



Physicochemical Properties of E-beam Irradiated Honey

Asma N. Khan and Hemlata K. Bagla

Department of Nuclear and Radiochemistry, K.C. College, HSNC University, Mumbai, India

hemlata.bagla@kccollege.edu.in, asma.khan@kccollege.edu.in



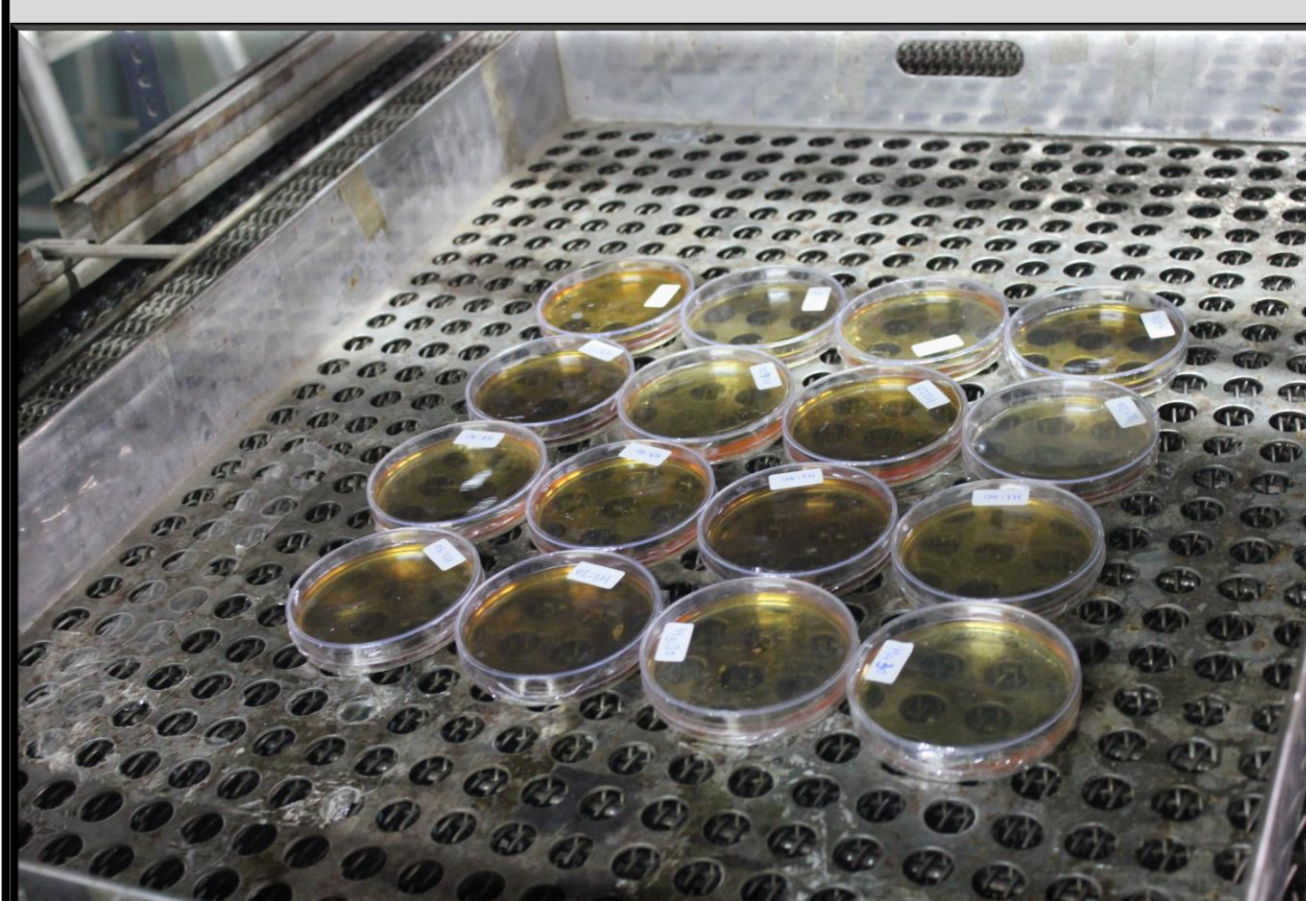
ABSTRACT ID: 187

RATIONALE

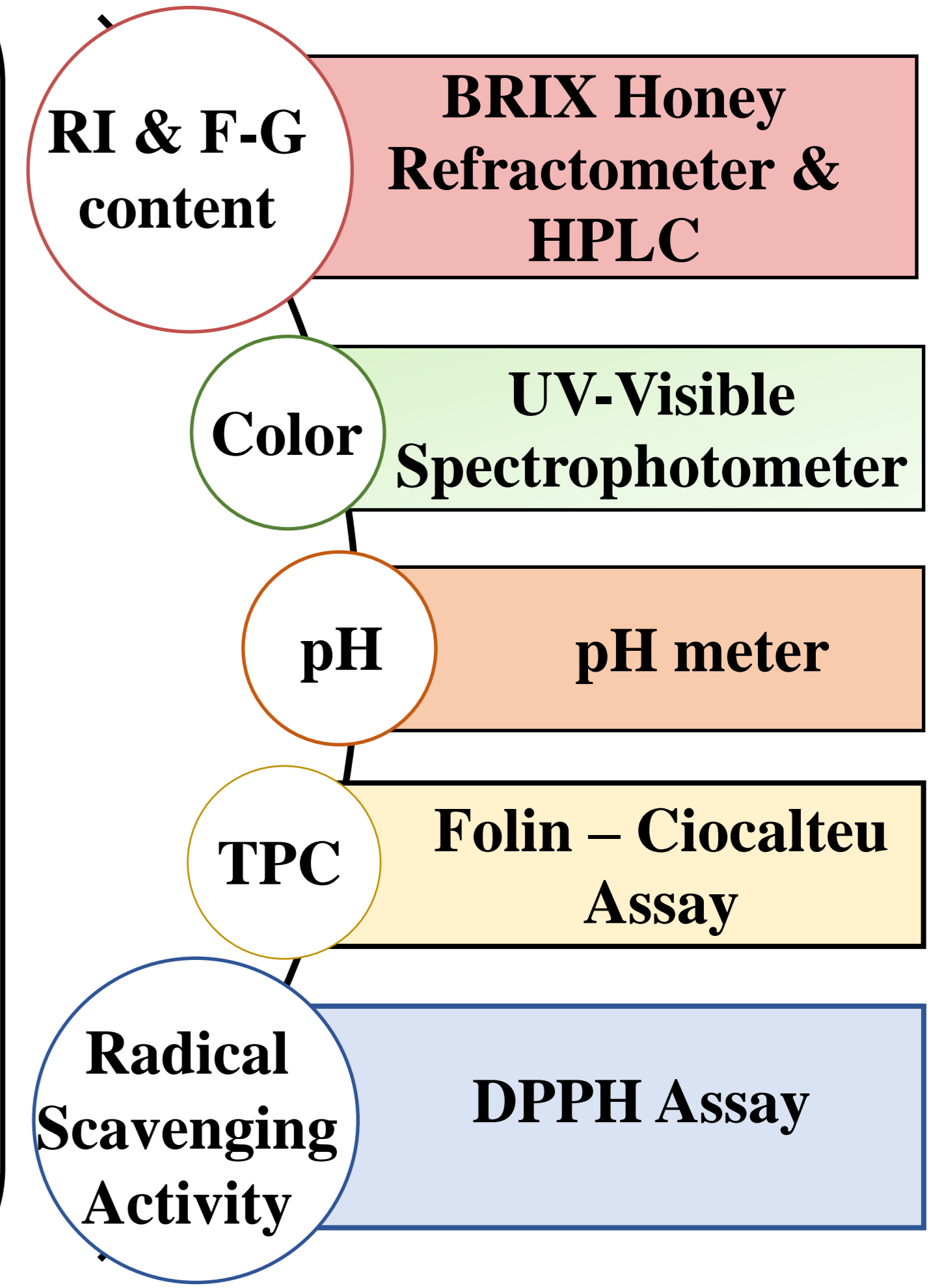
- Pasteurization of honey reduces microbial contamination from **Saccharomyces yeast, aerobic Bacillus, and anaerobic Clostridium spores.**
- As higher temperatures decrease the nutritional value of honey, room-temperature techniques like **gamma and electron-beam irradiation (EBI) are preferred for sterilization.**
- These may affect the color, texture, antioxidant activity, phenolic content, etc. Thus, it is important to study the effects of irradiation on the physicochemical properties of honey.
- Honey samples were treated with EBI at **10, 20, 30, 40 kGy** using the **linear pulse accelerator at Board of Radiation and Isotope Technology (BRIT), Mumbai.**
- Samples were tested for **radiation-induced changes** in pH, color, refractive index, reducing sugar content, antioxidant activity, and total phenolic counts.

