Review

Harnessing the health benefits of plant biodiversity originating from the American tropics in the diet

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Abstract — **Introduction**. Fruit and vegetable consumption is now more than ever before understood, along with physical exercise, to be among the factors ensuring well-being. Cross-cultural epidemiological studies reveal a preventive effect of this consumption on certain human pathologies, whence the emergence of preventive nutrition. **Changes in biodiversity dietary intake**. Industrially-processed products, undergoing a greater or lesser degree of refinement, were developed during the last century; they focused on a few productive species and varieties. The concept of high-calorie foods, an energy source, which has been prevalent in dietetics over the past few decades, had minimised the role of fruit and vegetables in the diet, due to their low calorie content. **Plant biodiversity in foodstuffs originating from the American tropics**. There are few cultivated major species and varieties in terms of biodiversity. 40% of the edible plant species in the world today originate from the American tropics. Of the planet's 250 000 estimated plant species, 100 000 are believed to be from the Americas. **Preserving the beneficial properties of processed products**. To improve recovery of the properties of the fresh resource for the consumer, innovation in the processing methods is required, with unit operations ensuring the best possible preservation of the healthy compounds. **Conclusion and prospects**. Communication on fruit and vegetables has not enjoyed the same research and publicity resources as many processed products. Knowledge of and information on food resources, diet and health have become a major challenge. The relative wealth of the plant biodiversity from the American tropics represents a heritage we need to reharness.

Tropical America / fruits / vegetables / biodiversity / antioxidants / phenolic compounds / health / human nutrition / processing

Appropriation alimentaire de vertus santé de la biodiversité végétale originaire d'Amérique tropicale.

Résumé — **Introduction**. La consommation de fruits et légumes est plus que jamais appréhendée, avec l'exercice physique, comme l'un des garants du bien être. Des études épidémiologiques transculturelles laissent apparaître un effet préventif de cette consommation sur certaines pathologies humaines, d'où l'éclosion de la nutrition préventive. **Évolution de l'appropriation alimentaire de la biodiversité**. Des produits transformés industrialisés, plus ou moins raffinés, ont été développés au cours du dernier siècle ; ils ont été focalisés sur quelques espèces et variétés productives. Le concept d'aliment calorique, source d'énergie, qui a prévalu dans la diététique ces dernières décennies, avait minimisé la place des fruits et légumes dans l'alimentation, du fait de leur faible apport calorique. **La biodiversité végétale alimentaire originaire d'Amérique tropicale**. Les espèces et variétés majeures cultivées sont peu nombreuses, au regard de la biodiversité. Aujourd'hui, 40 % des espèces végétales alimentaires dans le monde sont originaires d'Amérique tropicale. Parmi les 250 000 espèces végétales estimées de la planète, 100 000 seraient américaines. **Préserver les propriétés bénéfiques des produits transformés**. Pour permettre une meilleure restitution, au consommateur, des propriétés de la ressource fraîche, il faut innover dans les itinéraires de transformation, avec des opérations unitaires préservant au mieux les composés d'intérêt pour la santé. **Conclusion et perspectives**. La communication sur les fruits et les légumes n'a pas bénéficié d'autant de moyens de recherche et de publicité que beaucoup de produits transformés. La connaissance et l'information sur les ressources alimentaires, ainsi que sur l'alimentation et la santé sont devenues un enjeu de taille. La relative richesse de la biodiversité végétale de l'Amérique tropicale constitue un patrimoine à se réapproprier.

Amérique tropicale / fruits / légume / biodiversité / antioxydant / composé phénolique / santé / nutrition humaine / traitement

1. Introduction

Besides being the means of satisfying human bodily requirements of growth and maintenance, food is now more than ever before understood, along with physical exercise, to be one of the primary factors ensuring well-being, and good health in general. In terms of daily diet, the essential condition to avoid falling sick – the constant concern of Hygiea, one of Aesculapius' two daughters – in terms of daily diet means preventive nutrition. This has recently become one of the aspects of public health policies on a global scale.

