Conclusion
CHAPTER 5
CONCLUSION

In arid zones, vegetation is typically sparse and is comprised of perennial and annual grasses; other herbaceous plants, shrubs and small trees. Some plants have progressed special root systems while further have distinctive leaves characteristics that allow them to withstand prolonged periods of drought. A lot of woody genuses simply lose their leaves when soil moisture circumstances become too dry. For the growth of innumerable herbs, shrubs, climbers and trees are having medicinal properties. In Rajasthan and North India, cultivation of medicinal plant species has not yet picked up in commercial scale though the flora consist of numerous plant species having medicinal, aromatic and other economic value.

The targeted plants *Argemone mexicana Linn, Asparagus racemosus, Cyperus rotundus Linn, Melia azedarach Linn, Tagetes erecta Linn* and *Tinospora cordifolia* are very important medicinal plants found in Arid Zone Rajasthan have a great commercial importance. All these six plant species were considered for the present investigation.

*A. mexicana* L. is used as traditional medicine for ophthalmia, dropsy, jaundice, scabies and cutaneous affections. Plant parts are used in skin disease and demulcent, diuretic, expectorant and emetic; the seeds and seed oil are use therapy for dysentery, ulcers, asthma and other intestinal affections (Chopra *et al.*, 1956). Leaves and seeds are application maintaining normal cholesterol level and blood circulation in human body (Savithramma *et al.*, 2007); Flowers are found as expectorant and used in the action of whooping cough and antibacterial activity (Brahmachari *et al.*, 2010). Plant seeds are used as digestive, laxative and purgative while its latex is used against conjunctivitis (Agra *et al.*, 2008).

*A. racemosus* plant are widely used in as a female rejuvenative and sexual weakness, inability, spermatorrhea, swelling of sexual organs and helpful for dysentery, stomach ulcers, hyperacidity and bronchial infections (Saxena and Bopana, 2009). Herb is used for female rejuvenation and female problems including
infertility, amenorrhea, dysmenorrhoea, endometriosis, leucorrhea, menopausal symptoms. Leaves part of *A. racemosus* with butter-fat useful with assistance to boils, small pox and to prevent confluence (Chattejee and Pakrashi, 2001). Tubers are sweet in taste eaten for nutritional value as a food but not as part of a meal. In dyspepsia fresh root juice is given along with honey as a demulcent and with milk is useful in gonorrhea (Nadkarni, 2002).

*C. rotundus* L. plant have a traditionally use good remedy for dyspepsia and useful for metabolic disorders and psychotic diseases in dietary management. *C. rotundus* used in cure of Nausea and vomiting, dyspepsia, colic, fever, dysentery, diarrhoea, cough, antispasmodic, bronchitis, intestinal parasites, malaria, renal, skin diseases, stomachic, antitussive, wounds, cold, carminative, amenorrhea, diuretic and dysmenorrhoea (Mehrotra *et al.*, 2007; Williamson and Hooper, 2002). *C. rotundus* oil is evidence for notable antibacterial activity and antimitagenic activity (Kilani *et al.*, 2005).

*M. azedarach* L. Leaves are applied in the form of poultice to relieve nerves and to cure the eruption on the scalp; they are topically used in leprosy and related skin diseases. Leaf juice is anthelmintic, diuretic, vermifuge astringent and stomachic (Nadkarni, 1954). Flowers are astringent, diuretic, resolvent, deobstruent and stomachic (Warrier *et al.*, 1995; Sharma *et al.*, 2001). Fruits are considered tonic, internally in indigestion, colic and intestinal cathartic. *M. azedarach* are anthelmintic, emmolient and purgative (Rani *et al.*, 1999). Seeds are bitter, expectoretent, anthelmintic and aphrodisiac and are useful in helminthiasis, typhoid fever, pain in the pelvic region (Warrier *et al.*, 1995). Barks are bitter, astringent, antiseptic, constipating, expectorant, urinary astringent, anthelmintic and bitter tonic in low doses. They are useful in headache, leprosy, leucoderma, skin diseases, wounds, ulcers, piles, worm infestation, diabetes, abnormal urethral discharge, chronic and intermittent fevers, vomiting and post labour pain in uterus (Warrier *et al.*, 1995 and Sharma *et al.*, 2001).

