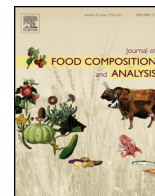




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Original Research Article

## Nutrient composition of selected traditional United States Northern Plains Native American plant foods<sup>☆,☆☆</sup>

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*Urtica dioica* L.

*Rosa pratincola* Greene

Ascorbic acid

Folate vitamers

Vegetables

Fruits

### ABSTRACT

Ten wild plants (cattail broad leaf shoots, chokecherries, beaked hazelnuts, lambsquarters, plains prickly pear, prairie turnips, stinging nettles, wild plums, raspberries, and rose hips) from three Native American reservations in North Dakota were analyzed to expand composition information of traditional foraged plants. Proximates, dietary fiber (DF), vitamins, minerals, carotenoids, and folate vitamers were assayed using standard methods and reference materials. Per serving, all were rich in Mn (100–2808 µg). Several provided >10% DRI of Fe (cattail shoots, steamed lambsquarters, and prairie turnips), Ca (steamed lambsquarters, prickly pear, and prairie turnips), Mg (cattail shoots, lambsquarters, prickly pear, and prairie turnips), vitamins B6 (chokecherries, steamed lambsquarters, broiled prickly pear, and prairie turnips), C (raw prickly pear, plums, raspberries, rose hips (426 mg/100 g), and K (cattail shoots, chokecherries, lambsquarters, plums, rose hips, and stinging nettles). DF was >10 g/serving in chokecherries, prairie turnips, plums and raspberries. Rose hips, plums, lambsquarters, and stinging nettles were carotenoid-rich (total, 3.2–11.7 mg/100 g; β-carotene, 1.2–2.4 mg/100 g; lutein/zeaxanthin, 0.9–6.2 mg/100 g) and lycopene (rose hips only, 6.8 mg/100 g). Folate (primarily 5-methyltetrahydrofolate) was highest in raw lambsquarters (97.5 µg/100 g) and notable in cattail shoots, raw prairie turnips, and blanched stinging nettles (10.8, 11.5, and 24.0 µg/100 g, respectively). Results, provided to collaborating tribes and available in the National Nutrient Database of the United States Department of Agriculture (USDA) ([www.ars.usda.gov/nutrientdata](http://www.ars.usda.gov/nutrientdata)), support reintroduction or increased consumption of foraged plants.

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## 1. Introduction

The diets and nutrient intakes of Native Americans have changed over time. From the 1800s until the 1970s, the fundamental nutritional concern of Native people was a lack of

adequate food (Story et al., 1998). The composition of the traditional diet of Native Americans has changed gradually, with increased intakes of fat and decreased consumption of harvested plant foods (Byers, 1996). Traditional foods of Native Americans (American Indians and Alaska Natives), largely influenced by climate, geography and tribal mobility, are specific to each Native American nation tribe. Fishing, hunting, harvesting and to some extent, agriculture, permitted the tribes to make the best use of indigenous resources. Also specific to the tribes are ceremonial dishes and everyday dishes, where cultural and/or spiritual meaning is very important (Kittler and Sucher, 2001).

Currently, traditional foods and particularly plant foods are not being eaten on a regular basis. A 2002 survey found that fewer than 10% of Native American children consumed traditional foods (Lytle et al., 2002). Moreover, among the foods actually being eaten at

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present, only 7 of the more than 1300 foods listed were identified as traditional. Surveys have shown that Native Americans regard traditional foods as health-promoting (Powers and Powers, 1990), but these foods are usually consumed only at special ceremonies and celebratory events (Bass and Wakefield, 1974; deGonzague et al., 1999; Toma and Curry, 1980; Woolf et al., 1999; Zephier et al., 1997).

The under-nutrition among Native Americans prevalent in the 1970s has been replaced by over-nutrition, in which contemporary food products, which are low in micronutrients (vitamins and minerals) but high in energy content (particularly fat) and are known to promote obesity, predominate (Lytle et al., 2002; Stang et al., 2005; Story et al., 1998; Taylor et al., 2005; Zephier et al., 1997). Studies of dietary intakes of Native Americans in Arizona, North Carolina, North and South Dakota, and Oklahoma found that vitamin and mineral intake fell under the recommended levels, but that fat consumption exceeded what is recommended in health guidelines, at >35% of daily energy intake (deGonzague et al., 1999; Zephier et al., 1997).

Many plant foods are rich in health-promoting components, including vitamins, minerals, and other bioactive factors, and have low fat and high fiber contents. It is likely that promoting consumption of traditional Native American foods could improve nutrition in these populations (Burns Kraft et al., 2008); however, there is a paucity of information on the nutrient contents of these plant foods, particularly the ones traditionally consumed among tribes in the Northern Plains (Schauss, 2010; Woolf et al., 1999). Nutrient composition data for these foods are needed to develop nutrient databases that support both practical and research applications that rely on food composition data (Amy and Pehrsson, 2003; Ershow, 2003; Pennington, 2003), to increase knowledge of biodiversity in food composition (Burlingame et al., 2009), and to facilitate health intervention research and programming.

