

Utilising biodiversity – cui bono?

The case of stevia, the sweetener of the Guaraní people



The University of Hohenheim, too, is researching into stevia; this photo was taken at the horticultural experiment station.

Photo: University of Hohenheim

“Ka’a he’ê” – “sweet herb” – is the name given by the indigenous Guaraní people in eastern Paraguay to the perennial shrub whose leaves they have used for centuries to sweeten their mate tea. They were also aware of the healing properties of the sweet herb and made use of these – although modern medicine continues to doubt the pharmacological effect of stevia.

Until about one hundred years ago, Ka’a he’ê or *Stevia rebaudiana Bertoni*, as the plant is called in scientific nomenclature, only grew in the wild. The Swiss botanist Moises Bertoni, who “discovered” the plant towards the end of the 19th century, classed it in the sunflower family (*Asteraceae*) and gave it its scientific name, and thus made the plant known outside Paraguay. In 1908, stevia was domesticated for the first time. Its commercial use only began in the late 1960s and early 1970s. The aqueous extract of the leaves was used to sweeten

Background

Providing access to genetic resources and ensuring their sustainable use is a key objective of the Convention on Biological Diversity (CBD) adopted in 1992 so, too, is sharing, in a fair and equitable way, the benefits arising from the utilisation of these resources. The aim is to create incentives for the sustainable and profitable utilisation of biological diversity to the benefit of developing countries. For these countries are home to some 80 % of species diversity worldwide. Nonetheless, despite such governance mechanisms and intensive debate at international level, there are hardly any examples as yet of successful and sustainable implementation of equitable benefit-sharing in relation to an animal breed or plant variety of global commercial interest. Utilising stevia, the sweet herb of Paraguay, is of very great commercial interest. Benefit-sharing as envisaged by the CBD has not yet emerged.

This issue paper explores the setting and presents experience gathered in relation to benefit-sharing. This experience may provide a basis for ways to handle other genetic resources of commercial importance.

beverages, cakes, ice cream and other foodstuffs. Japan, China, Brazil, Switzerland and the United States were the first countries to use stevia as a sweetener on a larger scale.

Stevioside is the principal component of stevia. It makes the leaves of the plant 20 - 30 times sweeter than sugar. In chemical terms, this is a glycoside, i.e. sugar molecules bound to alcohol. The plant contains further, related constituents that also have a sweetening effect. Depending upon the specific plant material and the area in which it is cultivated, one kilogram of dried stevia leaves contains 40 - 200 grams of sweet-tasting glycosides.

Cultivation and marketing

In Paraguay, its country of origin, stevia is cultivated mainly by smallholders, most of whom are mestizos. The plant is undemanding in terms of fertilisers, water and plant protection,

and thus ideal for poorer farmers. Cultivating stevia is, however, very labour-intensive. Smallholders generally crop slightly less than one hectare of stevia, but this generates more income for them than, say, cultivating cotton. The sweetleaf or sugarleaf, as stevia is sometimes called, delivers excellent yields: 1700 to 2000 kilograms of dried leaves per hectare. Per kilogram sold, a farmer receives 0.4 to 0.6 US dollars, which translates into 1000 to 1200 dollars per hectare.

In 2006, some 800 hectares of stevia were cultivated in Paraguay for commercial use. Until 2005, the entire crop was exported to neighbouring country Brazil. In the meantime, dried stevia leaves are also sold to other countries such as the US, Japan, Germany, Argentina, Mexico, France and even to China, which, with an estimated area of 4600 hectares, is itself the largest producer of stevia worldwide.

Stevia leaves are processed to sweeteners in Brazil, China, Japan, Malaysia, Korea, Canada, Ukraine and the US, but also in the European Union. Despite growing production and rising consumption of stevia products, its share in global sweetener consumption is only around one percent. This means that, to be precise, only 800 of the 80,000 tonnes of synthetic sweetener are stevia-derived.

On the world market's doorstep

It is quite possible that the sweet herb of Paraguay is not only suited as a substitute for sugar. Researchers are now exploring the possible use of stevia in medicine and pharmacology. Individual studies now suggest that the plant contains active medicinal substances. Broad-scale studies of these substances' effects are yet to be carried out.