METHODOLOGY

E-beam Irradiation of commercial honey samples

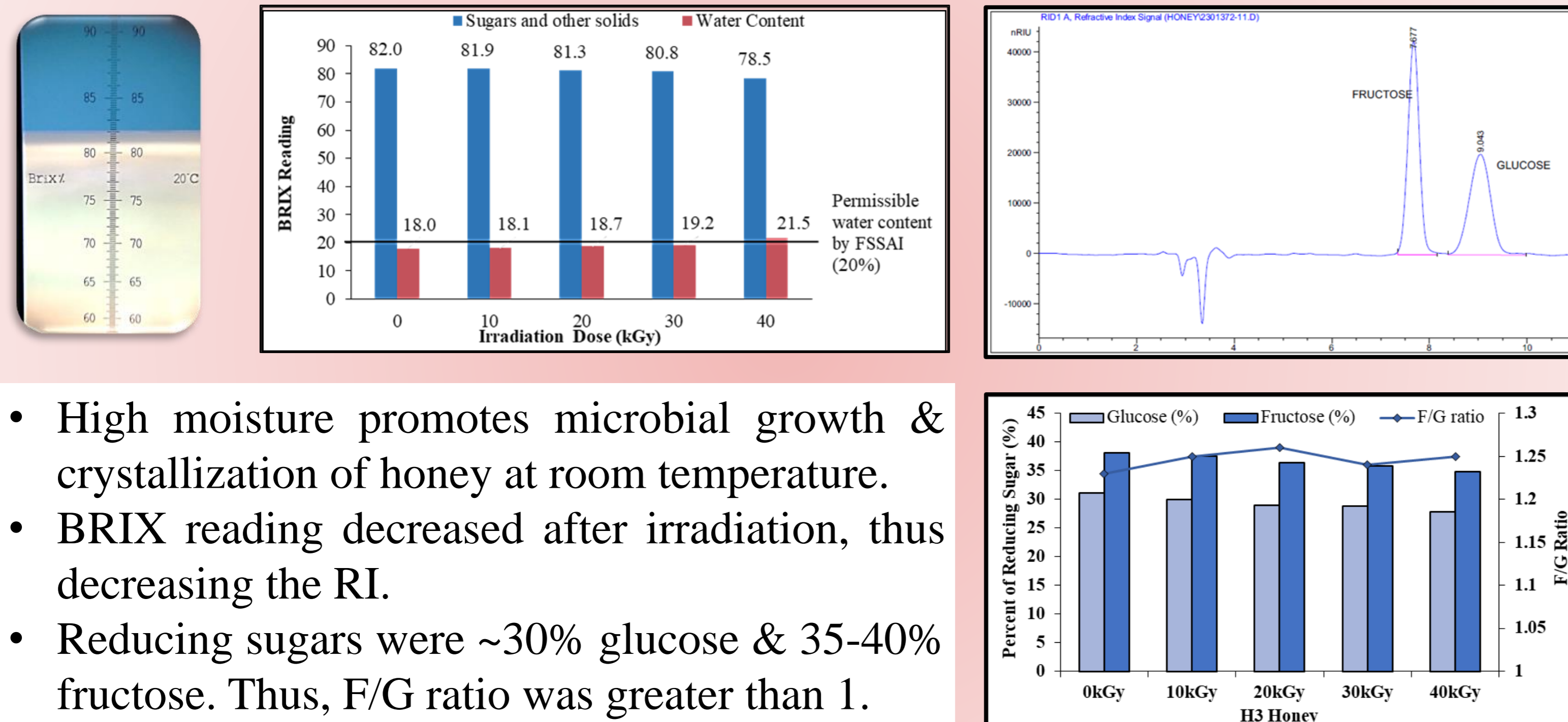


- Energy: 3.5 MeV
- Current: 250mA
- Average Current: 1mA
- Pulse Repetition Rate: 10/s
- Conveyer Speed 3cm/s
- Dose Per Pass: 5 kGy/pass
- Sample: 50 g per plate

