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AGRONOMY AND ARCHBIHOPRIC: HISTORICISING THE CONTRIBUTIONS OF ARCHBISHOP BENEDICT MAR GREGORIOS IN INDIAN AGRICULTURE AND SOCIAL FORESTRY

Article Particulars

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Abstract

This article is an attempt to enumerate the specific contributions of Archbishop Benedict Mar Gregorios in Indian agriculture and social forestry in the second half of the 20th century Kerala. His ecclesiastic position as a high priest was not an obstacle for him to engage in practicing and propagating agriculture and forestation. He introduced new methods of cultivation, set up miniature farms, introduced new plants in India from foreign countries, and started institutions for the help of cultivators. He was a proponent of mixed farming. He had been scientific and followed systematic cultivation of different crops. Many including the government of Kerala have been influenced by him in agricultural enterprise. He popularised social forestry and waste land cultivation. All this he had done for the material progress of the poor and the uplift of the society.

Keywords: *Archbishop, Syrian Catholic, Aramana, apiculture, cuniculture, Water harvesting, Bio fertilisers, Leucaena (subabul), Acasial- Mangium, Calliandra, etc..*

Introduction

It is not common that ecclesial heads involve in agricultural activities. But there lived an Archbishop in the second half of the 20th century who had been an economist and a learned agriculturist. He had multiple contributions to the society and agriculture is only one among them. But being a spiritual leader his contributions in such mundane sectors are not well recorded. Usually ascetics live single and solitary life and practice religious temperance by monastic living. They are persons who voluntarily choose to leave mainstream society and live in prayer and contemplation. There are, at the same time, some other ascetics who dedicate their life to serve all other living beings. Archbishop Benedict Mar Gregorios was one who belonged to the second category of ascetics who had intervened in all affairs of social life in Kerala during the second half of the 20th century (1952 to 1994). The Archbishopric and the headship of his community was only a platform for him to involve in social welfare activities. Beyond being an ecclesial head, he was a good agronomist and an agricultural scientist. His contributions in this field were revolutionary and novel at that time in many respects. But these were not historicised well either in the documents of the Church or in the general academic world. Hence this article attempts to make a critical evaluation of

the contributions of Archbishop Benedict Mar Gregorios in the field of Indian Agriculture and social forestry.

Objectives of the study

This article mainly aims:

- To Find out and make a critical study of the works of Archbishop Benedict Mar Gregorios in the development of Indian agriculture and social forestry.
- To put on record his contributions in the field to make it an illustration for the posterity.
- To enlighten and encourage similar others to become enthusiastic and engage in such activities following his model.
- To open up new areas of study and research.

Materials and Methods of Study

Materials, both primary and secondary nature are used for this study. Being contemporary enough primary documents including letters and public addresses are available. Secondary materials in the form of books, periodicals, newspapers, magazines, Souvenirs, memoirs etc. are also made use of. The method used in this study is mainly analytical and descriptive. All available primary materials are collected and systematically evaluated. Secondary materials are subjected to questioning and made to undergo the heuristic and hermeneutic process of criticism. All types of investigative techniques are used in the study. Historical method of research is more depended up on. Textual research is used with utmost care and a sceptical attitude.

A Biographical note on the Archbishop

Archbishop Benedict was born in an agriculturist family in a village called Kalloopara on the banks of river 'Manimala' near Tiruvalla on February 1, 1916. His parents were cultivators and he was the eldest of their eight children. He was very brilliant in his studies and attracted by the revival movement started by Archbishop Mar Ivanios among the Syrian Christians of Kerala during the first decades of the 20th century he joined the Bethany Monastic Movement of Mar Ivanios. Subsequently he was ordained a priest, and was sent to St. Joseph's college, Trichy, in Madras University for higher studies in Rural Economics. He passed his post graduation with first class and first Rank and was appointed the first principal of Mar Ivanios college, Trivandrum. Later Mar Ivanios consecrated him the successor bishop of his Church and on his death Mar Gregorios was ordained the Archbishop and Head of the Malankara Syrian Catholic Church by Rome in 1955. He led the Church for 41 years until his demise in 1994.

