CHAPTER NO. - V
DISCUSSION

Acacia leuophloea (Roxb.) Willd.

Dalbergia lanceolaria Subsp. paniculata (Roxb.) Thoth.

Albizia procera Benth.

Albizia julibrissin Durazz.

Desmodium oojenense (Roxb.) H. Ohashi.
DISCUSSION

1. Occurrence and distribution study by Quadrate Method

Forest was studied phytosociological to get the complete description and classification of vegetation. It also gives the detailed information about the floristic composition structure and development (Poore, 1955). Present study of phytosociological characteristic analysis by quadrate method provided the important information about the tree species diversity and distribution in the study area. Population diversity and composition can be studied with the help of percentage frequency, density and abundance (Misra, 1968, Odum, 1971).

Quadrate analysis study showed the presence of 27 leguminosae tree plants distributed in the 45 different quadrate. Out of this 27 leguminosae plants, 10 were belonging to the Papilionaceae, 6 were belonging to the Caesalpinaceae and 11 were belonging to the family Mimosaceae.

Several workers studied the diversity and distribution of vegetation by quadrate methods. 179 genera and 87 families frequency, density and basal area data were recorded from Tekai Tembeling Forest Reserve (Eswani, et al., 2010). Distribution and diversity of 17 ethano medicinal herbs from District Toba Tek Singh four places and seven sites were documented by relative density, relative frequency and prevalence (Choudhary, et al., 2014). Species diversity of 3414 individual trees representing 120 species were studied from Pasir Tengkorak Forest Reserve, Langkawi Island, Malaysia (Hayat, et al., 2010). Present status of Aconitum ferox and Aconitum heterophyllum were studied from Kumaun Himalaya (Bhatt, et al., 2014). Swertia angustifolia status assessment was studied from west Himalaya by quadrate analysis (Bhatt, et al., 2007). Tree diversity in the primary forest and different land from Central Sulawesi, Indonesia was studied by Field sampling methods (Kessler, et al., 2005).

Present work showed that highest frequency percentage was found in Butea monosperma(Lam.) Taub(88.89) followed by Cassia fistulaL.(71.11) and Bauhinia recemosaLam (55.56). Lowest frequency percentagewas found in Acacia chundra(Rottler) Willd. (4.44), Acacia catechu(L.f.) Willd. (6.67) and Albezia julibrissinDurazz. (6.67). Maximum density was found in Butea monosperma(Lam.) Taub.(10.66), followed by Cassia fistulaL.(6.91) and Gliricidia sepium(Jacq.) Walp.(3.71) Lowest density was found in Acacia chundra(Rottler) Willd.(0.067), Acacia catechu(L.f.) Willd.(0.13) and Albezia julibrissinDurazz.
Maximum abundance was found in *Gliricidia sepium* (Jacq.) Walp. (16.7), *Butea monosperma* (Lam.) Taub. (12) and *Cassia fistula* L. (9.72) and lowest abundance was found in *Acacia chundra* (Rottler) Willd. (1.5) and *Pterocarpus marsupium* Roxb. (2) and *Acacia catechu* (L.f.) Willd. (2).

Tree species diversity was studied from Afii Mountain Wildlife Sanctuary, Southern Nigeria showed that *Afzelia bipedensis* (RD = 5.00) is abundant species (Edet, *et al.*, 2012). Tree species was evaluated from three forest fragments of the Taita Hills revealed that *Eucalyptus* high density and abundance (Omoro, *et al.*, 2010). Diversity and distribution patterns of tree species from tropical forest of Eastern Ghat were studied by Relative frequency and density and other ecological parameters (Reddy and Ugle, 2008). Relative density, frequency, abundance and important value Index of 108 woody tree were studied from Mazowe Botanical Reserve, Zimbabwe (Zimudzi, *et al.*, 2013). 129 species diversity were studied from Tropical Forest Srikakulam District, Andhra Pradesh, India (Srinivasa, *et al.*, 2013).

2. Digitization

Digitization provided easily and widely accessible global plant data for science researchers and raises epistemological concerns (Svensson, 2015). Recent technique of digital photography and internet has become top medium for the information retrieval (Schmidt, *et al.*, 2009). Furthermore this method used for the identification of the plant species and 3D digitization of the plant specimen (Lang, *et al.*, 2007).

In present digitization work, 27 leguminosae plants from the study were documented. It provided the detailed information about the plants such as scientific name, classification the plants, distribution, GPS location, common name which included English name, Hindi name, Marathi name and Sanskrit name. Morphological detail along with the photographs were also documented such as habit, root, stem, leaves, flower, fruit and seeds, flowering and fruiting of the plants. Ethnobotanical uses of the plants along with other importance were also summarized in the project. Hyperlink computer technique was used while doing the digitization.

It is reported that this digitization help in conservation and analyzed the status of the plant species by Geographic Information Systems (Guarino, *et al.*, 2002). This digitization used for the floral image recognition (Hsu, *et al.*, 2011) and used as electronic field guide (Agarwal, *et al.*, 2007).
2006). This visual images along with the taxonomic description used for the better knowledge of the species (Dalitz and Homeie, 2004). The data base created by digitization use for the conservation of species and improve our understanding on plant resources (Sanjappa, et.al., 2008).
3. Selected leguminosae tree plants

i. *Acacia leucophloea* (Roxb.) Willd.

*Acacia leucophloea* (Roxb.) Willd. morphologically described by several taxonomist, it is small tree, rarely reaching 8 m. height, bark white or ash coloured (Naik, 1998). Leaflets 2 pinnate, subsessile, flower large terminal head, pods thin, flate, indehisent, seeds 10-20 (Yadav and sardesai, 2002). It is reported to have the important medicinal value in the Indian medicinal system. Bark used as astringent (Nadkarni and Nadkarni, 1976). It is distributed from Punjab, Rajasthan, Central India, Southern India to Sri Lanka (Kirtikar and Basu, 1975). The bark cures inflammation, bronchitis useful in biliousness, thirst, vomiting, burning sensation antihelmentic, blood purifier, antimicrobial and expectorant (Gupta, *et al.*, 2012). Dyes and tannins are manufacture from inner bark of the plant (Jhade, *et al.*, 2012). Leaf and bark is used for the treatment of gonorrhea and also show antimicrobial activity (Jitin, *et al.*, 2013). Phytochemical screening provides important information of bioactive components in the plant.

Qualitative analysis using different test showed that the presence of alkaloid, carbohydrate, protein, flavonoid, glycosides, triterpenoids, saponin, steroid, tannins and starch in bark and leaf methanolic extracts of the *Acacia leucophloea* (Roxb.) Willd. Resin was absent in both the extracts of the plants.

*Acacia leucopholea* (Roxb.) Willd. bark extract phytochemical screening revealed the presence of steroids, alkaloids, carbohydrates, tannins, glycosides, polyphenols, gum and mucilage present in methanolic extract. It also showed the presence of steroids, alkaloids, carbohydrates, flavonoids, tannins, glycosides, polyphenols, gum and mucilage in the ethanolic extract and water extract contain steroids, saponin, triterpenoid, saponins, alkaloids, carbohydrates, flavonoids, tannins, glycosides, polyphenols, gum and mucilage (Anjaneyulu *et al.*, 2010). Phytochemical analysis of the root showed that the presence terpene in petroleum ether and chloroform extract and alkaloids terpene, flavonoids and tannins in the ethyl alcohol extract (Jhade *et al.*, 2012).

