.
<i>Strychnos nux-vomica</i> L. (Strychnaceae), 'Kochila'	Root	Wound	Root paste mixed with mustard oil is applied topically for early healing of wounds.
<i>Tagetes erecta</i> L. (Asteraceae)	Leaf	Stop bleeding	Leaf paste is used to stop bleeding from any injury. Fresh leaf juice is applied topically for healing of broken horns.
<i>Tephrosia purpurea</i> (L.) Pers. (Fabaceae), 'Banakulathi'	Leaf	Wounds, constipation	Leaf paste is applied over the wounds for quick healing. Leaves with few chillies and red gram are grounded and the paste is given for constipation.
<i>Terminalia chebula</i> Retz. (Combretaceae), 'Harida'	Fruit, bark	Diarrhea and dysentery	About 100 gm of fruit and/or bark are crushed and boiled in water to prepare a decoction. The decoction is administered thrice daily with small amounts of rock salt to cattle to treat diarrhea and dysentery.
<i>Tridax procumbens</i> L. (Asteraceae), 'Bisalyakarani'	Leaf	Wound	Leaf is crushed and the extracted juice is applied over the effected part for quick healing of wounds.
<i>Trigonella foenum-graecum</i> L. (Fabaceae), 'Methi'	Seed	Hematuria (urine with blood)	About 50 gm of seed is cooked with 250 gm of rice flour is given to the infected cattle.
<i>Triticum aestivum</i> L. (Poaceae), 'Gahama'	Seed	Constipation	A mixture of wheat flour, cow ghee and molasses is given to animal for constipation.
<i>Withania somnifera</i> (L.) Dunal. (Solanaceae), 'Ashwagandha'	Root	Cure retard placenta	Root powder boiled in milk is given to animal to cure retard placenta.
<i>Zingiber officinale</i> Rosc. (Zingiberaceae), 'Ada'	Rhizome	Constipation	Crushed rhizome is given with wheat flour for constipation.
<i>Zizyphus oenoplia</i> (L.) Mill. (Rhamnaceae), 'Kankoli'	Root	Injury	Root decoction is used to wash injury on shoulder of oxen caused by yoke.

