

What can you grow hydroponically? Article 2 Stevia rebaudiana Bertoni

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In this series of articles I plan to describe various plants that we have grown hydroponically and which we know to be of interest in terms of commercial cultivation.

For the first article I chose Arnica Montana, that well-known medicinal plant, the illegal picking of which is endangering the plants of our mountain grasslands. Today I'm continuing with another plant which we have grown in our greenhouse, *Stevia rebaudiana Bertoni*, the cultivation of which is easy, the yield plentiful and the market, which is only just coming into being, particularly promising.

Indeed, *Stevia* has several interesting characteristics:

- It is traditionally recognised in many countries for its sweetening and also medicinal power.
- It is easy to grow hydroponically, with attractive results
- Despite legislation which continues to be cautious in Europe and the USA, it has every chance of being authorised in the coming years, thus opening up new production alternatives for private and industrial consumption which will rapidly expand.
- As far as its added value is concerned, we already know that it is extremely profitable, if the figures given on the Internet are to be believed.

Stevia, the plant.

Stevia rebaudiana Bertoni, the variety used, was named in 1899 by the first scientist to profile it, Dr. Bertoni. It is native to the Rio Monday valley in North Eastern Paraguay and belongs to the Asteraceae family. Its principle characteristic is its extreme sweetening power. It is also recognised as having a number of therapeutic properties, particularly for fighting obesity, diabetes and hypertension. It has been used since the mists of time by the Guarani Indians to sweeten mate, their traditional infusion. They call it *caá-êhê* or "sweet grass".

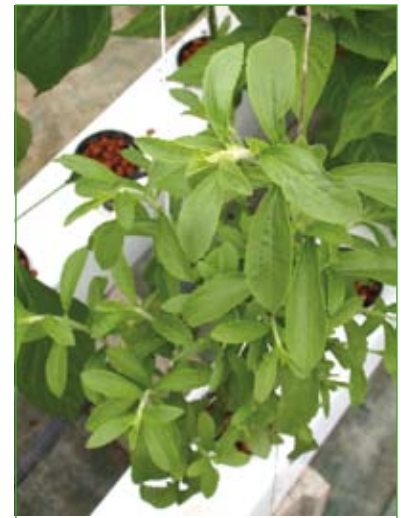
Stevia principally contains steviosides and rebaudiosides. The intensity of its sweetness and its taste are proportionally dependent on its content of four major diterpenic glycosides found in the leaves, veins and stems: Stevioside (5-10%), Rebaudioside A (2-4%), Rebaudioside C (1-2%) and Dulcoside A (0.5-1%). These glycosides are between 40 and 250 times sweeter than the sugar we commonly consume. Steviosides are rather bitter, whilst Rebaudiosides are sweet (www.puresweet.com.au).

Stevia is a small, dense shrub of roughly 50-80cm in height when growing wild, reaching up to 1m in height when cultivated. It has intense green lanceolate leaves growing diametrically opposite on the stem. Its flowers are small and white and its tiny seed plentiful yet difficult to germinate. The roots are fibrous and dense. The part used is the leaf, bearing in mind that from the time the plant starts budding its active principle concentration decreases.

It is a hardy sub-tropical plant which is affected by frost. Its ideal temperature is between 15°C and 26°C. It likes light and should be placed in full sunlight when outdoors. Indoors, MH or HPS lamps are recommended, but neon, which is more economical, can also be used. It needs little in the way of fertilisers so it can be grown on relatively poor land, bearing in mind that it does, however, need significant amounts of phosphate. It must be watered regularly as it likes wet soil rather than dry. It can be harvested up to 5 times a year for around 6 years, especially if you care for the roots appropriately and cut the plant right back after each harvest (<http://bio.kuleuven.be>).

We have been growing *Stevia* successfully for many years but without ever attempting commercial-type cultivation. We have grown it using the AquaFarm, the AeroFlo and the Dutch Pot Hydro and using Flora Series, Diamond Nectar and Mineral Magic. This year we have also grown a *Stevia* seedling in a Dutch Pot Aero using BioSevia and BM (see photo). Since the plant likes little nitrogen and more phosphate it is a perfect candidate for biological cultivation!

Growing *Stevia* is not always easy. For a start you have to germinate the seeds. We have sown them in very large quantities only to achieve limited results. We therefore prefer to take cuttings, which is more successful. You can also split it at the end of the season, which seems to be the best means of reproduction. Neverthe-



Young Stevia in an AeroFlo



Stevia grown in a Dutch Pot Aero with BioSevia and BM

less, our plants remain rather small in relation to the metre-high cultivated shrubs referred to in the literature. Ours seldom exceed 50-70cm. It must be said that, as commercial cultivation was not our aim, we did not force the plants but rather were happy to develop shrubs that were just large enough for personal consumption. Our plants are, however, beautiful, large-leaved, deep green in colour and extremely lush.

