SUMMARY

Investigations were undertaken in *Cocculus hirsutus* (L.) Diels a climber species of Menispermaceae for mass propagation. Attempts were made to study the biological activity of *in vivo* and *in vitro* produced leaves and fruits of *Cocculus hirsutus*.

**A. Direct regeneration from nodal explants**

- Full strength MS medium was used as the basal medium and the effect of various cytokinins such as BAP, KIN and TDZ on the multiple shoot induction from the nodal explant was studied.
- Among the cytokinins tested combination of BAP (0.5mg/l) and TDZ (0.1mg/L) was found to induce maximum number of multiple shoots (2-4).
- Elongation of shoot was achieved in MS medium supplemented with combination of BAP (0.3 mg/L) + TDZ (0.1mg/L) + GA3 (0.2mg/L). A maximum length of (3.92 cm) shoot was formed above medium.

**B. Indirect regeneration from leaf explants**

- The leaf explant was used for callus induction.
- MS medium supplemented with 2, 4- D (2 mg/L) was found to be favourable for callus induction (90%), followed by combination of BAP (1mg/L) + NAA (0.5mg/L) promoted the profuse proliferation of brown callus (80%).
- BAP (0.7 mg/L) in combination with GA3 (0.5mg/L) induced maximum number of shoots (3.4) from the callus.
C. Rooting and Hardening

- Among the auxins tested for rooting, IBA was found to be best for inducing roots in half strength MS medium.
- About 70% of the plantlets were hardened in the potting media containing soil and sand (1:1).

D. Phytochemistry

- *In vitro* and *in vivo* leaves contain alkaloids, carbohydrates, glycosides, tannins, saponins and steroids in the methanol and hot water extracts. The chloroform extract was found to contain only alkaloids. The fixed oil and fat were present in the benzene extract. The flavonoids and mucilage were present in the water extract.
- Acidified methanolic fruit extract contains phenol, flavonoid and anthocyanin.

E. Antioxidant activity

- The *in vivo* and *in vitro* leaves of *Cocculus hirsutus* were studied using enzymatic and non-enzymatic antioxidant assays.
- The overall results obtained revealed that the *in vitro* leaves had higher antioxidants than *in vivo* plants.
- The antioxidant activity of fruit extract was studied using several test systems.
- DPPH, ABTS scavenging of fruit extract was significant and the IC50 value was calculated as 144.51 ± 1.11 μg/ml and 80.90 ± 0.39 μg/ml respectively.
- Nitric oxide scavenging activity of fruit extract was observed and the IC50 value was 79.84 ± 1.48μg/ml.
- Inhibitory effect on lipid peroxidation of fruit extract was calculated as 107.6±0.48 μg/ml.
- Significant metal chelating activity assay of fruit extract was observed and the IC50 value was 200.27 ± 1.85 μg/ml.
Dose dependent Reducing power and total antioxidant capacity was observed significantly.

**F. Antibacterial activity**

- The *in vivo* and *in vitro* leaves were extracted with benzene, chloroform, methanol and hot water and tested against five pathogenic bacteria (*Pseudomonas aeruginosa, Escherichia coli, Klebsilla pneumonia, Sphyllococcus aureus and Bacillus*).
- The methanol and water extracts of *in vivo* and *in vitro* leaves of *Cocculus hirsutus* exhibited higher degree of antibacterial activity.
- The maximum zone of inhibition (23 ± 1mm) was observed in water extract of *in vivo* and *in vitro* leaves against the *E.coli*
- The different concentrations of the fruit extract evaluated for antibacterial activity and the extracts exhibited higher degree of antibacterial activity at 1000 µg/ml concentration in all tested stains.
- The maximum zone of inhibition 15.66±0.28 mm was observed in *Bacillus sp* followed by the order of *E.coli > S. aureus > P.aeruginosa > K. Pneumonia* at 1000 µg/ml concentration.

**G. Cytotoxicity**

- The different concentrations of the fruit extract were assayed for cytotoxicity against HEp-2 and MCF-7 cell lines using MTT assay.
- The cytotoxicity of fruit extract against HEp-2 and MCF-7 cell lines was significant and the IC50 value was 125 µg/ml for both the cell lines.