He was not only a spiritualist but an active social worker who aimed at the welfare of the whole people for which he himself had planned, executed and propagated. He sympathised with the poor and choked out numerous pro poor

schemes which had influenced successive governments in Kerala. Agriculture was one such field of his activity. He was a member of the Academic council of the Kerala Agricultural University. He always aimed at a dignified life for all people. His own statements on two different occasions are proof of his pro poor policies. In his first sermon after his ordination as Bishop in 1955 he said;

".....I empathise with the poor. I myself was poor and lived through and know the pangs of poverty. I swear that the rest of my whole life will be used for the uplift of the poor. And I challenge anybody who claims for the poor without action....."

Later in 1992 when interviewed by a foreign agency he reinstated that,

"Our Lord didn't come to save souls alone, but to save people! We must realise that the God who gave us a body and who himself assumed a body, cannot be thought of as indifferent to our material needs, for he made us to live in human dignity – dignity that presupposes a certain material well being"

His Precepts and Philosophy in Agriculture

His precepts and philosophies on agriculture is explicitly mentioned in his comprehensive Key Note address on the topic 'Kerala Agricultural University, 2000 A.D' at the University Seminar Hall held in November 1984. This address had been inclusive of all spheres of agricultural activities. The Archbishop expressed his strong convictions on many matters concerned with Indian agriculture in this address. He questions the central government for its lack of interest and less importance attached to agriculture in the first few five year plans. He mentions what type of agricultural culture our country should follow? What type of training and research we should aim at? What should be the approach of our Agricultural universities? What should be our approach in imitating the West in agriculture? and many more such matters in this address. At the same time he put forward certain suggestions to improve our agriculture. He believed that;

"For any country agriculture is the foundation of the economic edifice; industry, the walls and the professions, the superstructure. In India where nearly 80% of the population live off the land, this comparison is all the more valid. We have at present a weak foundation supporting still weaker walls on which ultimately rests too heavy a roof. The whole economy is in precarious situation. It is vitally necessary to strengthen the foundation as well as the walls and to lighten the superstructure so that we have a viable and strong economic edifice."

He was a keen observer of the economic planning in India and censure that our first few five year plans did not give enough weight to the domain of agriculture and slam them as devoid of better planning and management. He said that;

"In the first two Five Year Plans, the main concern was to harmonise public and private sectors without deliberately thinking of the harmony that should exist among the various sectors of the population. In the 3rd Plan there was stagnation. The per capita availability of food in 1966 was less than in 1950. It was in the 4th plan that

emphasis began to be given to the weaker sections of society. A number of specific programmes were initiated for the small farmers and for the rural population as a whole. Elimination of poverty was the dominant aspect of the 5th plan. This objective dominated also in the 6th Plan. The 7th Five Year Plan fortunately gave the highest importance to the rural population, among whom backwardness and poverty have become chronic and practically institutionalised. Production of food, rural employment and productivity are the main thrusts of the proposed 7th Plan."

He admits that the country has made conspicuous progress in the production of food grains. But, he contemplates it is not identical to our capability and incomparable to our high potential. He joins with Daniel Moynihan in saying that our Indo Gangetic plane alone, if properly developed, could produce enough food grains not only for the whole of India but also for the entire world.

His views on executing agricultural reforms were illustrated well in this address. He states that we should not imitate foreign countries. To put in his own words,

"In the West agriculture has taken on the nature of an industry - the ideal is to produce more and more goods from lesser and lesser area. There the rate of progress in agriculture is measured by the rate at which the human factor is eliminated from agricultural activities. In a typically advanced Western nation, five or six persons working on land could supply agricultural products sufficient for a hundred persons and even more. The situation in India is quite different in most respects. For us agriculture is not just a means of eking out an existence or just a source of income. It is a way of life. It has a culture and a philosophy of its own intimately affecting the quality of human life. The farmers live in close harmony with nature, the majestic temple of creation. Their work has to do with the life of plants and animals a life inexhaustible in its expression, inflexible in its laws, rich in allusion to God, the creator and the provider. They produce food for the support of human life and the raw materials for industry in ever richer supply."

He further says that in India, agriculture is-"a work which carries with it a dignity and nobility all its own. It is a work which demands a capacity for orientation and adaptation, patient waiting, a sense of responsibility and a spirit of perseverance and adventure. Education and modernisation of agriculture in a developing country like India with its' own social traditions should take this and similar facts into consideration."

