

“ARUANÃ FARM: HISTORY, PRODUCTIVITY AND MARKETING”

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“Food is the moral right of all who are born into this world.” (Norman Borlaug, 1914-2009)

My name is Sergio Vergueiro. I was born in São Paulo in 1939 and graduated in Agronomy at the Luiz de Queiroz Agriculture School – USP in Piracicaba, class of 1960.

In 1965, the Federal Government initiated a tax incentive program for the establishment of companies in the Amazon to develop and occupy the region by means of industries and agricultural companies. These enterprises were developed through projects analyzed and approved by the Government through SUDAM – Amazon Development Superintendence and the Manaus Free Economic Zone Superintendence.

I developed my first projects in 1965, initially in the northern region of the state of Mato Grosso, and in Tomé-Açu in the state of Pará.

In 1966 I visited Amazonas at the invitation of the state government, at the time governed by Danilo Areosa. The region was excellent for the development of agriculture and cattle raising, because of its landscape, plenty water and its proximity to roads, which at the time were dirt roads, connecting Manaus to Itacoatiara, and in construction for the connection with Boa Vista and Caracas, now called BR-174. Another preponderant factor was the absence of malaria in these regions.

As there were no private properties in these regions, I recommended that my family and friends accept the state government’s invitation and purchase land in the state for the implementation of agricultural and cattle raising projects for the raising, breeding and fattening of cattle. From 1967 to 1970, over 15 projects were submitted to SUDAM and the implementation of the first approved projects started in 1970; among them were the ARUANÃ AGRICULTURAL AND CATTLE RAISING COMPANY in Itacoatiara and the SANTA INÊS FARM in Itapiriganga (currently called Presidente Figueiredo).

The Aruanã Agriculture and Cattle Raising company developed the Aruanã Farm, located at km 213 of the Manaus- Itacoatiara Road (AM-010) and we also started the implementation of the Fazenda Santa Inês S.A. (Farm) on the right bank of the Uatumã River, which was completely flooded by the Balbina Hydroelectric Power Plant.

At the time, the forestry reserve in the Amazon was 50% of the property’s area. Ever since my first project in Mato Grosso, the Agrosan Farm in Diamantino; influenced by Rodolfo Ricardo Geiser, my friend and co-author of these initial project, also an agronomist graduated in Piracicaba, I adopted the practice of avoiding continuous deforestation dividing the farms designed in separate blocks by continuous strips of primary preserved forests, with 500 meters in width. In these blocks, with a maximum of 500 hectares each (approximately 2,000 x 2,500 m), all springs and banks were preserved (PPAs), a practice that we learned in college.

The physical implementation of the farm began in 1971 and by 1973 3,000 hectares were deforested in 6 blocks separated by strips with 500 meters of intact native forest. Within this area, all the PPAs were preserved. We planted grass and built the Zootechnical facilities (fences, gates, pens) and started raising, breeding and fattening cattle with the introduction of regional cattle (cows and calves), originating from Alenquer and Monte Alegre, and Nellore bulls from São Paulo.

As occurring in other regions of the Amazon, pasture areas became degraded, being dominated by

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invading vegetation called "Juquira", gradually reducing the capacity to support the herd. It became evident that, in order to recover those pastures, mechanized cleaning would be necessary, mandatorily preceded by stump removal in the entire area. This operation required large investments and we began looking for a culture that could be associated to the pastures in order to defray the investment.

At CPATU (Humid Tropic Research Center) at EMBRAPA in Belém, we met Dr. Carlos Hans Müller who was researching the cultivation of the Brazil Nut from former works at the former Northern Agronomic Institute. There already was a germplasm bank formed by mass selection of nuts from various regions, experiments with the production of seedlings and grafting.

Considering that the Brazil Nut is a known product and active in markets worldwide for quite some time, and whose tree is native from the Amazon, we were encouraged to try and cultivated in a spacing of 20m x 20m (25 trees per hectare), hoping to use the in between spaces as pasture.

We presented a project to IBDF (Brazilian Institute for Forest Development), which at the time was an agency of the Agricultural Department and that was approved, we started planting in 1981.

From the beginning, always with the assistance of Dr. Hans Müller from EMBRAPA and also Dr. Urano, we learned to produce seedlings, to plant and graft them (at the time the recommendation for grafting was of 12 months).

We implemented a Clonal Garden and made grafts with material bought from CPATU and with the technical assistance from Dr. Hans Müller.

As soon as we started, 2 problems emerged: 1st) cattle do not eat Brazil nut trees but they stomped or scratched themselves on the larger trees causing damage to the development of the Nut plantation; and 2nd) the grafts generated low yield due to diameter incompatibility between the donor and the receptor (the grafting of Brazil nut trees is by sprouting with open window).

Thus, we gave up on associating cattle with the Brazil nut trees, planting them in a spacing of 10mx10m (100 trees per hectare) and waited for the third year after planting to make the grafts.

