Physico chemical evaluation through sequential extraction using different solvents in various plant parts. They exhibited similar response for all major groups of the metabolites tested showing biosynthetic potentialities for all types of metabolites. Highest extract was found in water and alcohol and minimum in benzene and chloroform.

Primary metabolites analysis showed that TSS was more in callus, starch in root and phenol in seeds of *H. auriculata*. *H. quadrivalvis* seeds contain maximum protein and lipids.

Nodal and leaf explants of *H. auriculata* showed initial swelling followed by initiation of callus from the cut ends with in 2\textsuperscript{nd} week of inoculation on media supplemented with IBA: BAP (2: 0.5 mgL\textsuperscript{-1}), BAP: NAA (2: 0.2 mgL\textsuperscript{-1}), respectively. When media supplemented with BAP: NAA (3: 0.3, 4: 0.4 mgL\textsuperscript{-1}) callusing along with multiple shoot initiation was observed. Media supplemented with IBA: BAP (3: 0.5 mgL\textsuperscript{-1}) and IBA: IAA (4:4 mgL\textsuperscript{-1}) callus along with shoot and root was observed. When nodal explants cultured in a media supplemented with 2, 4-D (2, 4 mgL\textsuperscript{-1}) direct regeneration of shoot and in NAA: BAP (1.5: 0.5 mgL\textsuperscript{-1}) multiple shoots observed. Media supplemented with IBA: IAA (3:4 mgL\textsuperscript{-1}), IBA (3, 4 mgL\textsuperscript{-1}) direct regeneration of shoot and root from leaf explants. Media containing IBA (2 mgL\textsuperscript{-1}) direct regeneration of root from leaf explants was observed. Nodal and leaf explants of *H. auriculata* showed initial swelling followed by initiation of callus from the cut ends with in 2\textsuperscript{nd} week of inoculation on media supplemented with IBA: BAP (2: 0.5 mgL\textsuperscript{-1}), BAP: NAA (1: 0.2 mgL\textsuperscript{-1}), respectively.

*H. quadrivalvis* showed initial swelling followed by initiation of callus from the cut ends with in 2\textsuperscript{nd} week of inoculation on media supplemented with NAA: Kn (3: 0.3, 2.5:4, 1:2 mgL\textsuperscript{-1}), BAP: NAA (2: 0.2 mgL\textsuperscript{-1}) and IBA: BAP (2:2 mgL\textsuperscript{-1}), respectively. When media supplemented with BAP: Kn (2: 0.2 mgL\textsuperscript{-1}), IBA: NAA: Kn (2: 0.1: 0.2 mgL\textsuperscript{-1}) callusing along with multiple shoot initiation was observed. Media
supplemented with IBA: BAP (2: 0.5 mgL\(^{-1}\)) callus along with shoot and root was observed. Media supplemented with IBA (2, 4 mgL\(^{-1}\)) direct regeneration of shoot and root from leaf explants.

*In vitro* grown plantlets were removed from culture vessels, washed thoroughly with sterile water to remove traces of nutrient culture medium and transplanted to plastic pots containing autoclaved sand and soil (1:1). Plantlets were covered with polythene bags to maintain humidity and kept in culture room conditions. These plantlets were irrigated two times daily with sterilized water containing 1:1 solution of ammonium nitrate and potassium nitrate. Sixty percent (60%) plantlets continued to grow for 20 days. After 20 days plantlets were transferred to soil where they continued to grow normally. About (60%) plantlets were successfully established in soil.

Isolation and characterization of flavonoid was done by using the Subramanian and Nagaranjan method (1969). All the plant parts of both experimental plants showed the presence of kaempferol, quercetin *in vivo* and *in vitro*. In addition to this, rutin and luteolin were also identified. Total flavonoid content (free and bound form) was found to be maximum in callus of *H. auriculata* and minimum in roots of *H. quadrivalvis*.

Trigonelline isolated from test plants following the procedure of Kogan *et al.* (1953). The extracts give single fluorescent spot of brick red color on TLC plates, on spraying with Dragendorffs reagent, which coincided with standard reference compound (Rf-0.09). The identity of isolated compounds was further confirmed by UV and IR spectral studies.