Quantitative analysis of the bark extract showed the presence of 1.89 mg/g and 2.44 mg/g alkaloids in the leaves and bark extract of the plant respectively. This study also revealed that presence of 0.409 mg/g carbohydrates, 0.62 µg/ml proteins, 0.54 mg/g phenols, 0.22 mg/g flavonoids, 1.17 mg/g saponin and 0.009 mg/g tannin in the leaves extract of the plant. This
study also evaluated the 0.236 mg/g carbohydrates, 0.96 mg/g proteins, 0.65 mg/g phenols, 0.35 mg/g flavonoids, 1.116 mg/g saponin and 0.16 mg/g tannin in the bark extracts of the plant.

Quantitative estimation revealed that the leguminosae family is rich in phytoconstituent. Bark of *pterocarpus marsupium* reported the presence of 0.43 % flavonoids, 2.29 % tannin, 0.61 % total alkoloids, 9.74 % polyphenols and 12.43 % of protein (Patil and gaikwad, 2011). 34.44 mg/g phenols and 30.45 mg/g flavonoids were present in the alcoholic extracts of the *Delonix regia* flower (Shanmukha *et.al.*, 2011). Methanolic extract of cassia fistula pod showed the presence 0.0024 mg/g phenols, 83.5 mg/g carbohydrates, 1.94 mg/g protein and 0.096 mg/g of protein (Sumi and Oommen, 2012). Quantitative estimation of flavonoids in mulberry leaves of 19 varieties of the species showed that flavonoids in fresh leaves, oven dried, and air dried leaves extracts varies from 15.3 to 29.5 mg/g, 11.3 to 25.0 mg/g, 14.8 to 29.5 mg/g respectively. Flavonoid content was determined quantitatively by spectrophotometrically in terms of rutin equivalent (Zhishen *et.al.*, 1999). Quantitative analysis of Nigerian medicinal plants *Aspilia africana* and *Bryophyllum pinnatum* revealed the presence of bioactive constituents comprising alkaloids (Okwu and Josiah 2006).

HPTLC analysis is used for the estimation of compounds present in the extract by comparing with the standard compounds qualitatively and quantitatively. This was first time attempt was made to determine rutin and quercetin in the bark and leaves methanolic extract of the *Acacia leucophloea*(Roxb.) Willd. This HPTLC chemoprofilling of the plant extracts revealed that the Max $R_f$ value of the first peak and fourth peak of bark extract coincided with the Max $R_f$ value of standard rutin and quercetin respectively. Max $R_f$ value of the first peak and fifth peak of leaf extract coincided with the Max $R_f$ value of standard rutin and quercetin respectively.

Quantitative estimation of the gallic Acid, quercetin and lupeol from *Acacia leucophloea* Willd. flowers was carried out by HPTLC method (Leela and Saraswathy, 2013). Some other species of *Acacia* studied for the detection of flavonoids compound by HPTLC method. Catechin concentration in the acetone extract of *Acacia nilotica* bark was carried using standard catechin as marker compound by HPTLC (Momin, *et.al.*, 2011). This chromatographic fingerprint analysis by HPTLC was used for qualitative estimation of rutin and quercetin from ethanolic leaf extract of *Acacia catechu* (Lakshmi, *et.al.*, 2012). Quercetin in ethanolic extract of roots of *A. arabica* Willd. Was determined by HPTLC and it was estimated 1.70%w/w quantitatively.
(Alambayan, et.al., 2014). Presence gallic acid was detected in the acetone extract of Acacia nilotica Linn bark by HPTLC and it was found to be 0.86 % (Leela, et.al., 2010). In the other leguminosae plants Cassia occidentalis leaf and Indigofera tinctoria aerial showed the presence of flavonoid while comparing the extracts with the standard flavonoid by HPTLC (Dhandapani and Kadarkara, 2011, Felicia and Muthulingam, 2012).

GC-HRMS provided the detailed about the compound that were present in the plant extract. GC-HRMS analysis of Acacia leucophloea(Roxb.) Willd. identified that bark extract contain only one compound while leaf extract has 11 compounds. It revealed the compound present in the bark extract was 3-O-Methy - D- Glucose and the leaf extract contain 11 compounds were Pyrrolidine, Octadecane, Octadecane, 2-Dodecanone, n-Hexadecanoic acid, Acetylcarbromal, α-Hydroxy-17α-methyl testosterone, n-Heptadecanol-1, α-D-Galactopyranoside, methyl, Cyclohexonol, 5-methyl-2-(1-methylethyl) and Hexadecanoic acid 2,3-dihydroxypropyl ester respectively.

There is a growing interest all over the world for discovering the undraped biological activity of medicinal plants and its correlation with phytoconstituents (Selvamangai and Bhaskar, 2012). Numbers of compounds were identified by several other workers through GC-MS analysis in the Acacia. 44 amines and alkaloids were identified in methanolic extract of Acacia rigidula leaves, pteoiles and attached tender stems by GC-MS (Clement, et.al., 1998). 17 compounds were identified from flower oil of Acacia leucina by GC-MS and some of the compounds were transferruginol (32.18%), hepta-1,3,5-triyne 1-phenyl (23.26%), phytol acetate (9.72%, manool(8.90%), ace anisole(4.56%), eugenyl acetate(3.16%) (Ali, et.al., 2015). GC-MS Analysis of the methanolic extract of Acacia ferruginea determined 18 compounds and quinone (37.3%), quinoline (22.9%), imidazolidine (6.4%), pyrrolidine (4.5%), and cyclopentenone (3.5%) were identified as major components (Sakthivel and Guruvayoorappan, 2013). Chloroform extract of Acacia nilotica leaves reported presence of 63 compounds by GC-MS methods (Bai, et.al., 2014). 80% methanolic extracts of Acacia nilotica leaves reported the presence of eight compounds by GC-MS (Hemamalini, et.al., 2013). From Gliricidia sepium 16 compounds were identified from leaves extract while 6 compounds were identified from flower extracts by GC-MS (Kaniampady, et.al., 2007). From methanol leaves extract of Cassia nigricans Vahl. of five compounds were identified by GC-MS(Ayo, et.al., 2009).
It has been studied that bioactive compound possess strong antioxidant activity and may help to protect the cells against the oxidative damage caused by free-radicals apart from this they used as radical scavengers, metal chelators, reducing agents, hydrogen donors, and singlet oxygen quenchers (Narayanaswamy and Balakrishnan, 2011). Leaves and bark extracts of Acacia leucophloea showed significant antioxidant potential. It revealed that bark extract (68.82 %) has more DPPH radical scavenging activity percentage than the leaves extract (52.47 %) of the plant.