Another challenge emerged and we almost gave up: the grafts were good (the buds didn't die) but they were dormant and didn't sprout in 70% of the grafts. We tried removing the graft to force sprouting and still, the dormancy continued and the graft would die. Afterwards, we stopped the de-sprouting and almost gave up, as I said before.

One day, our field administrator, Nilamon Camargo Penteado, from a traditional family of coffee farmers from Jaú, state of São Paulo, and with vast experience in the Amazon since coming from Mato Grosso, Pará and Goiás, observed in experiments implemented by Dr. Hans Müller to reduce the sprouting of the stock, which in the planting area where the girdling of the stock above the graft, all the dormant buds sprouted. From then on, we did this in a large scale at the plantations that had been dormant up to then (some had been dormant for 3 years) and ALL SPROUTED. We began to adopt this practice in the entire plantation and the graft yield rose to 95%, ending the dormancy.

After this step was conquered, I still had a serious concern: the homogenization of the plantation with a single species, because I remembered what had happened with the rubber trees planted by Ford in Fordlandia.

We had already planted over 200,000 Brazil nut trees and nothing had occurred up to then (the older trees were 4 years old); however, they were still in their juvenile phase and my concern increased.

During that occasion, I was leaving the farm to return to Manaus when I received a phone call from EMBRAPA. It was Dr. Antelmo (Luiz Antelmo Silva Melo) telling me that he was coming with a World Bank team headed by NORMAN BORLAUG to visit Aruanã. Of course I was looking forward to this visit.

During the visit of the renowned 1970 Nobel Prize Winner, we went to all plantations and in the end, before he left, I asked him the question that concerned me: what Dr. Norman thought of the eventual consequences of this homogenous plantation. He replied, "You told me you were impressed with the extent of the native Brazil nut trees in Marabá, while you flew for hours over the tree tops. Well, I saw the same thing, and this fact shows that Brazil nut trees occur NATURALLY in homogenous populations being RESISTANT TO THE FOREST'S PATHOGENS, unlike the rubber tree that, in order to avoid "leaf disease", occur far away from each other. There will be no problem with the Brazil nut trees".

Now, after over 20 years and with 1,300,000 adult Brazil nut trees planted in 3,700 hectares, we can affirm that Dr. Norman Borlaug was right. We never have phytosanitary problems or pests, and we never had to use pesticides at the Aruanã Farm plantations.

Once the graft was resolved and without any concerns regarding the homogenous plantation, we proceeded with projects approved by IBDF in the planting of Brazil nut trees, reforesting the entire 3,000 hectare area, which we had deforested for pasture and another 700 hectares, also from former degraded pastures, which we purchased from our neighbor. I paid with interest the deforestation of reforested 3,000 hectares with Brazil nut trees.

From the beginning of the work at Aruanã Farm, I kept in touch at INPA with Prof. Warwick Kerr, of whom I was a student in Piracicaba, along with Agronomist Gabriel Teixeira de Paula Neto, my classmate and friend, who has been technical responsible for Aruanã for more than 20 years. Prof. Warwick has always been concerned with the pollination of Brazil nut trees. Following his advice, we planted passion fruit in the rows where stumps were removed and we planted achiote (urucum), to increase the offer of pollen to the BOMBUS, which we believed was the main Brazil nut tree pollinizer. In fact, for the record, the THOUSANDTH Brazil nut tree at Aruanã Farm was planted by Prof. Warwick and it is still there bearing fruit.

We found that the Aruanã project, maintaining all the PPAs and strips of native forest separating the deforested blocks, resulted in no Brazil nut tree planted in that area distant over 1,500 m from an area of native forest. This is essential for the reach of the pollinators whose habitat is in the forest. I'm grateful to my agronomy course for having taken that precaution when I designed the farm.

The development of the grafted Brazil nut trees was encouraging, but production estimates for the 6th year did not materialize because the first Brazil nut trees planted in 1981, only produced commercially 25 years later.

With the techniques we developed for the production of seedlings in large scale (up to now, we have produced approximately 3 million seedlings), grafting, pruning and moving of trees, we can now affirm that within 15 years we will be able to achieve the commercial productive phase (note that without chemical fertilization since the Brazil nut tree only reacts to phosphorous fertilizer and afterwards

does not require or respond to chemical fertilization).

Our plantations have always been followed closely by IBDF and afterwards by IBAMA, which besides supervising, contributed with the observations from its technicians, especially Lúcio Flávio Couto, Pedro Vargas and Antônio Carlos Hummel at IBDF, and Malvino Salvador at IBAMA.

From this joint work, the idea to plant Brazil nut trees in silvicultural spacing (2,0m x 2,5m) with 2,666 trees per hectare, aiming at the production of wood and fruits. Having verified the good development of these plantations, managed through pruning, as used to be done with Eucalyptus, as suggested by Malvino, we started planting for forest replacement contracts with the local logging industry. Within 5 years, we implemented plantation perimeters covering approximately 1 million trees.

