

BENEFITS OF RICEBEAN (*Vigna umbellata*) CONSUMPTION

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ABSTRACT: Leguminosae have an important role, both for the body and agriculture, with active principles which improve the quality of our nutrition for a healthy life, and rich nutrients for the soil and animals food. Ricebean (*Vigna umbellata*) consumption has reached considerable results, in terms of nutrition, for communities in need and in different therapies, since its nutrients are close to those of meat, in terms of proteins. These beans are sold in Brazil and traded by Eastern people, prepared as bean sweets, and can be consumed as common beans, with benefits to the health. In this sense, we tried to perform a bibliographic search intended to explain this subject under the light of published theoretical references. This kind of research showed to be highly efficient, since it enables to investigate a much broader series of factors, than direct investigation. Therefore, this work aimed to identify the nutraceutical properties of the bean, call attention for its cultivation and consumption and also to propose alternatives for the *ricebean*, as an option for exporting, highlighting all of its potentials and emphasizing its importance, also for human nutrition.

Keywords: *Adzuki bean*. Nutraceuticals. Human nutrition.

1. FOREWORDS

Beans are worldwide known *leguminosae*, due to the incomparable flavor and nutritional qualities. Besides their economic importance, they bring beneficial effects to our body and also can be used for animal feeding (LEWIS, 2005).

The bean, while worldwide known, presents different hypotheses, in respect of its origin – South of Mexico, Central America, Peru, Ecuador and even Bolivia. There are traces of beans consumption dating back to 8.5 thousand years BC, between Mexico and Peru. Regarding to Brazil, the population growth is responsible for the increasing of our beans production, but the whole production is internally consumed, with no margins to export.

According to Vieira (1992, p. 847), the following are among the most consumed and sold kinds of beans: *Vigna radiata* (known as *green mung bean*), *Vigna angularis*, *Vigna umbellata* and *Vigna unguiculata*. Antunes (2007) also says that the “tiny beans” crop (*green mung bean e ricebean*) is increasing, in temperate climate regions. Used as ruminant food, the crop is widely known by its qualities as poor soils fertilizer, such as sandy soils, with low availability of water, besides its large use in family agriculture.

Under a longevity point of view, it directly refers to the quality of consumed foods, whether for tradition, need or individual preferences. Some foods are able not only to satisfy the appetite, but also carry on functional and nutraceutical activities. Among these foods we can highlight: seeds, fruits, greens, integral cereals and leguminosae. The physiological effects of these in the human body can reduce the levels of cholesterol and the risk of development of certain kinds of carcinomas in the digestive tract and they also have metabolic or physiological active elements in their composition, which reduce the risks for the health, provided an usual nutrition time chart is followed (ANJO, 2004, p. 147).

Taking into account that *ricebean* consumption has reached relevant results, in terms of nutrition, it is here intended, in the light of the bibliographic review, to discuss the nutritional and functional properties of the *ricebean* (*Vigna umbellata*), in order to emphasize its importance for human nutrition.

2. METHODOLOGY

In order to contextualize and deepen the knowledge about the subject, we made use of bibliographical research with emphasis in the selected theme. The methods of research were the reading of mater dissertations, doctoral thesis, scientific journals and articles, specific literature covering themes of functionality and differentiated nutrition, as well as ricebean domestication, uses and consumption. Investigative research was also employed concerning the level of knowledge, and including a research about the major exporters of the grain, since it is imported and traded inside the country.

3. RESULTS AND DISCUSSIONS

3.1 Leguminosae and their importance

According to Lewis (2006), *leguminosae* make part of human nutrition and are amongst the largest botanic families, having large geographical distribution. The characteristic of this legume type fruit is the pod, and it is subdivided in three subfamilies: *Caesalpinioideae*, *Mimosoideae* and *Faboideae* (or *Papilionoideae*). Among the leguminosae we can find: soy (*Glycine max*), pea (*Pisum sativum*), alfafa (*Medicago sativa*) and chick pea (*Cicer arietinum*). Some leguminosae are used in forage for animals or to improve poor soils, having fundamental importance in nutrition, and also in urban ways ornamentation, such as the flamboyant (*Delonix regia*) and the orchid tree (*Bauhinia variegata*).

