Nutritional Value of Bamboo Shoots

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Georgia Bamboo Inc., supports research to find out the per acre yield of bamboo shoots. The support began in 2010 and is scheduled through 2015. In 2012 the SE Chapter of ABS decided to enhance the yield research by funding nutritional analysis. We funded analysis of bamboo shoots from three varieties of bamboo. The shoots were dug from Georgia Bamboo's locations in Fort Valley and Bonaire.

Data on the nutrition of tropical bamboos is available on the web from India. Data on the nutrition of moso and other temperate bamboos is available from China. Data on canned bamboo is found on the back of cans in grocery stores. We could not find nutritional data for bamboo shoots grown in the United States, and, especially for temperate bamboos, grown in middle Georgia.

We expected our data to be similar to chinese data for moso. Because analysis is expensive, we sent samples from three of our groves rather than from the eight that we harvest. We had a basic analysis done. A more extensive one would have included vitamins, minerals, amino acids, and other more obscure nutritional factors.

I sent samples of *Phyllostachys praecox* (Early Bamboo), *P. edulis* (moso bamboo), and *P. bambusoides* (Japanese timber) to EMSL Analytical, Inc. in Cinnaminson, New Jersey. The shoots were peeled, sliced, dropped into boiling water for 5 minutes and then cooled rapidly. They were sent overnight in an insulated box with a cooling pack. One pound of each variety was sent. *P. praecox* was mailed March 11; Moso, March 27, and, Japanese timber, April 18.

Once shooting began, I had been cooking bamboo shoots in various ways and eating them twice a day. They hold their shape and are crisp whether broiled, baked, grilled or boiled. They satisfy the need to chew the way meat does. They can substitute for meat in a meal because they have the same filling effect as meat and far fewer calories. Most recipes do have meat in them for flavor and bamboo for filler, flavor and appearance. Bamboos look beautiful in a serving of food.

I was surprised that the tests for *P. praecox* and *P. edulis* came back "no fiber". I had understood that bamboo shoots were "loaded with fiber". They feel full of fiber when chewed. For these reasons and because I had read that bamboo shoots are rich in fiber, I was sure my shoots would test "high in fiber". In fact I thought the "high in Fiber" aspect was one of the reasons that bamboo shoots are considered such healthy food.

The analysis of the Japanese timber sample differed from that of praecox and moso. Japanese timber did have a little fiber. I surmise that the reason is because I harvested the Japanese timber shoots when they were slightly past their prime time for harvesting. My surmisal is that they were beginning to develop fiber in preparation for elongation. On the other hand, perhaps there is a difference between Japanese timber and the other two.

