Pachamalai hills are the part of Eastern Ghats, situated in the central part of Tamil Nadu state, India. The hills are rich in biodiversity and medicinal plant wealth. The survey of medicinal plants in these hills was carried out and the database of availability of medicinal plants were tabulated with their status.

*Gloriosa superba* L. is one of the endangered medicinal plant of these hills, selected for *in vitro* studies. This plant is popularly known as “Glory lily” and is having tremendous medicinal properties.

In Ayurveda and Yunani systems of medicine, the tuber of the plant is well known due to its pungent, bitter, acrid, heating, antihelmenthic, laxative, alexiteric, and abortifacient nature. It is widely used in the treatment of ulcers, leprosy, piles, inflammations, abdominal pains, intestinal worms, thirst, bruises, infertility and skin problems.

The protocols were standardized for *in vitro* seed germination, callus induction, multiple shoot induction and tuberization from different explants.

Highest percentage (72.5) of *in vitro* seed germination was observed when the MS medium was supplemented with 1.0 mg/l BA and 0.5 mg/l GA₃.

The germinated seedlings were transplanted on corm producing medium for *in vitro* tuberization. Maximum percentage (90) of *in vitro* tuberization and
rooting was attained when MS medium fortified with 1.0 mg/l BAP, 0.05 mg/l GA₃ and 9.3 mg/l NAA, with 6% of sucrose.

Callus induction from *in vivo* leaf explants was achieved when MS medium supplemented with 2.0 mg/l 2,4-D. When SH media provided with 1.0 mg/l 2,4-D and 0.5 mg/l BA, increased the percentage of calli proliferation.

The best response of callus induction from nodal explant was observed when the SH medium supplemented with 2.0 mg/l 2,4-D and 2.0 mg/l 2iP. The highest number of multiple shoots where induced when MS medium was fortified with 5.0 mg/l BAP and 0.5 mg/l IAA.

The maximum number of shoots were proliferated from shoot tip explant when MS medium supplemented with 2.0 mg/l 2iP and 0.5 mg/l BA was used.

92% of rooting was attained on MS full strength medium supplemented with 1.0 mg/l IBA.

The phytochemical analysis were carried out using preliminary phytochemical tests and GC-MS to understand the bioactive compounds.

The HPTLC results revealed that *in vitro* tuber was having highest content of colchicine followed by *in vivo* seeds, tuber, leaf, and pericarp. These results proved that the application of plant tissue culture techniques are very much useful in large scale biotechnological production of medicinal plants, phytochemicals, *ex situ* conservation and availability of species throughout the year.
The protein content of *in vivo* leaf, seeds, tuber, pod and *in vitro* plant leaf were analysed by SDS PAGE. The maximum number of protein bands were found in *in vivo* tuber followed by *in vivo* seed and *in vitro* plant leaf (13), *in vivo* leaf (11), and *in vivo* pod (6).

*Gloriosa superba* L. collected from different accessions of Tamil Nadu highlighted remarkable genetic variations, when the Random Amplified Polymorphic DNA markers were used. The RAPD proved to be useful in the profiling of different accessions collected from different locations of Tamil Nadu. It is obvious that the entries that were found to be similar and taxonomical classification based on morphological characters do have divergence at DNA level.

RAPD studies between mother plant and *in vitro* plant showed no genetic variations. These results revealed that *in vitro* plants do not change their genetic make up and they are almost similar to wild plants. This suggests that the *in vitro* techniques can be extensively used for the conservation and large scale propagation of medicinal plants as there is an increasing need to produce large number of plants of improved quality which holds, good promise in this field.

In the present study, antibacterial evaluation of methanolic extracts of different parts of *G. superba* viz. *in vivo* tuber, seed, leaf, pod and also the *in vitro* plant possessing measurable inhibitory action against both gram-positive and gram-negative bacteria used in the experiments. The seeds and tubers of this plant possessing significant inhibitory action against several bacteria than the other parts. Therefore, the seeds and tubers of this plant are endowed with high antibacterial properties.