3.2 History and Origin of Adzuki Bean

According to Small (2009, p. 626), adzuki bean (*V.angularis*) can have its origin in China, India or Japan, where it is very appreciated and cultivated, being later introduced in Americas and Africa, under the usual names of *Adzuki*, *Adsuki*, *Azuki*.

According to the same author, the *Vigna* species consist of twenty-one subspecies distributed in almost

the whole Asia. Six cultivated species belong to *Ceratotropis subspecies*, among which we can enumerate: *mung bean (Vigna radiata)*, *ricebean (V.umbellata)*, black gram (*V. mung*) and *adzuki bean (V. angularis)*. Small (2009) also adds that the plant has a purplish, cylindrical stem, and grows up 13 cm, being able to generate 12 to 14 grains. The *ricebean* prefers a mild climate.

The largest adzuki bean producer is China, producing 640 thousand ha, while Japan produces 60 thousand ha, Korea 25 thousand ha and Taiwan 15 thousand hectares. Adzuki bean (*Vigna angularis*) is cultivated and consumed in the East since many centuries ago. It was introduced in China about a thousand years ago, having reached high economic levels, of large interests, in Japanese, Chinese and Korean scientific articles. It is described as an erect vine plant, cultivated in warm climates (ANDERSEN, 2009).

Vigna species, in global distribution, according to author Salinas (2012), has the following conformation: *Vigna: aconitifolia, angular, reflexo-pilosa, mungo, trilobata, trinervia and umbellata, species domesticated in Asia and underground and unguicullata Vigna, domesticated in Africa.*

According to Isemura (2011), four subspecies of *Vigna species* cultivated in Asia were studied, for creation of a genetic map between the subspecies: *adzuki bean, mung bean, black gram and ricebean*. The objective was to identify the regions associated to *ricebean* domestication, and compare these with the adzuki bean regions. The map was built with simple repeated sequences, in populations proceeding from cultivated *ricebean* and wild *ricebean*.

Ricebean is cultivated in limited extension in India, Burma, Malaysia, China, Fiji, Maurice Islands and Filipinas. The grains are frequently cooked with rice. There are many kinds and varieties of this species, where the seeds range from ivory color to greenish, red, purple and black, and are of small and medium sizes (ISEMURA, 2011).

3.3Crop handling

Lima (2008, p. 132) recommends to use 15 seeds per meter, in half meter lines. The beans emerge approximately in nine days after planting, if there are no aerial part diseases and harvest occurs after 98 days, with a 2.261 kg/hectare production.

According to Vieira (1996), crop consortium between beans and corn must be subjected to some cares, due to the nature of both crops. In the Brazilian southwest region we find two modalities of consortium with corn: corn and bean planted in October or November and bean planted in already formed corn beds, with the corn starting to dry, in February or March. The author also states that the best option would be the monoculture, with 1 meter spacing between lines, where *ricebean* would be more productive. *Ricebean* harvesting shall be made in the morning, due to non-uniform maturation and fragility of the pods.

Corn with *ricebean* crop has shown unfeasible, when both crops are sowed in the same date, since the *ricebean*, due to its characteristics, raises its branches to the height of the corn, at the point of suffocating the plant, being able to reach a height of 2.5 m, i.e., higher than the corn's height (VIEIRA, 1996).

3.3.1 Climate and soil

Although there is little information about this crop, according to Andersen (2009), *ricebean* grows under a large variety of soils type, including acid soils. In addition, this kind of bean is tolerant to droughts and soaking. The author also affirms that the *Vigna* species can adapt itself to wet regions, with a yield of 200 to 300 kg/ha, also being able to be cultivated in the soil waste period, in rice post-planting.

With respect to localization, the *ricebean* grows in the highlands, specially at East and South of hillsides, being common between 700m and 1400m of altitude, but also being found between 300 m e 600 m, up to 2400m of altitude.