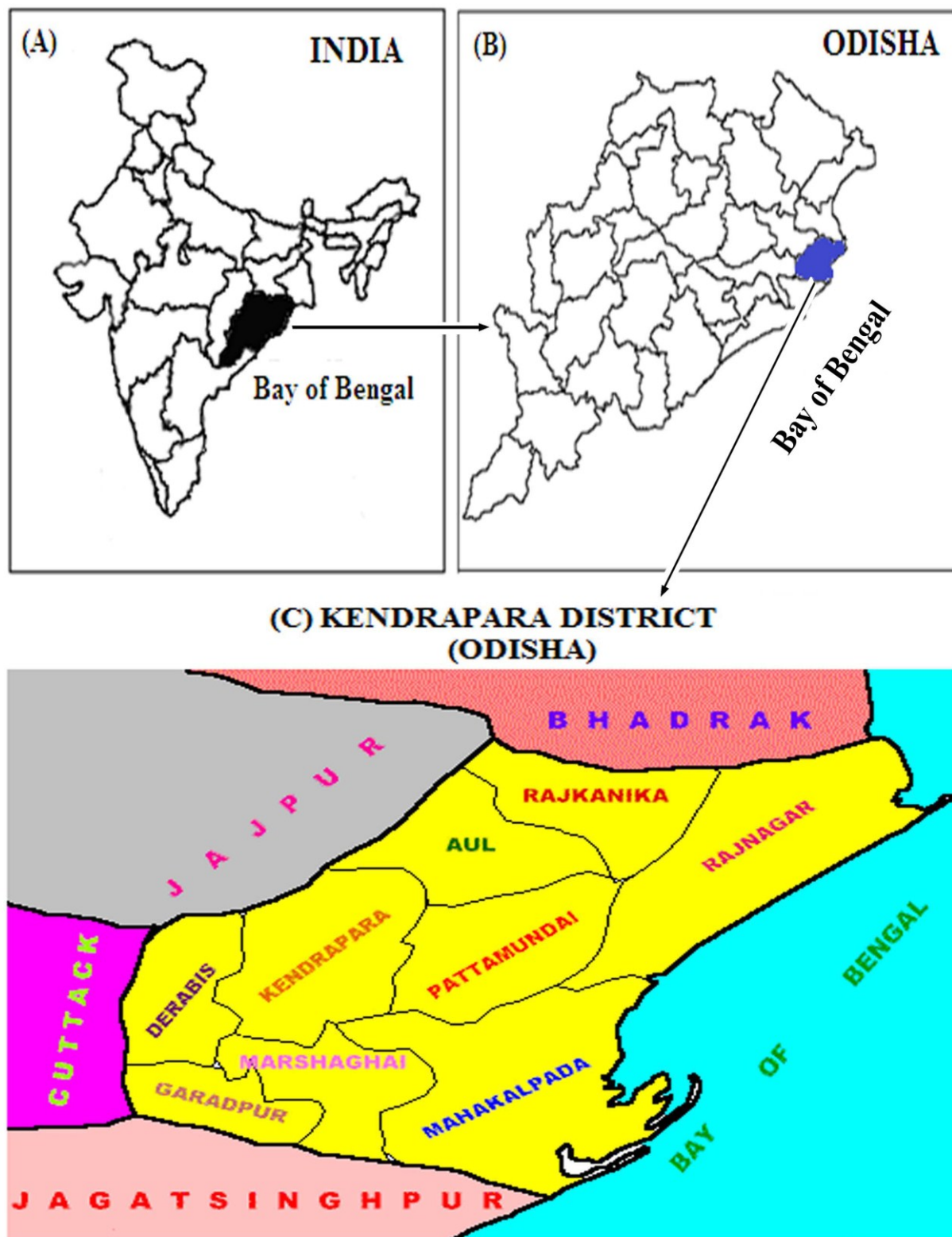
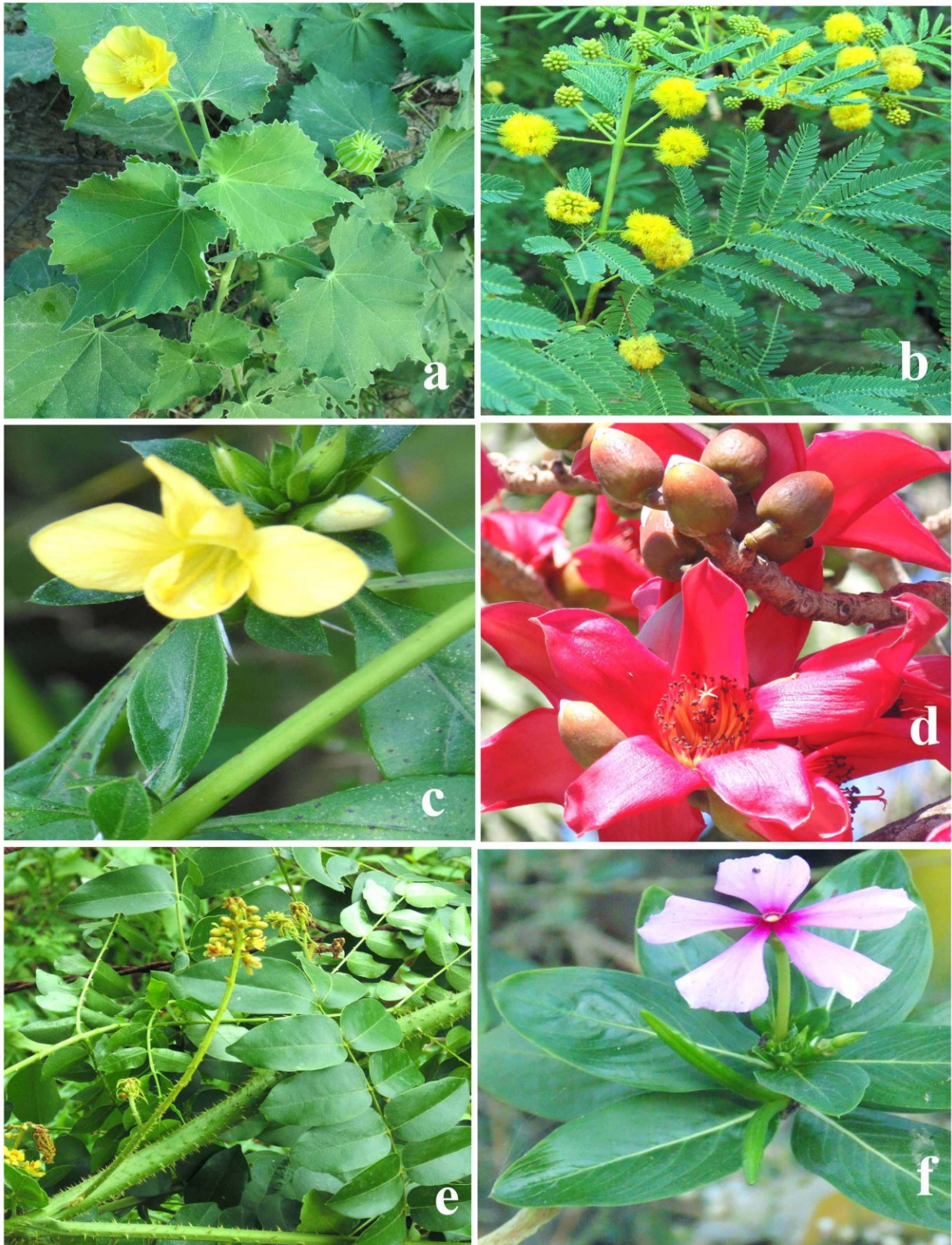