His policies on Agricultural Universities and Agricultural Research are of par excellence. The Archbishop had his own standards of how and what should be the criterion of agricultural research and the working of agricultural universities in the country. He says;

"The primary duty of the Agricultural University should be agricultural education. In my view the University has to involve itself much more in the work of extension and in making available to the farmer the new knowledge in agriculture. In promoting agricultural education, we must strongly resist the temptation to blindly imitate or copy

western patterns. Simply to adopt the findings of research in the West will, therefore be, counterproductive and the gap between the advanced countries and India would only increase rapidly. It is necessary to devise a process of research and modernisation strictly appropriate to our social, economic, and climatic conditions."

He assess that in India and particularly in Kerala there is the most pernicious attitude of considering idleness as more dignified than working with hand. Idleness of the labour force and the lack of intensity in work performance remain India's two economic ailments. Hence he advocated agricultural universities in India to take stern action against this lethargy of the people for manual labour. In his own words,

"Agricultural Universities should be centres for teaching and as a medium of education consists in orienting and conscientising the people and thus getting them involved in the process of development. Attitudes have to be changed. The standard of literacy and general education in Kerala could play a catalytic role in such development. In my view the university has to involve itself much more in the work of extension and in making available to the farmer the new knowledge in agriculture. It does not matter who does this process of communication, the University or the Government Departments. The University seems to be better equipped and more suitable for this work than any departments of the Government. This work has to be done and most urgently, and all human resources including voluntary agencies should be mobilised and should be actively and intensively involved."

He believed that the dedicated work of staff and the students could bring about a significant change and all round improvement first in the area around the university and once this had been achieved this process will rapidly spread in still wider circles.

"Our orientation of research should be to help us to draw the greatest benefit from the resources nature has placed at our disposal with a bounty beyond words. The greatest of these resources is our abundant sunlight. Sun light (photosynthesis) being the ultimate limiting factor in agricultural production, other things being equal, from a given area of land we can produce four times as much crop as in the temperate zone, say in New York."

He, as the head of the Church and as he was more interested in knowing the agricultural practices of other countries, had visited almost all foreign countries and had a comprehensive understanding of the different techniques and patterns of cultivation. He did not support a blind adoption of foreign techniques and patterns in our system of cultivation. At the same time he advises us to accept those things which make our agriculture profitable from developed countries. Imitating patterns of agricultural education in the West holds good in the field of research. He warns us that,

"Since agriculture in the West is capital intensive research also has the same bias. Most of the research in the West is highly sophisticated and suited to social and climatic conditions different from those of India. They have in fact reached a state of Permanent Agricultural Revolution. What is suitable in a country like India where

population more numerous than the total population of USSR and USA and most of the people depending on land for their living, agriculture and research should have a labour intensive pattern in view. At the same time there are many things which we could accept from developed countries. In general it may be said that in the world as a whole, in the last fifty years, more knowledge has been accumulated in agriculture than in all the previous ages from the time man began the art of cultivation. Unfortunately most of our people remain in complete ignorance of this great wealth of knowledge which is really the common property of mankind."

In order to improve Indian agriculture he suggests certain measures such as the use of natural fertilisers and well planned irrigation. We should make every attempt to identify crops which have very high nitrogen fixing qualities. It is with this intention that the Archbishop brought and popularised the cultivation of leguminous crops suitable for the tropics such as Leucaena (subabul), Acasial- Mangium and Calliandra from foreign countries. Identification of such other crops suitable to Indian conditions should be one of the programmes of agricultural universities. NPK and all trace elements like calcium and magnesium could thus be produced in abundance, with the added advantage of eliminating pollution. He also advocated better irrigation for better agriculture and prophesied the problem of water scarcity in future. He says' "For Kerala the problem is normally not scarcity of water but management of water."

In one of his article *'vanavathkaranathinte avashyakatha'* (Need for Afforestation) he instructs us to practice replenishing the under earth resources of water by digging rain harvesting trenches below the surface. He also advised for a proportional removal of old trees and planting of new ones in its place. He also pointed out the problem of processing of agricultural products in his key note address. He remarks that – "normally a farmer gets only about 10 % of the market value of the goods he produces. 90% of value goes to those who process and sell these goods. In today's economic system agriculture divorced from processing is almost the synonym poverty."

His Practices in Agriculture

It is as part of raising the material welfare of the people he started his experiments in agriculture. He firmly believed that only through scientific farming and modern techniques agriculture can be improved. His economic philosophy behind the agricultural activity he envisaged was not to run huge industries with thousands of employees and superstructure existing upon the exploitation of the poor but to coordinate human capabilities to organise and utilise the natural resource to guard away poverty from society. In the primary sector, the Archbishop wanted to increase the 'Work Participation Rate' of the rural population. As per the census report of 1981 the work participation rate, the percentage of the employed to the total population, was very low in Kerala compared to other states in India. He strongly believed that India being an agrarian country with more than 70 percent of its population

depending on agriculture cannot develop sidelining the primary sector. Understanding this reality he had made an economic planning giving primary importance to agricultural practices. When asked what moved him into such activities he answered that,

"Many people did not possess that minimal material comfort; they live in painful circumstances, knowing only hunger and want."

