Agriculture in the Northern Province

Its heritage, Potential and Prospects

XV Governors' Conference 2012 - Northern Province

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Preface

Northern Province is an agriculture hub and potential area in which people cultivate variety of crops. Certain cash crops such as banana, onion, grapes, tobacco and Palmyra products have demand in the southern markets of Sri Lanka. This book in a snapshot attempts to exhibit the potential resources, culture, tradition and developments associated with the farming in a quick glance. The texts are minimized as much as possible and more pictures are incorporated to enable the reader to have easy and quick understanding in a glance. A popular song in Tamil quotes "என்ன வளம் இல்லை இந்த திருநாட்டில் ஏன் கையை ஏந்தவேண்டும் வெளிநாட்டில்" means '*What are the resources you didn't have in this wonderland and why do you always beg the foreign countries*' is a question to everyone of us. Conservation, protection and effective utilization of the resources are the real need in agriculture. The province statistics still indicate the malnutrition and anemic conditions among children and women in some districts and this has to be looked into seriously through the balance food production. As a solution to this crisis, establishment of home gardens is one of the projection in '*Mahinda chinthana*' and is the ultimate base and strength towards food security. Emphasis is also given to exhibit the home gardens, school gardens and medicinal herbal gardens established in this province. This land has number of indigenous medicinal plants and while conserving and protecting these plants, their production has to be increased to cater the country's need. In addition the lifestyle, commitment and courage of the people especially women contribution is much elaborated as this piece of land has to provide opportunity to the widows and women headed families to sustain their livelihood. The pulse and the feelings of the people along with their traditional farm practices are documented. Agriculture is mostly intensive farming and due to over exploitation of resources; problems are created in soil, water and in the living environment. Organic farming is being practiced in this province and growing of input dependent improved varieties is yielding as expected but become dependent to the use of inorganic fertilizers and pesticides. Palmyrah palm based farming has a tradition and their products have definite demand outside the country. These palm products have to be standardized and develop as more value added products to meet the requirements of the global market with the caption of 'Made of Sri Lanka'. Ecotourism is another focus point to develop this province and bird's sanctuaries, botanical gardens, Agro-tourism centers need to be established to fulfill the needs of the tourists. The youth in this province should be motivated to involve self income generating enterprises, create job opportunities and become the powerful building blocks for future Sri Lanka.

Message of the Hon. Governor, Northern Province

The XV Governors' Conference could be considered a very special event for the peoples of the Northern Province, especially for those in the Jaffna peninsula as they would play host to the Hon. Governors of the different provinces of Sri Lanka, their Secretaries and the respective families.

The three decades of war devastated the Northern Province. However the leadership of His Excellency, President Mahinda Rajapaksa brought about peace to the country and development is now taking place at a rapid pace.

On this accord, the Northern Province is presently experiencing the fruits of development that has never been seen earlier. Thanks to the guidance provided by Hon.Basil Rajapaksa MP, Minister of Economic Development, and Chairman, Presidential Task Force for the Development of the Northern Province whereby "Uthuru Wasanthaya" was executed.

This has given rise to the people to freely involve themselves in their cultural activities without restraint. Similarly their Livelihood, Agriculture, Fisheries and such enjoys a boost.

Amidst all these, being host to the Hon. Governors of all the Provinces of Sri Lanka is an Honour and necessitates the issuance of a brief resume on the Agricultural Aspects of the Northern Province of Sri Lanka.

This exclusive publication would no doubt be of value to most of our distinguished and valuable guests, if not all of them, as it dwells into the afore mentioned areas in as brief a manner as presentable.

Thank you.

GA Chandrasiri
Governor
Northern Province.

Introduction

Sri Lanka is a beautiful is land nation in Asia. Our nation is the Pearl of the Indian Ocean and has potential resources in it. Our motherland has a multi-ethnic; multi-cultural; multi-religious and multi-climatic composition exhibiting its versatility that proves the stronghold of rich biodiversity. The Northern Province is geographically unique in its feature and its location. This province is blessed with ample resources such as agriculture and fisheries that helps the people to grow crops, capture fish, produce food, earn money, and overall to sustain their livelihood. The sea on the three sides of the Jaffna province provides ample opportunities to promote sea farming.