Stevia's commercial prospects on the global food market are more tangible. In some South American and Asian countries, notably Japan and China, stevia-derived products have been marketed for some time now as sweeteners. In the US, too, they have been available on the market for more than ten years as dietary supplements. However, the products still lack regulatory approval as foods in that country. A number of US food corporations are in the starting blocks, waiting for the US Food and Drug Administration (FDA) to approve stevia-derived sweeteners as safe. The *Blue California* company, for instance, has already announced plans to embark upon large-scale extraction of the sweetener in 2008

(<http://www.foodnavigator-usa.com/news/ng.asp?n=81404-blue-california-stevia-sweetener>). The *PureCircle* company has established a partnership with *Ghazou Julong High Tech Food Industries*, a large-scale producer in China, thus gaining access to large acreage for the cultivation of 5000 tonnes of stevia leaves in China; further production sites are to follow in other Asian countries and in Africa (http://www.earthtimes.org/articles/show/news_press_release,213662.shtml).



An Ayurvedic food supplement from India – although their medicinal effect has not yet been proved, stevia products are a runaway success on markets worldwide.

Photo: GTZ

In the European Union, there is still a ban on the use of stevia products. Neither steviosides, nor the plant or parts of it, have approval for use as foods or food additives in the EU. An application for approval under the Novel Food Regulation made in 1997 was rejected by the European Commission by Decision 2000/196/EC because of health concerns. The World Health Organization (WHO) is still evaluating whether the consumption of stevia can be hazardous to human health or not. These safety assessments concentrate on the question of whether stevia can have a cancerogenic effect, and on whether it may reduce fertility in men. Neither of the two questions have yet been resolved conclusively, although there are many indications that these concerns are unfounded. In June 2004, the Joint WHO/FAO Expert Committee on Food Additives (JECFA) set a preliminary ADI value of 0 - 2 milligrams per kilogram body weight for steviosides. Ongoing studies to assess safety in terms of human health are expected to conclude by mid-2008. It is expected that the European Food Safety Authority (EFSA) will have to reconsider steviosides, as two new applications for approval (*Stevia rebaudiana* as a novel food and steviol glycoside as a food additive) were made in July and September 2007.

Experts do not expect an approval of stevia products in the EU before 2011, and even that is considered optimistic by some. Debate on the proposal for an amendment to the Novel Food Regulation (Regulation 258/97/EC) published by the European Commission on 14 January 2008 has only just started and will probably continue until 2010. It remains to be seen whether the amended Novel Food Regulation does in fact lead to the hoped-for simplification in approval of traditional foods from third countries. (http://ec.europa.eu/food/food/biotechnology/novelfood/COM872_novel_food_proposal_en.pdf).

Be this as it may, broad-scale utilisation of stevia is only a question of time. It is important to resolve, before that happens, how the Guaraní, the original "owners" of the plant, are to gain a share in the anticipated benefits.

International agreements and benefit-sharing

The Biodiversity Convention is *the* international agreement regulating access to biological diversity and the associated indigenous knowledge as well as the sharing of the benefits arising from use of that diversity and knowledge (access and benefit-sharing – ABS). The CBD prescribes that every state has sovereign rights to its genetic resources. Whosoever wishes to utilise these resources needs the consent of the government in question and must conclude a contract with it that regulates fair and equitable benefit-sharing. Moreover, by signing the CBD, its member states have committed to protecting and promoting, within the framework of their national legislation, the rights of indigenous and local communities embodying traditional lifestyles with regard to their biological resources and knowledge systems, and to accord these communities an equitable share in the benefits arising from the commercial use of such resources.

This puts a hold on “biopiracy”. In order, however, to actually be able to pursue biopiracy as an offence, comprehensive

national-level legislation needs to be enacted which must also cover the fields of illegal use and patenting.