*T. erecta* L. plant contain different parts primarily flower part is used in folk medicine to therapy different ailments such as stomachic, fevers, epileptic fits,
astringent, carminative, scabies and liver complaints and also eye diseases (Kiranmai and Ibrahim, 2012). The leaves are useful against ulcers, piles, muscular pain, ear ache, kidney troubles and wounds. Plant infusion is used against cold, rheumatism, vermifuge diuretic, carminative and bronchitis. An extract of the root has possessed laxative properties. (The Wealth of India, 1992).

*T. cordifolia* is use in tribal region and different plant parts as folk medicine use in the country. Treatment of gout and ulcer used as a leaves. The stem is bitter stomachic, enriches the blood, stimulates bile secretion, diuretic, cures jaundice, bronchitis and skin diseases (Treadway, 1998). Stem as an infusion used to drunk as a vermifuge, jaundice, against intestinal worms; Stem as decoction used for washing sore eyes and syphilitic sores, antipyretic, antimalarial, stimulate immune system (Nagarkatti et al., 1994). Starch used for chronic diarrhoea obtained from stem and some form of chronic dysentery. In diabetes mellitus juices is useful and also helpful in vaginal and urethral discharges, reduce fevers and enlarged spleen (Stanely et al., 2001 and Kirtikar Basu, 1918). Dried fruit with ghee or honey are used as tonic and treatment of jaundice or rheumatism. Bark is Anti-allergic, Anti-spasmodic, Anti-leprotic (Ikram et al., 1987 and Nayampalli et al., 1986).

*Argemone mexicana* Linn, *Asparagus racemosus* Linn, *Cyperus rotundus* Linn, *Melia azedarach* Linn, *Tagetes erecta* Linn and *Tinospora cordifolia* are gradually declining due to over population and human habitation, development and industrialization. Cultivation of wild growing medicinal plants are greatest important for manufacturing of medicine company. Therefore, treatment of targeted plants with various disease regimes has been investigated. Enumeration of morphological and ecological information and mode and purposes of uses are also studied. Assessment of antioxidant and free radical scavenging properties of the *A. mexicana* L., *A. racemosus*, *C. rotundus* L., *M. azedarach* L., *T. erecta* L. and *T. cordifolia* were screened through various procedure, tools and techniques.

In the present investigation, cultivation, enumeration and other experiments were done at the Department School of Science, Suresh Gyan Vihar University. Results obtained in various experiments are summarized below.
5.1 Collection and Maintenance of Targeted Plants.

The targeted medicinal plants were collected from different parts of Jaipur, Rajasthan specially *Argemone mexicana*, *Asparagus racemosus* and *Melia azedarach* from Sh. Kapur Chand Kulish Smrti Udhyaan, Jaipur. *Cyperus rotundus* from Dravwati River, Jaipur *Tagetes erecta* and *Tinospora cordifolia* from also Sh. Kapur Chand Kulish Smrti Udhyaan, Jaipur. These plants were maintained since 2011 to 2014 and used as source material for the experiment.

5.2 Enumeration of Morphological and Ecological information, Mode and purpose of Uses of plant species are also studied.


*Argemone mexicana* found in Mexico and now has widely naturalized in the United States, India, Bangladesh and Ethiopia. It is an herbaceous plant with latex, which has grow naturally in many subtropical, tropical regions and arid region. It occurs as wasteland weed in almost every part of India (Mukherjee and Namahata, 1990; Das and Misra, 1987). *Argemone mexicana* naturally occurs in many countries are like as India, South Africa, Australia and other region of the world.

*Asparagus racemosus* is a significant therapeutic plant of tropical, subtropical and arid areas of western Rajasthan, India. In India the crop is cultivated in Rajasthan, Kerala, Andhra Pradesh, Tamil Nadu, Maharashtra, Gujarat, Karnataka and northern states. *A. racemosus* plant found throughout the tropical and subtropical region of India, as well as Andaman Islands and ascending up to 1500 m in the Himalaya from Kashmir eastwards and in Ceylon (Bopana and Saxena, 2007; Yelavan et al., 2007).