Recently, the studies on phytostimulants and antioxidant activity of plant part extracts have great importance. Antioxidant activity of Acacia leucophloea (Roxb.) Willd. barks methanolic, ethanolic and water extracts were analyzed at 50 to 400 ppm by DPPH method. It revealed that methanolic extract (81%) shows highest antioxidant activity than the ethanolic extract (75 %) and lowest antioxidant activity was reported in the water extract (70 %) (Anjaneyulu, et.al., 2010). Antioxidant activity of leaves, pods and seeds methanolic extracts of Acacia lucophloea (Roxb.) Willd. showed that pods extracts has more antioxidant activity than the leaves extracts and lowest antioxidant activity was found in seeds extracts (Haq, et.al., 2013). Pet. ether, ethanolic and aqueous extracts of Acacia lucophloea (Roxb.) Willd. root extracts reported higher antioxidant activity in aqueous extract than the ethanolic extract while pet ether showed the poor inhibition of superoxide scavenging activity. Foeniculum vulgare seed extract and ethanolic twig extract of C. osmophloeum shows significant antioxidant activity(Oktay et.al., 2003, Chau et.al., 2008).

In the present study, the larvicidal analysis of the methanolic extract of Acacia leucophloea (Roxb.) Willd. showed that highest mean mortality percentage in bark extract (61.33 %) than that of the leaves extracts (45.33 %) at 100 PPM concentration. Lowest mean mortality percentage was found in bark extract (10.67 %) of the plant at 0.0001 PPM concentration. At 0.0001 PPM concentration leaves extract (12 %) showed the lowest mean mortality percentage. This study was carried out to analyze the larvicidal potential of the extracts from the medicinal plants.

In the recent year studies were focused on developing plant origin insecticides as an alternative to chemical insecticide (Kamaraj, et.al., 2011). Acacia concinna seed ethyl acetate and methanolic extracts were studied on the two vector of malaria Anopheles stephensi and Culex quinquefasciatus. This study revealed that methanolic extract has better mortality percentage.
than the ethyl acetate extract (Kamaraj, et al., 2011). Larvicidal activity of *Acacia nilotica* leaves and fruit extract analysis showed that seed extracts has more mortality percentage of *Anopheles arabiensis* than the leaf extract (Edriss, et al., 2012). Methanolic extract of *Cassia obtusifolia*, *Cassia tora*, and *Vicia tetaspefinn* showed 90 % mortality against *Aedes aegypti* and *Culex pipiens pallens* (Jang, et al., 2002). Oil from the seeds of *Zanthoxylum armatum* DC (Rutaceae) showed significant larvicidal activity against three medically important species of mosquito vectors, *Aedes aegypti, Anopheles stephensi* and *Culex quinquefasciatus* (Tiwary, et al., 2007).
i. **Dalbergia lanceolaria** subsp. *paniculata* (Roxb.) Thoth.

*Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth was known to use for timber yielding tree belonging to family leguminosae. It was reported that it has potent antioxidant activity, anti-inflammatory activities, antimicrobial activity, oestrogenic and larvicidal properties (Kumar, *et al.*, 2015). It was evaluated that stem bark used for baldness and dysmenorrhea (Krishna, *et al.*, 2011, Murthy, 2012). It was reported that leaves were used as antifilariasis (Kumar and Suryanarayana, 2013). Number of compounds were isolated from the plant (Saha, *et al.*, 2013). Four isoflavonoids were isolated from ethanolic extracts of stem bark and leaves of plant (Amin, *et al.*, 2012).

It is reported that phytochemical analyses are important in supporting a particular biological activity in plants. Qualitative analysis using different test showed that the presence of alkaloids, carbohydrates, proteins, flavonoids, glycosides, triterpenoids, saponins, steroids, tannins and starch in bark and leaves methanolic extracts of the *Dalbergia lanceolaria* subsp. *paniculata* (Roxb.) Thoth. Resin was absent in both the extract of the plants.

Several workers studied the presence of phytoconstituents in the *Dalbergia* species to correlate the biological activity. Presence of important bioactive compounds have been reported in *Dalbergia coromandeliana* stem hexane, chloroform, ethyl acetate, ethanol and aqueous extracts (Edayadulla and Ramesh, 2012). Alkaloids, flavonoids, phenols, saponins, steroids and tannins were present in the methanolic extract of the *Dalbergia sisso* (Gnanaraja, *et al.*, 2014). Phytochemical analysis of *Dalbergia latifolia* bark extract reported the presence of carbohydrate, glycoside, protein and flavonoids in alcoholic extract while aqueous extract showed the presence of carbohydrates, glycosides and flavonoids (Khalid, *et al.*, 2011). Ethanolic, methanolic and chloroform extracts of *Dalbergia latifolia* root investigated the presence of carbohydrates, glycosides, alkaloids, phenols, flavonoids and tannins while proteins and gum and mucilage were absent (Prasad, *et al.*, 2013).

Quantitative analysis of the bark extract showed the presence of 1.82 mg/g and 2.07 mg/g alkaloids in the leaves and bark extract of the plant. This study also revealed that presence of 0.407 mg/g carbohydrates, 0.22 µg/ml proteins, 0.59 mg/g phenols, 0.28 mg/g flavonoids, 0.99 mg/g saponins and 0.09 mg/g tannins in the leaves extract of the plant. This study also evaluated
the 0.179 mg/g carbohydrates, 0.8 mg/g proteins, 0.88 mg/g phenols, 0.44 mg/g flavonoids, 1.28 mg/g saponins and 0.095 mg/g tannin in the bark extract of the plant.

Quantitative estimation was carried out to correlate relationship of the secondary metabolites present in the leaves and bark extract of plant and possible biological activities to evaluate as a potential source of natural bioactive chemicals (Patel, et.al., 2013). Total phenolic and flavonoid contain was found 210±1.56 and 46±3.61 respectively in the Dalbergia latifolia bark extracts (Khalid, et.al., 2015). Dalbergia sissoo ethyl acetate and ethanol extract study evaluated that the presence of 0.22 mg/g and 0.18 mg/g phenols while 0.17 mg/g and 0.16 flavonoid respectively (Muthu, et.al., 2014). Artemisia persica methanolic extract revealed that it contain 407 mg/g total phenol and 308 mg/g flavonoids (Rashid, et.al., 2010). Significant amount of total phenolic, total flavonoid content was found in Pandanus conoideus Lam. (Rohman, et.al., 2010). Tetracarpidium conophorum root extract showed the presence of Tannin, 0.545 mg/g Saponins, 10.705 mg/g, Alkaloids, 0.41 mg/g, Oxalate, 0.895 mg/g and Phenols, 0.215 mg/g (Ayoola, et.al., 2011).

High performance thin layer chromatography (HPTLC) reported as important tool in routine drug analysis and it has ability to analyze several samples simultaneously using a small amount of mobile phase (Seasotiya, et.al., 2014). HPTLC analysis of plant extracts revealed that max Rf value of the first peak and fifth peak of bark extract coincided with the Max Rf value of standard rutin and quercetin respectively. While leaves extract analysis showed that the max Rf value of the first peak and fifth peak of coincided with the Rf value of standard rutin and quercetin respectively. It confirmed the presence of rutin and quercetin in the leaf extract of the plant.

