2.1 General Introduction:

The following is a brief resume of the important work relevant to this work.

Most of the area under investigation comes under the arid and semi arid climate. Consequently, it is characterized by sandy plain, more or less barren land except in rainy season when multitudes of ephemerals come up and transform the bare land into a green carpet.

These ephemerals complete their life-cycle before the advent of summer season and the bulk of the area is once again transferred into open sandy plains, desolate and barren area.

In general the flora in the arid and semi arid region is in sparse. Plants with only xerophytic adaption are able to establish. The bulk of flora consists of stunted, thorny or prickly trees, shrubs and perennial herbs capable to draught resistance. These occur in open clump formation with plenty of vacant spaces between them. In the semi arid region of the flora mainly consist of dwarf grasses interspersed with few characteristics desert shrubs. Permanent flora of the entire area is therefore, xerophytic in characters and shows various xerophytic features like deep roots, spines and indumentums well developed; leaves either absent or much reduced through usually with a coating of wax or hairs to prevent excessive evaporation.

Through the floral composition about the flora of area is fairly well known through the exhaustive work of Blater and Hallberg (1918-21), yet adequate details on ecology and ethnobotany are lacking. Blatter and Hallberg call the main types of plant communities as formations which are exclusively controlled by edaphic factor; they devided these formations into smaller units known as associations and families. Almost all the subsequent workers have followed these authors in describing the flora of this region. Since the climate is more or less homogenous, the flora can better be said
to be edaphic controlled. Depending upon the rain water, the flora can also be distinctly divided into ephemerals and perennials.

2.2 Review of previous work

Theophrastus pupil of Plato and Aristotle about 340 B.C. wrote “History of Plants” describing about 500 food and medicinal plants. Dioscorides around the same period also wrote a book on medicinal plants. As early as in 1806, German Biochemist Friedric Sertturner was first to isolate the active chemical ingredient, Morphine, a kind of Alkaloid from the opium poppy (Papaver somniferum). Medical Science would ever remain grateful to Sertturner for showing the way, which later led to the isolation of several biologically active chemicals of medicinal value from plant sources. Quinine was isolated from Cinchona officinalis, Cocaine from Erythroxylon cocoa, Salicin from Salix sps, Reserpine from Rawolfia serpentina, Diosgenin from Dioscorea deltoidea, Digitoxin from Digitalis purpurea, Atropine from Atropa belladonna, Ergotene from the Ergot of Claviceps purpurea, Ephedrine from Ephedra sinica, Vinblastine from Catharanthus roseus, Pencillin from fungus Pencillium notatum etc.

In the 17th century most prolific writer on plants was Bauhin (1623). In 1623 appeared “The Herbal” by Geralde with references of Indian medicinal plants. Among the 18th century compilations the book of Rumphius (1755) – “Herbarium Amboinese” was important. It referred about the use of “Snake Root” plants (Rawolfia serpentina) by the natives of Bengal and Malabar in India.

In 1789 Jussieu described the Cinchona tree (Cinchona officinalis) hither to unknown to science. Ainslie (1813) wrote “Materia Medica of Hindustan” Honigberger (1852) wrote “Thirty Five Year in the East” Stewarts (1869) wrote “Punjab Plants”. Atkinson (1820) wrote “The Himalayan district of North West Provisions of India and Lawrence (1895) compiled “The valley of Kashmir” – all reporting on the herbal folk medicine practiced by the natives of Kashmir, Laddakh and the Kumaon hills of the Himalayas in India (Shah, 1981).
19th century onward, there was a reawakening in the studies of medicinal especially with regard to their traditional uses by the primitive human societies of the world- the folklores that inherited the knowledge of medicinal herbs from their forefathers. Many foreign authors were especially interested in the study of Indian medicinal plants and their connection with folklore. Biodiversity maintenance and development within a healthy ecosystem has an intrinsic value. Cultural and spiritual values among traditional societies are being undermined by rapid socio-economic change, through in industrialized societies the importance of these aspects is being re-discovered (Heywood et al, 1995).