The Northern Province consists five districts; Jaffna, Kilinochchi, Mullaitivu, Mannar and Vavuniya. The Jaffna peninsula is geographically attractive and has possibilities to expand fishing activities and improving agriculture to produce a variety of nutritious, healthy food to the people.

1

The Farmer looks for possibilities to grow crops in the changing climate

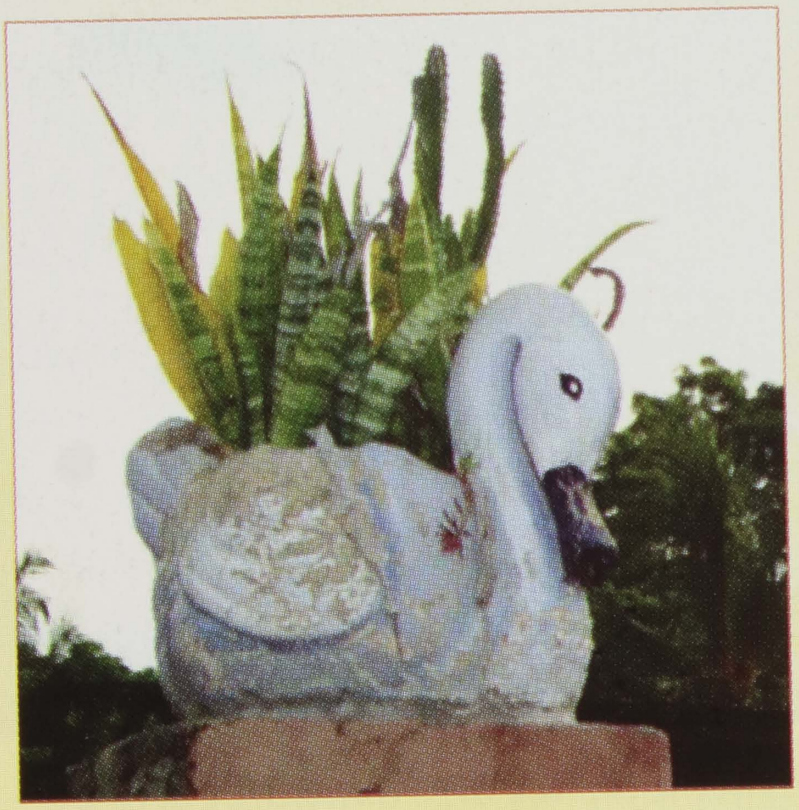
Jaffna is in the extreme north of the Island and is a potential area for agriculture and fisheries. Traditional and conventional agriculture is practiced in the Jaffna peninsula of which a sizable area is always occupied with cash crops through intensive agriculture that compels the farmers to solely depend on inorganic fertilizers and pesticides. Interest and commitment of the people in cultivating indigenous species of crops is an example for growing those traditional varieties and continuously used for consumption.

Intensified cultivation with newly improved varieties yield high crops but often succumb to pest damage and diseases. To control such crop pests top most priority is given to inorganic pesticides and are applied injudiciously. However these pesticides are opted randomly, mixed haphazardly and sprayed indiscriminately resulting in polluted harvested products with toxic chemicals that often consume more than 50 percent of the cost of cultivation.

Intensive crop cultivation in Jaffna. Plants in the picture are Palmyrah, Coconut, Banana, Tobacco, Sunnhemp (fiber cum nitrogen fixing plant)

Jaffna farmers are best recognized good performance in agriculture but are also noted as high consumers of inorganic pesticides under the shadow of modern agriculture. Use of inorganic pesticides is inevitable in intensive agriculture; however traditional farming is still in practice and is the credible example for the nature loving attitude of the people of this province.

Religious belief attract the farming community in their day today activities. The people keep animals in their homes as a symbol of their cultural heritage. Depending on their desire, people have statues of different animals, birds, and even other monuments.



Different structures built at the entrance of Jaffna homes/temples

Background

Agriculture and fisheries sectors are the major sources of living to the people of the Northern Province. Traditional farming is in practice in many places. However, a paradigm shift to mechanization is evident due to shortage of skilled labourers. The Northern Province is gifted with the blessings of palmyrah palm based farming and its utilities. This tree based farming has great concern towards the livelihood of the people in various categories. Small scale farming is predominant in the province and it has been focused in designing development programs of the province. Displacements due to conflict caused heavy loss in terms of assets as well as manpower of the farming families. In such an imbalanced situation, farming families have been able to manage to continue their farming activities with the support of government relief.