HPTLC analysis of heartwood and small branches (stem) in Dalbergia sissoo ethyl acetate extract showed that both the extracts has similar phytochemical fingerprint profiling (Verma, et.al., 2015). Rutin and quercetin were detected in the Tephrosia purpurea leaves by HPTLC (Jain, et.al., 2009). Rutin and quercetin present in Triphala churna was determined by using HPTLC method (Pawar and Salunkhe, 2012). Flavonoids presence was confirmed in the Aerva lanata L. by HPTLC (Mariswamy et al., 2012).

Gas chromatography mass spectroscopy commonly used for identification and quantification of unknown organic compounds in a complex mixture (Thomas, et.al., 2013). GC-HRMS analysis
determined the presence of n-Decanoic acid in bark extract while leaves extracts contain eight compounds were Benzene, 1-methyl-2-nitro; 1,4-Cyclohexadiene-1,2-dicarbonitrile, 4,5-dichloro-3,6-dioxo-; Floxuridine; 3-Hexanol,2,4-dimethyl; 3-Hexanone,2,2-dimethyl; n-Hexadecanoic acid; Phytol and Benzenacetonitrile, α-glucopyranosyloxy.

This GC-MS analysis was carried out in several plants part to find out the different compound present in it. Bioactive compounds in the ethanol extract of *Macrotyloma uniflorum* leguminosae plant were evaluated using GC-MS analysis which has been rich in linoleic acid and its esters compounds (Das, et.al., 2014). Leaf extracts of *Dalbergia saxatilis* revealed a number of volatile components including four terpenoids, and two fatty acid esters by GC-MS (Koma and Fakunle, 2014). Wood extract of *Dalbergia sissoo* showed the presence of 1,2-benzenedicarboxylic acid dibutyl ester (13.68%), 5-Nitro-2,4(1H,3H)-pyrimidinedione (7.94%), 3-hydroxycarbonyl-2,5-dimethylpyrrolidine (7.83%) and formic acid, 1-methylethyl ester (7.38%) by GC-MS (Aly, et.al., 2013). GC-MS analysis of *Sophora alopecuroides* L. var. *alopecuroides* showed the presence 27 alkoloids in aerial part and 21 alkoloids in the seeds (Kucukboyaci, et al., 2011). From *Pterocarpus marsupium* wood and bark ethanolic extracts different compounds were identified by GC-MS analysis (Maruthupandian and Mohan, 2011). 17 compounds were identified from water extracts of *Trigonella foenumgrecum* seeds (Priya, et al., 2011).

In the recent year interest of novel natural antioxidants of plant origin has increased which play a major role in the protective effect of plant medicine (Saeed, et.al., 2012). Antioxidant activity of the leaves and bark extracts of plant revealed that bark extract (76.81 %) has more DPPH radical scavenging activity percentage than the leaves extract (72.24 %) of the plant.

Antioxidant activity of leaves, bark, stem and root methanolic extract was studied reducing power assay, total antioxidant assay, hydrogen peroxide scavenging activity, hydrogen radical scavenging activity, superoxide radical scavenging activity and nitric oxide scavenging activity methods. This study evaluated that the plant extracts were potent source of natural antioxidant (Chaitra, et.al., 2015). Bark and leaves 70% ethanolic extracts showed leaves extract (68.5 ± 0.5) has more in vitro antioxidant potential than that of the bark (68.1 ± 0.9) extract (Amin, et.al., 2012). *Dalbergia paniculata* leaves 70% methanolic extracts was investigated for antioxidant activity by superoxide radical scavenging activity method and hydroxyl radical scavenging activity method. This study revealed that antioxidant percentage of leaves extract was more in

In the recent year interest has developed in alternative approaches for biological control and safer insecticides of plant derived as a simple and sustainable method of mosquito control (Ghosh, *et al.*, 2012). Larvicidal activity showed that highest mean mortality percentage was found in bark extract (74.66 %) than that of the leaves extracts (49.33 %) which shows highest mortality in 100 PPM concentration. Lowest mean mortality percentage was found in leaves extract (16 %) of the plant at 0.0001 PPM concentration. At 0.0001 PPM concentration bark extract (18.67 %).

Larvicidal and repellent actions were studied by oil extracts obtained through hydrodistillation of *Dalbergia sissoo* Roxb against *Anopheles stephensi, Aedes aegypti* and *Culex quinquefasciatus*. It revealed that larvicidal activity is directly proportional to the concentration of dosage (Ansari, *et al.*, 2000). Compound isolated from *Dalbergia sissooides* flower Biochanin- A, showed the prominent larvicidal activity (LC 50-308.238ppm, LC90 -1889.926 ppm) against *Culex quinquefasciatus* (Nagarajan, *et al.*, 1998). Compound rotenoids isolated from *Dalbergia monetaria* seeds showed 100% mortality against *Aedes aegypti* L. within 3 days (Abe, *et al.*, 1985). 100% mortality was observed in *Cassia fistula* benzene leaves extracts against *Aedes aegypti*. Methanolic flower extract *Delonix regia* showed significant larvicidal activity against the *Hyblaea puera* Cramer (Deepa and Remadevi, 2011). Maximum larvicidal activity was observed in ethanol extracts of *Gliricidia sepium* as compared to the ethyl acetate extract at 250 ppm concentration (Krishnappa, *et al.*, 2012).
i. *Albezia procera* Benth.

*Albezia procera* Benth. have been morphologically identified and described by the several taxonomist. It is unarmed trees, leaflet 4-8, and flower sessile in numerous small heads (Yadav and Sardesai, 2002). It is distributed throughout India and widely used as folk medicine (Kirtikar and Basu, 1975). Bark is used in pregnancy, stomachache pain and fish poison. Leaves were given as remedy for ulcer (shinwari, et.al., 2014). Leaves were used as insectisidal and bark is given with salt as medicine for water buffalo (Khatoon, et.al., 2014). Bark decoction is used in rheumatism and haemorrhage (Sangeetha, et.al., 2013). In Thailand plant used for cardiovascular and inflammatory problems (Luanchoy, et.al., 2014). Bark used in astringent and leaves were used for the treatment of variety of wounds (Sivakrishnan, et.al., 2013). Seeds powder used in amoediasis, urinary tract infection (Sivakrishnan and Muthu, 2013).

Qualitative analysis of the leaves and bark showed the presence of alkaloids, carbohydrates, proteins, flavonoids, glycosides, triterpenoids, saponins and tannins with the help different test. For the steroid Liberman Buchard’s test was negative while Salkawski test was positive which confirmed the presence of steroid in the both the extracts. Resin and starch was absent in both the extract of the plants.

Aerial part of *Albizia procera*Benth.ethanolic extracts detected the presence of bioactive compound such as flavonoids, saponins, tannins, triterpenoids, carbohydrates, glycosides, phytosterols and phenolic compounds (Sivakrishnan and Muthu, 2014). Qualitative analysis of *Albizia procera*Benth.leaves extracts showed the presence of different phytoconstituents namely flavonoids, saponins, glycosides and tannin in methanolic, petroleum ether, carbon tetrachloride, dichloromethane and aqueous extracts (khatoon, et.al., 2013). Several workers studied the qualitative analysis in *Albizia* species and which revealed that geusus *Albizia* is rich in phytoconstituent. Qualitative analysis of methanol leaves extract of *Albizia chevalieri* showed the presence alkaloids, saponins, triterpenes, flavonoids and tannins (Aliyu, et.al., 2009). Methanolic flower extract of *Albizia lebbeck* revealed the presence of phenols, flavonoids, saponins, proteins, tannins, steroids, carbohydrates and cumarines (Jeeva, et.al., 2011).