Data from cross-cultural epidemiological studies reveals that fruit and vegetable consumption has a preventive effect on certain pathologies, for which the action mechanisms are largely unknown. It is useful to research and study in plant biodiversity, in which the American tropics are especially rich, the potential for this preventive effect. Also, this potential may be improved on the basis of genetic resources widely present in the zones of origin; they represent opportunities for socio-economic development for these zones. Hippocrates' (460–377 B.C.) saying "*Let your food be your medicine and your medicine your food"* is a reality or a strong expectation for an increasing number of discontented consumers, concerned with achieving a level of bodily well-being, in the face of an environment which can be aggressive in physiological and mental terms. The American tropics are an area of high biodiversity, to be considered for identifying and diversifying fruits and vegetables able to meet the expectation of these consumers. To ensure manufactured food products retain their sickness-preventing properties, the plant resource processing and preparation processes are undergoing changes incorporating new approaches and technologies.

2. Biodiversity dietary intake

Over centuries of progressive harnessing of biodiversity, the methods of acquisition and production have gone from hunter-gathering to subsistence multi-cropping and then to single cropping. This change in production modes has reduced the dietary range, particularly for city dwellers, and the general styles of human food consumption. The last century saw the development of industrially-processed products, undergoing a greater or lesser degree of refinement, focused on a few productive species and varieties, obtained from single cropping. These changes led to increasing global availability of certain resources and food fractions (flour, oatmeal, semolina, pasta, mousse, crisps, oil, juice, cordial, fruit drinks, etc.) with a high food safety level. Hunger has been repelled, though not eliminated. Currently, according to the Executive Director (2001) of the United Nations' population fund, "world food production is sufficient to feed all the inhabitants, but this food and the technology for its production does not always reach those who need it the most". Indeed, chronic food shortage affects 850 million people worldwide, according to the FAO annual report of 30 October 2006.

According to Jean Trémolières, foods are edible, nourishing, appetising and habitual substances. In modern societies, food is often meals prepared from basic resources and ingredients originating from mass production farming of various food types [1]:

– starchy (cereals, potatoes, sweet potato, cassava, yam, etc.),
– oil crops (oil palm, sunflower, etc.),
– high-protein (cereals, legumes),
– oil-rich and protein-rich (soybean),
– sugar-rich (sugar cane and beet),
– animal (meat, milk, honey, etc.).

The practicality and use of ingredients and fractions are well engrained in modern consumer cooking practices and tastes. They have been instilled with a culture of food as a body-builder, an energy source burned in the process of digestion and body construction materials: given proportions of carbohydrates, lipids and protein are the basis for meals considered to be balanced. Salt, spices and condiments are added to enhance the appeal and organoleptic properties, contributing to the intake of trace elements and vitamins protecting the consumer from certain dietary deficiencies, sources of

diseases which have become rare: beriberi, scurvy, Barlow's disease, xerophtalmia, rickets, etc. Industrial processing of food agricultural resources designed to produce basic ingredients (sugar, flour, oil, butter, etc.) and fractions (starch, gluten, lecithins, soy proteins, skimmed milk, etc.) breaks down the natural matrix, which reduces the nutritional density of the processed products, and thereby their natural health-preserving potential.

The nutritional model established at the start of the industrial age was based on a concept of the body likened to a calorie-burning machine. From the 1970s, the fear of cardio-vascular diseases associated with excess cholesterol and obesity was used by the big food-processing companies to develop *light* and *low-fat* products, which were nonetheless manufactured essentially with carbohydrates, salt and fats. Medical advice in this period was simply to eat less of foods bad for your health.

Studies of diets of diverse population groups, in association with epidemiological studies, have revealed a correlation between the decrease in the prevalence of so-called civilisation diseases, at a population level, and the increase in fruit and vegetable consumption [2, 3]. These diseases are caused by the conditions of modern life, combining stress, prolonged exposure to solar radiation, pollution and dietary imbalances.

The analytical knowledge of fruit and vegetables, whole cereals, spices, condiments, aromatic, culinary and medicinal herbs, vegetable gum, roots and peel has increased considerably over the past few decades. Fruit and vegetables, in particular, appear to be relatively rich in antioxidant compounds with health-preserving properties [4–7]. These beneficial plant organs, as well as aromatics, spices and condiments, were perceived as culinary additives, with low energy density, serving simply to vary the forms, consistency or flavour of meals. The concept of calorie-rich foods, an energy source, which has been prevalent in dietetics for the past few decades, had marginalised the special properties of these resources, and contributed to minimising the role of fruit and vegetables in the human diet, due to their low calorie content. "The physiological impact of fruit and vegetables is especially large since it affects all parts of the body, and functionings as diverse as the hepatic, circulatory, renal and ocular ones" [8]. Fruit and vegetable fibres generate appetite-suppressing satiety signals, and are essential for eliminating cholesterol and bile salts, and promote development of healthy fermentation processes in the large intestine. [8–10].