To make a change in this situation he firmly believed that;

"India must experience an agrarian revolution to precede any industrial revolution; to do this, scientific farming must be done and many of the farms must be consolidated. And if the farmers are removed from the land there must be a place for them in society, there must be homes and jobs waiting for them. Even more vexing is the problem of raising the education level of millions of people to make such a revolution possible."

Such a revolution he had envisaged and executed on his own in Kerala which was conceived, developed, and nourished by this great man. In his opinion a farmer gets only 10 % of his profit the rest is absorbed by costs. This is why he worked diligently on farming and farm products. He also criticised the increasing tendency of people to migrate to urban areas leaving behind the rural cultivable land. He firmly believed that the only solution to the shortage food grains in India is not import but a going back to domestic agriculture. Considering this he actively involved in planning and implementation of a number of projects aimed at achieving technical changes in Kerala agriculture and the overall economic development of the state. He set up demonstration farms attached to local parishes in several areas. The newest techniques were employed and the people could see and eat the result for themselves. Thus, methods of agriculture that were previously suspected was introduced and won popular acceptance through the teaching and the example of the church. His agriculture was not limited to cultivation of plants and crops alone. It spread into other related areas like poultry, sheep farming, apiculture, cuniculture, dairy farming, and many such connected activities. He encouraged the establishment of poultry farms together with backyard chicken coops to supplement the protein poor diet of many of the people who eat rice three times a day. He had his own philosophies and convictions behind all these activities. He had been passionate and enthusiastic in rural agrarian activities.

The Archbishop's house at Pattom in Trivandrum had been a laboratory of various techniques of modern cultivation. He introduced many new plants and trees from different parts of the world. Instead of simply asking people to plant them in their field, he himself planted them in the premises of his residence and estates of the church, made systematic study upon their growth, trained men on nurturing them, studied the merits, demerits and after effect and only after careful watch of their adaptability and value to the Kerala topography and agrarian set-up he preached for their

reproduction and propagation. The agricultural contributions of the Archbishop was most vehemently propagated and acknowledged by the former Minister of Agriculture Sri. M N Govindan Nair. He even advised the bureaucrats in his department to visit the Archbishop's farm.

Animal husbandry especially Aviculture was a field of interest to the Archbishop. High yielding breeds of Cows and Sheep were imported from Australia and attempted for a hybrid breed with the native. New verities of sheep that gives up to 3 litters of milk a day and 100 kilograms of meat was produced in his farm. A new hybrid grass for cattle had also been developed. It grew rapidly in the Indian climate and could be cut frequently. The villages were then encouraged to collect seeds for planting on their own farms. He also started an experiment on breeding of quails (kada pakshi) Having known the medicinal benefits of the meat of *Kada Pakshi* and their eggs he started their cultivation. Breeding of *kada pakshi* being comparatively simple and less expensive, he thought of popularising this as an income generating scheme to the cultivators. Development of Irrigation by constructing canals and Water harvesting, and use of Bio fertilisers were promoted by the Archbishop from the 1980s onwards. Above all, he was a lover of nature and a hard core environmentalist. His contributions to the field of agriculture in Kerala forms a land mark in its history as it was very rare to see a Bishop running after everything new in agricultural technology in the world scenario and imparting and experimenting them in his own land and distributing the benefits to the general public for the general welfare.

He popularised roof top cultivation even from the 1970s which is at present common at every households in urban centres. A roof garden is a garden on the roof of a building. All the roof space in his *Aramana* in Trivandrum was made use for such cultivation. Besides the decorative benefit, he used to say, roof planting may provide food, temperature control, hydrological benefits, architectural enhancement, and habitats for small creatures. It also provides recreational opportunities, and in large scale it may even have ecological benefits. Plants have the ability to reduce the overall heat absorption of the building which then reduces energy consumption. The primary cause of heat build-up in cities is insulation, the absorption of solar radiation by roads and buildings in the city and the storage of this heat in the building material and its subsequent re-radiation. Plant surfaces however, as a result of transpiration, do not rise more than 4–5 °C above the ambient and are sometimes cooler.

