INTRODUCTION

Chile peppers, native to the Americas, have spread around the world and have been integrated into the diets of many cultures. Much like their heat content, nutritional content can vary dramatically between different pepper types. In this study, a diverse set of Chile pepper types were examined for nutrient content. Some pepper types were found to have high levels of vitamin A, vitamin C, or folate.

Peppers are consumed raw, cooked, and as a spice [1]. The secondary metabolites commonly connected with peppers are capsaicinoids, the compounds that produce their “heat.” Peppers are also a good source of vitamin C, vitamin A, vitamin E, and folate [2-3,4]. A number of factors can affect their nutritional content including agronomics [5], harvest time [6], storage and preparation technique [7,8,9], and cultivar type [10,11,12].

Peppers, with their high nutritional content and global consumption, may have a role in reducing nutrient deficiencies. In this study, a diverse collection of diverse peppers was evaluated for vitamin A, vitamin C, folate, and capsaicin content. Relationships were explored among nutrient levels, geographic origin, species, and breeding status (heirloom/landrace or modern cultivar). Pepper types were identified with high nutrient content and a range of Scoville heat levels, suggesting that subsequent breeding could develop nutrient-packed mild or hot peppers.

Correlations between nutrient content, species, cultivation status, or geographic region were limited. Varietal selection or plant breeding offer tools to augment nutrient content in peppers. Integration of nutrient rich pepper types into diets that already include peppers could help combat nutrient deficiencies by providing a significant portion of recommended daily nutrients.

MATERIALS AND METHODS

Assembly and propagation of diverse germplasm

Pepper types were sourced from various heirloom seed producers across North America to explore their phenotypic diversity. Plants were grown in a completely random design with two replications in Madison, WI.

Vitamin concentration ascertainment

Vitamin A concentrations using a Vitamin A Food Enzyme-Linked Immunosorbent Assay (ELISA) technique (Crystal Chem Inc., IL) and a microplate reader (450 nm) (Epoc 2, BioTek).

Vitamin C concentrations were estimated using an EnzyChrom™ Ascorbic Acid Assay Kit (BioAssay Systems, Hayward, CA) and a microplate reader (570 nm).

Folate concentrations were estimated using a Folic Acid ELISA kit (Eagle Biosciences, Nashua, NH) and using a microplate reader (450 nm).

Capsaicin concentration was estimated using a Capsaiein HS Plate kit (Beacon Analytical Systems Inc., Saco, ME) following manufacturer’s instructions and a microplate reader at 450 nm.

Statistical analysis

Each univariate nutritional compound data set was analyzed using an Analysis of Variance with cultivar as a fixed factor on complete univariate data sets. Cultivar means for each compound were separated using a Fishers Least Significant Variance with cultivar as a fixed factor on complete univariate data sets. Cultivar type means for each compound were separated using a Fishers Least Significant Variance with cultivar as a fixed factor on complete univariate data sets. Cultivar type relationships were explored among nutrient levels, geographic origin, species, and breeding status (heirloom/landrace or modern cultivar).

Exploring Public Data on Nutrition

Data from the USDA National Nutrient Database for Standard Reference Release 28 was downloaded to compare concentration of vitamin A, vitamin C, and Folate in the examined pepper types to other foods known to be high in the nutrients and the effect preparation techniques have on nutrient content [14].

CONCLUSIONS

Direct consumption of the more nutritious peppers assayed here as well as future consumption of nutritionally enhanced varieties could be used in international efforts to address vitamin deficiency. Thus, though not a silver bullet, peppers could constitute an important part of an integrated strategy, including nutrient supplementation and food fortification, for combating vitamin deficiency. While lower quantities of pepper are consumed daily compared to staples, such as maize or wheat, highly nutritious or nutritionally improved peppers can contribute to a diverse and healthy diet.

REFERENCES

9. Further information can be found at: http://www.fao.org/docrep/006/Y4613e/y4613e00.htm
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