

CTAHR RESEARCH NEWS

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Special focus
functional
foods



Corilee Watters and Ted Radovich explore the functional/bioactive components in papaya and kale.

Functional foods explored at CTAHR

TSTAR and Floriculture grants

Students win at college symposium

Enhancing phytonutrients in vegetables through crop management

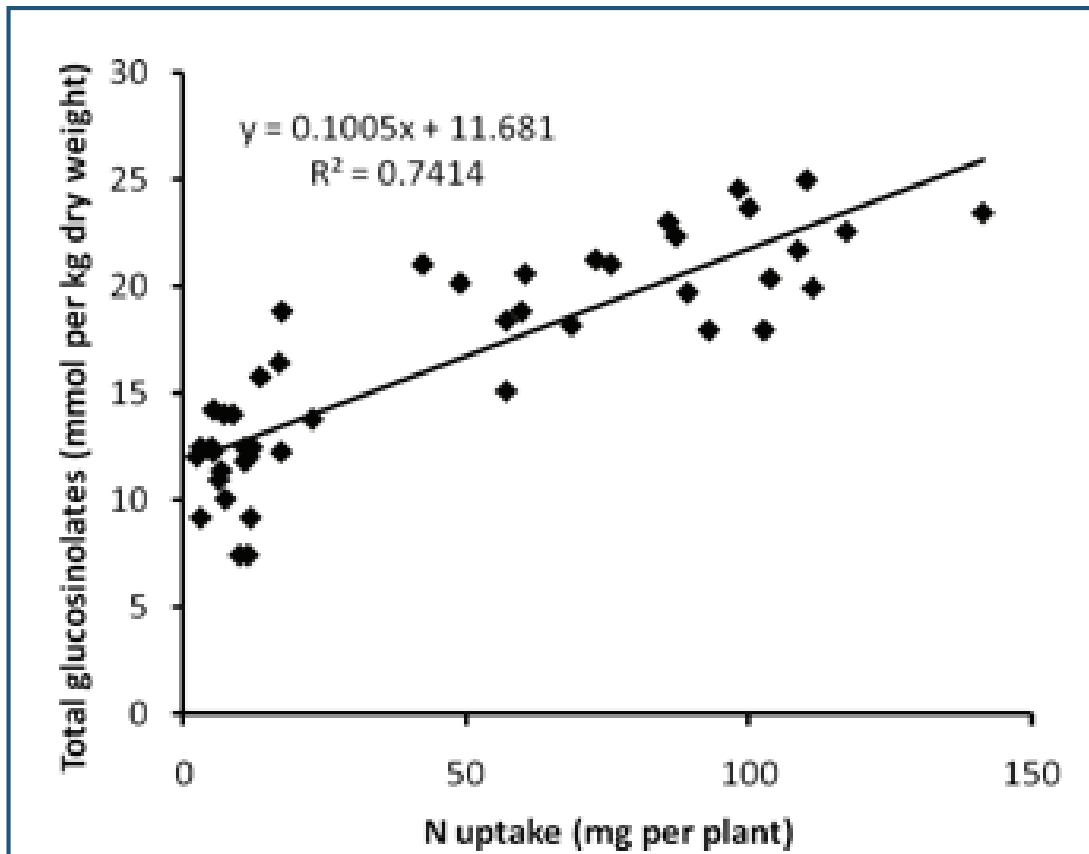
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It has been long recognized that a diet high in vegetables is protective against diseases. There is increased evidence for the health benefits of plant products such as glucosinolates, flavonoids, polyphenols and carotenoids. For example, studies following population groups over time (epidemiology), have found consumption of vegetables in the cabbage family (*Brassicaceae*) to be associated with a decreased risk for developing cancer, and this effect has been largely attributed to glucosinolate content of these vegetables. Glucosinolates are amino acid derived sulfur containing compounds that also affect vegetable flavor (e.g. pungency in radish) and influence the behavior of pests.

The levels of glucosinolates and other phytonutrients in vegetables are determined by many factors, including genotype, plant part, tissue age, and climate. The word *Terrior*, often used in reference to wine, poetically articulates the reality that the living and non-living components of the crop environment can significantly influence the chemical foundation of taste, aroma and human health potential. Our work, along with the work of many others, has demonstrated that management decisions such as cultivar selection, planting date, irrigation, and plant nutrition can influence the content



Chile peppers with different capsaicin content grown at the Waimanalo Research station. Photo by C.N. Lee.



Relationship between Nitrogen uptake and total glucosinolates in Pak Choi. N= 45. (Pant, Radovich and Hue, unpublished data).

of glucosinolates in vegetables, often in a reasonably predictable manner. Glucosinolates and other phytochemicals are thought to play an important role in plant defense, and they frequently increase in concentration under stress conditions such as supra-optimal temperatures or deficit irrigation. However, response to environmental factors is dependent on the plant compounds and environmental factors involved. For example, we and our collaborators recently observed glucosinolate and carotenoid concentrations in pak choi to correspond positively with nitrogen uptake and subsequent growth of Pak Choi, while total phenolics exhibited the opposite relationship to plant nitrogen status.

Chile peppers, pumpkins and other crops have been added to our list as our collaborators and we continue to investigate the independent and interactive effects of genotype and environment on the chemical quality of vegetables. The possibility of managing food systems for optimum chemical quality of crops is exciting and grounded in good science. However, realizing the full potential of “Farming for Functionality” will not be simple nor easy, and will require the continued cooperative efforts of researchers, industry groups and growers.

[Editor's note: for the version of this story with the scientific references, please contact the author at: theodore@hawaii.edu].