

## Witloof endive, Jicama and artichokes – soluble fiber

### When you gotta go, you gotta go

The Asteraceae is the largest plant family, but oddly does not contribute much to human nutrition other than sunflower seeds for oil and snacks for baseball players and the artichoke, *Cynara cardunculus* and the Jerusalem artichoke, *Helianthus tuberosus*. The real contribution to humanity of the Asteraceae family is to dominate salads with the many lettuces, *Lactuca sativa* (butter, Iceberg, Leaf, Oak Romain) and the most common weed in my lawn, the dandelion. The Asteraceae family also contributes the Chicories, *Chichorium endiva* (Endive, Escarole, Frisee and Radicchio); and *Chicorium intybus* (Catalonga and Belgian endive) as well as common chicory root, one of the industrial sources of food grade inulin).

The most common plant carbohydrate to store energy is insoluble starch which are strings of thousands of glucose sugars; an alternative is common in the Asteraceae family, soluble inulin, which is a storage carbohydrate made of fructose polymers. It is hypothesized that the solubility of inulin allows plants to adjust osmotic potential and may contribute to cold tolerance; I accepted this hypothesis until I became aware that a tropical legume in the Fabaceae family, Jicama, *Pachyrizus erosus*, from the Central American tropics also stores inulin in its tuberous roots. When I first encountered Jicama, I thought it was exotic and was warned by farmers in Costa Rica that the foliage, fruit and seeds were toxic due to high concentrations of rotenone. Jicama roots are now commonly available in US supermarkets and their crispy texture and sweetness (due to inulin) make it a terrific companion to a low calorie salad or fruit plate.



For human nutrition, the distinction between starch and inulin is important, as we humans are “imperfect vessels” and we do not have the enzymes necessary to digest inulin; thus it goes in, and shortly afterwards, comes out, as dietary fiber. Inulin is sweet, so it can be used to sweeten foods or drinks with reduced calories. If you feel a desire to become “regular”, I would recommend having a vegetarian lunch at the Giant Artichoke restaurant in Castroville, CA., everything on the menu, even the coffee, is made from artichokes – needless to say the influx of dietary fiber will keep you “going” for weeks on end. Pack some toilet paper.

Another somewhat strange vegetable is witloof Belgian endive. This is comes from the chicory root, but one selected for forcing. The plants are grown during the summer and in the fall you cut off the leaves and harvest the root which is stored at low temperatures (vernalization) and then in the winter the roots are planted in the dark and the buds begin to grow – this is the vegetable – pretty unique. Who the heck first thought of



this? Was it a fortuitous accident?

100 g	Belgian Endive	Jicama	Artichoke	Potato
Calories	16	38	46	78
Fat	0.4	0.1	0.1	0.1
Total carbohydrate	2.4	8.8	10	18
Dietary fiber	2.4 100 %	5 57%	5 50%	2.2 12%
Sugar	0.4	0.2	1.0	1.0
Protein	1.2	0.7	3.2	2.0
Vit A	10%	2%	0	0
Vit C	2 %	33 %	25%	70%

The difference between plants that store carbohydrates as inulin compared to the potato which stores carbohydrates as starch is striking. Not only are total carbohydrates lower in Endive, Jicama and Artichoke, but also the percentage of dietary fiber (non digestible carbohydrates from inulin) is much higher 50 to 100%, compared to the potato, 12%. This

difference is also indicated by the much lower caloric content of the inulin producers compared to the starchy potato. Thus, Belgian endive, Jicama and Artichoke are not only delicious, but also can contribute to a lower calorie diet. The only down side of Belgian endive is that is an acquired taste that is somewhat bitter due to the ‘sesquiterpene lactones’ which are sleep inducing and bitter tasting

compounds. There is current research to use genomic Crisper/Cas to turn off these genes to make endive sweeter. I wonder if the lactones also make insects fall asleep as they eat the leaves?