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Quality evaluation of dehydrated green leafy vegetables during storage

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Abstract
India is blessed with an array of leafy vegetables of which some are cultivated, many are gathered. Green leafy vegetables represent an excellent component of the habitual diet in the tropical and temperate countries like India. They add variety to a monotonous diet, have an alternative taste, attractive in appearance and contribute a pleasing aroma and a natural colour. Now a days, due to urbanization and changes in life style, the consumption of green leafy vegetables is in decreasing manner. These are also highly perishable with shelf-life of only few days owing to higher amount of moisture due to which around 30 per cent of the produce gets rotten and spoilt, becomes inedible and thus rendering wastage. This calls for preservation and processing to prevent losses as well as make them available in the lean season at remunerative prices. Dehydration is considered to be an inexpensive preservation technique. In the present study, six different greens with good mineral profile, namely *Amaranthus viridis, Hedyotis corymbosa, Chenopodium ambrosioides Houttuniya cordata, Rumex vesicarius and Spinacia oleracea* were selected for dehydration using four different methods. Three different packaging materials were also used to study the shelf life of the dehydrated products in terms of moisture content, rehydration ratio and non-enzymatic browning. Among the drying methods, cabinet drying retained better quality of dehydrated greens. Shelf life study revealed that these greens can be easily stored upto 6 months in ambient temperature and HDPE pouches resulted as the best packaging materials than PP pouches and plastic bottles. These greens are easily grown in this region and can be used for drying commercially to increase their availability and shelf life, thus facilitating marketing with minimum facilities.

Keywords: Dehydration, storage study, non-enzymatic browning

Introduction
Assam being blessed with a variety of natural surroundings, varying climates and seasons, has a number of species of edible green leafy vegetables. It is located at the Eastern Himalayan Biodiversity region, one of the two biodiversity 'hotspots' in the country. Green leafy vegetables occupy an important place among the food crops as they promise supply of health protective factors as micro-nutrients like calcium, iron, vitamin A, vitamin C etc. [1]. Inclusion of greens in various forms like curry, stir-fried, chutney etc. was a common practice in Assamese households. But this is in decreasing trend as revealed by NFHS 3 report (2008) [2]. Green leafy vegetables require more time for pre-preparation and also have short shelf life. Green leafy vegetables can be processed and preserved by various methods. Dehydration is one of the traditional methods of preservation, which converts the food into light weight, easily transportable and storable product. There are several advantages of dehydration where vegetables can be easily converted in to fresh-like form by rehydrating and can be used throughout the year. Dehydration facilitates the utilization of the dried leaves in other parts of the country or world where this vegetable is unavailable. In addition to increasing variety in the menu, reducing wastage, labour and storage space, dehydrated vegetables are simple to use and have longer shelf life than fresh vegetables [3].
Hence, the present study was undertaken to increase consumption of green leafy vegetables with the following objectives-