2

The tree of the Northern Province, Terminalia arjuna (Family: Combretaceae) (T. *Maruthu*). Usually grow in the sides of ponds/lakes to protect erosion as its roots entrap the soil and to provide shade. The tree has medicinal value, the fruits used to repel mosquitoes. Also grows nearer to the open wells to purify the water. Good for the honey bees as the flower produces honey. Good timber used for construction of bridges and the chariot of Hindu temples.

Heritage of agriculture

Agriculture in the Northern Province has a long history. Paddy is grown as a major food crop during the *maha* season (October to January) and is grown as rainfed crop depending on the rainfall. Those days only the traditional varieties were grown and are continued even now in isolated pockets. The North East monsoon blesses the province to meet the water requirement for drinking, household use, irrigation and other purposes. Changes in the rainfall pattern and amount received in a year decide the crops' success. Men and women in a family are engaged in family farming and their size of farming is also small. The land owned by a family gets partitioned further to when given as dowry when a daughter gets marry.

The Jaffna farming village has a definite structure. The well, the irrigation system with the sweep (T. *Thula*) and basket (T. *Paddai*) are unique and not seen in any other part of Sri Lanka or in the world. This irrigation system was evolved more than thousand years ago. The soil structure with

the underground network of aquifers had indeed contributed to a great extent towards for the development of the present farming and irrigation system, which is now commonly referred as the Traditional farming in Jaffna. The Jaffna peninsula floats like a lens on the surface of the seawater. The bottomless fresh water well at Nilavarai has sea water underneath. The fresh water wells in Jaffna turns salty and during the dry season with the level of the fresh water table going down. In several places, in Jaffna, the underground fresh water aquifers surface to the top.

Thula – a structure made out of palmyrah whole palm to lift the groundwater - is now replaced with kerosene water pump for lifting water.

One such place has been converted to the fresh water swimming pool at Keerimalai. These observations had led the Jaffna farmer to dig wells. Some wells are shallow while others are deep. The depth of the wells depend on the level of the underground water aquifer beneath. In the adjoining Kilinochchi districts, the soil structure has no limestone belt.

The sweep (T.*Thula*) and the basket (T.*Paddai*) with the well type irrigation have evolved using the raw materials that are in plenty in Jaffna. The sweep is crafted from the trunk of the palmyrah tree or coconut tree, of which the bottom portion is bigger and the top is narrower and lighter. The sweep is fitted with a palmyrah plank horizontally at its two third portion and the edges of the horizontal plank is rolling on two elevated clamps of palmyrah trunks or cemented walls. This set up helps the sweep to swing freely up and down. A rope carries the basket at one end while its other end is tied to the sweep. The water drawn up from the well flows into a canal (T. *Vaikkal*) leading to the plants to be irrigated.

This way of lifting water manually demands no fuel or electricity but exemplify the hardships and will power in their style of living.

If this irrigation system is setup in the field, it requires a minimum of three persons each performing a specific job; one for the sweep, one to tilt the water in the basket into the canal and the other to irrigate the plants. Where the wells are deep as in Thirunelvely, two men are on the sweep.

Climate and Rainfall

The Jaffna Peninsula comes under the dry zone low country divisions 3 and 4 (DL3 and DL4), which receives a total annual rainfall of about 635-1400mm out of which 65-75 per cent is received during October-March (*maha* season) and the rest during April-September (*yala* season). The total rainfall in the Peninsula when compared with arid zones is high in aggregate terms but highly seasonal.

Typical ponds excavated in Thenmaradchi areas to lift water using a device called 'pattai' Made out of palmyrah leaves to water the plants in the garden

The north-east monsoon is the main source of rain water for the dry zone and lasts from October or early November to late December or early January. Although occasional heavy rains occur in late March and early April the seasonality of the rainfall is so marked that three to four months of drought is common in normal years. In lean years around six months of absolute drought can be expected. These rainy periods determine the cropping seasons and systems. In spite of limited water resources and relatively poor soils, small farmers have developed a highly successful and profitable farming system. Ground water resources are found in the limestone belt in the Peninsula and this is being intensively exploited for cash crop farming. However, there are certain environmental features peculiar to Jaffna that needs serious consideration.