An inventory of 41 plant species from 29 families in which 13 were trees, 11 shrubs and 17 herbaceous plants were observed, an indication of high plant biodiversity. There were 57 medicinal plant uses out of which leaves, stem bark, seeds, roots, fruits, flowers, buds were used, maximum of which were leaves. (Egharevba and Lkhatua, 2008)

Charak and Sushruta recognized the importance of the laymen and the primitive tribal people in the discovery of the medicinal plants. Nagarjuna wrote another notable book, which was extension of Sushruta’s work between 200 B.C. to 642 A.D. (Buddhist period). After the Vedas there is no concrete information on the development of this science in India for about 1000 years. In India even the legendary purana- Brahma puran and Vayu puran of the pre-vedic periods mentioned about medicinal plants of which “Sanjiwani” (now identified as *Selaginella bryopteris*) was called a resurrection plant used to restore life after death. Yasmeen Sahana and others reported at IV ICE (1994) some indigenous herbal drugs which have “de-addictive” effects when tested on moderately and severely “morphine” dependent rats. The plants identified are *Delphinium denudatum*, *Strychnos nux-vomica*, *Hyocymus niger* and *Datura alba*.

Rajasthan, the dry land, which has richest cultural and historical heritage, is suffering through poor economic development due to scanty rainfall and increased human and animal population pressure. Almost all the type of industrial development is based on availability of water including rich infrastructure, but biotechnology can enhance the desired economic development and the quality of human life. This area is of great importance from the point of tree biodiversity or may be called as local hot spot of Rajasthan. *Commiphora wightii* (Arn.) Bhandari, *Wrightia tinctoria* (Roxb.) R.Br, *Guazuma ulmifolia* (Lam.), *Butea monosperma* (Lam.) Taub, *Cordia gharaf* (Forssk.) Ehrenb. Ex. Asch., *Diospyros melanoxylon* (Roxb.), *Mitragyna parvifolia* (Roxb.) Korth., are well known threatened species occurring in this region (Singh.M and R. Seenivasan, 2005).

Some workers have also recorded ethno-botanical information on individual plants viz. *Salvadora oleoides* and *Salvadora persica*, *Solanum surattense*, *Adansonia digitata*, *Vitex negundo*, Mahua, Henna or on specific group of plants viz. Cucurbits, and *Cassia* described the plants having poisonous properties and their potential of turning them to advantageous products (Singh and Pandey, 1981), Kumar *et al*., (2007).

40 plants were recorded by Katewa *et al*.,( 2006) as traditional folk herbal medicines from Shekhawati region of Rajasthan. Local people have adequate knowledge to distinguish the chemical effectiveness and thus constituent of plant parts. Plant parts of some species have toxic effects if consumed by human and domestic animals in significant amounts. Katewa *et al*., (2008) described about 28 poisonous plants of Southern Aravalli hills of Rajasthan, which are although poisonous, but are used in many diseases.

About 28 plants were recorded as threatened plants in Rajasthan by Trivedi, (2004), in which many of them are useful in various ailments, e.g. seeds of *Buchanania lanzan* are used in mouth ulceration, stem and root of *Tinospora cordifolia* are used in fever and snakebite (Kadavul and Dixit, 2009). Various widely growing plants having hypoglycemic potential also have been described by Mishra & Singh, (2010). Mineral
contents of some halophyte species of Thar Desert were also evaluated by Singh & Arya, (2010).

The state of Rajasthan invited the attention of floristic workers, perhaps, because of three factors: The desert (King 1869, 1870, 1878); the hill resort at Mount Abu (Macdam, 1890; Sutaria, 1941; Mc. Cann, 1942, 1943, Mahabale and Kharadi, 1946; Raizada, 1954, Sarup, 1954) and the centrally administrative region of Ajmer- Merwara (Duthie, 1886).

Parker (1918) mentioned some plants from erstwhile Jaipur state in his “forest flora of Punjab”, and Duthie (1903-29) has covered a major portion of eastern Rajasthan in his “flora of upper gangetic plains”, and thereafter, i.e from 1930 onwards there has hardly been any contribution on the floristics and vegetation studies on Rajasthan, but for a lonely report on forests of Jaipur state (George, 1937) and Ramchandra (1941), “a list of plants of desert area “Mt. Abu, of course being exception.

The Shekhawati region which covers partly Churu and completely and completely Sikar and Jhunjhunu was studied for some scattered certain localities by following botanists time to time viz; first of all the Shekhawati region was touched from vegetation study point of view by Mulay and Ratnam (1955) vegetation of Chirawa by Nair (1956) vegetation of Jhunjhunu by Nair and Kanodia.