Quantitative analysis of the bark extract showed the presence of 3.5 mg/g and 2.47 mg/g alkaloids in the leaves and bark extract of the plant. This study also revealed that presence of
0.182 mg/g carbohydrates, 0.16 µg/ml proteins, 0.4 mg/g phenols, 0.18 mg/g flavonoids, 0.98 mg/g saponin and 0.12 mg/g tannin in the leaves extract of the plant. This study also evaluated the 0.2 mg/g carbohydrates, 0.27 mg/g proteins, 0.51 mg/g phenols, 0.24 mg/g flavonoids, 1.114 mg/g saponins and 0.19 mg/g tannins in the bark extracts of the plant.

Quantitative analysis in *Albizia procera* Benth. and other species were evaluated by number of researcher. Total phenolic contain and flavonoids contain were found as 3.980±0.006 mg/g and 2.651±0.007 mg/g in aerial part of *Albizia procera* Benth. ethanolic extract (Sivakrishnan, et.al., 2013). *Albizia procera* Benth. metanolic, petroleum ether, carbon tetrachloride, dichloromethane, ethyl acetate and aqueous extract evaluation showed that total phenolic content was 110.73, 107.513, 32.687, 204.91, 449.18, 71.789 mg/g respectively (Khatoon, et.al., 2013). *Decalepis hamiltonii* Wight and Arn. showed the presence of 12.62±2.20 mg GAE/g extract total phenol and 14.08±2.40 mg CE/g extract total flavonoids (Samydurai, et.al., 2012). Quantitative analysis of *Bambusa vulgaris*, *Euphorbia hirta*, *Lawsonia inarmic*, *Mimosa pudica*, *Bidens pilosa*, *Croton zambesicus* and *Persia americana* reveled that alkaloids very high in *Euphorbia hirta* (533 mg/100g), terpenoids showed highest level in *Croton zambesicus* (62.0 mg/100g), flavonoids in *Bambusa vulgaris* (260 mg/100g), saponins was found to be very high in *Mimosa pudica* (87.0 mg/100g), tannins very high in *Mimosa pudica* (180 mg/100g) (Abidemi, 2013).

High Performance Thin Layer Chromatography analysis revealed that the Max Rf value of the first peak and fourth peak of bark extracts coincided with the Max Rf value of standard rutin and quercetin respectively. While leaves extract analysis revealed that the Max Rf value of the first peak and third peak coincided with the Max Rf value of standard rutin and quercetin respectively. This investigation confirmed the presence of rutin and quercetin in the leaves and bark extracts.

This study of detection of rutin and quercetin from the methanolic leaves and bark extract of *Albizia procera* by HPTLC was carried out first time. So far several researchers have studied the chromatographic fingerprint in different species of *Albizia* by HPTLC. HPTLC analysis of *Albizia lebbeck* leaves investigated that petroleum ether extract showed 5 peaks, ethyl acetate extract has 7 peaks, and methanolic extract has seven peaks (Bobby, et.al., 2012). *Albizia amara* HPTLC analysis evaluated the presence of macrocyclic alkaloids budmunchiamines in the leaves extract (Rajkumar and Sinha, 2010). *Albizia lebbeck* leaves extracts study revealed that petroleum ether extract showed 10 of alkaloids while ethyl acetate extract has 5 alkloids (Bobby,
et.al., 2012)c. Quercetin presence in the *Indigofera aspalathoides* ethanolic extracts was confirmed by HPTLC method (Rani, et.al., 2013).

Gas chromatography high resolution mass spectroscopy analysis revealed that bark extract of the plant contain three compounds 1-Butanamine, N-butylidene; Acetic acid, diethyl; Myo-inositol-4-C-methyl. Leaves extract of the plant showed that it contain α-Ethylcaproic acid; Pentadecanecarboxylic acid; Carbamic acid, 2-chloroethyl ester; 3-O-Methyl-d-glucose; Hexanoic acid, 2-ethyl-; n-Hexadecanoic acid; Bromacetocarbamide; 9,12,15-Octadecatrienoic acid, methyl ester; 1-Docosene and Hexyl orthoborate.

Different compound in the *Albizia* species and other leguminosae plants were identified by several workers through the GC-MS technique. GC-MS analysis of *Albizia procera*Benth.ethanolic extract of aerial part showed the presence of twelve compounds. These twelve compounds were as follow 3-O-Methyl-d-glucose, 13-Tetradece-11-yn-1-ol, 3-chloro-N-(4-methoxyphenyl)-, Squalene, 6,9,12 Octadecatrienoic acid, phenylmethylester, (Z,Z,Z),9,12-Octadecadienoic acid (Z,Z)-phenylmethyl ester, Phytol, 1,10-Decanediol, 3-Pentanol, 2,3-dimethyl-, Decanoic acid, ethyl ester, 1-Undecyne and Didodecyl phthalate, Benzo[b]thiophene-2 carboxamide (Krishnan, et.al., 2013). GC-MS analysis of of *Albizia saman* oil extract showed the presence of fatty acids (69.1%), oxygen containing monoterpenes (16.8%), monoterpene hydrocarbons (4.0%), sesquiterpene hydrocarbons (3.6%), aliphatic compounds (3.5%), oxygen containing sesquiterpenes (2.7%) (Ogunwande, et.al., 2006). 18 compounds from *Desmodium gyrans* leaves ethanolic extract and 10 quinolizidine alkaloids from aerial parts of *Genista sandrasica* Hartvig & Strid were identified by GC-MS(Gopalakrishnan and Rajameena, 2012, Kucukboyaci, et.al., 2012). Methanolic root extracts of *Pseudarthria viscida* Wight and Arn and *Desmodium gangeticum* (Linn) DC showed the presence of 43 and 18 compounds respectively(Hemlal and Subban, 2012).

Antioxidant activity of plants extract can be estimated using different methods such as DPPH radical scavenging, ABTS scavenging, hydroxyl radical scavenging, hydrogen peroxide scavenging, super oxide scavenging, nitric oxide scavenging etc.(Khokra, et.al., 2011). Antioxidant activity of leaves and bark extracts of the plant revealed that bark extract (79.85 %) has more DPPH radical scavenging activity percentage than the leaves extract (71.1 %) of the plant.
Several researchers have studied the antioxidant activity in the *Albizia procera* Benth. *Albizia procera* Benth. bark extract study revealed ethanol extract has 80.39±429, hydroalcohol extract has 79.53±0.329, ethyl acetate has 78.23±0.662, chloroform has 72.34±1.050 and petroleum ether has 67.98±0.612 % DPPH scavenging activity (Sangeetha, *et al.*, 2013). Antioxidant activity in *Albizia procera* Benth. bark showed that it is highest in ethanol followed by hydroalcohol, ethyl acetate and chloroform and lowest was found in case of petroleum ether extract (Sangeetha, *et al.*, 2013). Antioxidant activity of ethanolic extract of *Albizia procera* Benth. aerial part was investigated by 3 different method i.e. iron chelating activity, total antioxidant activity and ferrous tripyridyltriazine assay (Sivkrishnan, *et al.*, 2013). Antioxidant activity of *Albizia procera* Benth. leaves was studied using different extracts. This study revealed that antioxidant activity is more in ethyl acetate extract followed by methanolic extract, carbon tetrachloride extract and dichloromethane extract lowest activity shown by the aqueous extract (Khatoon, *et al.*, 2013). Aerial part of *Albizia procera* Benth. ethanolic extract showed the significant antioxidant activity by lipid peroxidation assay. Methanol leaves extract of *Urtica dioica* showed 57.34% of DPPH radical scavenging activity.