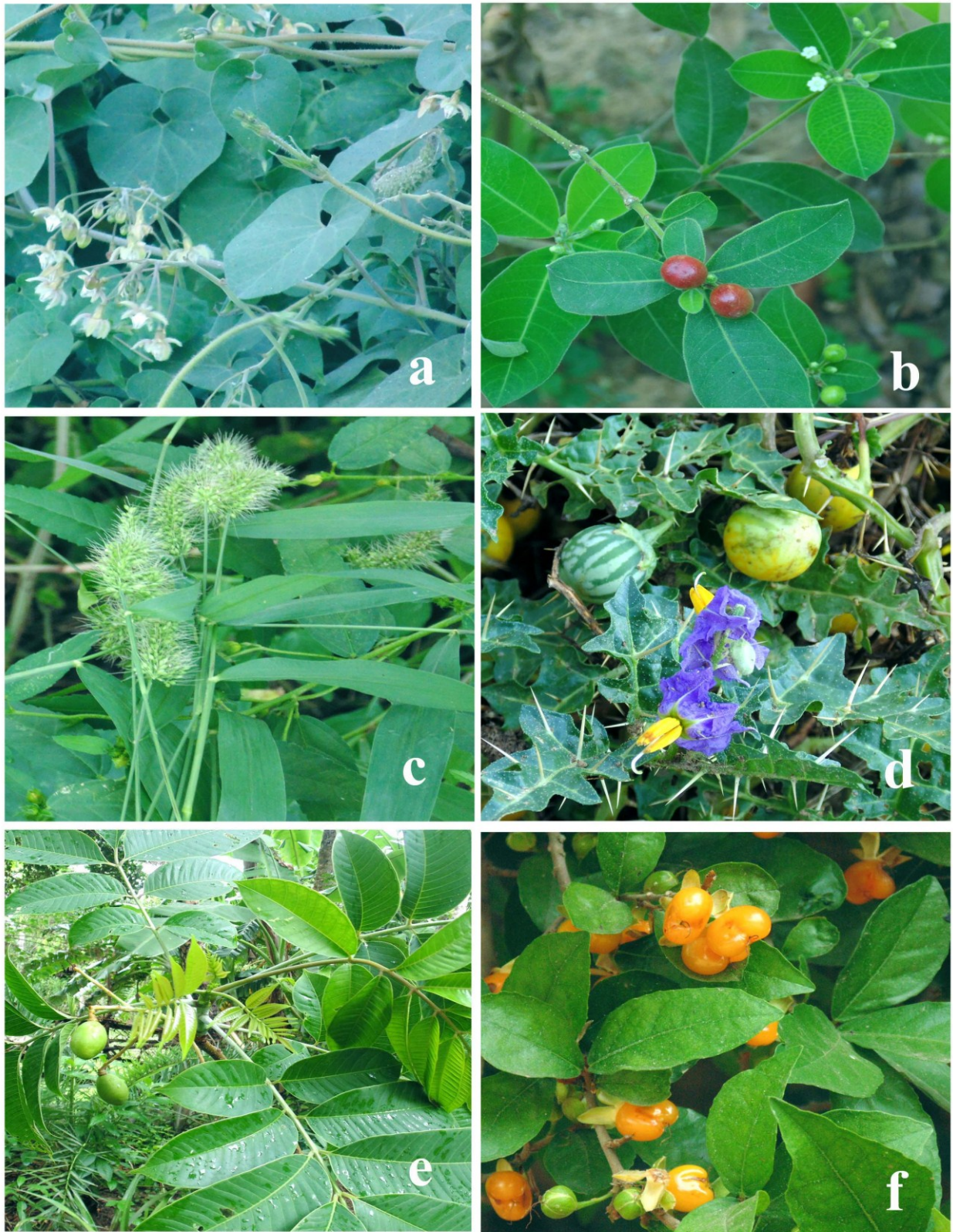
Fig. 1 (A) Location of the Odisha state in the eastern region of India, (B) map of the Odisha state and (C) study area showing different blocks of the Kendrapara district.