After the reorganization of botanical survey of India in 1955, a revival in floristic studies in the state of Rajasthan also has been observed. Since then as many as 5 floras of different regions of the state have been published. Two of these floras (Puri et al., 1964 and Bhandari 1978) cover the arid region of Rajasthan while Sharma and Tiagi’s (1979). Flora of north-east Rajasthan and two recently published flora by botanical survey of India, viz., “Flora of Tonk district” (Shetty and Pandey, 1983) and “Flora of Banswara district” (V. Singh 1983) have come out for the eastern half. Majumdar in a series of papers (1971, 1976 and 1980) has published the “Synoptic flora of Kota division”; further addition to which have been made by Maheshwari and Singh (1976) and Singh and Pandey (1979).
Mathur (1960) has mentioned the forest types in Rajasthan. The floral composition of Rajasthan has been discussed by Jain (1970, 1977). Mulay (1960), Puri and Jain (1961), Sharma (1967), Majumdar (1969, 1971) Singh (1976) studied the phytogeography and distribution patterns of plants in the state. The alien flora of the state was studied by Maheshwari (1977). Reports on rare and threatened or endemic plant species have been published by Pandey and Shetty (1981), Pandey at al.(1983) and Sharma (1983).The promising plants of Rajasthan (Singh,1983) and some treatological observation on plants have been recorded by Pandey et al. (1982).

2.3 Floristic studies in the study area:

The Ardawata college and Pilani school came out with contributions mainly in forms of the check list of the plants of certain areas in their vicinity viz., various areas from the Shekhawati region, e.g. on and around pilani (Bakshi, 1954; Joshi 1958; Mulay and Ratnam, 1950; Nair and Nathawat, 1956; Nair and Joshi,1957; Ratnam and Joshi, 1952), chirawa (Nair, 1956) lohagal (Ratnam,1951; Nair and Malhotra,1961) Harshnath hills (Nair and Nathawat,1957), Jhunjhunnu and Mandrella and neighbourhood Nair,1956), ajit Sagar (Nair and Kanodia,1959) and khetari and environs(Nair, Kanodia and Thoms, 1961) Joshi and Sharma (1964,1966 ) and Sharma (1967) listed grasses and sedges from Jhunjhunu and adjacent localities. But these publications lessen their value since the herbarium collections are untraceable for purpose of a future reference.

Joshi (1977) studied the grassland and range resource of Shekhawati area in Rajasthan. Recently Takhar (2002) have carried out systematic and ecological studies on the grasses of north – west Rajasthan. He listed 151 grass species from the north-west region of Rajasthan.

2.4 Ethnobotanical &Ethnoveterinary studies:-

Ethnobotany in totality is virtually very interesting field of research. If this field is investigated thoroughly and systematically, it will yield result of great value to the ethnologists, geologist, environmentalist, archaeologists, anthropologists, plant geographers, ethnobotanists, botanists, linguists and phytochemists. After the time of
Harshberger (1895) to the present date, several authors have tried to give a description of the subject ethnobotany and its scope, methodology, its various disciplines, subdisciplines, potential etc. Schultes (1960) had written on tapping our heritage for ethnobotanical lore. He had suggested three methods of ethnobotanical research namely through literature, through chemical investigation and through field study of ethnobotany among primitive peoples. He also gave some example of plants used during the ancient period - a historical account. This is a general account of the significance of ethnobotanical studies from mankind's heritage in general. Two years latter Schultes (1962) outlined the role of ethnobotanists in the search of new medicinal plants. So this was a paper on the subject ethnobotany on a specialized line i.e. medicinal plant. Archeological plants remain, notes on plant collections and herbaria, literature survey, field studies, among aboriginal societies are amongst the procedures by which he suggests that new medicinal plants can be discovered.

Much later in 1986 he tried to bring the attention of societies to ethnobotanical conservation for years he has been engaged on studies in pristine forest of the Amazon and other regions of the tropical South America.

In India, S.K. Jain who laid the foundation of ethnobotany wrote on the role of a botanist in folklore research (1964). He writes that folklore research involves the study of all aspects of intellectual and material culture of the indigenous or backward people. Plants are their proud possession and the knowledge of their properties resulting from a close association gives rise to rich plant folk lore. He appeals to field workers in folklore that whenever there is reference to plants in folk song, folk tale or folk proverbs and riddles, a point should be made to assure oneself of the identity of the plants. Most of the Ancient literature has been written by non botanist. Jain (1965) outlined the prospects by some new or less known medicinal plants resources. In (1967) he wrote on ethnobotany and its scope. Much later in the interdisciplinary science reviews, Jain (1986) gave an overview of the subject ethnobotany, its significance and scope., the various aspects of ethnobotany, in indication of the regular research during the last forty years in this field and also showed how ethnobotany is an covering the vast part of
science. In 1987 he described the scope of the ethnobotany and its various sub disciplines in details.