Although some reports exist on some of the nutrients in a few of the foods (e.g. Andersson et al., 2011; Bhargava et al., 2008; Guil et al., 1997; Guil-Guerrero et al., 2003; Kuhnlein, 1990; Yildirim et al., 2001), without common control samples between studies it is impossible to compare nutrient concentrations since inter-laboratory analytical uncertainty could be confused with a true difference in composition (Phillips et al., 2006a). Additionally,

growing conditions can affect the concentration of nutrients in the same plant (Bhargava et al., 2008; Pennington, 2008), and biodiversity of food composition is of increasing interest for sustainable food supplies (Burlingame et al., 2009; Charrondièrre et al., 2013; Heywood, 2011; Toledo and Burlingame, 2006).

This study focused on the composition of the foods collected in season by the Northern U.S. Plains Native American tribes. The nutritional content of several traditional Native American plant foods collected in season from reservations in the Northern Plains region of the US, analyzed as part of the US Department of Agriculture (USDA) National Food and Nutrient Analysis Program (Haytowitz et al., 2008), including detailed quality control and results for commercially available reference materials, to increase data on the composition of traditional Native American foods (Amy and Pehrsson, 2003).

## 2. Materials and methods

### 2.1. Samples

Staff from United Tribes Technical College (UTTC) (Bismarck, ND, USA) contacted tribal leaders and elders of the Turtle Mountain Band of Chippewa (Belcourt, ND, USA), three affiliated tribes of Ft. Berthold, ND (Mandan, Hidatsa, Arikara), and Standing Rock Sioux reservation (ND) and received permission for participation in this study. UTTC staff accompanied selected tribal elders who collected traditional plant foods: prairie turnips (*Psoralea esculenta* Pursh.), lambsquarters (*Chenopodium album* L.), cattail broad leaf shoots (*Typha latifolia* L.), stinging nettles (*Urtica dioica* L.), wild plums (*Prunus americana* Marshall), chokecherries (*Prunus virginiana* L.), wild rose hips (*Rosa pratincola* Greene), wild raspberries (*Rubus idaeus* L.), beaked hazelnuts (*Corylus cornuta* Marshall), and plains prickly pears (*Opuntia polyacantha* Haw.) in a culturally respectful manner in 2005 during the typical foraging season (May and June) at each of the three reservations located as indicated in Fig. 1. A late frost and other impediments to optimal growing conditions limited the number and amounts of plant foods that were available for collection; a total of 0.5–2 kg of each plant was sampled. The total amount comprised one sample for each food except prairie turnips (2 samples), chokecherries (3 samples), stinging nettles (2 samples), cattail shoots (3 samples), and lambsquarters

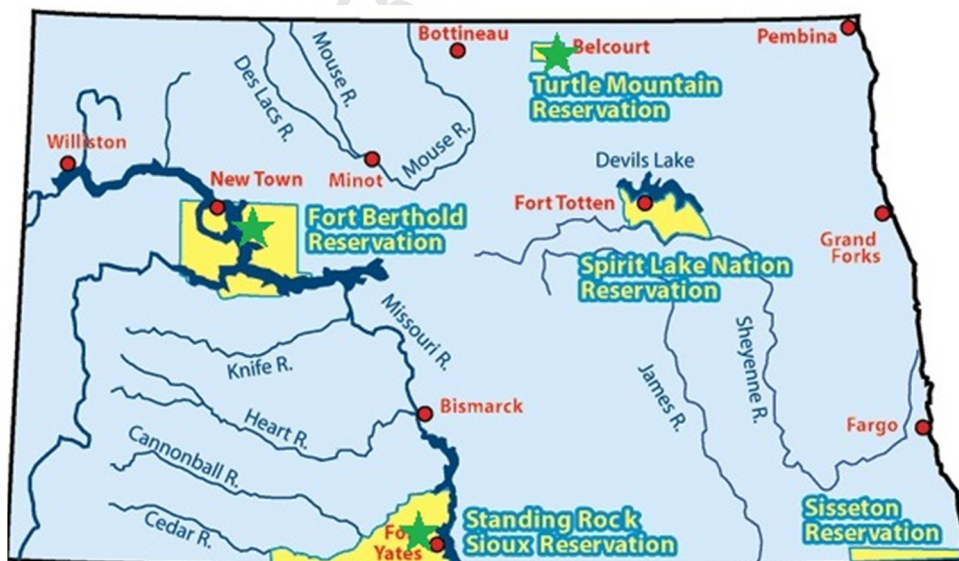


Fig. 1. Sampling locations (★) for Native American Plains Indian food samples (source of underlying map: North Dakota Studies Program, State Historical Society of North Dakota, <http://www.ndstudies.org/images/aind/reservations.gif>).

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