"Fruit and vegetables contain vitamins, three of which are provided primarily by this food group: vitamin C, vitamin B_9 or folates, and beta-carotene or provitamin A. In addition to their vitamin function, they fulfil an antioxidant function. At cell level, antioxidants are capable of opposing the accumulation of free radicals, which leads to DNA and membrane damage, promoting carcinogenesis and atherogenesis. Fruit and vegetables are rich in other antioxidant compounds: lycopene, alpha-carotene, lutein, zeaxanthin, polyphenols, etc." [2].

With over 5000 molecules, the world of polyphenols, of which flavonoids are an important group, is one of the most extraordinary among micronutrients with active health properties [8]. When we consume fruit and vegetables we take in more than vitamins. The phenolic compounds and vitamins in plants, antioxidant substances [11, 12], appear to give fruit, vegetables, herbs and condiments properties preventing serious chronic diseases and metabolic syndromes such as: cancers, cardiovascular disorders, neurodegenerative diseases, osteoporosis, diabetes, hypercholesterolemia and cell ageing [3, 13–17]. To understand the protective role of phenolic compounds, we need to track their progress in the body. There is a great variation in their intestinal absorption level, the metabolism and biological properties from one polyphenol to another.

The WHO ranges low fruit and vegetable consumption in sixth place in the top 20 global human mortality risk factors, just behind better-known causes of morbidity such as tobacco and hypercholesterolemia. Recent developments in national public health policies worldwide are striving to eliminate the perception of fruit and vegetables as secondary food products and ingredients.

There is no doubt that the health preservation properties of fruit and vegetables depend on the quantities consumed, but also on the diversity of botanic species. The most abundant compounds with active properties in meals are not necessarily the most active in the body. It is important for us as omnivores to vary our dietary choices so that our organs are exposed to the molecular diversity of natural resources.

The advances and diffusion of knowledge in physiology of fruit and vegetable development and maturation, in physiology of nutrition and in analytical techniques are bases for a better understanding of the properties of plant resources, which are factors in a quality of life better protected from the assaults from the environment, time and organ dysfunctions.

3. Dietary plant biodiversity in the American tropics

Industrialisation of agriculture has placed the West with its surpluses in the centre of the agricultural world, which has transformed the food wealth map. The zones of origin of cultivated plants and livestock, from which Neolithic agriculture spread, are no longer the most productive, or the richest in biodiversity of cultivated species. So it seems important to investigate the molecular composition of plant biodiversity individuals in the zone of origin, which provides the dietary preventive effects against the so-called civilisation diseases. Genetic variability in micro-constituent content within a species may be considerable [18], and often one small part of this variability is expressed in the cultivated varieties. The agricultural and pedo-climatic development conditions of food organs, the physiological stage of harvesting and the post-harvest conservation conditions are also parameters for consideration in physiology of the biosynthesis of compounds with active health properties [19].

Our relationship with nature increasingly brings in biotechnologies which require biodiversity to prosper. A new food age is dawning, in step with the dazzling progress in biology and information technology. The importance of biodiversity has been apparent on numerous occasions. Doubtless, the best-known example of a modern epidemic occurred in Ireland in the 1840s with a resource originating from the Andes – the potato – which was produced by single cropping in a single foodstuff system. An epidemic hit the sole variety grown there, and over one million Irish died due to the resulting potato shortage. Finally, the solution came from the discovery by researchers, in the Andes and in Mexico, of new varieties resistant to the mysterious disease behind the epidemic [20].

There are few major cultivated species and varieties in terms of biodiversity. Fifteen cultivated plants form the core of the world's food base. Only around 110 edible plant species are listed on the FAO agricultural production database, of which 80 are fruit, vegetables and spices[1]. Examination of various databases shows around 120 fruit species listed[2]. Zeven and Zhukovsky, quoted by Pitrat and Foury [21], listed 360 vegetable species, while Bois [22] mentioned 788. According to Lévêque [23]: "…Only 150 to 200 plant species are cultivated today, although around 10% of the 250,000 higher plant species are edible. Three species, rice, maize and wheat, provide nearly 60% of proteins originating from plant-based foods". To achieve good health, humans must not eat cereals alone, but also a variety of fruit and vegetables, at best of their natural complexity. There is a great number of non-cultivated species which are traditionally prized in traditional cooking and medicine, or by children from country areas. Ethnobotany is a field for exploration. In many countries worldwide, wild and semi-wild plants contribute to population food safety. Some are considered to be delicacies, or play an essential role in the diet of rural populations living from subsistence agriculture, providing vitamins (particularly vitamin C, vitamin B_9, beta-carotene), minerals, and other micro-constituents (carotenoids, polyphenols, etc.).