Vartak and Gadgil (1980) gave a simple account of this new vista in botanical sciences. The paper describes the importance of ethnobotanical studies and also emphasizes the need for inclusion of the subject in the curriculum in Indian universities. Vishnu Mittre (1981) gave a vivid description of wild plants in Indian folklife in the historical perspective. Forty utility groups of wild plants were given by him for each group giving some example in the Indian context. Ethnobotany and its role in domestication and conservation of native plant genetic resources was the content of paper written by Arora (1987), giving the detailed account of this important area where ethnobotanist have still a great to do. Mani Lal (1989) through light on the linkages of ethnobotany with other science and disciplines. Important yields like food and nutrition, defense and survival, sociology and culture, religion, medicine, art and literature, mythology, anthropology, archaeology, forestry and agriculture, economics, language, history and politics, ecology and conservation etc. are the major field to which this subject is linked.

As far as early work on wild plants in Rajasthan is concerned, references can be made that of King (1869), Bhandari (1974) and Joshi and Awasthi (1991) who gave an account of plants used in famine in Marwar region, which are substitutes of ordinary cereals, used in acute famine condition.

The first doctoral thesis on ethnoveterinary in Rajasthan was submitted by Sebastian (1985) entitled ‘ethnobotanical’ survey in some forest area of Rajasthan covering the districts of Sirohi, Udaipur, Banswara, Dungarpur and people Bhil & Garasia. Many years later Shekhawat in 1986 submitted his thesis ethnobotanical survey of desert area of Rajasthan. His work is spread over the district of Barmer, Bikaner, Jaisalmer, Jodhpur, and Nagour covering both the nomadic and sedentary communities, some of which are Raikas, Sidhis, Banjaras, Ghati wala jogis, Gadolia lohars, Sansis, Nuts, Kalbelias, Meenas, and Meghwals. ‘Ethnobotany of Aravalis’ was submitted by Joshi (1987), who covered the major tribals of southern Rajasthan. His
work is of general ethnobotanical nature. ‘Ethnobotany and Biochemical analysis’ was a doctoral work of Vyas (1987). Description and ethnobotanical information of 35 species of this group of plants is given in this work. ‘Floristics and ethnobotanical studies on Pali district of Rajasthan’ running in two volumes, Pandey (1989) gave an account of medicinal plants used in 25 ailments group, magico-religious plants and those in folklore, folk songs and also the ones indicating weather 198 plant species of ethnobotanical significance are described in this work. ‘Ethnobotany of the Bhil tribe in Rajasthan’ was submitted by Khandalwal (1997), who covered the Bhil tribes of south Rajasthan. His work is of general ethnobotanical nature and an account of various aspects of bhil lives. Asa Arora (1997) submitted her thesis on ethnobotanical studies on the wild plants from Aravali hills of Rajasthan. Her studies embody the result of an integrated approach to assess the potential of wild plants in their native form. Any year later Guria (1998) carried out ‘ethnobotanical studies on the grasses of Rajasthan’. A thesis entitled ‘A study of the contribution of some wild food plants to the diet of tribal of south–east Rajasthan’ was submitted by Ambika Nag (1999). She has highlighted the importance of various wild food plants in the diet of tribals. Choudhary (2001) submitted his thesis entitled ‘Ethnobotanical studies on Rajasmand District of Rajasthan’.

Recently, the first online Ethnoveterinary data bank and an international mailing list have been developed (International Network Prelude, 2002). On the other hand, interdisciplinary field studies focused on traditional knowledge related to veterinary practices have rarely been conducted, and most have been focused mainly on the description of animal health management practices and much less on the bioscientific and anthropological evaluation of traditional remedies. Systemic Ethnoveterinary studies on remedies used in traditional phototherapeutic practices have been carried out mainly in Africa, Asia and Central America (Lans et. al, 2000, 2001; Scarpa, 2000; Nfi et. al., 2001; Alawa et. al., 2002; Ole-Miaron, 2003). In Europe, medicinal plants used in folk veterinary practices have been specifically investigated in only a few field studies (Blanca et. al., 1999; Uncini Manganelli et. al., 2001; Waller et. al., 2001; Pieroni et.al., 2004).
From analysis of literature on ethnoveterinary medicine some conclusions are derived. Ethnoveterinary research is still continue, research in this regard has mainly been done in Africa continent, less in Asia and very little in America and elsewhere. These researches are mainly descriptive (practices, prescriptions, linguistic analyses). Few analytical studies (e.g. Bachmann, 1998; compared the knowledge of pastoralists with epidemiological data on contagious caprine pleuropneumonia) have been carried out (Mathias, 1996). Major work in this field has been carried out by women (Evelyn Matthias and Constance McCorlke especially), a veterinarian and a sociologist, a combination which has entailed to a broader understanding.

