SUMMARY

- DNA barcoding proved successful in the identification of the genus *Ocimum*.
- A total of thirty DNA barcode sequences belonging to the *matK*, *rbcL* and *psbA-trnH* regions were submitted to both NCBI and BOLD.
- Several *Ocimum* spp. sequences were submitted for the first time and comprise of 70% of the total submissions in the genus *Ocimum* in the BOLD database.
- The *psbA-trnH* region was identified as the most suitable DNA barcode for the identification of the genus *Ocimum* with a variation of 7.5% at the inter species level.
- Negligent variation in the candidate barcode region at the intra species level proved the consistency of barcode sequences despite geographical variation.
- Pairwise distance and ClustalW analysis helped in solving various taxonomic conflicts in morphologically similar species of the genus *Ocimum*.
- Phylogenetic analysis was able to identify the ancestry of hybrid *Ocimum* spp.
- The efficiency of real-time DNA barcode based HRM analysis in the identification of *Ocimum* spp. and their varieties was demonstrated.
- A suitable DNA barcode region (*ITS* gene region) compatible for HRM based *Ocimum* spp. identification was identified.
- Characteristic melt profiles for each of the *Ocimum* spp. were obtained right up to the variety level.
- HRM analysis also proved itself in the validation of processed commercial samples containing both single and mixed plant species.
The barcode based PCR–RFLP method was successful in identifying three *Ocimum* spp. viz. *O. gratissimum*, *O. tenuiflorum* and *O. fliamentosum*.

The *psbA-trnH* gene region was best suited for PCR–RFLP analysis based identification of these *Ocimum* spp.

A PCR–RFLP method for the rapid and reliable authentication of the medicinally important species of the genus *Ocimum*, both in fresh samples and also in commercially available crude drugs was developed.

A DNA barcoding approach for the identification of *Ocimum* species narrowed down the region of significance w.r.t. the molecular marker hunt for species specific gene regions, in the case of HRM and RFLP methods.

The results obtained on analysis of commercial products using the DNA barcoding, HRM and RFLP methods coincided and established their efficiency and reliability.