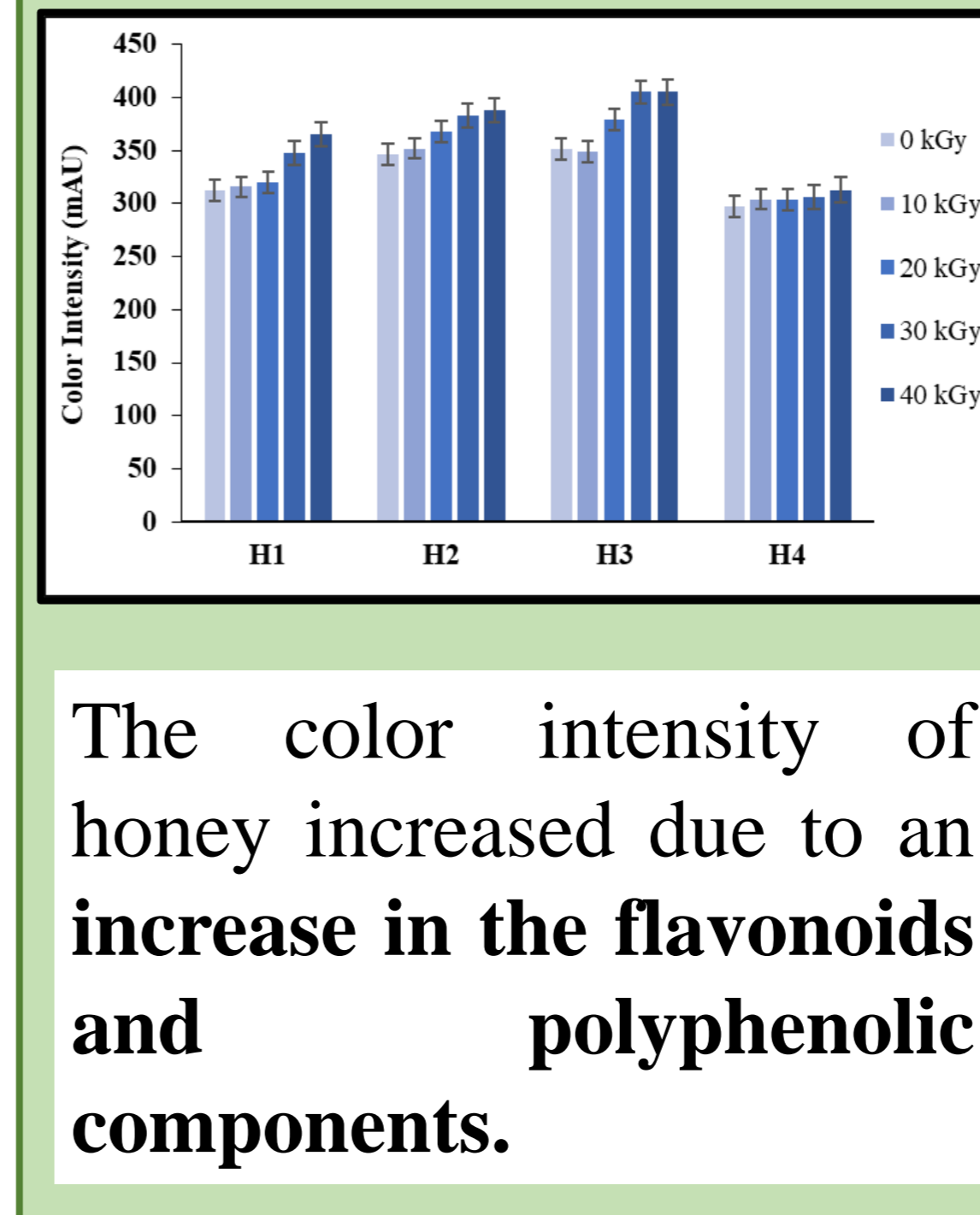


RESULTS AND DISCUSSIONS