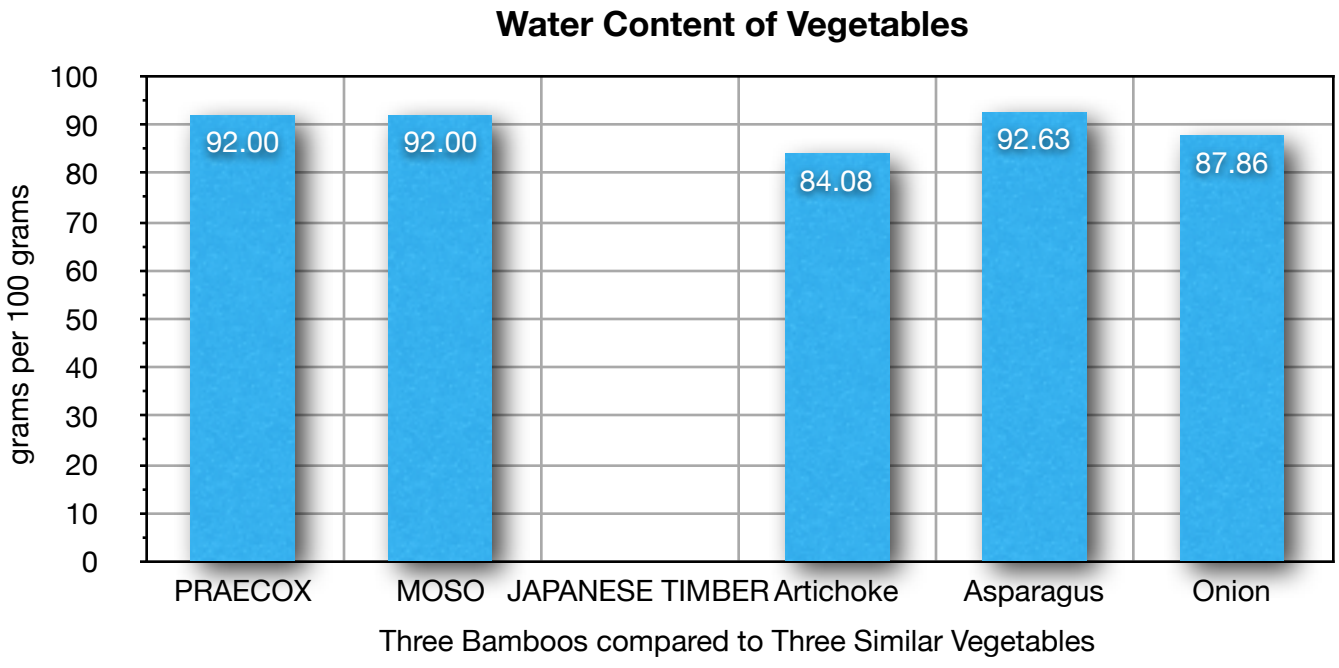
When I read the data from EMSL, Inc., I was not sure what the data meant. I realized that a food that has no fat and no sugar and a lot of water is good for weight management. Other than that, I was not sure why article after article stresses that bamboo shoots are very healthy to eat. To find out what the data meant, I decided to compare bamboo shoots to similar vegetables. I chose artichoke, asparagus and onion. See Table 1 below.

Table 1
NUTRITIONAL COMPARISON OF BAMBOOS AND VEGETABLES
Sample size is 100 grams

Vegetable	Water %	Calories kcal	Protein grams	Carbo. grams	Fat grams	Sugar grams	Fiber grams	Vit. C mg
P. praecox	92	28	1.39	5.50	0.0	0.0	0.0	2.66
P. edulis	92	29	1.82	5.3	0.0	0.0	0.0	3.3
P. bambusoides	?	30	1.54	6.0	0.0	1.2	2.15	0.0
Artichoke	84.08	53	2.89	11.95	0.34	0.99	8.6	7.4
Asparagus	92.63	22	2.40	4.11	0.22	1.30	2.0	7.7
Onion	87.86	44	1.36	11.95	0.19	4.73	1.4	5.2

Right away you can see that bamboo shoots are mostly water. They are low in calories and have no fat and no sugar (except for bambusoides). They have a smattering of protein and some carbohydrates. Clearly they are a good choice for diabetics and for people wanting to lose weight.