*Cyperus rotundus* is indigenous to India, but are now found in subtropical, tropical and arid regions. The genus *Cyperus* includes common weeds found in upland and paddy fields in temperature to tropical regions (Pooley et al., 1998).
Melia azedarach tree is found in India and most similar to Neem. It has become naturalized to tropical and warm temperate regions of the India and is planted in similar climates around the world. It is inhabitant to upper Burmah region (Nahak and Sahu 2010). It grows wild in the Sub-Himalayan tract up to 1700 m, Rohilkhand, Dehradun and Saharanpur forests. It is commonly cultivated almost throughout India, Rajasthan, Bihar, Orissa, West Bengal, Punjab, Konkan and Deccan and in most districts of south India, as an ornamental avenue tree. The various parts of the tree possess the same therapeutic significance as neem tree. It is widespread and grow wild in most of the tropical and subtropical regions (Ramya et al., 2009).

Tagetes erecta present area cultivation of marigold (T. erecta) is 28,825 hectares with a production of more than 2.0 metric tons in India (Anonymous, 2004). The marigold carotenoids are done in Cochin, Hyderabad, Tamil Nadu and Bangalore (Karnataka). T. erecta flowers are globular in shape. Colour shades vary from light yellow to creamy and bright yellow, cadmium and deep orange, yellow and white. Tagetes erecta flowers are under commercial cultivation for premium prices. T. erecta originated in North and South America and widely cultivated in other Asian countries like Bhutan, China, Nepal, India etc become cultivated to tropical and warm temperate regions of the India (Abdul Halim, 2007).

Tinospora cordifolia is a climbing shrub, leaf heart shape, glabrous, deciduous. It is found all over tropical and semi arid zone of India, also found in China, Bangladesh, Myanmar, Sri Lanka, South Asia, Indonesia, Phillipians and Thailand. T. cordifolia prefers extensive range of soil, acid to alkaline and it requires moderate level of soil moisture, mounting to an elevation of 300m-1200m in worldwide (Sharma et al., 2010).

5.3 Assessment of Antioxidant Activity
- The result of methanolic extract of Argemone mexicana Linn, Asparagus racemosus, Cyperus rotundus Linn, Melia azedarach Linn, Tagetes erecta Linn and Tinospora cordifolia showed strong antioxidant and free radical scavenging activity. It has been recognized that the total phenolic and
flavonoid content enhance the free radical scavenging activity due to the presence of hydroxyl groups.

- The all parts of the *Argemone mexicana* Linn, *Asparagus racemosus, Cyperus rotundus* Linn, *Melia azedarach* Linn, *Tagetes erecta* Linn and *Tinospora cordifolia* showed higher antioxidant activity such as DPPH and FRAP radical scavenging activity. All the plant parts extract has good source and good potential for natural antioxidants to prevent free radical mediated oxidative damage.

- Differences of antioxidant activity also observed in all parts of targeted plants.

- The maximum antioxidant activity of *Argemone mexicana* using DPPH radical scavenging activity, 29±0.45 in leaves.

- The minimum antioxidant activity of *Argemone mexicana* using DPPH radical scavenging activity, 111±1.2 in root.

- The maximum antioxidant activity of *Argemone mexicana* using FRAP radical scavenging activity, 32±0.86 in root.

- The minimum antioxidant activity of *Argemone mexicana* using FRAP radical scavenging activity, 138±1.02 in seeds.

- Maximum total phenolic content of *Argemone mexicana*, 15.06±0.25 in stem.

- Minimum total phenolic content of *Argemone mexicana*, 3.80±0.16 in leaves.

- Maximum total flavonoid content of *Argemone mexicana*, 31.20±0.24 in leaves.

- Minimum total flavonoid content of *Argemone mexicana*, 3.90±0.19 in root.

- The maximum antioxidant activity of *Asparagus racemosus* using DPPH radical scavenging activity, 31±0.65 in leaves.

- The minimum antioxidant activity of *Asparagus racemosus* using DPPH radical scavenging activity, 125±0.84 in stem.

- The maximum antioxidant activity of *Asparagus racemosus* using FRAP radical scavenging activity, 66±0.86 in root.