India is now beginning to search her roots in the past and revive her lost glory of the traditional system of medicine which flourished here for several centuries and contributed much to the development of the medical science of world. To alleviate the sufferings of her large ever growing populace, she has to revive the Traditional Folklore Medicine and bring it into the mainstream of National Health-Care Program. An account of botanical ethnoveterinary prescriptions in India and Rajasthan has been given by Sebastian and Bhandari, 1984; Reddy and Sudarshan, 1987; Jain, 1991, 1999; Livestock Census, 2003; Sharma, 2005; Sikarwar et.al. 1994; Joshi, 1995; Dwivedi, 1998; Singh and Pandey, 1998; Kumar, 2000, 2002, 2006; Katewa and Chaudhary, 2000; Anjaria et.al.,2002; Anonymous, 2004; Kumar et.al.,2004; Mokat and Deokule, 2004; Khoda, 2005; Swarup and Patra, 2005; Unnikrishnan and Shankar, 2005; Katewa and Jain, 2006; Kadel and Jain, 2006; Nag et. al., 2006, 2007; Tiwari and Pande, 2006 Yadav, 2007; Galav et. al.,2007, Mini and Shivdasan, 2007and Jain et. al.,2008.

2.5. OBJECTIVE OF THE RESEARCH

1. Ethnoveterinary survey of Shekhawati region of Rajathan for documentation of folk wisdom of veterinary herbal medicines.
2. Preparation of herbarium of all the ethnoveterinary herbal medicine for future reference.

3. To identify the endangered ethnoveterinary medicinal herbs and develop awareness among rural people of the Shekhawati area for their conservation.

4. To create awareness about traditional ethnoveterinary healing practices.

5. To preserve and conserve all those traditional knowledge belief and knowledge that promote conservation – oriented practices of ethnoveterinary herbal medicine on verge of extinction.

6. To Promote cultivation of veterinary medicinal plants by the farmers and their marketing.

**Work plan:**

**Tasks**

**A. Activities**

**First year**

1. Survey of half villages of Shekhwati region for collection and documentation of ethnoveterinary medicines used by rural communities.

2. Herbarium preparation of collected ethnoveterinary medicines from above villages of the region.

3. Literature consultation at IVARI. Izatnagar, IARI., NBPRGR.,New Dehli and CDRI. Lucknow.

4. Organization of grassroot level training/meeting of farmers to create awareness about ethnoveterinary medicines.

**Second Year**

1. Survey of remaining villages of Shekhwati region for collection and documentation of ethnoveterinary medicines used by rural communities.
2. Herbarium preparation of collected ethnoveterinary medicines from above villages of the region.

3. Organization of grassroot level training/meeting of farmers to create awareness about ethnoveterinary medicines.

B. logical sequence of activities and outputs leading to realization of the objectives.

The proposed investigation will be carried out in the following phases:

1. Exploratory phase

Both intensive and extensive ethnoveterinary survey of all the villages of the Shekhawati region will be made by undertaking field tours to various localities of study area for collection of information about indigenous use of various herbs for the treatment of various ailments of animals

2. Consolidation phase

The collected material will be identified with the help of existing herbarium material and available literature. The difficult and otherwise doubtful specimens after formal examination will be matched with the plants available in the FRI Herbarium at Dehradun and BSI Central Herbarium Kolkata. Grassroot level training cum awareness meeting of farmers will be organised at various places of study area.

2.6. Hypothesis

Ethnoveterinary medicine is often taken to mean using medicinal herbs. Stock raisers commonly have sense to ascertain that their animal is sick. They can give the description of symptoms of disease and which season the disease commonly strikes. They also know where to find the best pasture, how to avoid tsetse-infested areas, where to find saltlicks, and many, many other things. This is much broader than just the use of herbal medicines. It also helps in bone setting, vaccination against pox and other communicable diseases, branding, and careful management practices.

Beliefs are commonly thought has to be suppressed. Still, some beliefs can be very useful because they improve the animals’ condition or prevent them from falling sick. Examples are the licking of salt that has been blessed, prevent animals against
evil winds, and not letting animals on pastures where other animals have died due to diseases such as infectious diseases i.e. anthrax. So it is advised to have a close watch at beliefs and encourage these if they promote animal health. At first sight, they may produce less than introduced breeds, but they may not score as poorly if both input costs and outputs are considered, instead of only the outputs. Local breeds are presently receiving increased attention in connection with attempts to conserve their dwindling genetic resources. Knowledgeable farmers, herders and local healers are treasurers of knowledge and can be valuable partners in development projects.