Considering all these he planted various types of plants like Orchids, Anthuriam, Cherry, etc. and vegetable plants like spinach, ladies finger, brinjal, pea, snake gourd, bittergourd, dolikos beans, tomato, chilly etc in earth filled sacks and pots on the terrace of his residence. Often Manjiam seedlings also found place there. The premises of his residence were a garden of various plants and trees. Winged Bean, Red Gram, Jasmin, pigeon pea, mushrooms, caliandra which provides honey and lac, velvet apple, egg fruit, walnut trees etc could be seen there. Fast growing tree seedlings were

given to farmers and proper planting techniques explained. Dr. K R Narayanan when he was the ambassador of India in US had given the Archbishop a Subabul seed on his visit to America which he had planted in front of his Aramana and he named it 'Narayanan' tree. It was a hobby for his Grace to visit Agricultural Research Centres of the foreign countries he had visited and brought plants from Latin America, USA, Australia etc. Amaranta and Manjium was brought here by his Grace from the National Academy of Sciences in USA. After his visit to Tokyo in Japan he became convinced about the medicinal properties of Mushroom and he started public distribution of scientifically produced mushroom seeds in his Aramana at reasonable prices and began training in mushroom cultivation on the 15th and 30th of every month. He sent Manjiam seeds free of cost through post for about 50, 000 and in person 15,000. Gooseberry and Cocoa cultivation also was promoted by him. Gooseberry juice and Choclate from Cocoa was produced in his residence. With the intention of providing scientific training on cultivation to medium and small scale cultivators in the state he had started a separate institute called the 'Chavara Bhavan' at Pattom. His palace was usually visited by Sri M.N Govindan Nair former minister for agriculture, R.Heli, M.S. Swaminathan, V Kurian and many others who loved agriculture.

The Archbishop and Social Forestry

He was also a proponent of Social Forestry and was a member in the state level committee of the Central Social Forestry Department. His scholarly articles were published in different agrarian journals. He argued for an education system which incorporates in its syllabus the need and necessity of agricultural training and activities in our schools and colleges. In one of the planning sessions of educational restructuring in colleges Mar Gregorios maintained that colleges and other higher educational institutions, without waiting for the approval of Government or University, should include in its academic activity realistic regional master plans, schemes and activities contributing and enriching to the locality. This is what the UGC asserts now in the name of social extension programmes in colleges.

Social Forestry means the management and protection of forest and afforestation of barren and deforested lands with the purpose of helping environmental, social and rural development. The term, social forestry, was first used in India in 1977. It was then that India embarked upon a social forestry project with the aim of taking the pressure off currently existing forests by planting trees on all unused and fallow land. Through Social Forestry Government is trying to increase forest areas that are close to human settlement and have been degraded over the years due to human activities needed to be afforested. Trees were to be planted in and around agricultural fields. Plantation of trees along railway lines and roadsides, and river and canal banks were carried out. They were planted in village common land, government wasteland, and *Panchayat* land. Social forestry scheme was initiated in India to increase fuel

availability in rural areas and to prevent soil erosion. It also aims at raising plantations by the common man so as to meet the growing demand for timber, fuel wood, fodder, etc., thereby reducing pressure on traditional forest areas With the introduction of this scheme the government is now encouraging rural participation in the management of natural resources. Through the social forestry scheme, the government has involved community participation, as part of a drive towards afforestation, and rehabilitating the degraded forest and common lands.

Mar Gregorios says, "Social forestry will help ordinary people to find the fuel they require for cooking. Planners consider that by 2000 A. D. the supply of grains could be adequate for all the people in the world. But the fuel for cooking food would become increasingly scarce. It is now time for us to plan for meeting such an eventuality. Social forestry is also a rich source for finding rural employment."

A true lover of nature, he chaired the Kerala Chapter of the 'Friends of Trees' and the 'Agri Horticultural society' till his death. The most important contribution of Mar Gregorios in social forestry is the introduction of new plants like Subabool, Manjiam, Ippil Ippil, Amarantus, and Caliandra to Indian soil and Indian forestry. All these trees are leguminous in nature and deposits large quantities of nitrogen in the earth.