[1] (http://faostat.fao.org/site/370/default.aspx).
[2] (http://tous-les-fruits.com/index-fruits.html).

Today, 40% of edible plant species worldwide originate from the Americas. Of the world's estimated 250 000 plant species, 100 000 are said to be American in origin, with European flora consisting of just 12 000 [24]. The regions of origin are of prime importance in terms of the genetic stock for varietal creation. It was primarily the intertropical zone which produced the domestic species. For example, Fournet [25] listed 3200 taxons in his phanerogamous flora from Guadeloupe and Martinique, 1536 of which were indigenous, over an area of islands covering 2800 km^2. Folk traditions in Guadeloupe recognise 625 medicinal species, 220 edible species including 130 fruit species, 60 vegetable species, 20 tubers and around 10 species producing nuts and seeds. Some multi-purpose West Indian plants are known for their antioxidant property. Weniger [26] observes this property for 18 species, 12 of which are edible, with some very well known such as cocoa and achiote, others less well known such as the tamarind. Very many other species are described in botanical or traditional medicine terms in various works [27–32], although there is little or no data on their phytochemistry, including the antioxidant compounds.

Regarding the origin of the food resources, Boudan [24] wrote in 2004: "For a quick review of Latin America, we should mention… legumes and oil crops (six sorts of bean, but also the amaranths, peanut, lupine) and tubers (potatoes, sweet potato, Jerusalem artichoke, *achira, anu, arracacha*, arrow-root, *jicama, maca*, manioc, *mashua, oca, ullucu, uncucha, yacon*…). The list of American vegetables is shorter: tomato, green tomato, chayote, pumpkin, winter squash, common squash, bottle gourd, *huacatai, huaotzontle, paico*… The list of spices and aromatics is not so long either: capsicum, red pepper, Jamaica pepper, *achiote*, vanilla. But the quantity of fruit species is considerable: pineapple, soursop, avocado, cranberry (in the North), green cherry, Barbados and Cayenne cherries, *cherimolia, ciruela, corossol*, prickly pear, Chilean and Virginia strawberries, raspberry (in the North), passion fruit, guava, grenadilla, *guanabana*, American persimmon, *lulo, mamey*, whortleberry, *guava*, papaya, Quito pear, custard apple, *sapote*, tree tomato, etc., without forgetting some dried fruits such as the cashew nut, cocoa, hickory and pecan nut."

In 1994, Lévêque [33] wrote: "Plants of particular importance in the everyday life of the Mexican Aztecs of the pre-Columbian period are now widespread throughout the world: maize, beans, sweet potato, squash, pumpkin, prickly pear, cocoa, vanilla, cotton, tobacco, capsicum."

For his part, Garine [34] wrote in 1990: "…the American tropics have made a large contribution to the world food stock." In the resources he mentions we can find, in addition to those presented by Boudan [24], the Spanish plum (*Spondias* sp.), sage (*Salvia hispanica*), also used in rites, and the arrowleaf elephantear (*Xanthosoma sagittifolium*).

We will add to these lists the mamey (*Mamea americana*), giant grenadilla (*Passiflora quadrangularis*), star apple (*Chrysophyllum cainito*), cocoplum (*Chrysobalanus icaco*), yams (*Dioscorea* sp.), palms, peas, mombin plum (*Spondias mombin*), sea grape (*Cocoloba uvifera*), Spanish lime (*Melicoccus bijugatus*), sapodilla (*Manilkara zapota*), Otaheite gooseberry (*Phyllanhtus acidus*), etc.

In "The inventory of French culinary heritage" [35], for Guyana, traditional resources specific to the Amazon basin are mentioned, especially palms: Awarra (*Astrocaryum vulgare*), Turu (*Oenocarpus bacaba*), Maripa (*Altalea regia*), Peach palm (*Bactris gasipaes*), Pataua (*Oenocarpus oligocarpa*), and Wassey or Acai (*Euterpe oleraceae* Mart.), etc. According to recent publications, fruit from the latter exhibits an exceptionally high total antioxidant capacity (TAC) against the peroxyl radical ($RO_2^{\bullet}$): freeze-dried powder of the acai fruit (pulp and skin) has the highest reported value for fruit and vegetables, i.e. 1027 µmol TE·g^{-1} (trolox equivalent per gram), measured by the ORAC method [36, 37].

