Conclusion
5.0. CONSUMMATION AND THOUGHTS PROVOKED

Consummation of the experimental results which have provoked certain thoughts for future lines of studies are presented below.

5.1. CONCLUSIONS

The following conclusions can be drawn from the experiments conducted for assessing “the toxicity reduction of *Calotropis gigantea* during biomethanation”.

5.1.1. Objectives based

1. Quick initiation, prolonged generation and higher production of biogas occur when *Calotropis* biomass is used as a substrate for biomethanation.

2. Among the cell wall materials, cellulose manifests a higher proportion, degrades more and expresses a higher efficiency of carbon conversion into methane.

3. Lignin accumulates more in the biogas slurry with no biodegradation.

4. Though the content of volatile fatty acids is more in cow dung, its utility for biomethanation is higher in *Calotropis* biomass.

5. The biogas slurry is rich in plant macronutrients (N, P and K).

6. Rhizoplane soil does not support bacterial growth whereas the rhizosphere soil contains four different bacterial genera (*Staphylococcus aureus, Bacillus subtilis, Pseudomonas aeruginosa* and *Escherichia coli)*.

7. The susceptibility of the rhizosphere bacteria to the plant extract is as follows:- *Escherichia coli* > *Pseudomonas aeruginosa* > *Bacillus subtilis* > *Staphylococcus aureus*.

8. All the secondary metabolites considered for the analysis (flavonoid, terpenoid, alkaloid and steroid) degraded during biomethanation.
9. Among the secondary metabolites studied the degree of degradation differs: (flavonoid (93 per cent), terpenoid (80 per cent), alkaloid (55 per cent) and steroid (52 per cent).

10. The degradation potential depends upon the structural integrity of the secondary metabolites. Compounds with simpler structures degrade faster than the compounds with complex structures.

5.1.2. Aim based

*Calotropis* biomass can be used as a potential source of biogas to solve the energy crisis.

Since, all the experimented toxic secondary metabolites degrade during the biomethanation, the fermented residue with rich plant nutrients can be safely used as a manure to manage the fertilizer demand.
5.2. SUGGESTIONS

The foregoing studies on 'the toxicity reduction of Calotropis gigantea (L.) R. Br. during biomethanation' instigate the following suggestions:

- **Large scale biomethanation unit for community utilization** from biomass must be developed.

- **Cost Index** of technology for the transformation of biomass materials to biofuel should be worked out.

- Effective conversion of methane to electricity through **fuel cells** for various applications can be evaluated.

- Various microorganisms and consortia can be assessed for their **total degradation potential** of complex secondary metabolites (alkaloids and steroids).

- The efficacy of *Calotropis* metabolites as **biopesticides and pest repellents** can be studied for large scale utilization.

- The **relative efficiency** of *Calotropis* and the other **laticiferous** plants independently and in combination in terms of biogas generation and toxicity reduction can be determined.

- **Cultivation technologies** for *Calotropis* in **waste land utilization** can be promoted.

- The **fertilizer potential** of biogas slurry for various soils and crops could be estimated.