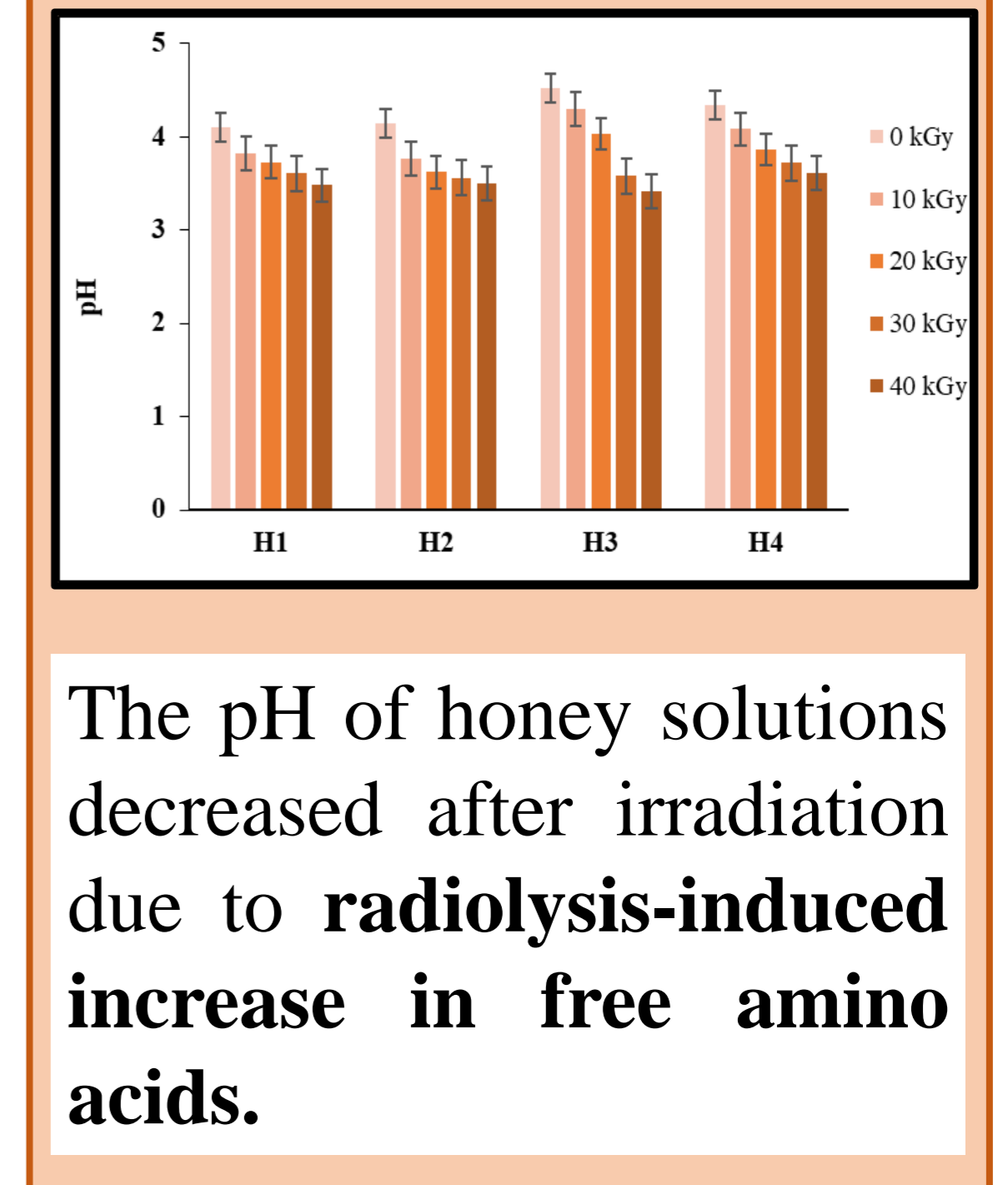
Refractive Index and Reducing Sugar Content



