DISCUSSION

In Marathwada region about 10 genera and 30 species belonging the family solanaceae has been reported (Naik, 1998), most of these are wild while some are cultivated as vegetable crops. *Datura* is the most neglected genus in this region. It is represented by 4 species, these are *Datura inoxia* Mill, *Datura ferox* L., *Datura metel* L., and *Datura stramonium* L. Almost all species grow wide under natural conditions.

In the present study attempts were made to find out the anatomical and biochemical analysis of *Datura* species. In anatomy the root, stem, leaf and petiole anatomy were done, its peculiar characters were sorted out, these characters were constant in the particular species to species. These findings reported in chapter III and IV.

In biochemical studies attempts were made to find out the chemicals present in the plant. It has been observed that the total ash percent was maximum in the root of *D. inoxia* i.e. 19% while it was minimum in the seed of *D. stramonium*. It observed that the highest percent of water insoluble ash was present in the root of *Datura inoxia* i.e. 18.3% and minimum percent was observed seeds of *Datura metel* i.e. 2.6%. It was observed that the maximum percent of water soluble ash present in the fruit coat of *Datura inoxia* as well as *Datura ferox* i.e. 7.4%, while it was seen that the seeds of *Datura ferox* having minimum percent of water soluble ash which was 0.3%. The root powder of *Datura inoxia* contains the maximum percent of acid soluble ash i.e. 15.5%, while the seeds of *Datura ferox* contains the minimum percent of acid soluble ash i.e. 1.7%. The leaf powder of *Datura ferox* contains the maximum percent of acid insoluble ash i.e. 7.5%, while the root, stem, seeds and fruit coat of *Datura stramonium* contains the minimum percent of acid insoluble ash. The maximum percent was observed in the leaf of *Datura inoxia* as well as fruit coat, while root and leaf powder of *Datura metel* as well as root, stem and fruit coat powder of *Datura stramonium* contains the same percent of water soluble nitrogen i.e. 0.50%, which was the minimum percent. It was seen that the leaf of *Datura ferox* contains highest percent of nitrogen i.e. 4.83%. The minimum
percent was observed in the seeds of *Datura ferox* i.e. 0.41%. It was observed that the highest percent was observed in the leaf of *Datura ferox* and *Datura stramonium* i.e. 1.85% of calcium, while it was minimum in the seeds of *Datura metel* i.e. 0.06% of calcium. It can be observed that the leaf powder of *Datura stramonium* contains maximum percent of phosphorus i.e. 0.62% and the minimum percent was observed in the stem powder of the *Datura ferox* i.e. 0.10% of phosphorus. The maximum percent was observed in stem of *D. inoxia*, while it was minimum in seeds of *D. metel* as well as in root of *D. stramonium*.

It was observed that the seeds of *Datura stramonium* contain the maximum percent of crude fat i.e. 30.9%, while it was minimum in the stem powder of the *Datura metel* i.e. 3.5% of crude fat. It was observed that the leaf powder of *Datura ferox* contains the maximum percent i.e. 30.2% of crude protein. While the seed powder of *Datura ferox* contains the minimum percent i.e. 2.56% of crude protein. It was observed that, the seeds of *Datura inoxia* have maximum Kcal/gm of gross energy, while the stem of *Datura metel* having the minimum Kcal/gm of gross energy. It was observed that the leaf powder of *Datura inoxia* was having the maximum percent of reducing sugar i.e. 4.23%, while it was minimum percent was observed in the stem of *Datura metel*, in stem of *Datura inoxia* as well as in root powder of *Datura stramonium* i.e. 0.15%. It was observed that, the seeds of *Datura metel* having the maximum percent of total sugar i.e. 5.14%, while it was minimum in the stem of the *Datura inoxia* i.e. 0.51% of total sugar. It was observed that the seeds of *Datura metel* contain the maximum percent of non reducing sugar i.e. 2.58%, while it was minimum in the leaf powder of *Datura inoxia* i.e. 0.18%. It was observed that, the stem powder of *Datura ferox* contains the maximum percent of crude fiber, while it was minimum in seed and fruit coat of the *Datura ferox*. It was observed that the stem of *Datura stramonium* contains the maximum percent of nitrogen free extract, while it was minimum in the seeds of *Datura stramonium*. It was observed that the maximum percent was present in the stem powder of *Datura stramonium*, while the minimum percent was observed in the seed powder of *Datura stramonium*. It was seen that the leaf of *Datura ferox* having the
maximum percent i.e. 1.76%, while it was minimum in stem of *Datura stramonium*. It was observed that the leaf powder of *Datura inoxia* contains the maximum percent of amino nitrogen i.e. 0.188%, while it was minimum in the stem powder of *Datura stramonium* i.e. 0.008% of amino nitrogen. It was observed that, the leaf powder of *Datura stramonium* contains the maximum percent of cellulose, while the seed powder of *Datura metel* contains the minimum percent of cellulose i.e. 17.8%. It was observed that the seed powder of *Datura inoxia* contains the maximum percent of total alkaloids, while the stem powder of *Datura metel* contains the minimum percent of total alkaloids. It was observed that the maximum percent of phenol observed in the leaf of *Datura stramonium* i.e. 0.40%, while it was minimum in stem of *Datura metel* i.e. 0.02%. It was observed that, the leaf powder of *Datura metel* contains the maximum percent of tannins i.e. 0.97%, while the minimum percent of tannins was observed in the root powder of *Datura ferox* i.e. 0.03% of tannins.