The FAO International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) – *see also the issue paper: “The International Treaty on Plant Genetic Resources for Food and Agriculture” in this series* – serves specifically to conserve agrobiodiversity and protect the traditional rights of farmers and indigenous communities as the custodians of this diversity. The International Treaty entered into force in mid-2004. It stipulates the specific rights of farmers – “Farmers’ Rights”. Further key elements of the Treaty are the protection of traditional knowledge, the right to equitable benefit-sharing, and the right to participate in national decisions relating to the use and conservation of these resources (*see also the issue paper: “Farmers’ Rights and Agrobiodiversity” in this series*).

No national regime in place yet

The Guaraní’s sweet herb and its worldwide commercial use are a case for both the CBD and the International Treaty. Paraguay has ratified both agreements, but has not yet transposed their provisions into national law. As a result stevia continues to be subject to national law in the fields of plant variety protection, patent protection and indigenous communities. This leads to a situation in which the Guaraní continue to be excluded from co-determining how stevia is used and having a share in the profits. This situation is not ameliorated by the current national strategy and action plan for biodiversity conservation in Paraguay. In order to allow the Guaraní an equitable share in the benefits arising from the use of stevia, the Paraguayan Government would therefore need to implement as quickly as possible the international agreements relating to biodiversity and create the corresponding national-level laws.

The national agricultural institute of Paraguay gained variety protection for a newly bred variety of stevia in 2005, and for another in November 2007. Paraguayan farmers need pay no licence fees for these varieties. Whether this is relevant in the event of a worldwide breakthrough of stevia is questionable.

Conserving stevia and safeguarding indigenous interests

To ensure that the Guaraní gain their justified share in the benefits arising from the use of stevia, the following activities are needed:

- inventorising the present ecological and commercial (production, trade, consumption, demand, supply chains, markets etc.) situation of stevia

Of agreements and benefits

The Biodiversity Convention constitutes the framework for the handling of genetic resources. An important rule is that, as a matter of principle, the original holder or breeder of this resource has a say in access and equitable benefit-sharing. The CBD does not, however, make provision for any monitoring or coercive mechanism which might allow the imposition of sanctions in the event of non-compliance.

In practice, the international patent system, and specifically the protection of plant varieties, has a much stronger bearing on the way genetic resources are handled than the CBD, and effectively decides their fate. In contrast to the CBD, these systems envisage that the first holder of rights to genetic resources is not the state of origin of the organism or the peoples or communities who have domesticated and selected the organism. The rights rest with the inventor or breeder who has registered his/her additional input as a patent or protected variety. Neither patent law nor the law governing the protection of plant varieties make provision for an equitable sharing of benefits with states of origin or the holders of traditional knowledge; nor do they yet require any proof of having gained access in accordance with the provisions of the CBD as a precondition for the granting of a patent or protection.



Stevia powder is up to thirty times sweeter than sugar but has fewer calories.

- clarifying the geographical origin of stevia and the associated traditional knowledge
- reviewing patents on stevia and, where appropriate, lodging complaints by the Paraguayan state
- formulating and implementing national policies that clearly regulate access to stevia and the way in which the indigenous population has a share in the benefits arising therefrom
- contacting states which cultivate stevia and engaging in negotiations and implementing agreements concerning equitable benefit-sharing
- completing national-level implementation of the provisions of the Biodiversity Convention and the International Treaty, and adjusting national patent and variety protection law to the provisions of these agreements
- pursuing participation of Paraguay in international ABS negotiations with reference to the issues surrounding stevia
- raising awareness among all groups with a stake in stevia the Guaraní are the custodians of the plant and must receive compensation if others make a profit from it
- promoting fair and equitable business practices.



The “People, Food and Biodiversity” Issue Paper Series is designed for individuals and institutions engaged in development cooperation. Its aim is to:

- Arouse interest in the issues surrounding food and biodiversity and spotlight the various linkages.
- Showcase new topics and approaches.
- Rapidly and lucidly present proven approaches and experiences.
- Encourage and stimulate you to increasingly take up these issues in your work.

We look forward to your feedback, which helps us bring the series to its full potential.

Further issue papers are available at www.gtz.de/biodiv.

Further information:

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