SUMMARY

Present investigation was undertaken (a) to assess the antifungal activity of oil (kernels) and pericarp extracts (petroleum ether, chloroform and methanol and butanol extract of methanol) from different seed sources namely, Dehradun and Gyarahdevi (Uttarakhand) and Nainatikker (Himachal Pradesh) of a common Indian forest tree, *S. mukorossi*, (b) isolation and identification of active principle (hederagenin) from soap nut pericarp and (c) quantification of antifungal activity of hederagenin. Different extracts were tested on the basis of IC$_{50}$ and hederagenin on the basis of IC$_{50}$, MIC, fungicidal and fungistatic activity and spore/conidial germination. The antifungal activity of extracts/hederagenin of *S. mukorossi* was performed against common forest fungi namely, *A. alternata, C. gloeosporioides, Phoma sp., P. dalbergiae, F. oxysporum, G. lucidum R. solani* and *T. piluliferum* using poisoned food technique.

The findings of the present investigation are summarized as under:

1. Kernel oil of *S. mukorossi* did not show any antifungal activity.
2. No antifungal activity was exhibited by petroleum ether pericarp extract of Dehradun against tested fungi. There was no antifungal activity recorded by all the sources against three fungi namely, *Phoma* sp., *P. dalbergiae* and *G. lucidum*. Petroleum ether pericarp extract of any of the source could not achieve IC$_{50}$ against any of the fungi.
3. Chloroform extract of all three sources could not achieve IC$_{50}$ against *A. alternata* and *F. oxysporum* ranging from 0.5 to 2.0 per cent concentration. It was found that all three sources registered IC$_{50}$ at all concentrations against *Phoma* sp. and *P. dalbergiae*.
4. It was observed that all three sources attained IC$_{50}$ at all concentrations against *Phoma* sp., *P. dalbergiae*, *R. solani* and *T.
Like chloroform extract, IC_{50} was not achieved against *A. alternata* and *F. oxysporum* at any concentration of the sources in methanol extract.

5. Similarly, butanol extract did not show antifungal activity against *A. alternata* and *F. oxysporum* at any of the concentrations of all the seed sources tested. While, IC_{50} for rest of the fungi achieved right from the lowest concentration of 0.5 per cent in all the sources.

6. Butanol extract of Gyarahdevi exhibited best antifungal activity, therefore, it was used for fractionation to get pure hederagenin. It was acid hydrolyzed to get sapogenin.

7. A pure compound, i.e. hederagenin was isolated through column chromatography of sapogenin.

8. Identity of hederagenin as pure compound was confirmed through UV, IR and NMR spectroscopy.

9. The amount of hederagenin of all three sources i.e. Dehradun, Gyarahdevi and Naintaikker was quantified through HPTLC. There is substantial variation in the hederagenin quantity of the seed sources, for example, Dehradun (0.31%) has almost 1/10^{th} quantity of hederagenin in comparison to the best source of Gyarahdevi (3.1%). The quantity of hederagenin in Nainatikker (2.9%) was comparable with Gyarahdevi.

10. Thereafter, hederagenin from different sources was tested for antifungal activity. There was minor variation (0.9 to 1.7%) in antifungal activity of hederagenin among sources. Therefore, hederagenin of Gyarahdevi was selected for further testing as its quantity was highest among all the seed sources.
11. The IC$_{50}$ of *Phoma* sp. and *R. solani* was achieved at minimum of 400 ppm and the growth of *P. dalberagiae*, *F. oxysporum* and *G. lucidum* was inhibited at the higher concentration of 1,000 ppm.

12. The MIC of hederagenin from all the sources ranged between 1,000 (A. alternata) to 1,400 ppm (G. lucidum) for the tested fungi.

13. Hederagenin from pericarp of *S. mukorossi* from all three sources i.e. Dehradun, Gyarahdevi and Nainatikker were fungistatic in nature for *Phoma* sp., *R. solani* and *T. piluliferum* and fungicidal for rest of the five fungi namely, A. alternata, C. gloeosporioides, P. dalberagiae, F. oxysporum and G. lucidum.

14. Practically no difference in MIC and fungicidal/fungistatic activity among sources signifies that variation in quantity has no bearing on the antifungal activity.

15. More than 80 per cent inhibition of spore/conidium of all the test fungi was observed at different concentrations after 24 and 48 h of incubation.

16. Though saponins of soap nut tree have many useful biological activities but it does not contain comparable biological activity against common forest fungi. Still, the butanol extract and hederagenin have potential as botanical fungicide based on IC$_{50}$, MIC, fungicidal and fungistatic activity and spore/conidial germination. Based on the differences of hederagenin among the seed sources, it can be concluded that identification of appropriate source is prelude to development of a botanics. Further, Gyarahdevi has highest percentage of hederagenin underlining its importance as potential seed source not only for extraction of active principle but also a promising source of seed for future multiplication as planting material and deployment.