Larvicidal activity showed that highest mean mortality percentage was found in bark extract (74.66 %) than that of the leaves extracts (49.33 %) at 100 PPM concentration. Lowest mean mortality percentage was found in leaves extract (16 %) of the plant at 0.0001 PPM concentration. At 0.0001 PPM concentration bark extract (18.67 %) showed the lowest mean mortality percentage.

This is the first time attempt was made to evaluate the larvicidal activity of the leaves and bark extract of *Albizia procera* Benth. In the recent year interests have been developed in plant based larvicidal because synthetic larvicidal are expensive and they are less effective in hotter regions (Farias, *et al.*, 2010).Few researchers have studied the larvicidal activity in the *Albizia* species. Leaves of *Albizia amara* showed the significant larvicidal activity against *Anopheles stephensi* (Vinayagam, *et al.*, 2008). Root, leaves, stem and bark of plant *Albizia altissimum* showed 100 % maotality in 1250 ppm solution against the *Aedes aegypti* (Agboola, *et al.*, 2014).Petroleum ether extract of *Lantana camara*, *Tridax procumbens* and *Datura stramonium* showed 100% mortality after 48hrs of incubation against *Aedes aegypti* (Rajasekaran and Duraikannan, 2012).
i.  *Albizia julibrissin* Durazz.

*Albizia julibrissin* Durazz. evaluated have been morphologically described by several taxonomist. It is medium sized, unarmed trees, pinnae 8-24, 2.5 cm long sessile (Naik, 1998). Flower pink, peduncle head and pod pale brown with 8-12 seeds (Kirtikar and Basu, 1975). Plant used to treat the depression and anxiety. It also showed antioxidant and antimicrobial activity (Karim and Azlan, 2012). Bark used in palpitations, anxiety and insomnia (Samwald, et.al., 2010). Bark showed the anti-cancerous activity. Bark used in lungs diseases, haemorrhoids, skin ulcers, wounds, bruises, abscesses and fractures (Nehdi, 2011).

Qualitative analysis using different test showed that the presence of alkaloids, carbohydrates, proteins, flavonoids, glycosides, triterpenoids, saponins, steroids and tannins in bark and leaves methanolic extracts of the *Albizia julibrissin* Durazz. Resin and starch was absent in both the extract of the plants.

Several researcher have been studied the qualitative analysis of *Albizia* species to find out the bioactive component in the plants. Pods and flowers of *Albizia lebbeck* showed the presence of important phytocostiuents alkaloids, flavonoids, phenols, tannins carbohydrates, steroids and oils present in the hexane, ethyl acetate and hydroalcohol extracts (Padamanabhan, et.al., 2013). *Albizia chevalieri* (Harms) bark methanol extract revealed the presence of tannins, saponins and flavonoids (Kwaji and Japaru, 2015). Phytochemical analysis of *Albizia samanis* showed the presence of glycosides, flavonoids, steriods, saponins, tannins, and terpenoids in the methanol, ethanol, benzene, chlofoform, ethylacetate and Petroleum ether leaves extracts (Kirithika, et.al., 2013).

Quantitative analysis of the bark extract showed the presence of 5.32 mg/g and 2.41 mg/g alkaloids in the leaves and bark extract of the plant. This study also revealed that presence of 0.321 mg/g carbohydrates, 0.55 µg/ ml proteins, 0.55 mg/g phenols, 0.23 mg/g flavonoids, 0.97 mg/g saponins and 0.092 mg/g tannins in the leaves extract of the plant. This study also evaluated the 0.207 mg/g carbohydrates, 0.95 mg/g proteins, 0.68 mg/g phenols, 0.38 mg/g flavonoids, 0.53 mg/g saponins and 0.12 mg/g tannins in the bark extracts of the plant.

*Albizia julibrissin* Durazz. leaves 60 % methanolic extract showed the presence of total phenols 140 ORAC value (Lau, et.al., 2007). *Albizia julibrissin* different extracts showed that leaves
(35.14 mg/g), flowers (32.0 mg/g) followed by stem extracts (25.26 mg/g) flavonoids contain (Rajalakshmi and Senthil, 2014). Albizia lebbeck leaves and bark alcoholic extract was studied quantitatively. Leaves extract showed presence of 0.10 mg/g alkaloids, 10.45 mg/g flavonoids, 32.18 mg/g steroids, 26.92 mg/g saponins, 40.81 mg/g phenols and 30.69 mg/g tannins. While bark extract showed the presence of 0.16 mg/g alkaloids, 6.73 mg/g flavonoids, 28.35 mg/g steroids, 21.53 mg/g saponins, 33.34 mg/g phenols and 27.16 mg/g tannins (Vasanthi, et.al., 2014). Methanolic extract of Foeniculum vulgare seeds extract showed 9.325 ± 1.25 mg QE/g flavonoids in dry seeds (Dua, et.al., 2013). Total phenol, flavonoids, flavonol were found high in five cereals extracts (Prajapati, et.al., 2013). Garcinia cola quantitative analysis showed that it contain 1.88 – 6.10 mg/100g flavonoids, 12.00 – 1.23 mg/100g saponins, 0.31-0.41 mg /100g tannins, 0.40 – 0.30/100 alkaloids and 0.1- 0.09 mg/100g phenols (Alaje, et.al., 2014).

High Performance Thin Layer Chromatography analysis revealed that the Max $R_f$ value of the first peak and fifth peak of bark extract coincided with the Max $R_f$ value of standard rutin and quercetin respectively. While leaves extract showed that the Max $R_f$ value of the first peak and fifth peak coincided with the Max $R_f$ value of standard rutin and quercetin respectively.

Several samples were simultaneously analyzed with use of small amount of mobile phase through the HPTLC (Tambe, et.al., 2013). This is the first time attempt was made for the determination of rutin and quercetin in the leaves and bark methanolic extracts by HPTLC. Several workers has been studied the chromatographic fingerprint analysis by HPTLC in Albizia species. Albizia lebbeck bark and leaves methanolic extract HPTLC analysis showed the presence of diosgenin (Ganesan and Subramanian, 2015). 13 types of phenyl propanoids were identified from the leaves of Albizia lebbeck by HPTLC (Bobby, et.al., 2012) b. Quercetin and rutin were identified from the flowers and leaves ethanolic extract of Rhododendron arboreum using high-performance thin-layer chromatography (Sonar, et.al., 2012).