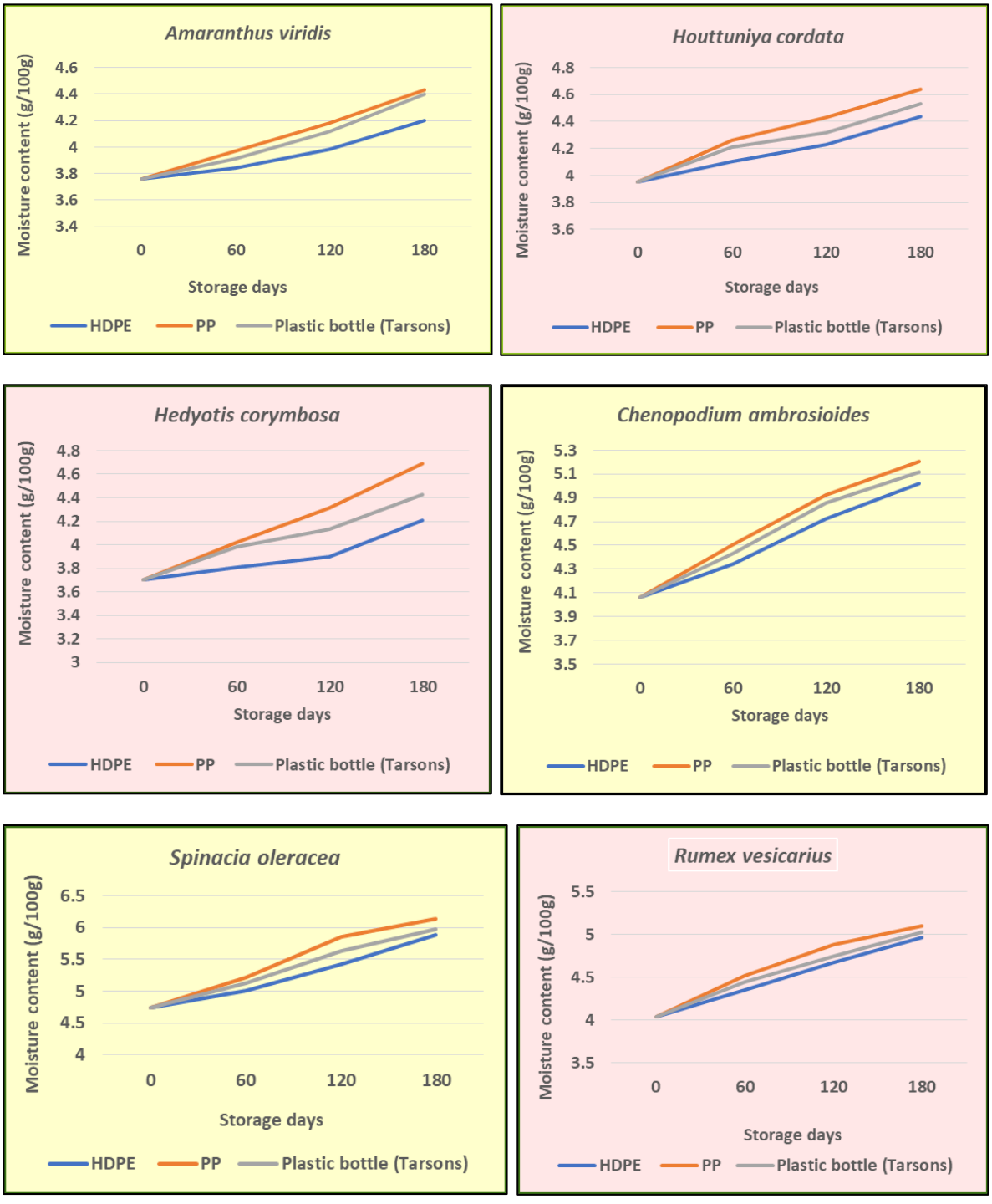
- To dehydrate the selected greens using different drying methods
- To study the effect of shelf life of the dehydrated products

Materials and methods
Six different greens with good mineral profile, namely *Amaranthus viridis, Hedyotis corymbosa, Chenopodium ambrosioides Houttuniya cordata, Rumex vesicarius and Spinacia oleracea* were selected which are commonly grown in this region.

These greens were dehydrated in cabinet dryer in 60 °C. Three different packaging materials namely HDPE pouches, PP pouches and plastic bottle (Tarsons) were also used to study the shelf life of the dehydrated products in terms of moisture content, rehydration ratio and non-enzymatic browning. Moisture content of samples was obtained by drying at 105 °C in an oven using method of AOAC (2000) [4]. Ash, crude fibre, calcium and potassium were estimated by methods of AOAC (2000). Iron and phosphorous content were estimated by methods described by Ranganna (1986) [5]. One gram of sample was soaked overnight in ethanol (20 ml) and non-enzymatic browning was expressed in terms of optical density values at 420 nm. The rehydration ratio of dehydrated GLVs was estimated as per methods of Patil *et al.*, 1978 [6].

