Conclusion
Anti-malarial herbal formulation is established from *Calotropis procera* (Ait.) R.Br. (Asclepiadaceae) by using apical bud, flower and latex.

Apical bud, flower and latex were evaluated for schizonticidal activity with three different extracts viz., aqueous decoction, acetone and methanol. The aqueous decoction of latex was most active among the tested extracts and further partitioned with organic solvents n-hexane, chloroform, ethyl acetate and n-butanol. Out of that ethyl acetate was found most active.

Aqueous extract of latex and apical bud were evaluated against *Plasmodium burghei* infected mice models. Latex extract was evaluated on cerebral staged malaria on C57 mice and apical bud extract was evaluated for blood staged malaria in Swiss White mice. The latex extract cleared parasitemia in the same duration as chloroquine treated experiment. Apical bud extract reduced the parasitemia but did not cure the mice effectively as compared to chloroquine.

Powder of latex and apical bud were evaluated for acute toxicity on Swiss albino mice with 10 time higher dose than the treatment dose. No mortality or adverse effect was observed on mice.

Chemical composition of aqueous and acetone extract of latex and apical bud was evaluated. About 15 major compounds have been identified from acetone extract of latex. Out of that 13 compounds were identified with MS spectra and two by comparing with standard compounds. Four compounds identified were from acetone extract of apical bud by comparing with standard compounds on GC.
Aqueous extract of latex was partitioned with four organic solvents. IR spectra were mathematically correlated with peak intensity and schizonticidal activity for latex. The successful correlation was established with two peaks of C=C (alkenes; 1640-1610 cm\(^{-1}\)) and C=O (carboxylic acid; 1730-1700 cm\(^{-1}\)) functional groups. The ethyl acetate fraction of latex decoction was separated through HPLC and compared with six standard compounds.

HPTLC fingerprinting was established for apical bud and latex with common marker compounds triolein, β-sitosterol and oleic acid. IR and NMR fingerprinting was established for latex and seven functional groups were characterized for identification of latex sample. Latex was characterized for its odor through identification of seven compounds present in essential oil by comparing standard compounds on GC. Elements were detected through XRF analysis in latex and apical bud for 10 different elements and cultivated soil for 11 different elements. Apical bud and latex were evaluated for heavy metals viz. mercury, lead and cadmium with toxic metal arsenic through AAS and were found in permissible limit. Extract values in organic solvents for apical bud and latex were calculated. Acetone was found to extract highest amount from latex and ethanol to extract highest amount from apical bud. The ash value was calculated for apical bud and was compared with mature leaves. Growth rate of the plant was measured for deciding harvesting schedule of apical buds. The apical buds initiated after plucking in 5-7 days and reached to the desired size of 5.5-8.5 cm in 17-20 days. Therefore, subsequent harvesting of apical bud is possible after 25-30 days.

Clinical trial was conducted for the treatment of \textit{P. vivax} and \textit{P. falciparum} with apical bud and latex treatment. The plant parts used in the formulation were apical bud and
flower in equal proportion, and latex alone was used in the form of tablet. Apical bud/flower (1:1) radically cured 95.65% *P. vivax* and 56.76% *P. falciparum*, (78.91% over all malaria cases included clinically diagnosed and multiple infection). Latex could cure 100% *P. vivax* and 87.88% *P. falciparum* (over all cure 90.70% malaria cases include clinically diagnosed and multiple infection cases). The effect of latex is better than apical bud and flower. Fever reduction time and parasite clearance time was less with latex treatment. In the treatment of *P. falciparum* latex reduced fever in 12 hrs and cleared parasitemia in 3 days. Capsules (apical bud and flower) were administered in the dose of 70mg/kg for the treatment of both *P. vivax* and *P. falciparum* to adult and pediatric patients. Tablets (latex) were administered for the treatment of *P. vivax* and *P. falciparum* in the dose of 17.5mg/kg for adults and 16.7mg/kg for pediatric patients. The apical bud capsules were administered in 7 days (t.d.s.) with the dose of 21 capsules and latex tablets were administered in 3 days with the dose of 21 tablets. The common side effects observed were nausea and vomit; no severe side effects were noticed. Powder of *Kapoor Kachali* was added in the formulation to subside the emetic effect, and black pepper was added which worked as *Yogvahi* according to the principles of Ayurveda.

Quality control standards established for commercial production of the formulation includes dry yield of the material, calculation of production costing, physical parameters of the material used and microbial load of the prepared formulation. The capsules and tablets were also characterized for physical parameters. The hardness of tablet is 0.5 kg/cm² with 28min TDS, where as capsule has 7 min TDS.

Antibacterial property of the aqueous, acetone, methanol and ethanol extracts of latex and apical twig were evaluated on 12 bacterial strains. The organic fraction of aqueous
decoction of latex and apical twig was derived in the same manner and evaluated on bacterial strains. Ethyl acetate fraction was found to be the most active. Antibacterial effect of the extracts derived from apical twig was more than the extracts of latex.

Micro-propagation from nodal explants was established for *in vitro* cultivation of *C. procera*. The hormone combination standardized for *in vitro* shoot induction is 2,4-D and Kn in equal concentration of 0.5 mg/l.