In the qualitative analysis results were found that tannins were present in the leaf powder as well as in fruit coat of all species of *Datura*. While it was observed that the tannin were minimum in root of *D. inoxia*, seeds of *D. ferox*, stem of *D. metel* and seeds of *D. stramonium*. Saponins were present in all the parts of all species of *Datura*. It was observed that the saponin contains was maximum in the stem, leaf and seed powder of all species, while it was minimum in root of *D. inoxia*, *D. metel* and *D. stramonium* as well as in fruit coat of *D. stramonium*. Iridoids were present in seed powder of all the species of *Datura*, while it was observed that iridoids present in only root powder of *D. stramonium*, as well as in leaf powder of *D. metel*. Fruit coat powder of *D. ferox*, *D. metel* and *D. stramonium* contains iridoids. Form the TLC of amino acid it has been observed that the tryptophan were present in all the species of *Datura* as well as in all the parts of the plant except seeds of *D. inoxia* and *D. ferox*, and leaf of *D. ferox*. Leucine was absent in all the species as well as plant parts of *Datura*. Methionine was present in all the parts of *D. stramonium* while it was absent in root and stem of *D. inoxia* as well as in *D. metel*. It was also absent in seed of *D. ferox*. Valline was present in all the parts of *D. metel*, it was
absent in stem of remaining three *Datura* species, it was absent in leaf of *D. inoxia*, fruit coat of *D. ferox*, seeds of *D. stramonium*. Alanine was absent in all the parts of *D. inoxia* except leaf, it was present in stem, leaf and fruit coat of *D. ferox*, it was present in all the parts of *D. metel* except leaf and it was present in seed and fruit coat of *D. stramonium*. Threonine was present in seed of *D. inoxia*, leaf of *D. ferox*, leaf and seed of *D. metel* and it was present in stem as well as in leaf of *D. stramonium*. Serine, glycine and hydroxyproline was present in leaf and fruit coat of *D. inoxia*, it was absent in all the parts of *D. ferox* except seeds, it was also observed that it was absent in stem and seed of *D. metel*, and it was present in leaf and fruit coat of *D. stramonium*. Proline was present in all the parts of *D. metel* while it was absent in all the parts of *D. ferox*. It was also present in all the parts of *D. stramonium* except root, while it was absent in root, seed and fruit coat of *D. inoxia*. Glutamic acid was absent in all the parts of *D. inoxia* as well as in *D. metel*. It was present in stem and leaf of *D. ferox* as well as in root of *D. stramonium*. Aspartic acid was absent in *D. metel*, it was present in root and seed of *D. inoxia* as well as in *D. stramonium*. It was absent in root and seeds of *D. ferox*. Cysteic acid was present in all the parts of *Datura* species except root of *D. inoxia*. The data presented in chapter V, clearly indicated that the quantitative and qualitative biochemical analysis of the plant.

Some functional group of plant part extract was studied by IR method, from these result it has been observed that the methanol extract of plant part of *D. inoxia* shows hydroxyl, carbonyl group as well as it has been observed that the olefinic group was also present in stem and leaf of *D. inoxia*, C-H group was present in root, seed and fruit coat extract. C-O group was present in root and fruit coat extract. In *D. ferox*, it was observed that the hydroxyl and carbonyl group was present in all the parts of the plant, olefinic group was present in root, stem, leaf and fruit coat extract of the plant. Saturated alkanes were present in stem and leaf extract, aromatic group was present in fruit coat extract, C-H group was present in seed and fruit coat extract. In *D. metel*, it has been observed that the hydroxyl group was present in all the parts of the plant,
carbonyl group was present in root, seed and fruit coat extract, alkenes were also present in root and leaf extract and C-H group were present in stem, leaf, seed and fruit coat extract. Hydroxyl group was present in all the parts of D. stramonium, it was also found that NH group present in all parts of the plant except root extract. Saturated alkanes were present in all the parts of the plant, olefinic group was present in root and fruit coat extract. Carbonyl group was present in stem and leaf extract, aromatic group was present in stem extract, nitrile group was also present in leaf extract of D. stramonium.

Some chemicals also studied by GC-MS technique, the results were summarized in chapter no. V.

In order to investigate the antibacterial activity of extracts of different parts of four Datura spp. viz. Datura inoxia Mill., Datura ferox L., Datura metel L. and Datura stramonium L., a experiment was conducted by using aqueous extract of different plant parts like root, stem, leaf, seed and fruit coat of above mentioned four species of Datura. The efficacy of aqueous extract were tested against five human pathogenic bacteria viz. Bacillus megaterium, Bacillus cereus, Escherichia coli, Salmonella typhi and Staphylococcus aureus, at the concentration of 50 µ and 100 µ. The results obtained were compared with control one. The aqueous root extract of D. inoxia shown maximum antibacterial activity against human pathogenic bacterium Salmonella typhi i.e. 13 and 15 mm at 50 µl and 100 µl concentration respectively. The aqueous stem extract of Datura ferox was most effective against bacterium Staphylococcus aureus and shown inhibition of 14 and 24 mm at the concentration of 50 µl and 100 µl respectively. The aqueous leaf extract of Datura ferox shown maximum antibacterial activity against Staphylococcus aureous. The aqueous stem extract of D. ferox shown inhibition i.e. 12 and 21 mm at the concentration of 50 µl and 100 µl respectively. The aqueous seed extract of D. metel was effective against Staphylococcus aureus and shown inhibition 14 and 17 mm at the concentration of 50 µl and 100µl respectively. The aqueous extract of fruit coat of D. ferox was most effective against the human pathogenic bacterium Salmonella typhi.
It is felt that the observation recorded during present study will be useful for delimitation and determination of the taxa of *Datura* species.