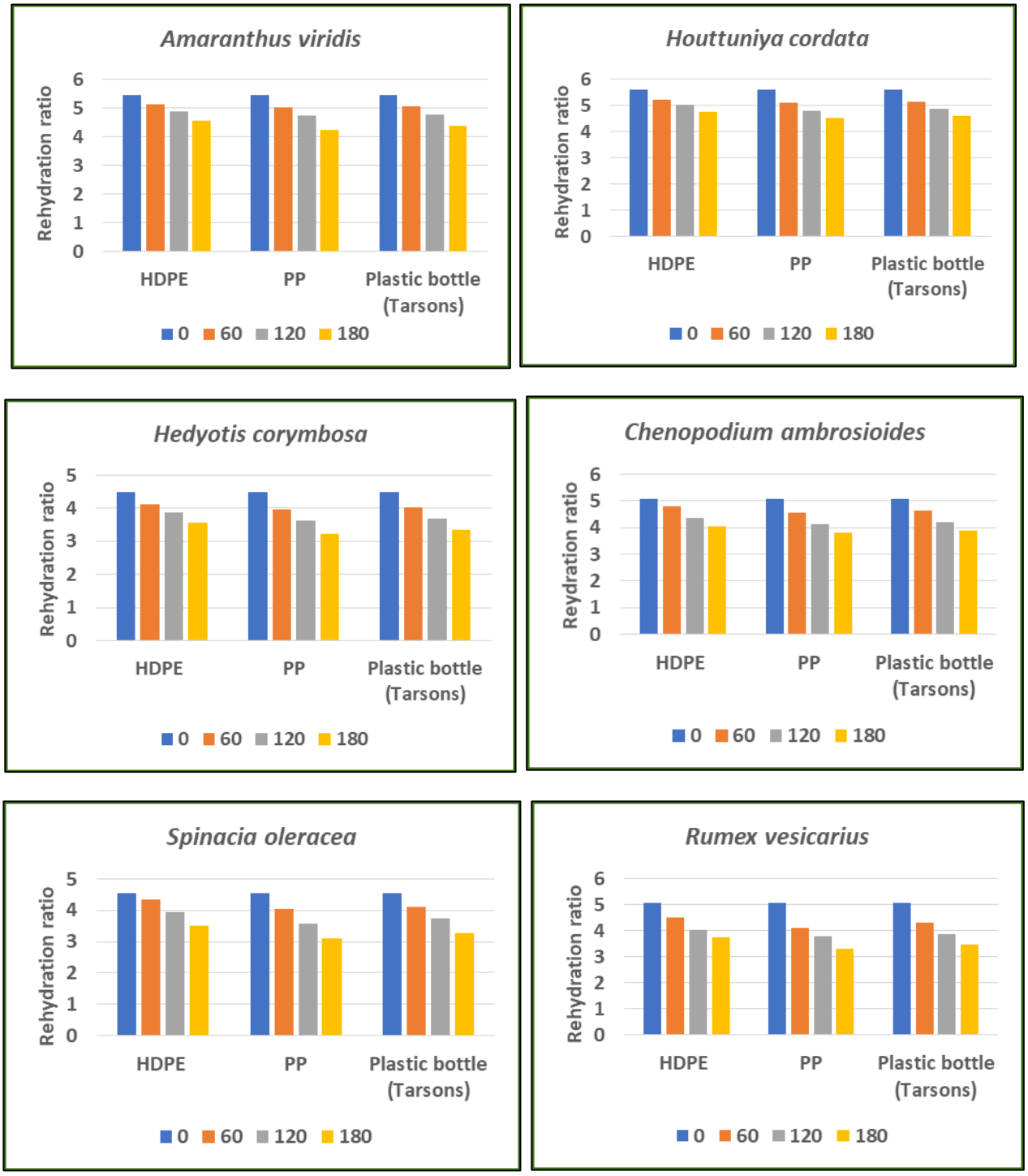
Results and discussion

Moisture content during storage: The moisture content of the dehydrated products during storage was estimated at an interval of 60 days till 180 days. The moisture content increased during storage and maximum increment was observed in PP pouch packed greens. HDPE pouch packed greens showed less moisture increment than the other two packaging materials. In a study by Seevaratnam *et al.* (2012) reported that the moisture content of *Alternanthera sessilis* and *Amaranthus polygonoides* dried green leafy vegetable samples packed in different packaging materials increased gradually with increase in storage period. The rate of increase in moisture was low in samples packed in HDPE followed by plastic bottle and PP pouches. This might be due to high porosity of PP pouches than HDPE pouches [7].