Traditional varieties:

Many farmers still grow traditional varieties of crops and preserve their seeds for their next generation. These are commendable and the best practices of farmers. For example certain traditional rice varieties are being grown year after year. Indigenous rice varieties such as *Moddaikaruppan* and *Morungan* are still in practice in certain pockets in the Jaffna peninsula. These red pericarp rice varieties possess bran rich in vitamines and are always preferred and consumed as par-boiled rice and by the people in this region. One of main the attribute of these rice varieties is that they never fail to give an average yield when they experience flood during harvesting. The grains will not shatter even when it attains maturity and harvesting of rice is possible under flooded conditions. During the period of abnormal dry months the varieties never fail to produce an average yield. In total, the traditional varieties require less care and are the potential inputs of nature's farming.

Although these traditional rice varieties are low yielders and less comparable with respect to high yielding varieties, the harvested produce is sufficiently used for consumption of the entire family for that year and to keep seed material for the next cultivation. With respect to pest management, they never require a single spray of pesticides, these

traditional varieties are best opted by the farmers and are considered as best practice.

Brinjal [Aubergine] varieties such as *Madduvil white* and *Thinnavely-purple* are grown in Madduvil and Thirunelvely areas, respectively. Being a potential indigenous variety, *Madduvil white* is less preferred by the ever striking major insect pest, shoot and fruit borer, but is an average yielder compared to improved varieties. However *Thinnavely-purple* is much preferred by the consumers due to its shades of purple colour and taste and also preferred by the fruit borer as well.

Moddaikaruppan – commonly growing indigenous variety of paddy

Farmers spray a mixture of insecticides every alternate day and few of them even spray daily to draw a sizable income from brinjal fruits from high yielding and improved varieties targeting successful control of shoot and fruit borer.

The larvae bore shoots at their early stage resulting to wilting of branches and later forms bore holes in the fruit leading to low consumer preference and ultimately rotting takes place. Without a single spray of insecticide it is perhaps very difficult to harvest a brinjal fruit without a bore hole in it. To get rid of the use and to reduce the cost of insecticides in brinjal, farmers prefer to grow traditional varieties like *Madduvil white* having resistance against shoot and fruit borer. This has a better demand among the consumers who have concern on poisonous vegetables.

The village and its tradition

The village pattern in the Northern Province is unique and every household has a well with a live fence or parapet wall on four sides and a house in the middle. The house is constructed with a cajan roof and the base is smeared with cowdung giving protection from contamination. Every farming family celebrates all the religious festivals giving respect to the sun and earth. Especially all the

Madduvil white (Insect Resistant cultivar) and Thinnavely-purple

farming families celebrate the Pongal day to respect the sun as the supreme source of light and energy and the essential component inspiring all plants to synthesize food through photosynthesis. The following day is the pongal for their house hold animals. In addition, all the 'Hindu' religious activities have close relationship with farming activities.

Painful worshipping – hanging in needles clamped on a rope fixed with the palmyrah trunks tied on a four wheel tractor.

Burning of coconut dried leaves and banana - a symbol to set fire as a means of religious event - attract flying insect pests and control them

The wooden made chariot festival is an ever seen occasion in Hindu temples. The chariot was made of (T.) maruthu, muthirai, vembu, Karunkali, nuna and palie.

Religion and agriculture

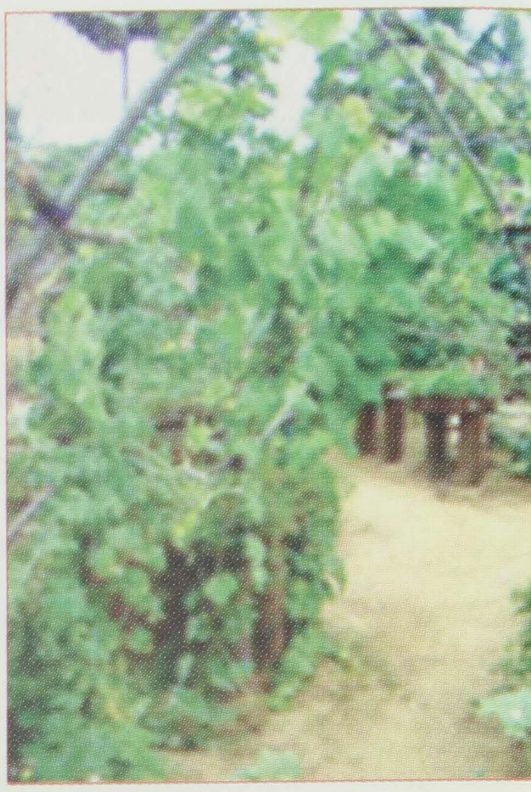
Religion is closely associated with farming activities. Every event gives meaning to a farming activity and demonstrates the power of each God. Temples during festival are decorated with a variety of plants and shows that diversity is being maintained. Especially in Hindu religion, all festival activities symbolically depict farming events and explain the importance of plants.