**Fig. 2 a. *Abutilon indicum* (L.) Sweet. b. *Acacia nilotica* (L.) Delile. c. *Barleria prionitis* L. d. *Bombax ceiba* L. e. *Caesalpinia bonduc* (L.) f. *Catharanthus roseus* (L.) G. Don.**



**Fig. 3 a. *Cissus quadrangularis* L. b. *Gloriosa superba* L. c. *Ipomea aquatica* Forssk. d. *Luffa acutangula* (L.) Roxb. e. *Morinda citrifolia* L. f. *Moringa oleifera* Lam.**



**Fig. 4 a. *Pergularia daemia* (Forssk.) Chiov. b. *Rauvolfia serpentina* (L.) Benth.ex Kurz. c. *Setaria verticillata* (L.)P. Beauv. d. *Solanum surattense* Burm. f. e. *Spondias mangifera* Willd. f. *Streblus asper* Lour.**

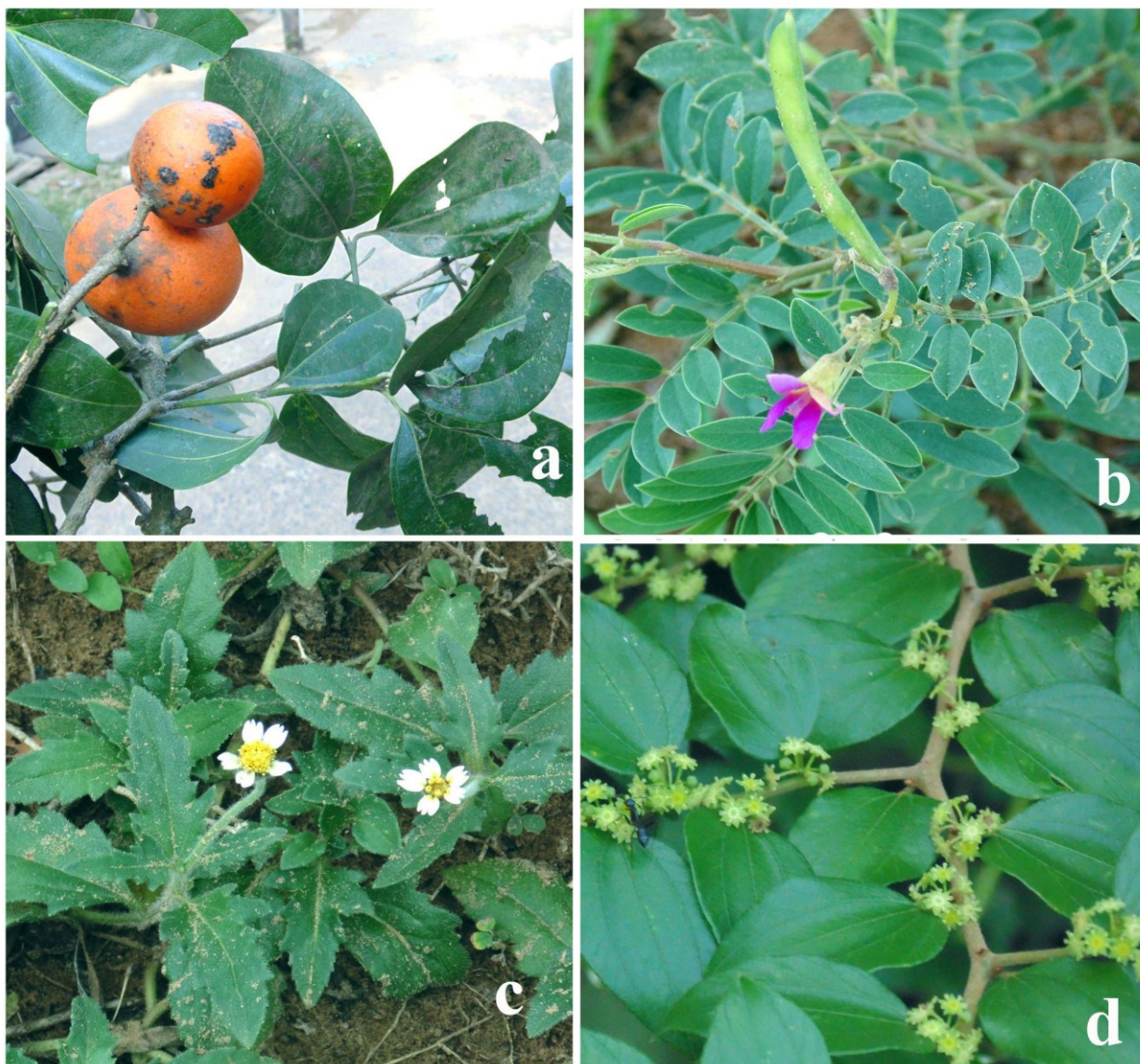
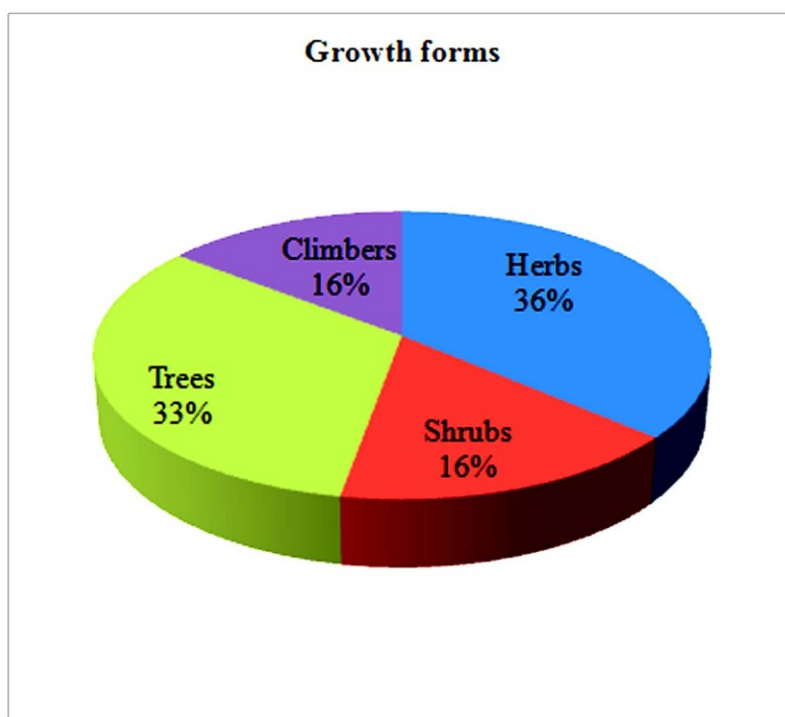
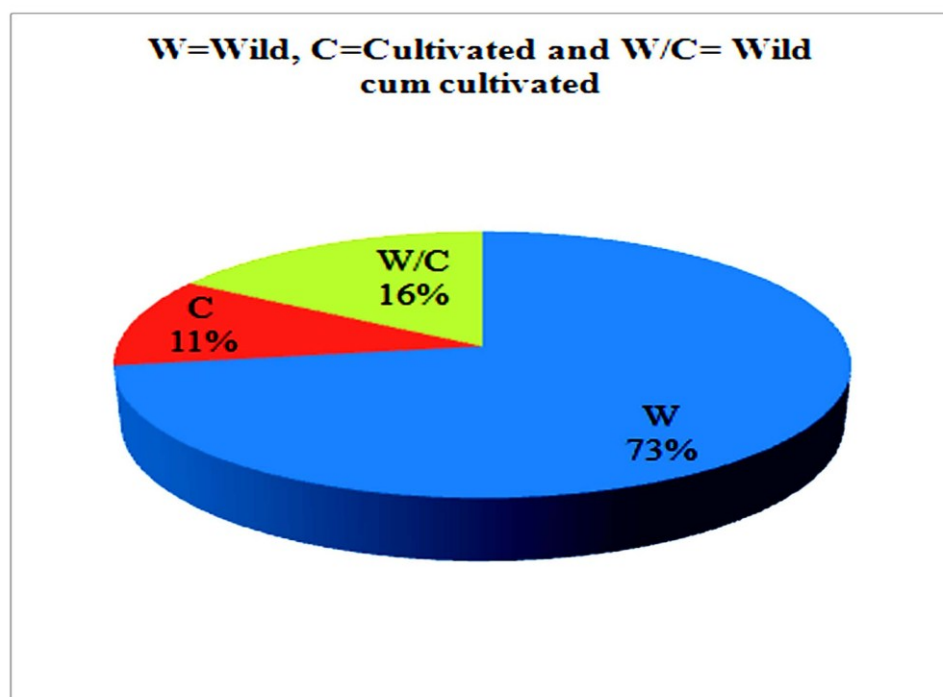