Color Intensity



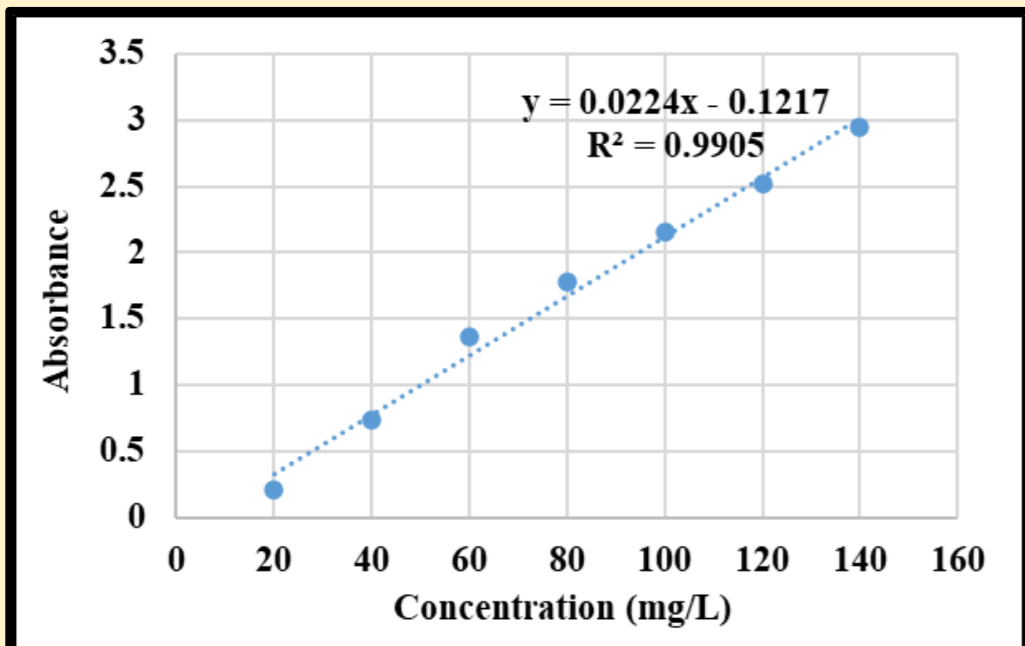
pH



Total Phenolic Content (TPC)