Trigonelline content was increased by feeding the medium with different concentrations of nicotinic acid. Callus cultures grown on medium supplemented with different concentration of nicotinic acid and harvested at the time interval of 2, 4, 6 and 8 weeks of subculturings. Trigonellin content in relation to concentration doses of
nicotinic acid was maximum in callus obtained from 50mg% nicotinic acid supplemented media of *H.quadrivalvis*.

Phytosterols analysis revealed the presence of β-sitosterols, stigmasterols. The identification of compounds was done by TLC, mp, mmp and IR spectral studies. Total steroidal content was maximum in seeds of *H. auriculata* and minimum in roots of *H. quadrivalvis*. Individually maximum β-sitosterol and stigmasterol present in seeds of *H. auriculata* which was at par to seeds of *H. quadrivalvis* and minimum in roots of *H. quadrivalvis*.

Precursor feeding to increase the yield of various metabolites. Six month old callus cultures of experimental plants were grown on MS medium supplemented with cholesterol (0.025, 0.05 and 0.1 mM) and were harvested at the time interval of 2, 4, 6 and 8 weeks. These callus samples were analyzed for diosgenin content separately along with control simultaneously. Diosgenin recovery was highly significant in all the treatment doses of nicotinic acid in *H. quadrivalvis*.

Elicitors are compounds which elicitate product accumulation by plant cells in suspension cultures acts as mediator compounds triggering the formation of secondary metabolites. Elicitation of diosgenin was done by supplemented medium by salicylic acid and nitroprusside in suspension cultures (0.025, 0.05 and 0.1 mM) which are abiotic elicitors and the callus samples were harvested after a fix time. The diosgenin recovery was significant in all treatment doses. The content was higher in suspension culture of *H. quadrivalvis* sample provided with treatment dose of salicylic acid as compared doses of nitroprusside.

Free radical scavenging activity from DPPH, HG and FRAP assay of the experimental plants were found to be comparable with well known antioxidants such as vitamin C (Ascorbic acid), vitamin E, vitamin A and quercetin.
The effect of various elicitors on the fresh macerated tissues of various parts (seeds and leaves) and 6 month old maintained callus cultures of experimental plants, were evaluated (Kamal et al., 2007) using different treatment doses of salicylic acid (0.025, 0.05, 0.075 and 0.1 mM) and sodium nitroprusside, sodium chloride at concentrations of 50 and 100 mM and ascorbic acid at concentration of 0.05 mM and 0.1 mM. The tissues were analyzed for their activity after 6, 12, 18 and 24 hr intervals separately. Six month old maintained callus cultures of both experimental plants were also given elicitation treatment in their respective suspension culture using different doses of SA and SNP (0.025, 0.05, 0.075 & 0.10 mM). Sodium chloride at concentration of 50 and 100 mM and effect of Ascorbic acid at concentration of 0.05 and 0.1 mM had also been observed in experimental plants. Effect of nitric oxide (NO) Scavenging activity, Lipid peroxidation (LPO) assay, SOD (Superoxide dismutase), CA (Catalase), POX (Peroxidase) assay. SOD, CA, POX activities after elicitation get increased and relatively higher than the control.

*H. auriculata* and *H. quadrivalvis* showed antimicrobial activity against *E. cloacae*, *S. aureus*, *S. viridens* and *E. coli*. Similarly, in case of fungal strains both plants showed potent activity against *Aspergillus niger*, and *Trichoderma harzianum*. Test plants showed potent activity against fungal strains than the bacterial strains.

Various extract of seeds and leaves of experimental plants posses’ significant effect on antiplatelets parameters. *H. auriculata* aqueous extracts of seeds at 100 µg/mL had significant prolonged clotting time which was about 24.4 times higher than the standard value (15 sec) in PT. In APTT assay *H. quadrivalvis* seeds aqueous extract 100 µg/mL prolonged clotting time significantly which was about 8.26 folds higher than the standard value (40 sec). It was observed that clotting time increase with increasing the concentration of the extracts both in PT and APTT assay. This is due to affectivity of herbal extract, which prolonged the clotting time and prevent platelet aggregation at lower concentration of 100 µg/mL which is significantly and slowly increased with increasing treatment doses.