3.3.2 Diseases and Pests

Vieira (1992), affirms that, in comparison with other beans, *ricebean* is the less affected, in terms of bug infestations and also in terms of rust and other aerial parts diseases. There were no occurrences of any disease or pest in *ricebean* crops. It is believed that best results would be obtained if a wider and more diversified collection of its germoplasms were tested. The author also affirms that mechanical control is important and shall be performed from 7 to 10 days after planting, removing any concurrent weed by manual weeding, to be repeated after a 10 to 20 days period. It's not recommended the use of agrochemical products in adzuki bean plantations. Some diseases, as white mould (*Sclerotinia* sp), can occur in adzuki bean, which can be attenuate through crop rotation and the use of treated seeds.

Insects affecting adzuki bean had no significance. Harvest occurred in 118 days, depending on the time of planting, and it was verified that the time of harvesting seems to affect the quality of the grains. Care during harvest is recommended, since the pods are sensitive, and can easily loose the seeds, if broken, impairing the whole production (HARDMAN, 1989).

3.4 Benefits of the Crop

Mendonza (1997, p. 1318), affirms that American Dietetic Association (ADA) states that vegetarian diets are benefic to the health and nutritionally adequate, promoting benefits and preventing certain diseases. For the author, the food pyramid with a vegetarian menu would have cereals as a basis, vegetables in the second level and leguminosae, in the third position.

According to Andersen (2007), the evaluation of nutrients present in *ricebean* grains took as a base the deficient diets of the inhabitants of marginal and rural hillside areas of India e Nepal. *Ricebean* was consumed in soups, cooked dishes, stews, served with rice and other recipes. The author affirms that the beans can be used as a substitute for other foods, due to its nutritional value, and low fat concentration. Protein percentage is also high, since *ricebean* has more essential amino acids than any other grain. Compared with other beans, *ricebean* has a high mineral content, specially calcium, magnesium, potassium, iron, manganese and vitamin K, but with a low percentage o zinc and vitamin B complex. Its phytate (phytic acid in salt form) content is high (2%). It shall be preferably consumed cooked, due to its trypsin content, that only can be removed this way, thus neutralizing the toxic or allergenic properties. Some of its compounds are antioxidant, maybe

anticarcinogenic, and benefic to the health.

According to Yao (2012), due to the increased interest for nutraceutical foods, recent researches have disclosed that *ricebean* has significant differences in total phenolic compounds (p-cumaric acid, ferulic acid e sinapic acid), flavonoids (catequins, epicatequins, vitexin, isovitexin e quercetin) and antioxidants, which are compounds that remove the free radicals, being potential antidiabetic compounds, found in *ricebean* varieties in China.

3.5 Functional Foods

Functional foods are those containing probiotic compounds (live microorganisms species, such as lactobaciles and bifidobacteria, whose function is to colonize and protect the intestinal walls) and prebiotic compounds (non digestible fibers that serve as food for the benefic intestinal bacteria, helping the immune system and intestinal functions) sulphurated and nitrogenated compounds, pigments and vitamins, phenolic compounds, polyunsaturated fatty acids and fibers. Lack of these items can cause intestinal, cardiovascular and hepatic diseases, arteriosclerosis or even cerebrovascular accidents CVA (MORAIS, 2006, p. 101).

According to item 3.3 of ANVISA Resolution No. 19 (1999), foods with alleged functional or health promoting properties can be registered and labeled. The following sequence of directions will be mandatory, for this: 1) Allegation of functional or health promoting properties is allowed, in a promotional aspect; 2) The food or ingredient alleging functional or health promoting properties, besides its basic nutritional functions, in case of nutrients, can produce metabolic or physiologic effects, besides the benefic effects to health, being considered safe for consumption without medical supervision; 3) Functional or content-related allegations for nutrients and non-nutrients are allowed, being acceptable those that describe the physiological role of the nutrient or non-nutrient for the growth, development and normal functions of the body, by demonstration of such efficacy; 4) Nutrients whose functions are largely known by the scientific community will not require efficacy demonstration or analysis, for functional allegation in the labeling. .

