6.1 SUMMARY OF THE FINDINGS OF THE STUDY

The findings of this study have been summarized as follows

1. Both ‘Haanj’ samples and plant extracts exhibited presence of phenolic compounds. The range of TPC the ‘Haanj’ samples was 2.834±0.005–4.997±0.003mgGAE/mL. The highest TPC was found in the sample, prepared in the Lab. During the storage for a period of three months TPC decreased, if stored at r.t.. TPC of ‘Haanj’ samples, stored in refrigerator was not significantly affected.

2. The range of TPC in the eight investigated plant extracts was 0.451±0.003 to 9.598±0.008 mgGAE/g. MeOH extract of *M. malabathricum* showed the highest TPC (9.598±0.008 mgGAE/g) and lowest TPC was found in hexane extract of *R. ellipticus* (0.451±0.003 mgGAE/g).

3. Antioxidant activity was not significantly different in ‘Haanj’, prepared by different rice varieties (‘Bora’ and ‘Red Bao’).

4. All the ‘Haanj’ samples and plant extracts showed good % inhibition in four radical scavenging methods. In all the methods, antioxidant activity of ‘Haanj’ samples showed the same order as BR-4> BR-2 > RB > BR-1 > BR-3.

5. Radical scavenging activity of traditional ‘Haanj’ samples decreased on storage. In samples, stored in refrigerator, the decrease of % inhibition was low compared to the samples stored at r.t..

6. In ‘Haanj’, prepared in Lab, stored in a refrigerator (at 0-5ºC), the effect of storage time was almost negligible.
7. The percentage of ethanol present in ‘Haanj’ samples was in the range of 11-15%.
   ‘Haanj’ without ethanol has lower antioxidant activity compared to the whole
   beverage (with ethanol).

8. Plants extracts exhibited moderate to good % inhibition in all four assays. MeOH
   extracts of all plants showed highest radical scavenging activity compared to
   EtOAc and hexane extracts. Exceptionally, EtOAc extract of *F. bhotanica* showed
   higher radical scavenging activity than MeOH extract determined by ABTS assay.
   Again, EtOAc extract of *R. ellipticus* exhibited better antioxidant activity than
   MeOH extract determined by deoxy ribose assay. A good correlation was observed
   between the antioxidant activities of the plant species and the radical scavenging
   assays employed. A good correlation was also observed between antioxidant
   activity assays and TPC of ‘Haanj’ samples and plant extracts.

9. All the ‘Haanj’ samples and plant extracts were found to be excellent radical
   scavenger and good inhibitor of electrochemical oxidation of 1,4-diaminobenzene.

10. Gallic acid, quercetin and caffeic acid, protocatechuic acid, catechin, syringic acid
    and sinapic acid were identified in ‘Haanj’ samples as well as in the plants extracts
    by HPLC analysis.

11. Use of fermentation cakes (FC) with rice in a ratio 1:8 w/w results in optimum
    antioxidant activity. Use of only the eight plants that are invariably used at all
    places for preparation of FC is sufficient for preparation of a good quality ‘Haanj’.
    These plants are otherwise not edible, but can be considered as valuable sources of
    dietary antioxidants, which are incorporated into ‘Haanj’.

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12. With the presence of phenolic contents and the capability to scavenge free radicals, ‘Haanj’ is a potential source of natural dietary antioxidant and may be used for prevention of free radical induced diseases in human health.

6.2 FUTURE SCOPE OF THE WORK

From the present study, we have identified various important scopes for future studies, for academic as well as economic and environmental benefit. A few points are cited here.

1. Efforts may be taken up for increasing shelf-life of ‘Haanj’ for storage of a long period for commercialization.

2. Comparative study may be taken up for antioxidant and other nutritional properties of ‘Haanj’ with other commercial beverages.

3. Further investigation may be taken up to minimize the number of plants for preparation of fermentation cakes even to fewer.

4. Some efforts are going on in this Lab including the above aspects.

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