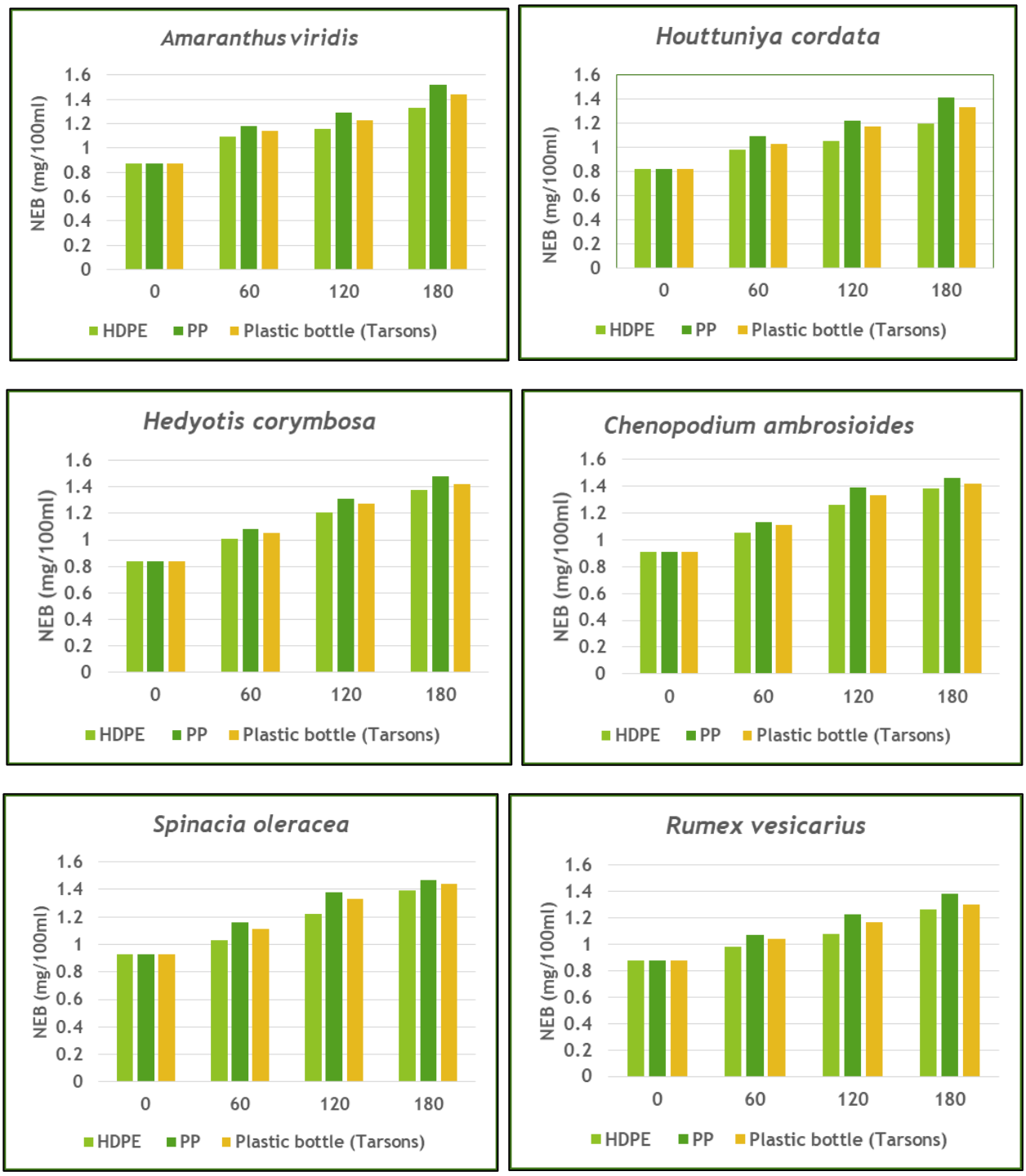
Moisture increment during storage

Rehydration ratio during storage: In the present study, rehydration ratio of dehydrated green leafy vegetables was found to be decreased on storage. Variation was also observed in different packaging materials in reduction of rehydration ratio. HDPE packaged dehydrated greens exhibited highest rehydration ratio and lowest was observed in PP pouch packaged greens. As more moisture permeates through PP pouches than HDPE pouches, this leads to decrease in rehydration ratio of the dehydrated greens. Singh and Sagar (2010) reported similar observation while studying rehydration ratio of dehydrated curry leaves and drumstick leaves during storage in different packaging materials. The rehydration ratio was more in leaves packaged in HDPE films as compared to PP pouches. As more moisture permeates through PP pouches than HDPE pouches, this leads to decrease in rehydration ratio of the dehydrated greens [8].



Rehydration ratio during storage

Non-enzymatic browning during storage: A significant effect was observed by the packaging materials on browning of samples during storage. There was a steady increase in Non Enzymatic Browning (NEB) values which was more in samples packed in PP pouches. At the end of 6 months, the NEB value was lowest in HDPE pouch packed samples and highest in PP pouch packed samples. The increment of non-enzymatic browning values over storage period of 180 days were depicted in following figures-



Non-enzymatic browning during storage

Conclusion