The term “functional food” is also called “nutraceutical” in order to be not confused with medications. Functional foods can also be those foods to which fortifying substances were added. For Morais (2006, p. 103-04), dietetic supplements are not considered as functional, since they do not replace the normal diet.

According to Khanal (2009), *ricebean* has cultural and medicinal value, and ethnical diversity, being Nepal a country which presents large diversity, in terms of food habits. A large variety of foods is consumed, mainly during commemorations and special occasions. The beans are connected to cultural and religious aspects of the Nepalese society, having a distinctive value, in some festivals. Therefore, the *ricebean* is a leguminosae with cultural importance, being the main component of festival dishes, as the *Kwati* (soup prepared from a mix of whole grains of nine leguminosae grains) and *khichadi* (split legumes, specially *blackgram* or *ricebean*). Additionally, *ricebean* is a nutritive legume, recommended for those who have digestive problems. It's the best carbohydrate for those who perform hard works, with lesser consumption among elders and children. The usual validity period for grains storage is one year.

3.6 Economic values of *ricebean*

All the *Vigna* species have economic potential for introduction, increased production or crop expansion of the crop, being an additional protein supplementary or alternative source for food supplying. Such species are suitable for production in many areas with dry and hot climate, besides having extreme potential for a successful production, as any leguminosae.

In Brazil, according to Moraes (2006), the production lines of adzuki beans seeds are still sparse, with preferential election of Cowpea Beans, Black-eyed Peas, Tiny Beans, Green Beans and Common Beans crops. However, our country has large fertile areas and a suitable climate for agriculture, being one of the main global producers and suppliers of food. This would enable larger crops of *ricebean* and, consequently, higher initiatives for its consumption.

Regarding to economical value, this is based in the cost between cultivation and selling of the grain. Farmers plant it for own consumption and reserve only 30% from the total for selling to other consumers. The stored 70% are for family consumption and also stocked to be planted in the next year. In Brazil, another damaging factor, for the internal market issue, is the middleman, who pays a low price when buying the production from the farmer, and rises the non-supervised price when reselling to his clients (ANTUNES, 2007).

Taking in to account that adzuki bean consumption, with its nutritional properties representing a great potential to the health, not only represents one more item in the balanced nutritional diet, but an important fodder for farming, we must seek alternatives that can be adapted to the new concepts of healthy food without pesticides, harmful to the health and the environment.

In this sense, it will be required to investigate the feasibility of production, the costs and acceptance in the market (Information not contemplated in the present study, limited to the nutritional consumption of *ricebean*). Even without such required deepening, we can say that it would be more feasible to intensify such studies in Brazil, respective to adzuki bean crop, since, besides its benefic natural properties, it can represent an option, in terms of grains exporting.

4. CONCLUSION

After this study, we may conclude that the leguminosae exert an important role, both for human health and agriculture, since their active principles can add quality to nutrition, promoting a healthy life for human beings, as well as benefits to the soil and animal food. *Ricebean* consumption, with its nutritional properties representing a great potential for the health, not only represents one more item in the balanced nutritional diet, but an important fodder for farming, specially, in milk production.

Ricebean is well qualified to restore poor soils, besides enabling easy cultivation and adaptation to different kinds of soil, crops handling and climatic acceptance. Placed among the functional foods largely exploited by the food industries, the technological researches in this area must be intensified, in order to

enlarge the view over the functional foods area, which presupposes healthy nutrition and environmental awareness.

This is to say that we must seek for alternatives adaptable to the new concept of healthy foods without pesticides, not harmful to the health and the environment. In this sense, it would be feasible to intensify the studies, in Brazil, about the *ricebean* crop, i.e., to check production and consumption aspects in Brazil, feasibility of production, costs and acceptability of this kind of legume, and what means could be used to reach such information, among other factors.

For last, nevertheless the benefic natural properties of adzuki bean, this bean is still unknown by the majority of beans consumers. The intensification of studies in this area may promote a larger production and consumption of this legume, which can also represent one more option, in terms of grains exporting, for our country.

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