Gas chromatography-high resolution mass spectroscopy analysis revealed that the four compound present in the bark extract were Triallate; Vobassan-17-oic acid, 4-demethyl-3-oxo-, methyl ester; 3,6-Octadienoic acid, 3,7-dimethyl-methyl ester and Ceradran-dioland. Five compound were present in the leaves extract of the plant, these are 3-Methylmannoside; Propanoic acid, 2-chloro-, methyl ester; n-Hexadecanoic acid; n-Heptadecanol-1 and Hexadecanoic acid, 2,3-dihydroxypropyl ester.
Albizia julibrissin floral oil extract was investigated by GC-MS method. This study evaluated the presence of dominated compound by palmitic acid (23.3%), pentacosane (7.2%), trans-linalool oxide (both furanoid and pyranoid forms, 6.6% and 7.0%, respectively), methyl salicylate (6.2%), eugenol (6.1%), and 1-octanol (5.2%) (Zhang and Setzer, 2013). GC-MS analysis of bark extract of Albizia chevalieri is showed the presence of 13 bioactive compounds dominated by n-Decane (20.70 %), n-nonane (19.97 %), Secbutylcyclohexane (9.68 %), 2-methyloctane (6.80 %) and 1, 2-dimethylbenzene (10.63 %) (Ama, et.al., 2015). The GC-MS analysis of Albizia antunesiana aqueous and ethanol extracts of the roots and leaves showed that several aromatic phenolic compounds, some common triterpenoids and a coumarin were present in these extracts (Chipiti, et.al., 2013). Mundulea sericea eight, five and eleven compounds were identified from the leaves n-Hexane extract and twigs and stem bark chloroform extract respectively (Mazimba, et.al., 2012).

In the recent year scientist focused on to obtained potent natural sources of antioxidant as they have important role in diseases prevention and anti-aging capacity (Nahak and Sahu, 2011). With this hypothesis, the present work of antioxidant activity was carried out. Antioxidant activity of leaves and bark extract of the plant revealed that bark extract (68.82 %) has more DPPH radical scavenging activity percentage than the leaves extract (52.47 %) of the plant.

Antioxidant activity of Albizia julibrissin Durazz. bark water, 70/ ethanolic and hot water extract showed that plant have significant natural antioxidant (Lee, et.al., 2011). Albizia julibrissin Durazz. aerial part contain quercetin derivative, hyperoside xnd quercitrin showed significant antioxidant activity (Karuppannan, et.al., 2013). Two compound were isolated from the Albizia julibrissin Durazz. bark showed excellent antioxidant activity (Jung, et.al., 2003). Several other species of Albizia were evaluated to find out the good source of natural antioxidant. Antioxidant activity of Albizia lebbeck bark methanolic extract by DPPH radical scavenging and reducing power method showed significant antioxidant potential (Suruse, et.al., 2013). Water extract of Albizia myriophylla Benth. stem showed 7.320 mM/g total antioxidant activity (Palasuwan and Soogarun, 2014). DPPH radical scavenging activity was (132.91 µg/ml) for Sesbania grandiflora whereas (184.55 µg/ml) for Acacia nilotica (Pandey, et.al., 2012). Zingiber roseum rhizome chloroform extract showed 52% DPPH radical scavenging activity at 200 µg/ml concentration.
Synthetic larvicidal caused adverse effect on environment and ecological balance was disturbed. While on the other hand use of biological larvicidal were biodegradable and has least effect on non-targeted organisms (Govindarajan, et.al. 2012). With this aspect were taken in consideration to carry out the present work of larvicidal activity. It was the first time attempt to carryout plant based larvicidal activity. Larvicidal activity showed that highest mean mortality percentage was found in bark extract (61.33 %) than that of the leaves extracts (45.33 %) at 100 PPM concentration. Lowest mean mortality percentage was found in bark extract (10.67 %) of the plant at 0.0001 PPM concentration. At 0.0001 PPM concentration leaves extract (12 %) showed the lowest mean mortality percentage.

Mosquito are important vector to caused number of endemic diseases to the human being, more than two million peoples and at least one million children died every year due to mosquito borne diseases (Pugazhvendan and Elumali, 2013). From the ancient time man used the plant based material to control the mosquito growth and development in the recent year human being search for the better remedies for their control (Vasudevan, et.al., 2009).

Several leguminosae plants were investigated for the larvicidal activity. Leaves and seeds methanolic extract of *pithocelobium dulce* showed the significant larvicidal and ovicidal effects against the larvae of *Anopheles stephens* and *Aedes aegypti* (Govindarajan, et.al., 2013). Crude oil of *Copaifera reticulate* showed significant larvicidal activity against *Aedes aegypti* larvae (Silva, et.al., 2007). *Derris urucu* methanolic root extract showed hundred percent mortality at 150 µg/ml concentration against fourth instar larvae of *Aedes aegypti* (Gusmao, et.al, 2002). Larvicidal activity of *Gliricidia sepium* decreases from petroleum ether, hexan, acetone to methanolic extracts against *Culex quinquefasciatus* (Thomas, et al., 2012).
Desmodium oojeinense (Roxb.) H. Ohashi.

*Desmodium oojeinense* (Roxb.) H. Ohashi studied morphologically and reported the medicinal value by several researchers. It is distributed from sub-Himalayan tracts and outer Himalayan valleys, slopes to 5000 ft. up to Punjab, Marwar, Orissa, Chota Nagpur and southern India (Kirtikar and Basu, 1975). Deciduous glabrous tree, 10-15 m. tall, bark dark brown, deeply cracked, flower short, axillary, pods oblong, 4-7.5 mm. long, 3-5 jointed (Naik, 1998). Bark reported to have anti-inflammatory and antihelmintic activity and used in leprosy and anemia (Gunasekaran, et.al., 2011). It also used for skin diseases, burning syndrome, urinary disorder and obesity (Vel murugan, et.al., 2011). Bark used to treat diarrhea and dysentery (Srivastava, et.al., 2012). Whole plant showed antidiabetic and wound healing activity (Samyal, et.al. 2013). Tree is used as fodder and yield bast fiber (Anonymous, 1948)

This study of qualitative analysis of the leaves and bark extract of *Desmodium oojeinense* (Roxb.) H. Ohashi was carried to find out important bioactive component in the plant. Qualitative analysis using different test showed that the presence of alkaloids, carbohydrates, proteins, flavonoids, glycosides, triterpenoids, saponins, steroids, tannins and starch in bark and leaf methanolic extracts of the *Desmodium oojeinense* (Roxb.) H. Ohashi. Resin was absent in both the extract of the plants.

Qualitative analysis of bark extract of the *Desmodium oojeinense* (Roxb.) H. Ohashi showed the presence of saponins, glycosides, carbohydrates, tannins, phenolic compounds, flavonoids, gum and mucilage in ethanolic and aqueous extracts while alkaloids were present in the ethanolic extract (Gunasekaran, et.al., 2011). *Desmodium oojeinense* (Roxb.) H. Ohashi. 95% ethanolic bark extract revealed the presence important bioactive compounds alkaloids, carbohydrates, flavonoids, triterpenoids and steroids (Jayadevaiah, et.al., 2011). *Desmodium oojeinense* (Roxb.) H. Ohashi. 95% ethanolic bark extract revealed the presence of important phytoconstituent in the extract i.e. alkaloids, carbohydrates, flavonoids, steroids and triterpenoids (Jayadevaiah, et.al., 2012).