Home Gardens

The Home garden is not a new concept and people did have them in early days. Most of the green leafy vegetables are grown in home gardens. It has been proposed to grow green leafy vegetables for a family requirement in their home garden. The concept of home garden is powerful as all the family members are involved in cultivating crops on their own although in small scale. Management of pests is made easy and methods other than chemicals can be given top most priority and can harvest poison free products. The institutions working on livelihood projects, extension and input supply centers have taken initiatives to provide awareness campaigns to all to promote home gardens in each homestead.

The Home garden provides good and fresh vegetables which has several other advantages. It is very helpful to get rid of psychological problems and to refresh the minds when children play with these plants in the home garden. Vegetables, fruit trees, medicinal plants, flowering plants are the chief components in the home garden.

Green leafy vegetable -Centrella asiatica (Gotu kola) grown with ornamental plants under the tree Army assisted home garden at Kondavil



CIMIC Jaffna assisted home garden from Chavakachcheri won the first price in the home

garden contest in 2011. Note that the containers of armaments are used to grow plants.

A home garden can be established with the available resources at every home. These plants help to have cool fresh air and look charming with colourful flowers and fruits. The green look helps our minds. In Jaffna, home gardening and household farming are very common and the run-off water from the wells are channeled to these home gardens and trees. Each house has an open or a tube well. The water extracted from these wells are used for bathing, washing and drinking purposes. The water used for bathing is directed through a channel and flows to the plants. In this way the water is not wasted and used for growing plants. In addition the waste generate at the farm or homestead, will be used by recycling into good compost. House hold composting is promoted by the government through various programs.

School garden at J/St John's College, Jaffna

School garden at J/Nelliady Madya Maha Vidyalayam

School garden at J/Pandatharippu Hindu College

Let's grow and build the country

Promotion of home gardening, school gardening and gardening at institutions is a commendable activity. The Government of Sri Lanka launched a program called "*Api wawamu rata nagamu* – Let's grow and build the country" sounds well and has to be extended to all homes. Research should target identifying suitable home garden models to cater to the requirements of the public and to meet the challenges of climate change. As an incentive, Jaffna Science Association (JSA) conducted school science program included school garden contest in the year 2010 and encouraged the schools to establish a garden in their schools. JSA wholeheartedly honoured J/St John's college, J/Pandatharippu Hindu College, and J/Nelliyady Mathya Maha Vidyalam for being winners of first three places in the school garden contest during 2011.

Demonstration on Green house effect by students

Garden maintained at J/Chundikuli Girls High School.

Greening and diversifying the environment:

Conservation of the environment we live in is very essential. It is appropriate that growing more and more crops/trees will diversify the environment. Such diversification will lead to a number of intra specific

CIMIC Jaffna assisted home garden at Eevinai, Kadduvan

interactions. More the species we grow the more we will diversify the environment. Plants growing in different strata with different canopy size can be selected. This will overcome the interspecific competition and will best survive in the existing ecosystem. In other words we have to strengthen the environment by incorporating more and more species to reach the balance.

Since we are living in a dry zone atmosphere, we have to face a dry spell for a long period of about 9 months. Now we are in the process of designing a model to suit the existing environmental conditions and such successful model can later be kept as replica to establish similar ones in other areas. While strengthening the ecosystem structure we could avail the ecosystem services for various purposes.

Above all the Northern Province is urged to have a botanical garden to conserve, preserve and protect the endangered plants of this province. By establishing a botanical garden it will serve the community to educate them about the importance of the plants, their identity and usage. All the plants should be grown in one place and labelled.