Stevia's known enemies are primarily aphids and slugs. The literature talks of Septoriosis, a fungal disease which is believed to be the cause of significant crop loss but which, fortunately, we have not yet experienced (gireaud.net/stevia.htm). Our plants have been affected by whitefly, those little white flies which can be particularly destructive. We fought them using *Macrolophus caliginosus*, one of their natural predators.



Stevia flowers

It is the old leaves which are the richest in active principles. The harvest must take place before budding begins. You must therefore cut the plant back before August/September, when it starts to bud. It can be cut back often in order to preserve it over time and thus get several harvests in a year. Fresh leaves can be used. They have a rather strong taste, similar to that of liquorice. But it is generally used in its dried powder form. It is also converted in some countries and comes in the forms of both a white crystalline powder and an extremely concentrated liquid extract. The leaves are dried in the shade, in a ventilated space and below 40°C, in order to preserve them for as long as possible. In order to prepare it for consumption the well-dried, crisp leaves must be crushed in a coffee mill. (www.aromatiques.com/fichesculture.stevia.html). This leaves you with a more or less finely ground green powder that can be added to coffee and infusions and that can also be used in cooking since it remains stable when faced with pH variations and high temperatures.

If you live in a country where it is forbidden to consume it, you should not do so. But anywhere else, in a private capacity, there is nothing to prevent you from growing your own Stevia plant at home, on your balcony or indoors. The result will be your own plant, the quality of which will be in your control, and which you can use to sweeten your infusions. In order to avoid consuming too much of it, it is recommended that you start with very small doses and adapt it to individual tastes. However, care should be taken when using it for therapeutic purposes; it is always best to consult a doctor before beginning any self-treatment as plants can also be harmful.



Is Stevia dangerous, then? Why should this interest us?

Stevia is natural product which contains 0 calories, especially when consumed in the form of dried leaves. It has become increasingly successful over the past few years, primarily due to its sweetening power but also because of its therapeutic properties. Stevia does indeed seem harmless and can be an advantageous replacement for sugar and especially its substitutes such as aspartames, saccharins and cyclamates, the extreme dangers of which are now recognised. It also seems that it can be used for hypertension, digestive problems, obesity and oral hygiene and that it is of particular interest to diabetics, who can safely consume it.



Stevia grown in an AeroFlo with Flora Series, Diamond Nectar and Mineral Magic

The tribes of South America (Brazil, Paraguay and Uruguay) have been using Stevia for centuries for its sweetening and therapeutic powers with no apparent problems thus far. There is much scientific research today, particularly in Australia and Thailand, which does not show the plant to involve any danger. Nevertheless it remains a "risk" for the health services in some countries, especially in the West. It is a very controversial plant in Europe and the United States especially, where they insist on its potentially dangerous side and where further in-depth studies are awaited. We therefore have a European law, document 300DO196 dated 22nd February 2000, relating to the refusal of marketing authorisation for «*Stevia rebaudiana* Bertoni, in plant and dried leaf form, as a new foodstuff or food ingredient in accordance with the European Parliament's regulation CE N° 258/97» (gireaud.net/stevia.htm). However, it can be found in various forms to be consumed on the Internet and you can buy the fresh plant from many nurseries throughout Europe.

Some explain its prohibition by the fact that the sugar industry (beet and cane), which is particularly dynamic in our countries, does not wish to be superseded by Stevia. The economic interests are indeed immense.

In 1970, the Japanese government banned the use of synthetic sweeteners and allowed the marketing of natural steviosides. The Japanese have been using Stevia in extract and powder form for nearly 40 years and have thus far found no drawbacks in its consumption. It represents 40% of the sweetener market in Japan and Korea and an



*Stevia grown in a Dutch Pot
Hydro with Flora Series*

increasing number of countries, such as China, Taiwan, Thailand and Malaysia, are consuming it. Large-scale production of Stevia is already underway in Argentina, Brazil, Uruguay, Central America, the United States, Canada, England, Lebanon and Israel among other countries. (fr.wikipedia.org). China and Brazil alone are responsible for 90% of the global production.

Harvests vary between 1,500kg and 3,000kg per hectare. For Stevia extract alone the market is estimated at 1.5 billion kilos, converted from 12 million kilos of leaves! (www.puresweet.com.au)

You can also see the multitude of offers of Stevia in all its forms on the Internet and the plant form already has attractive outlets wherever its sale is authorised.

All this goes to show that this market has huge potential. A hydroponic greenhouse produces around a further 30% of harvests. When used correctly, fertilisers can guarantee a high quality plant which is rich in active principles. We have the know-how to do this.

In 2000, the Department of Pharmacognosy in Toulouse analysed and compared crops from our greenhouse with outstanding results. (www.eurohydro.com/pdf/articles/fr_medical.pdf). The commercial farming of Stevia can thus be viewed as a new alternative to traditional cultivation, which would enable a new income to be generated in a society which needs all its resources to create solid and beneficial wealth.

For more info, don't hesitate to contact us!



*End of flowering: Stevia produces a huge
amount of seeds.*