CONCLUSION

Wild edible fruits are considered as excellent sources of nutrients and various bioactive compounds especially the antioxidant compounds. These fruits have received worldwide increasing attention because of their important contributions to human health. Regular intake of fruits is widely recommended in human diet as they are the rich sources of minerals and important phytochemical constituents which on consumption contribute several health benefits against various diseases.

The objective of this investigation was to determine the nutritional contents, phytochemical constituents, antioxidant activity, antimicrobial activity, amino acid composition and anti-nutritional contents of five wild edible fruits *viz*. *Grewia sapida, Antidesma bunius, Eugenia operculata*, *Aporosa dioica* and *Ottelia alismoides* from Assam, North East India. In this study, antioxidant activities in methanolic extracts of fruits were evaluated using DPPH (1, 1-diphenyl-2-picrylhydrazyl), ABTS (2, 2′-Azinobis (3-ethylbenothiazoline-6-sulfonic acid) diammonium salt), H_2O_2 (Hydrogen peroxide) and FRAP (Ferric reducing antioxidant power) assays. The antimicrobial activities of methanolic extracts were investigated against four bacterial species (two strains of gram-positive bacteria and two strains of gram-negative bacteria) using agar disc diffusion method.

The study successfully investigated a total of five wild fruits harvested from different places of Assam (India) for their nutritional value. The present study shows that the wild edible fruits have variable amounts of proximate parameters. The calorific value was found the highest in *E. operculata* fruit (394.58 ± 0.03 kcal/100 g) among the five wild fruits followed by *O. alismoides* (388.51 ± 1.12 kcal/100 g) and it was found the lowest in *G. sapida* fruit (346.34 ± 0.04 kcal/100 g). Higher calorific value of the fruits could be attributed to high carbohydrate and protein content. The study showed that these wild fruits have good nutritional qualities and consumption of these fruits in sufficient amount could contribute greatly towards meeting nutritional requirements for normal growth and protection against diseases arising from malnutrition. This study could also provide information to the rural population in knowing the nutritional importance of these fruits. Future research could be conducted for domestication, to extend the shelf-life and processing of these fruits to various food products.

The study revealed that the wild edible fruits contained appreciable amount of macro- and micro-minerals. *A. bunius* fruits had the highest content of K and Ca whereas *O. alismoides* fruits had the highest content of Na, Mg, Fe, Mn, Co and Cu. The mineral contents of these fruits were comparable to those of some commercially cultivated fruits. The results highlighted the significance of studied fruits as an important source of nutrients for the rural people and for the benefits of increasing the use of these species as dietary supplements. This study also suggests that consumption of these fruits in adequate amount could be used to overcome malnutrition problems faced by rural population. Future research work could be conducted on maintaining the nutritional quality of such fruits, minimizing loss of nutrient content through optimization of preservation techniques.

In this study, the phytochemical screening of different solvent extracts of the fruits exhibited the presence of various bioactive compounds *viz*. phenols, tannins, flavonoids, saponins, glycosides, steroids, terpenoids, and alkaloids which have potentials for pharmacological uses. The results demonstrated that the methanol extracts of *E. operculata* fruit (DPPH and FRAP assays) and *A. dioica* fruit (ABTS and H_2O_2 assays) showed potent antioxidant capacity. The methanol extract of *G. sapida* fruit showed the highest total phenolic content (294.35 ± 4.69 mg GAE/g DE) and highest total flavonoid content (116.95 ± 10.71 mg QE/g DE). The highest vitamin C content (8.60 ± 0.30 mg/100 g fresh fruit) was also observed in *G. sapida* fruit. Pearson's correlation study indicated a strong positive correlation of DPPH assay with ABTS and H_2O_2 assays. ABTS assay showed a moderate positive correlation with H_2O_2 assay and a strong positive correlation of TPC with TFC was observed. This study suggests that the fruits could play a positive role against the diseases caused by oxidative stress and could inhibit the development of various diseases. Further, isolation and identification of bioactive compounds responsible for antioxidant activity is encouraged.

From the study, it was found that all the five wild fruit extracts exhibited different degrees of antibacterial activities. *O. alismoides* and *G. sapida* fruit extracts are exhibiting the highest inhibition zone (16.6 mm) at 30 mg/mL against *E. coli* and *P. vulgaris* respectively. When compared to other fruit extracts, *G. sapida* fruit extract was found potentially effective against all bacterial strains (*B. cereus, S. aureus, E. coli* and *P. vulgaris*) at two concentrations (20 and 30 mg/mL). *O. alismoides* and *A. dioica* fruits exhibited the lowest MIC value (7.5 mg/mL) against *S. aureus*, whereas *G. sapida* fruit showed MBC value of 15

mg/mL against *E. coli* and *P. vulgaris*. The present study clearly indicates that the fruit extracts possess antibacterial properties. Therefore, these fruits can be used as natural food preservatives to prevent foodborne pathogens in order to avoid human health hazards of chemically antimicrobial agent applications. Future studies about the substances responsible for the antimicrobial activity can be expanded.

In this study, a total of seventeen amino acids in varying compositions were identified and eight of these are essential amino acids and nine are non-essential amino acids. *A. dioica* fruit showed the highest amino acid content (51.974%) followed by *O. alismoides* fruit (46.816%). *A. bunius* fruits showed the highest NEAA contents (30.417%) whereas *O. alismoides* fruits displayed the highest EAA contents (34.38%). Leucine was found to be the most abundant EAA whereas glutamic acid was found to be the most abundant NEAA. This study indicates that the fruits may be useful as good sources of both EAA and NEAA, and could be served as good natural supplements for EAA which may contribute to proper maintenance and growth of human health.

In this study, the fruit of *O. alismoides* exhibited higher levels of anti-nutritional factors such as oxalate, tannin, saponin and alkaloid. The lower levels of oxalate, phytate and alkaloid contents were observed in the fruit of *A. bunius*. The presence of anti-nutritional factors such as oxalate, phytate, tannin, saponin and alkaloid in wild fruits may affect micro-nutrients absorption and thus make the nutrients unavailable. All the five wild edible fruits contained anti-nutritional factors at varied concentrations and very high levels of anti-nutritional compounds were not observed. As the consumption of raw fruits with high anti-nutrients is not recommended, therefore, future research work is required to explore the different processing technique that will reduce the concentration and effect of anti-nutritional factors in edible wild fruits and enhance their nutritive value.