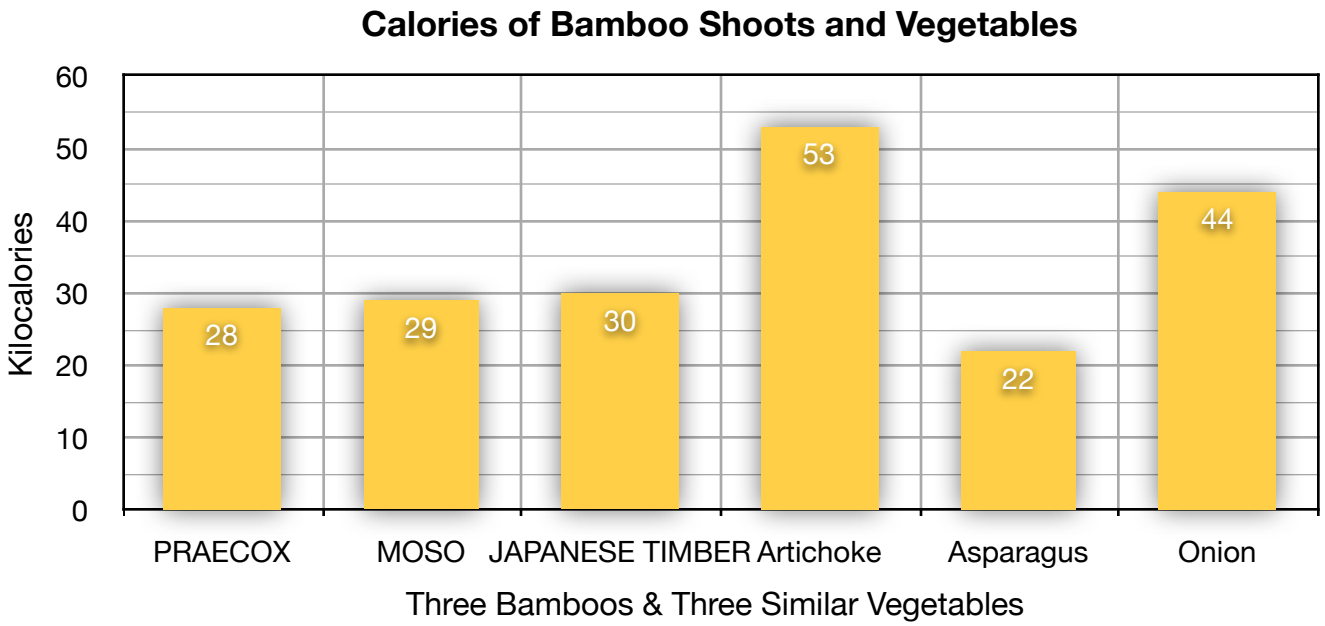
Chart 1



In water content, the three varieties of bamboo are similar to each other and to asparagus and onion. Artichoke has less water than onion and asparagus. Is eating vegetables like drinking water...? I read that in general our bodies are 60% water. Babies are more water, old people are less. Drink water and stay young?

Clearly bamboo and other vegetables are low in calories. It is intuitive that onions and artichokes have more energy per 100 gram serving than asparagus and bamboo shoots. Bamboo qualifies as a fine vegetable to eat for weight management. It fills you up with few calories.