In the silvicultural system, the Brazil nut tree has become one of the most promising species for the recovery of degraded areas in the Amazon, considering its resistance to homogenization of plantations, fast growth and no fertilizer and pesticide requirements. The development of this form of cultivation has been monitored by EMBRAPA through PROF. ROBERVAL MONTEIRO BEZERRA DE LIMA.

Despite always working with environmental and research agencies, I was concerned with the need for studies about the crop in general, and especially about the systematic gathering of data about our crops in order to provide a solid foundation of the techniques to be applied and the dissemination of knowledge regarding this crop. In this field, we have always had close contact with INPA through Prof. Warwick, Dr. Charles Clement (we planted 600,000 pupunha palm trees in association with the Brazil nut tree), Dr. Sidnei Ferreira, Dr. Ferraz (who has been visiting us for over 30 years).

EMBRAPA has always followed us since Carlos Hans Muller and Urano and, up to now, when this important and comprehensive research work on Brazil nut tree crops begins, and has developed valuable studies about pollination of the species under the coordination of Prof. Márcia Maués, with the participation of Marcelo Casimiro (whose first work at Aruanã was recommended by Prof. Warwick). IBDF, currently IBAMA, as well as the environmental agencies of the state of Amazonas, interact positively with our works. We believe that our experience can be used by researchers, systematizing the observations and publishing the results so that the knowledge can be multiplied and more people can use it.

In 2006 we created an NGO (OSCIP) called EXCELSA INSTITUTE, which is headed by my daughter Ana Luiza (I'm not part of the board), to transmit our practical knowledge to the small communities surrounding Aruanã and other Amazonas regions, so that they can plant and grow Brazil nut trees in their fields, recovering the deforested areas for their subsistence with a native, perennial, profitable and sustainable crop. Seedlings are distributed for free to small farmers who request them and their crops are registered and georeferenced by GPS. In 6 years, the EXCELSA INSTITUTE delivered 456,000 seedlings to over 1,000 families in 100 communities of Amazonas.

These small farmers will become future ECONUT suppliers, which will pay a price adequate to the product, in other words, higher than the prices practiced on the market. It is also our intent to create a BRAZIL NUT CONTROLLED DESIGNATION REGION, as is done with wine in Europe.

In addition to being extremely nutritious, the major differential of the Brazil Nut (BRAZIL NUT TREE seed) is that it is the greatest source of SELENIUM known in nature. The content of selenium is defined by the soil where the Brazil nut tree develops. In our region, this content is ideal so that only one nut a day is enough to supply the daily dose of selenium for an adult.

We verified this when we analyzed samples from our first crop with Prof. Dr. Sílvia Cozzolino from the USP Pharmaceutical Sciences School. Due to the quality of our Brazil Nut, she suggested that we make a product directed to human health, since the crop allowed a complete quality tracking from the tree to final packaging.

We had already been testing samples of our first crops for years seeking for a post-harvest process and packaging that provided the product with a long shelf life. Prof. Dr. Marisa D'Arce from E.S.A. Luiz de Queiroz in Piracicaba helped us by testing, analyzing and suggesting. In addition, we also wanted to avoid aflatoxin and maintain our nut's nutritional qualities, crunchiness and flavor.

Regarding aflatoxin, students of Prof. Benedito Corrêa from USP (Medical and Biological Sciences Institute) conducted a scientific study at the Aruanã Farm analyzing the entire Aspergillus cycle from the tree to the final product.

Thus, we created the ECONUT brand, which is a Brazil Nut GROWN, controlled in a protocol from the tree to final packaging, and meeting standards of the Agricultural Department for ORGANIC PRODUCTS. We managed to establish these practices and obtained the ORGANIC CERTIFICATION (SisOrg Stamp) through a TECPAR (Technology Institute of the state of Paraná) audit. ECONUT also meets MAPA international export standards.

From the tree to the final packaging, our ECONUT goes through 10 selections, is analyzed regarding water activity (under 0.6) and absence of aflatoxin (below international standard values), and packaged for a 2-year shelf life.

The essence of this process is that the product is ENTIRELY produced at the Aruanã Farm, by local staff (many of them born on the farm), proving that our local labor is qualified to produce high quality products with high added value, provided that they are properly trained and oriented. The industry in the Manaus Free Economic Zone proves this every day and the Aruanã Farm also confirms this quality in terms of agriculture.

As we observed, as occurs with all commercial crops, the association of technical field work with research generates proves to be fruitful. This also occurs with the Brazil Nut and is now being intensified. It is important to emphasize that after dozens of years of research, experimentation and attempts in the field, the studies made by environmental research and development agencies associated to field studies with persistent technicians, has DOMESTICATED the *Bertholletia excelsa* HBK species, ensuring its survival and preventing its EXTINCTION.

There is still a lot to study and improve so that Brazil nut tree crops can be efficient, profitable and can help in the recovery of vast degraded areas in the AMAZON so that it can become a source of dignity and nourishment.

The wider the shores of knowledge, the greater the ocean of the unknown.

MANAUS, NOVEMBER OF 2012