Quantitative analysis of the bark extract showed the presence of 1.51 mg/g and 1.43 mg/g alkaloids in the leaves extract of the plant. This study also revealed that presence of 0.172 mg/g
carbohydrates, 0.23 µg/ml proteins, 0.28 mg/g phenols, 0.12 mg/g flavonoids, 1.62 mg/g saponins and 0.1 mg/g tannins in the leaves extract of the plant. This study also evaluated the 0.182 mg/g carbohydrates, 0.41 mg/g proteins, 0.48 mg/g phenols, 0.19 mg/g flavonoids, 0.75 mg/g saponin and 0.11 mg/g tannins in the bark extracts of the plant.

Quantitative analysis of plant extract was carried out to correlate with the biological activity of the extracts. Several researchers were studied the quantitative analysis in some species of *Desmodium*. *Desmodium velutinum* stem ethanolic extract investigated the presence of 3.45±0.006 Alkaloids, 1.90±0.003 Soluble carbohydrates, 3.34±0.003 Reducing sugar, 2.94±0.003 Flavonoids, 0.64±0.004 Steroids, 0.37±0.002 Terpenoids 1.34±0.004 Saponins, 2.14±0.003 Tannins and 0.52±0.003 Cyanide (Eze-Steven, *et al.*, 2014). *Desmodium gangeticum* root and aerial part ethanolic extracts showed the presence of 14.4 mg/g and 13.8 mg/g total phenols respectively (Nranjan and Tiwari, 2007). *Geranium robertianum* leaves extracts showed the presence of 4.266±0.10 flavonoids, 3.67±1.5 tannins, 1.43±0.06 saponin, 1.200±0.10 alkaloids, 1.002±0.03 oxalate and 0.03±0.02 phenols (Igwenyi and Elekwa, 2014). Other leguminosae plants *Pentatropis capensis*, *Pergularia daemia* and *Wattakaka volubilis* extracted in the hexane, chloroform, ethanol and water extracts showed that plants are rich in alkaloids, tannins (Reddy,* et al.*, 2014).

High Performance Thin Layer Chromatography analysis revealed that the Max $R_f$ value of the first peak and fifth peak of bark extract coincided with the Max $R_f$ value of standard rutin and quercetin respectively. While leaves extract revealed that the Max $R_f$ value of the first peak and third peak coincided with the Max $R_f$ value of standard rutin and quercetin respectively.

It is reported that rutin and quercetin are present in all the plant parts and showed the anti-inflammatory, neuroprotective, analgesic and antioxidant activity. Water soluble rutin can converted into the quercetin (Azevedo, *et al.*, 2013). It is studied that quercetin is useful in cardiovascular health, protection against osteoporosis and reducing risk for cancer, human airways smooth, while rutin useful in muscle relaxation (Djelili, *et al.*, 2012). This impotance of rutin and quercetin attracted the researchers to find out its presence in the medicinally useful plants. This HPTLC method was used to detect the compound present in some of species of *Desmodium*. Indole base was detected from methanolic extracts of *Desmodium gangeticum* (Linn) DC leaves by HPTLC (Srivastava, *et al.*, 2011). Stigmasterol was detected in the
Desmodium gangeticum (Linn) DC methanolic extracts of the root by HPTLC (Hemlal and Subban, 2012).

Gas Chromatography high resolution mass spectroscopy used to find out the important phytoconstituent in the plant extracts. GC-HRMS reveled that the two compound present in the bark extract were 2-Octanone and Oxalic acid, allyl tridecyl ester. Five compound present in the leaves extract were 4H-Pyran-4-one, 2,3-dihydroxy-3,5-dihydroxy-6 methyl; 4-Methyl-2-pentyl acetate; Cyclooctanamine; 9-Hexadecen-1-ol; Hexadecanoic acid, methyl ester; 2-Octanone; Ethanol, 2-[2-(2-butoxyethoxy)ethoxy]-; 1,2:5,6-Dianhydrogalactitol; Azelaic Acid; 10-Undecen-1-al, 2- methyl; Bufotenine; Hexadecanoic acid, 2,3-dihydroxypropyl ester.

Several other workers reported the presence of different compounds in the Desmodium ooojeinense(Roxb.) H. Ohashi. GC-MS analysis of ethanolic bark extract of Desmodium ooojeinense(Roxb.)H. Ohashi evaluated the presence of eight phytocistituents and compounds such as 1-octanol, 2-butyl, linoleic acid, oleic acid, sugar moiety 3-omethyl-d-glucose, palmitic acid, fatty acid ester, 1,2 benzene dicarboxilic acid and triterpene squalene (Gunasekaran, et.al., 2011). GC-MS analysis of the root ethanolic extract showed the presence of eight compounds which confirmed the presence of terpenoids and flavonoids in the extract (Gunasekaran, et.al., 2012). 13 compounds were identified from hexane extract of Bolusanthus speciosus stem bark and 28 compounds were identified from M. uniflorum ethanolic seed extract by GC-MS (Mtunzi, et.al., 2013, Das, et.al., 2014).

Antioxidant activity of leaves and bark extract of the plant revealed that bark extract (73.38 %) has more DPPH radical scavenging activity percentage than the leaves extract (42.97 %) of the plant. Purpose of this study was to find out natural source of potent antioxidant from the plant.

Several studies were carried out to find out antioxidant activity of the plants. Antioxidant activity of Desmodium ooojeinense(Roxb.) H. Ohashi leaves methanolic extract and aqueous extract was carried out using nitric oxide scavenging, super oxide scavenging, free radical scavenging methods. Out of these methods free radical scavenging activity method showed highest antioxidant activity percentage 96.24±2.12 (Singh, et.al., 2011). Antioxidant activity of Desmodium ooojeinense(Roxb.) H. Ohashi 95 % methanolic bark extract was studied by reducing power method, Nitric oxide radical scavenging method and DPPH free radical scavenging.

Larvicidal activity showed that the highest mean mortality percentage was found in bark extract (54.67%) than that of the leaves extracts (48 %) which shows highest mortality in 100 PPM concentration. Lowest mean mortality percentage was found in bark extract (20%) of the plant at 0.0001 PPM concentration. At 0.0001 PPM concentration leaves extract (20 %) showed the lowest mean mortality percentage.

This is the first time attempt was carried out to find out the natural plant based larvicidal. Several species from the *Desmodium* showed the larvicidal activity. *Desmodium velutinum* leaves water, ethanol and dichloromethane extracts reported larvicidal activity against *Anopheles gambiae* (Traore-Coulibaly, *et al.*, 2013). *Desmodium gangeticum* meathanolic extract showed the 100 % percentage of larval mortality against *Culex quinquefasciatus* (Nazar, *et al.*, 2009). Maximum larval mortality was detected in acetone extract of *E. indica* followed by *M. indica* acetone extract against *Aedes aegypti*. 