The acerola or Barbados cherry (*Malpighia punicifolia*) [38] is used on an industrial scale as a source of vitamin C to correct

Table I.
Production (in Mt), in 2004, of three food species of American origin, in various zones of the world (http://faostat.fao.org).

Production zone	Tomato	Potato	Pineapple
Latin America + Carribean	10.0	16.2	4.9
North America	13.7	25.8	0.2
Africa	19.9	15.1	2.6
Asia + Pacific	61.8	131.0	8.4
Europe	23.4	141.5	–

the vitamin content in orange, apple and grape juice. The camu-camu, *Myrciaria dubia*, is treated in its area of origin, the Amazon, as a natural source of vitamin C for the formulation of dietetic foods [39]. Cocoa (*Theobroma cacao*) [40] is renowned for its antioxidant content (phenols and tannins); capsicums (*Capsicum* sp.) are also known for their relative richness in vitamin C [21]. Kondo *et al*. [41] studied the antioxidant activity of tropical fruits at different stages of development and during their exposure to cold. Kuskoski *et al*. studied cold stored pulp [42].

The start of the story of the spread of American species to the other continents is well known. Most arrived during the 17th and 18th centuries in Spain, of which around sixty were of greater dietary importance in the Americas. But, on arrival in Seville, these species had lost something as important as their genetic heritage in the course of the voyage: the culture of how they were cultivated, selected, conserved, prepared and consumed. For this reason, and for climatic reasons, many succumbed in the attempts to introduce them. In the 19th century, the development of global transportation, agronomy and the industrialisation of food reconfigured the food world [24]. The result of this today is that important species [1] of American origin, such as the tomato or potato, are cultivated far beyond the Americas; the same is true to a lesser degree for the pineapple, produced exclusively in the tropics, fresh and processed fruit from which is also exported to everywhere under the sun (*table I*). Therefore, consumers in the Americas do not necessarily enjoy a greater level of health benefits from fruit and vegetables of American origin.

Research and study work into the composition of familiar resources such as the tomato [43, 44], sweet potato [45, 46] or chocolate [40], and less well-known species, such as the acai [36, 37], acerola [38] or the camu-camu [39], are beginning to reveal a useful potential for safeguarding consumer health, to be investigated in the rich biodiversity of the American tropics.

4. Preserving the health properties of processed products

Beyond the nutrition and health dimension, phenolic compounds are important elements for fruit and vegetable sensorial qualities (colour, astringency, etc.). These compounds are generally at the optimum level for consumption fresh around maturity, but they are labile [47]. Their involvement in enzymic browning phenomena make them a parameter essential to control after harvesting and in the technological processing of plant resources.

In urban environments with Westernised customs, processed foods now represent over 80%, in nature and in quantity, of foods consumed. Home cooking was initially besieged by ready-to-use products, before later being conquered by ready-to-eat meals. Their nutritional quality was generally a minor consideration in relation to yield, conservation, processability or practicality of consumption (mince beef with 20% fat, bread with mediocre highly-refined flours, fruits sold by appearance, fizzy drinks, etc.). At the end of the food chain, in households and kitchens, the use of recipes offers preparations meeting the consumer's calorie needs, providing appetising forms, odours and flavours. The main practical recommendation arising from the conclusions of public health watchdogs is to increase consumption of resources rich in antioxidants, especially fruit and vegetables. The FAO[3] promotes consumption of "more

[3] (http://www.fao.org/ag/fr/magazine/0606sp2.htm).

fruit and vegetables". Growing knowledge of the composition and properties of the resources, combined with selected production and processing methods, will be the future of expanding the range and availability of foods with active health properties.

To provide populations with the benefit of preventive and curative properties of antioxidant substances in plants, it would seem right to increase our knowledge and distribution of fresh or near-fresh products harvested at optimum physiological stages. "Controlling fruit and vegetable composition, particularly in terms of micro-nutrients, constitutes a very relevant field of research for today, which also has great scope for the future" [8].