The Subabul, native of central America, scientifically known as Leucaena leucocephala, is a leguminous tree known for its versatile uses in tropics such as a source of nutritive livestock feed, firewood, pulp wood, shade plant, soil erosion controller, and soil enricher. Its seeds give good quality oil. It is resistant to drought, heat, salinity, and land terrain and is considered as a boon in dry farming and agro forestry systems. Quick growth and enormous biomass production by Subabul demands an adequate nutrient supply particularly nitrogen and phosphorous. Being a leguminous plant Subabul is capable of utilising the atmospheric nitrogen which is plentiful through symbiotic association with root nodule bacteria (Rhizobium). "Normally a Subabul tree reaches full growth by 8 years and its wood as strong as Jack tree wood", says the Archbishop. It is also a good firewood and its' leafs good quality fodder. Most of the furniture in his *Aramana* are made of Subabul wood.

Acacia Mangium, another tree introduced by the Archbishop in India is a native of Australia, a species of flowering tree in the pea family Fabaceae, Like many other legumes, it is able to fix nitrogen in the soil. Mangium is a popular species for forest plantation and used more and more also for agro-forestry projects. In mixed cultures, plants can profit of the shadow from Mangium and the nitrogen fixation. Mangium trees produce sapwood and heartwood. The heartwood's colour is brownish yellow shimmery and medium textured. Because the timber is extremely heavy, hard, very strong, tough, and not liable to warp and crack badly it is used for furniture, doors and window frames. The glossy and smooth surface finish after polishing leads also to a potential for making export orientated parquet flooring tiles and artefacts. This is also used for the paper pulp and biomass Fuel industries. Due to the fact that it is a very fast

growing tree it develops an intensive rooting system, particularly in a low fertility soil. That helps to recover degraded tropical lands for what Mangium is very useful. He introduced this tree to find a solution to the shortage of wood in the country. This tree is fast growing and reaches its full growth within a few years while our native trees like Teak, Jack Tree, Mahagoni or others take a long period of time. Its wood is suitable for furniture and less costly when compared to other woods available in the market. Almost all furniture in the Mar Baselios College of Engineering, Trivandrum and the Mar Gregorios Renewal Centre Trivandrum, both run by the church, are made of Manjium wood. During the 1980s and 1990s there were Manjium plantations both in the private and public sector at different places in Kerala. Later many have started plantation business on Manjium in Kerala. The most important thing in connection with his promotion of Manjium on a commercial basis was that in his 'last will and advice' given on Cotober 9, 1994 one day before his death, to his auxiliary bishop Lawerance Mar Ephrem he wanted all the profit gained from Manjium cultivation by the Diocese is to be assigned for the poor especially for the education of poor children with priority to scheduled caste and tribes.

The 'Ipil-Ipil' also known as Leucaena leucocephala is another plant brought to Indian topography by te Archbishop. It is a small fast growing mimosoid tree native to southern Mexico and northern Central America, but is now naturalized throughout the tropics. During the 1970s and 1980s, it was promoted as a "miracle tree" for its multiple uses. ncy to get uprooted in rain and wind. Amaranthus, collectively known as amaranth, is a cosmopolitan genus of annual or short-lived perennial plants is another plant popularised by his Grace as part of the social forestation programme. Some amaranth species are cultivated as leaf vegetables, pseudo-cereals, and ornamental plants. Most of the Amaranthus species are summer annual weeds and are commonly referred to as pigweed. Amaranth is an excellent source of protein, dietary fiber, and some dietary minerals. It is particularly rich in manganese, magnesium, iron , and selenium . Cooked amaranth leaves are an excellent source of vitamin A, vitamin C, calcium, manganese, and folate. Amaranth does not contain gluten, so it may be a healthy and less expensive alternative to ingredients traditionally used in gluten-free products. It has high biological value and its benefits are not limited to people with gluten-related disorders, but are applicable to the general population. Quantity and quality of proteins of amaranth are superior to those of wheat. It also contains higher concentrations of folic acid than wheat and its fiber and minerals contents are higher than those of other cereals. Calliandra Calothyrsus is another small leguminous tree. It is native to the tropics of Central America where its typical habitat is wet tropical forests or seasonally dry forests with a dry season of four to seven months, when it may become deciduous. Calliandra is able to fix nitrogen from the atmosphere which has a positive effect on the nitrogen content in the soil. It can be used in crop rotation with sugar cane or with other crops. They are used, for

example, as stake for other crop species, such as climbing beans. It also provides shade for seedlings of plantation species, like damar for example. Calliandra is a fast growing tree that has a potential for reforestation in the Tropics.

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