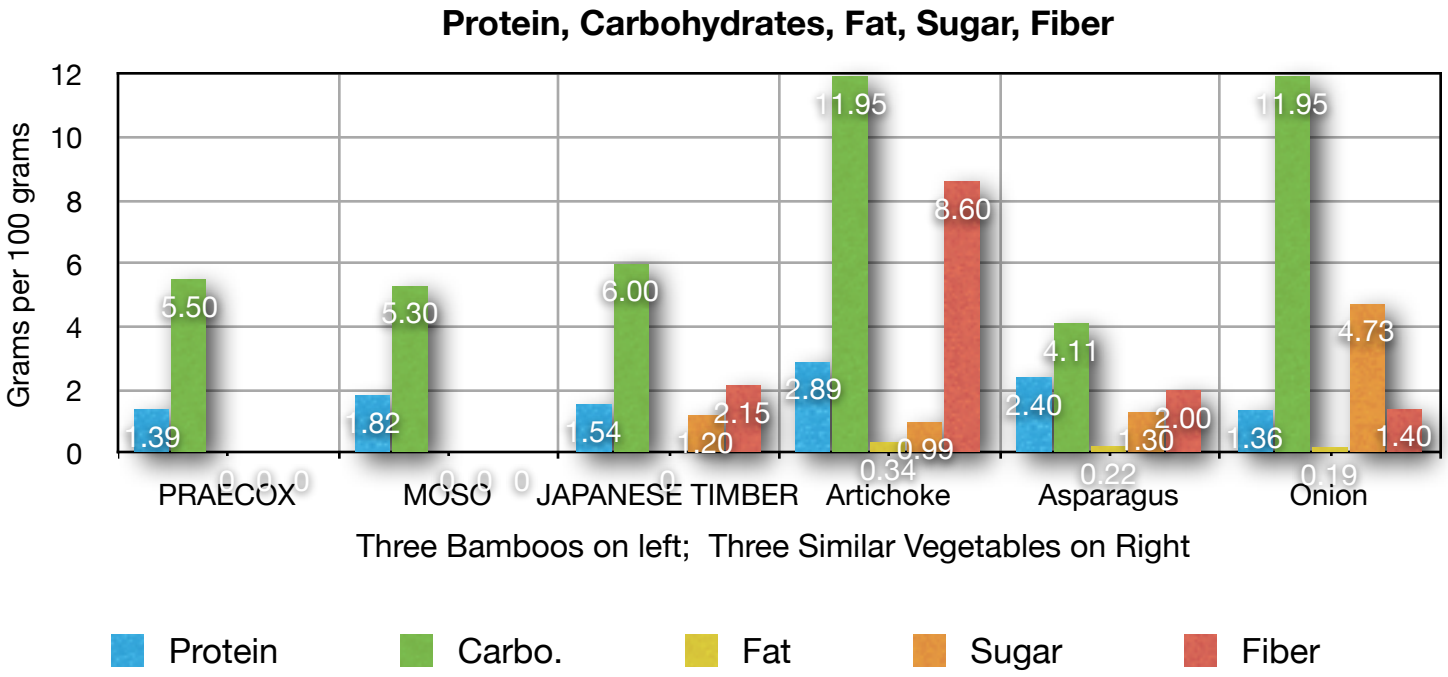
Chart 2



All three bamboos have similar amounts of protein and carbohydrates. Bambusoides also has a small amount of sugar and fiber. I suspect that the shoots were older when harvested. In other words, they had been out of the ground for a few more days than the praecox and moso. I assume that had I harvested bambusoides shoots when just a few days out of the ground, its graphs would be like those of praecox and moso. Artichoke, asparagus and onion are more complex than bamboo shoots. Each of these has similar amounts of protein, different amounts of carbohydrates and, in addition, varying amounts of fat, sugar and fiber.

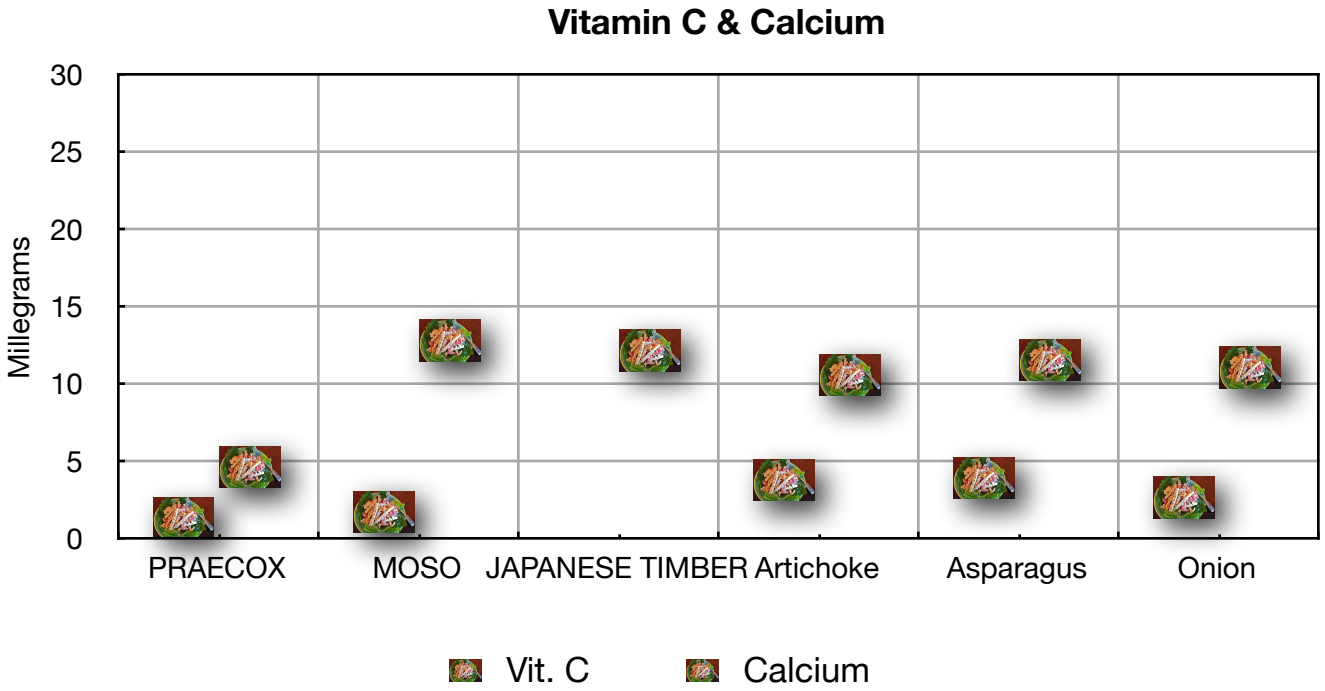
Artichokes and onions are harvested when the edible parts are mature. Like bamboo shoots, asparagus spears are harvested when the edible part is just elongating out of the ground. Does that explain the differences? Next season in 2013, I will compare bamboo shoots at a few days out of the ground with ones several days out of the ground. My assumption is that fiber would appear in the older shoots.