The processing and conditioning of foods govern the preservation of their properties and antioxidant potential: the higher the heat-treatment temperatures, the more the antioxidant potential is reduced [48, 49]. Freshness and limitation of exposure of internal fruit and vegetable tissues to air ensure preservation of food antioxidant potential [50]. To improve product "naturality" and "recoverability", i.e., a better restoration of the properties of the corresponding fresh resource, the use of additives, some of which are disputed, needs to be limited. Processing methods of resources which cannot be consumed in their natural state should be developed and diffused. New concepts and new physical, athermal techniques, may make a contribution: high pressure, high pressure combined with cold, pulsed electric fields [51], current-carrying tube pasteurisation (Actijoule process), vacuum impregnation or anoxic processing line [52]. The use of ultrasound, microwaves and supercritical fluids is being investigated to update extraction processes of bioactive substances such as polyphenols.

5. Conclusion

After decades of frantic growth in productivity, the circulation and acquisition of products and services have switched to a dynamic of quality, which does not omit the food connection between humans and nature. The centre of gravity of quality is now shifting from the product to the consumer, incorporating health protection as well as nutrition. Health protection effects of fruit and vegetable consumption are clearly revealed in epidemiological studies in relation to specific diets (Cretan, Mediterranean, vegetarian, etc.) or consumptions (garlic, wine, etc.). The accentuated intake of phenolic antioxidant substances resulting from these diets and consumptions appears to be a significant factor among those which combine to make for a perception of better quality and quantity of life on a population scale. For an individual's health, there are complex interactions between the expression of their genetic heritage, which is an intrinsic factor, and extrinsic factors such as physical activity taken, the nature of their diet or socio-cultural culinary practices; hence there is a genuine difficulty in completely ensuring an individual the beneficial effects revealed by epidemiology, apart from hope.

"Communication on fruit and vegetables has remained too generic and has not enjoyed the same research and publicity resources as many processed products." Knowledge of and information on food resources, diet and health have become a major challenge. Research into phenolic compounds also aims to establish proof of the health effects of their consumption and identify which of the thousands of them could play a major protective role with a view to preventive nutrition. With a view to sustainable development, co-construction between life sciences (biotechnologies, varietal selection, analytical chemistry, etc.), food-processing engineering and dietary and consumption sciences may give rise to a new food production supply, tailored to recent changes in consumer health expectations and eating habits. Finally, plant biodiversity, in which the American tropics are particularly rich, represents a heritage we need to reharness, in terms of its molecular composition, species and varieties with consumer health-protection properties – all by means of new, powerful scientific tools – to contribute to a future supply.

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Apropiación alimentaría de las cualidades saludables de la biodiversidad vegetal originaria de la parte tropical de América.

Resumen — Introducción. Ahora más que nunca, el consumo de frutas y verduras junto con ejercicio físico se concibe como uno de los garantes del bienestar. Existen estudios epidemiológicos transculturales que muestran el efecto preventivo en ciertas patologías humanas gracias a este consumo; de ahí que surja la nutrición preventiva. **Evolución de la apropiación alimentaría de la biodiversidad**. A lo largo del siglo pasado se desarrollaron productos transformados industrializados, más o menos refinados; se focalizaron en algunas especies y variedades productivas. El concepto de alimento calórico, fuente de energía, que prevaleció en la dietética de estas últimas décadas, eclipsó el puesto ocupado de la alimentación de frutas y verduras, debido al débil aporte calórico de esta última. **La biodiversidad vegetal alimentaría originaria de la parte tropical de América**. Las especies y variedades cultivadas más importantes son poco numerosas en comparación con la biodiversidad. A día de hoy, el 40% de las especies vegetales alimentarías en el mundo son originarias de la parte tropical de América. De las 250 000 especies vegetales estimadas en la tierra, parece ser que 100 000 provienen de América. Preservar las propiedades benéficas de los productos transformados. Con el fin de ofrecer al consumidor una restitución mejor de las propiedades que poseen los recursos frescos, es necesario innovar los itinerarios de transformación aportando operaciones unitarias que preserven del mejor modo posible los componentes de interés para la salud. **Conclusión y perspectivas**. La comunicación sobre las frutas y verduras no ha gozado de tantos medios de investigación ni de publicidad como muchos otros productos transformados. El conocimiento y la información de los recursos alimentarios, de la alimentación y de la salud se han vuelto un reto importante. La riqueza relativa de la biodiversidad vegetal de la parte tropical de América constituye un patrimonio necesario de ser reapropiado.

América tropical / frutas / hortalizas / biodiversidad / antioxidantes / compuestos fenólicos / salud / nutrición humana / procesamiento