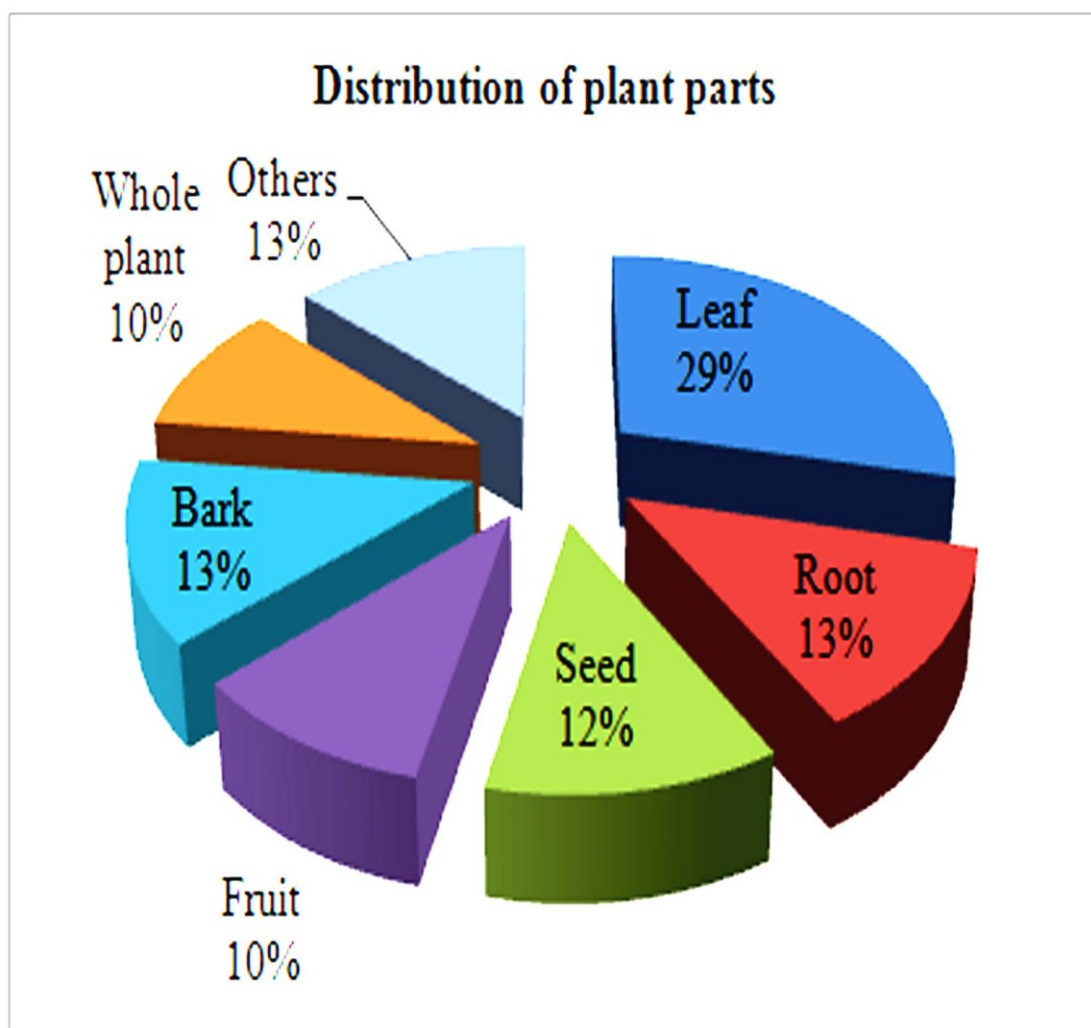
Fig. 5 a. *Strychnos nux-vomica* L. b. *Tephrosia purpurea* (L.) Pers. c. *Tridax procumbens* L. d. *Zizyphus oenoplia* (L.) Mill.



**Fig. 6.** The growth life form of documented plant species used in livestock treatment in Kendrapara district, Odisha, India.



**Fig. 7.** Percent distribution of wild, cultivated and wild cum cultivated plant species used ethnoveterinary medicine in Kendrapara district, Odisha, India.



**Fig. 8. Percent distribution of plant parts used ethnoveterinary medicine in Kendrapara district, Odisha, India.**

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