Chart 3



We think that we need to drink milk to get calcium. Perhaps if we just ate our vegetables, that would be sufficient. And to prevent scurvy from lack of vitamin C? Eat vegetables...

Chart 4



Asian writers state that bamboo shoots are a healthy food. A very healthy food! A web site called Asian Bamboo AG writes the following.

“A traditional forest vegetable in China for more than 2,500 years, bamboo shoots are not only delicious but are also rich in nutrients, and rank among the five most popular healthcare foods in the world. In Japan, the bamboo shoot is called the King of Forest Vegetables.

Modern research finds that the bamboo shoot has a number of medicinal benefits, from cancer prevention and weight loss to improving appetite and digestion. It is also low in sugar and therefore can be used for treating hypertension, hyperlipemia and hyperglycemia.

Japanese scientists recently discovered that bamboo shoots contain anti-cancer agents and making them a regular part of your diet effectively eliminates the free radicals that can produce dangerous carcinogens.”

Our data confirm the claim for weight loss. Bamboo shoots have 28 - 30 calories per 100 grams. Our analysis did not go into details like minerals, vitamins, and amino acids. We can not confirm further health claims.

My experience cooking fresh bamboo shoots in 2011 and 2012 takes some of the mystery out of them. Simply put, bamboo shoots are a vegetable. Cook them the way you cook other vegetables. Do you like to grill vegetables? Then grill the shoots. Do you like to stir fry vegetables? Then peel them, cut them into pieces, and drop them into the wok with the other vegetables. Remove the mystery from these vegetables!

Table 2 shows the data from EMSL Analytical compared to data from the web site Asian Bamboo and from the USDA nutritional web site. I do not know if these two analyses were done with quickly boiled shoots like ours. The Asian Bamboo site says it averaged data from 27 (!) varieties of bamboo. The 27 varieties would be tropical ones given that the authors are located in India. The USDA site does not say what variety was tested.

Table 2 EMSL Data Compared to Others

Vegetable per 100 grams	Water /100 g	Calories kcal	Protein grams	Carbo. grams	Fat grams	Sugar grams	Fiber grams	Vit. C mg	Calcium mg
PRAECOX	92	28	1.39	5.50	0.0	0.0	0.0	2.66	9.13
MOSO	92	29	1.82	5.3	0.0	0.0	0.0	3.3	25.5
JAPANESE TIMBER	?	30	1.54	6.0	0.0	1.2	2.15	0.0	24.2
Average of 27 varieties*	90.86	?	2.65	?	0.49	?	0.58	?	?
USDA	91	27	2	5	0.0	3	2.0	4	13
MOSO/ INBAR	92	?	2.15	5.6	?	?	?	?	5.8

I look at these data and wonder why bamboo shoots are considered a health food. Nirmala Chongtham, Madho Singh Bisht, Sheena Haorongbam claim great health benefits in their on-line article published 6 April , 2011, “Nutritional Properties of Bamboo Shoots: Potential and Prospects for Utilization as a Health Food”.