- The minimum antioxidant activity of *Asparagus racemosus* using FRAP radical scavenging activity, 185±0.77 in stem.
• Maximum total phenolic content of *Asparagus racemosus*, 6.23±0.12 in stem.
• Minimum total phenolic content of *Asparagus racemosus*, 3.03 ±0.29 in root.
• Maximum total flavonoid content of *Asparagus racemosus*, 3.25±0.09 in seeds.
• Minimum total flavonoid content of *Asparagus racemosus*, 0.90±0.12 in root.
• The maximum antioxidant activity of *Cyperus rotundus* using DPPH radical scavenging activity, 57±0.23 in leaves.
• The minimum antioxidant activity of *Cyperus rotundus* using DPPH radical scavenging activity, 61±0.57 in rhizome.
• The maximum antioxidant activity of *Cyperus rotundus* using FRAP radical scavenging activity, 129±0.19 in leaves.
• The minimum antioxidant activity of *Cyperus rotundus* using FRAP radical scavenging activity, 162±0.25 in rhizome.
• Maximum total phenolic content of *Cyperus rotundus*, 5.15±0.13 in rhizome.
• Minimum total phenolic content of *Cyperus rotundus*, 3.23±0.19 in leaves.
• Maximum total flavonoid content of *Cyperus rotundus*, 1.06±0.19 in rhizome.
• Minimum total flavonoid content of *Cyperus rotundus*, 0.30±0.22 in leaves.
• The maximum antioxidant activity of *Melia azedarach* using DPPH radical scavenging activity, 47±0.59 in root.
• The minimum antioxidant activity of *Melia azedarach* using DPPH radical scavenging activity, 98±0.24 in seeds.
• The maximum antioxidant activity of *Melia azedarach* using FRAP radical scavenging activity, 46±1.24 in root.
• The minimum antioxidant activity of *Melia azedarach* using FRAP radical scavenging activity, 215±1.08 in seeds.
• Maximum total phenolic content of *Melia azedarach*, 8.02±0.22 in root.
• Minimum total phenolic content of *Melia azedarach*, 5.07±0.33 in bark.
• Maximum total flavonoid content of *Melia azedarach*, 23.15±0.22 in bark.
• Minimum total flavonoid content of *Melia azedarach*, 10.11±0.24 in root.
The maximum antioxidant activity of *Tagetes erecta* using DPPH radical scavenging activity, 63±0.89 in leaves.

The minimum antioxidant activity of *Tagetes erecta* using DPPH radical scavenging activity, 165±0.93 in root.

The maximum antioxidant activity of *Tagetes erecta* using FRAP radical scavenging activity, 16±0.78 in leaves.

The minimum antioxidant activity of *Tagetes erecta* using FRAP radical scavenging activity, 259±1.29 in root.

Maximum total phenolic content of *Tagetes erecta*, 124.89±1.32 in flower.

Minimum total phenolic content of *Tagetes erecta*, 38.13±0.36 in stem.

Maximum total flavonoid content of *Tagetes erecta*, 102.15±1.29 in flower.

Minimum total flavonoid content of *Tagetes erecta*, 38.12±0.24 in root.

The maximum antioxidant activity of *Tinospora cordifolia* using DPPH radical scavenging activity, 37±0.87 in leaves.

The minimum antioxidant activity of *Tinospora cordifolia* using DPPH radical scavenging activity, 172±0.87 in root.

The maximum antioxidant activity of *Tinospora cordifolia* using FRAP radical scavenging activity, 43±0.73 in leaves.

The minimum antioxidant activity of *Tinospora cordifolia* using FRAP radical scavenging activity, 72±0.72 in root.

Maximum total phenolic content of *Tinospora cordifolia*, 9.02±0.22 in stem.

Minimum total phenolic content of *Tinospora cordifolia*, 3.06±0.29 in root.

Maximum total flavonoid content of *Tinospora cordifolia*, 5.78±0.17 in stem.

Minimum total flavonoid content of *Tinospora cordifolia*, 0.73±0.34 in leaves.

### 5.4 Comparison of Targeted Plant parts for Antioxidant Potential

The use of natural antioxidants as a potential preventive for free radical mediated diseases has become a very important issue for improving the quality of life. The present investigation showed the significant antioxidant and free radical scavenging properties of plant extracts from targeted plants of *Argemone mexicana* Linn, *Asparagus racemosus*, *Cyperus rotundus* Linn, *Melia azedarach* Linn, *Tagetes erecta* Linn and *Tinospora cordifolia*. 