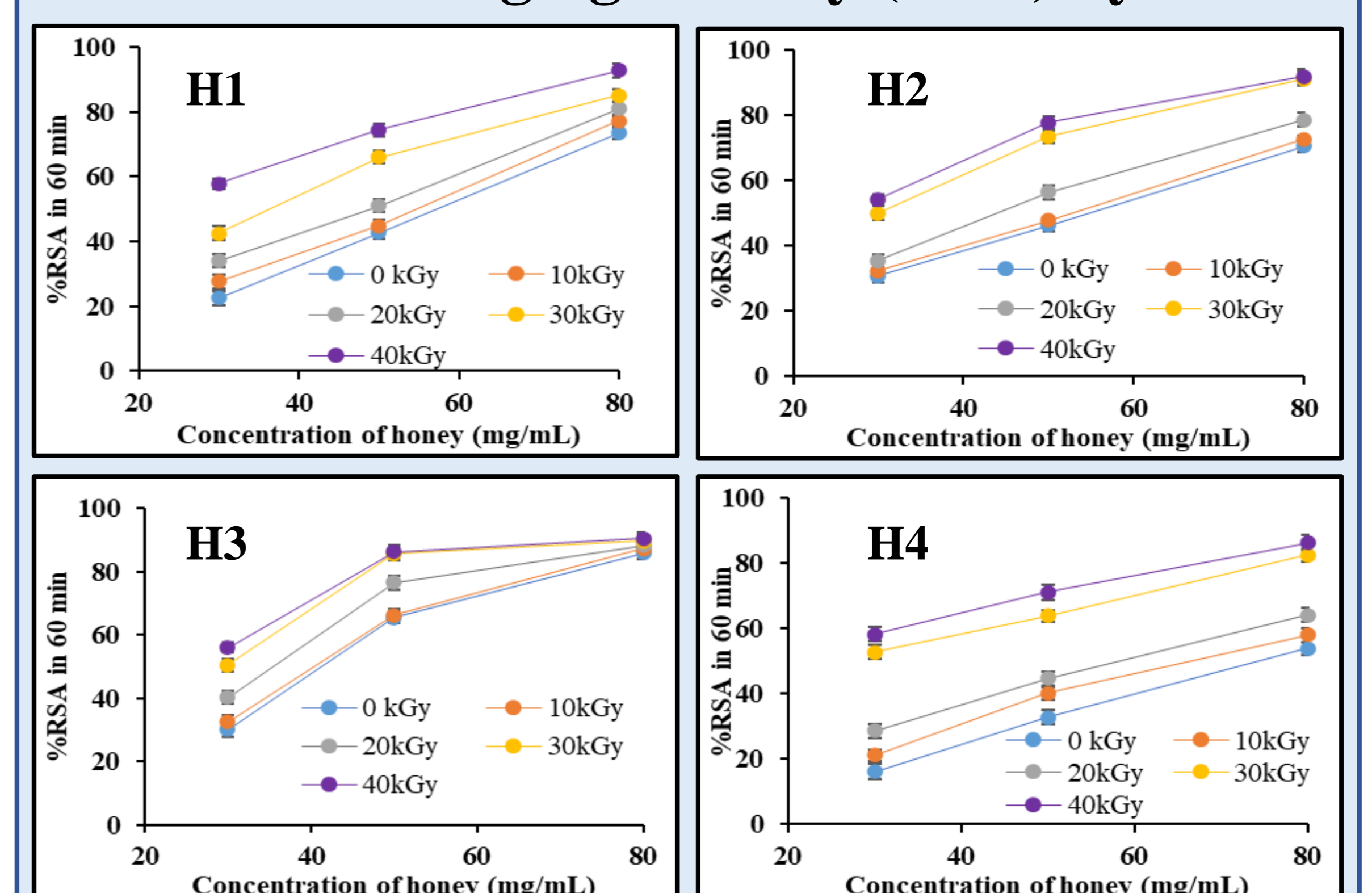
The TPC of four commercial honey samples- H1, H2, H3, and H4 were compared to their irradiated counterparts as follows:

Dose	H1	H2	H3	H4
0 kGy	85.79 ± 2.15	75.30 ± 2.06	83.47 ± 2.32	93.65 ± 2.21
10 kGy	89.80 ± 2.52	77.44 ± 2.13	86.24 ± 1.85	99.18 ± 2.08
20 kGy	99.18 ± 1.91	83.56 ± 2.55	90.25 ± 2.20	109.45 ± 2.24
30 kGy	109.90 ± 2.40	102.75 ± 2.51	103.65 ± 2.43	121.06 ± 2.15
40 kGy	114.81 ± 1.84	112.31 ± 1.96	111.37 ± 2.18	126.15 ± 2.04



Radical scavenging activity increased with irradiation and corresponding increase was observed in the total phenolic content by Folin-Ciocalteu assay. TPC was expressed in terms of Gallic Acid Equivalents (GAE) in mg/g of the sample.

Radical Scavenging Activity (RSA) by DPPH



CONCLUSIONS

The irradiation dose of **30kGy** sufficiently improved the phenolic content and antioxidant activity for all samples without significantly affecting other properties. Thus, E-beam irradiation is not only useful for sterilization but also for enhancing the quality parameters of honey.

REFERENCES

- M. Khatun et al., "Gamma radiation processing of honey of Mustard, Black seed and Lychee flower." Meas. Food, vol. 6, p. 100026, 2022.
- W. Migdał, et al., "Microbiological decontamination of natural honey by irradiation," Radiat. Phys. Chem., vol. 57, no. 3, pp. 285–288, 2000.

ACKNOWLEDGEMENTS

We would like to thank Board of Radiation and Isotope Technology (BRIT), Mumbai, for the use of E-Beam facility and Bombay Textile Research Association for HPLC analysis.