“Bamboo shoots are gastronomic treats whether used fresh or in fermented or roasted form. In addition to being delicious, bamboo shoots are rich in some nutrient components, mainly proteins, carbohydrates, and minerals but have a low fat content. Bamboo shoots also contain phytosterols and a high amount of fiber that have cholesterol-lowering and anti-carcinogenic activity and therefore could be called nutraceuticals or natural medicines.”

Chongtham, Bisht, and Haorongbam also write: “Bamboo shoots are low in calories, high in dietary fiber, and rich in various nutrients. The main nutrients in bamboo shoots are protein, carbohydrates, amino acids, minerals, fat, sugar, fiber, and inorganic salts.”

Our tests show low calories and sufficient proteins and carbohydrates. We did not find the fat and sugar and fiber that Chongtham, Bisht, and Haorongbam found. While our shoots did not have fiber, they certainly moved through my digestive tract as if they did.

Our shoots were harvested when above ground. They had no sugars. According to “Characteristics of Sugar Content in Different Sections and Harvest Maturity of Bamboo Shoots” on-line at HortScience, sugar content is greater when shoots are harvested below ground than when harvested above ground.

The Table Below ranks various foods in order of protein content. Animal derived foods like chicken, cheddar cheese, eggs and yogurt have five to twenty times more protein. Plant derived nuts like almonds and pecans have 6 to 14 times more.

I concur that bamboo shoots are an excellent food to add to American diets. They are excellent for what they don’t have as well as what they do have. Not having sugar means they are good for diabetics. Having few calories means they are good for all of us.

Table 2 Nutritional Values of Various foods sorted by protein content.

per 100 grams	Water /100 g	Calories kcal	Protein grams	Carbo. grams	Fat grams	Sugar grams	Fiber grams	Vit. C mg	Calciummg	
chicken	59.45	239	27.3	0.00	13.6	0.00	0.0	0.0	15	
cheddar	36.75	403	24.9	1.28	33.1	0.52	0.0	0.0	721	
almonds	4.7	575	21.22	21.67	494	3.89	12.2	0.0	264	
egg	74.62	155	12.58	1.12	10.6	1.12	0.0	0.0	50	
pecans	3.52	691	9.17	13.86	72	3.97	9.6	1.1	70	
navy beans, boiled	63.81	140	8.23	26.05	0.62	0.37	10.5	0.9	0.69	
peas	77.87	84	5.36	15.63	0.22	5.93	5.5	14.2	27	
yogurt	85.07	63	5.25	7.04	1.55	7.04	0.0	0.8	183	
beet greens	89.13	27	2.57	5.46	0.20	0.60	2.9	24.9	114	
avocado	78.8	120	2.23	7.82	10.1	2.42	5.6	17.4	10	
green beans	89.22	35	1.89	7.88	0.28	1.55	3.2	9.7	44	
MOSO	92	29	1.82	5.3	0.0	0.0	0.0	3.3	25.5	
JAPANESE TIMBER	?	30	1.54	6.0	0.0	1.2	2.15	0.0	24.2	
PRAECOX	92	28	1.39	5.50	0.0	0.0	0.0	2.66	9.13	
tomatoes	94.52	18	0.88	3.89	0.2	2.63	1.2	13.7	10	
apple	85.56	52	0.26	13.8	0.17	10.39	2.4	4.6	6	
***boiled, drained**										

CONCLUSION

Our tests do not address most of the health claims found on web sites. They do show that the nutritional data of *Phyllostachys* bamboos grown in Georgia is similar to the nutritional data of moso bamboo grown in China. However, we do not find that bamboo shoots have fiber. The obvious benefits of eating bamboo shoots are that they taste great, fill you up, move your bowels, and have few calories. None of the calories comes from sugars. With 33% of Americans obese and 8.3% with diabetes, bamboo shoots are indeed a health food.