Dehydration increases shelf-life of the greens. Hence, drying is suitable for commercial purpose to make products available in off-seasons. Among the packaging materials, HDPE packaging was found better as it retained more quality parameters than other two packaging materials. Thus from the above study it can be concluded that the shelf-life of the highly perishable green leafy vegetables can be increased by using dehydration up to 6 months without much deterioration of quality parameters. These dehydrated leaves can be rehydrated easily and thus can be incorporated into various preparations and also help to reduce micronutrient deficiency.

References

1. Sheela K, Nath KG, Vijayalakshami D, Yankanchi GM, Patil RB. Proximate composition of under-utilized green leafy vegetables in Southern Karnataka. J Hum. Ecol. 2004; 15(3):227-229.
2. National Family Health Survey-3 NFHS-2 India, 2005-06: Assam Mumbai: International Institute for Population Sciences, 2008.
3. Chauhan SK, Sharma CR. Development of instant dehydrated saag. Beverage and Food World. 1993; 20(4):25-26.
4. AOAC. Official Methods of Analysis. Association of Official Analytical Chemists (17th ed.) Washington, D.C, 2000.
5. Ranganna S. In Handbook of analysis and quality control for fruit and vegetable products. 2nd Ed., Tata McGraw-Hill, New Delhi, India, 1986.

6. Patil VR, Kulkarni DN, Kulkarni K, Ingle UM. Effect of blanching factors on quality and durability of sun dried and dehydrated fenugreek (*methi*). Indian Food Packer. 1978; 32(1):43-49.
7. Seevaratnam V, Banumathi P, Premalatha MR, Sundaram SP, Arumugam T. Effect of Packaging Materials on Retention of Quality Characteristics of Selected Dehydrated Green Leafy Vegetables during Storage. World J Dairy Fd. Sci. 2012; **7**(2):190-194.
8. Singh U, Sagar VR. Quality characteristics of dehydrated leafy vegetables influenced by packaging materials and storage temperature. J Sci. Indust. Res. 2010; 69:785-789.