SUMMARY

*Eupatorium adenophorum* Spreng. (Family-Asteraceae) is well known plant found profusely in Himalayan Region of India. The investigational work on the leaves of this plant has been performed and thus presented in this thesis under three major parts.

I. Pharmacognostical and Phytochemical Studies.

II. Pharmacological Studies.

III. Microbiological Studies.

Part I of the thesis which includes the complete information on the plant under investigation, has been reported in chapter 1. This chapter also has provided a nucleus for the modern scientific evaluation by providing the available documentation about the therapeutical potency of the plant for the entire mankind. In chapter 2, Pharmacognostical profiles of the leaves of *Eupatorium adenophorum* including the macroscopic and microscopic characteristics of the leaves as a whole and its powdered form, ash value and extractive values, behavioural characteristics, with different chemical reagents and fluorescence characteristics have been represented for future identification of the leaves. One scientific abstract on this chapter has been published in the proceedings of the 90th session of the Indian Science Congress, Bangalore, (2003).

The powdered leaves were successively extracted with petroleum ether (60-80°C), benzene, chloroform, acetone and methanol in a Soxhlet extractor. On preliminary chemical group tests, the presence of steroids, flavonoids, triterpenoids, reducing sugars, tannins in different extracts were observed which have been mentioned in chapter 3. The methanol extract showed positive test for the presence of steroids, triterpenoids and flavonoids.

The methanol extract was subjected to separation of unsaponifiable constituents and then to column chromatographic separation with the eluting solvent chloroform : methanol (40:1) on alumina (neutral) column. The eluants were concentrated and treated with alcohol and chloroform mixture and it was filtered off. The filtrate was charcoal and on concentration needle shaped crystals were separated out. It was further purified by recrystallisation from alcohol and chloroform mixture. The crystals were melted at 140°C.
In chapter 4, furnished the characterization of the isolated compound. It showed positive test for Liebermann-Burchard, Salkawoski tests which confirm the compound to be a steroidal in nature. The Thin Layer Chromatography of the isolated material showed the identical hRf value as that of authentic sample of β-sitosterol. The UV, IR, NMR and Mass spectra of the isolated compound exhibited identical spectra when compared with authentic sample of β- sitosterol . The mass spectrum of the isolated compound was the characteristic of a steroidal compound and it showed principal peak at m/z 414, 412, 396 381, 298, 270 and 255. This intense peak at 414 showed the molecular ion of the isolated compound. The melting point of the mixture of isolated compound and β- sitosterol did not show any change and melted at 140°C. The elemental analysis fits well with the molecular formula C_{29}H_{50}O with the molecular weight of 414. All these evidences conclusively proved that the isolated compound is to be a β-sitosterol.

In Chapter 5, tinctures of *E. adenophorum* leaves were prepared by maceration process with different strengths of alcohol. 30% v/v alcohol yielded maximum amount of total solid. Some physico-chemical characterisation of all the tinctures and presence of chemical groups were confirmed. A paper on this chapter has been communicated to *Indian Journal of Natural Products* (2004).

In folklore use of the various part of *E. adenophorum*, various therapeutic activities have been observed. Part II of this thesis has been furnished with screening and evaluation of some of those pharmacological profiles of methanol extract of *E. adenophorum* leaves.

In Chapter 6, the toxicological investigations of the methanol extract were performed in different routes of drug administration. The minimum lethal dose (MLD) of the methanol extract was found to be >3.2 g/kg and 2 g/kg in oral and intraperitoneal route respectively.

Chapter 7 represents the anti-ulcer activity of methanol extract of the leaves of *Eupatorium adenophorum*. The methanol extract at the doses of 400 and 800 mg/kg were
found to produce significant reduction (30.04% and 52.22%) of indomethacin induced lesion index as compared to control. The anti-ulcer activity of the extract was comparable to that of standard anti-ulcer drug ranitidine. One research paper on this chapter has been published in *Indian Journal of Natural products*, 20(2): 23-26 (2004).

Chapter-8, deals with analgesic activity of leaves extract of *Eupatorium adenophorum* on acetic acid induced writhing test model, Tail immersion test model and tail flick test model in albino mice. The extract at the doses of 200 and 300 mg/kg, i.p. showed significant analgesic activity by the above all models and the results were comparable with those of the standard drugs. One scientific abstract on this chapter has been published in the proceedings of the 91st session of the Indian Science Congress, Chandigarh, (2004) and one paper has been communicated for publication in *Indian Journal of Experimental Biology*, New Delhi(2004).

In Chapter-9, in this chapter the anti-inflammatory activity of the methanol extract of E. adenophorum leaves has been reported. The extract at the doses of 100 and 200 mg/kg, i.p., showed significant anti-inflammatory activity against carrageenin induced rat paw oedema model. The effects produced by the extract were comparable to those of phenylbutazone, a prototype non-steroidal anti-inflammatory drug. In this chapter Antipyretic activity of the methanol extract of *E. adenophorum* on yeast induced pyrexia has also been furnished. The extract at the doses of 300 and 400 mg/kg body wt. shows the decreased yeast provoked elevation of body temperature of rats. The results were compared with the control group. We observed a significant reduction in the yeast elevated rectal temperature. The anti-pyretic effect was comparable to that of standard anti-pyretic agent paracetamol (150 mg/kg p.o.). One scientific abstract on this chapter has been published in proceedings of the 91st session of the Indian Science Congress, Chandigarh, (2004) and one paper on this chapter has also been communicated for publication in *Indian Journal of Natural product* (2004).

In Chapter-10 the anti-tussive evaluation of methanol extract of *E. adenophorum* leaves has been included. The extract at the doses of 200 mg/kg and 400 mg/kg (P.O.) produced a maximum inhibitions of cough 36% and 40% respectively and showed significant inhibition of cough in comparison with control. One research paper on this chapter has been communicated in *Natural Product Sciences*, Korea (2003).
In Chapter-11, the wound healing activity of the methanol extract of *E. adenophorum* leaves has been reported. The leaf extract ointment (5%w/w) caused significant contraction of wound comparing with simple ointment (control). The results were comparable with that of standard Betadine ointment. The research paper on this chapter has been communicated in *Phytomedicine*, U.S.A. (2003).

Chapter-12 deals with the antibacterial activity of the methanol extract of *E. adenophorum* leaves. The extract of leaves were tested for its antibacterial activities against 17 microbial strains of 12 different genera. The effects produced by the extracts were comparable with those of chloramphenicol. The extract showed MIC value at 150 μg/ml level against each of *Staphylococcus aureus* AM 8/98, *Bacillus subtilis* CD/99/1, *Streptococcus pneumoniae* 7465 and *Sarcina lutea* CD/99/1. The MIC value of the extract against each of *Salmonella typhimurium* ATCC 6539 and *Pseudomonas aeruginosa* ATCC 25619 was found to be 200 μg/ml concentration of the extract. A paper has been communicated in *J. of Ethnopharmacology*, Netherlands (2003).

Thus a thorough study on the aspects (Pharmacognostical & Phytochemical, Pharmacological and Microbiological) have been made and represented in this thesis based on the combined approaches of both exploitation and exploration which may lead to a new line of treatment by folklore herbal medicine. The works performed and furnished in this thesis have either been published or communicated for publication.