Best practices in farming

a. **Rotation of crops:**

The density of the population in Jaffna is high and the extent of cultivable land is quite limited. Jaffna peninsula is cris-crossed with brackish water lagoons. Sea water intrudes the lagoon during the North-East monsoon season. The increased population with limited cultivable land supported by the wells had favoured the evolution of a unique farming system. The rotation of crops is for survival coupled with economic development. The saying, from *Thiruvalluvar* period, a thousand years ago is "*The survival of the wisest*" (T.*Puththiman Pallavan*).

The rainy season comes to an end by January. However the cool weather continues through January, February and part of March. Upcountry vegetables eg. leaks, cabbages, carrots cauliflowers and

Onion as a crop in the Jaffna soil

cash crops onion, tobacco, lentils, green gram, black gram, gingelly and flax for fiber are cultivated. Most of these crops are harvested from 60 days onwards and completed in 90 days. The same land is now ready for a second set of crops.

The second set of crops are planted in April and harvested in July or early August. This is a very dry season with the sun overhead in Jaffna in April. The supply of underground water decreases. The water in the top wells limits the cultivation. Crops like (drought resistant) finger millet, maize, gingelly, green gram, black gram, and manioc requiring little water are planted. Chillies, onion, tobacco require a regular supply of more water. Water management is practiced where a judicious selection of crops based on the water requirement and water availability. Country vegetable like egg plant, ladies finger, string beans, bitter gourd, snake gourd, pumpkins, melons together with Jaffna mangoes, plantains and jack fruits decorate the season.

With the beginning of the rainy season in September, low lying lands are cultivated with paddy. Marginal lands not cultivated during the dry season are also brought under cultivation, the low lying areas with paddy and upland with cash crops.

Onion stored in bundles

Tobacco – the cash crop field in Jaffna

Cash crops for income:

Northern Province is well known for cash crops especially small onion, banana, mangoes and grapes. Small onion is grown in a large extent since it has demand immediately. Among the cash crops tobacco is given priority.

Although tobacco is not encouraged to grow by the government due to the presence of narcotics, it is ideal to find alternative crops to it. However farmers prefer to grow tobacco due to its demand. Because of the risk associated with the tobacco, and its effect in human body it is essential to educate the farming community to select other crops for cultivation. Under such condition, medicinal plants can be thought of to replace these cash crops.

Natural drying of tobacco leaves on the parapet wall of the houses.

Fruits of the soil

Fruit crops are also equally important to other crops giving fibre and other essential nutrients. Papaya, guava, pomegranate, grapes and banana are cultivated commonly. However the consumption rate is less probably due to its higher price. To avoid malnutrition and constipation fruits should be included into the daily meals. The unique cultivar of mango, *Karuththa kolumban* is also not flowing into the market at recent times due to its low production. The purity of the cultivars is not maintained. Most of the mango trees in the peninsula are parasitized by the plant; *Dodder* sp. Grapes is cultivated in selected pockets especially Kopay, Karanavay, Chandilipay and Ilavalai. Though one unique variety is cultivated so far, new varieties have to be incorporated.

Palmyrah and livelihoods

Palmyrah is a unique palm of the Northern Province and many farm families depend on this. Palm products are marketed locally and very

Palmyrah home made products in the market - livelihood of small scale businesses

Tapping of toddy from Palmyrah palm- using mud pot and plastic bottle

less amount in foreign markets. Since all the parts are useful to human being palm based products are to be produced satisfying international standards.

Tapping of toddy is an employment to youth living in these areas. It is an art to climb the palm and tap the sweet sap. Now it faces atmost risk due to the depletion of number of toddy tappers as they move towards other jobs. If any edible chemical composition is invented to substitute $CaCO_3$, to prevent fermenting of the sweet sap and production of toddy could be prevented. Further sweet sap could be tapped from the palm and sold in bottles. This will lead to closure of illegal toddy taverns that create a healthy atmosphere among the workers families.

Since large number of palms are available in the Northern Province palm based agri business should be strengthened to uplift its commercialization into the global market. Jaggery is another product that is obtained from the sweet sap of the palm to be refined to produce as palm sugar. The pulp, seed nut and wet and dry roots (T: *Pulukkodiyal* and *Odiyal*) are to be value added to increase its marketability.

Life fence – Thespecia pepulnea

Life fence – Commophora caudata

Indigenous Technology in practice
Green manures and Green leaf manures:

Thespecia trees are left in every home when parapet wall is constructed inside (above) to use the trunk to burn corpses at funeral pyres (below).

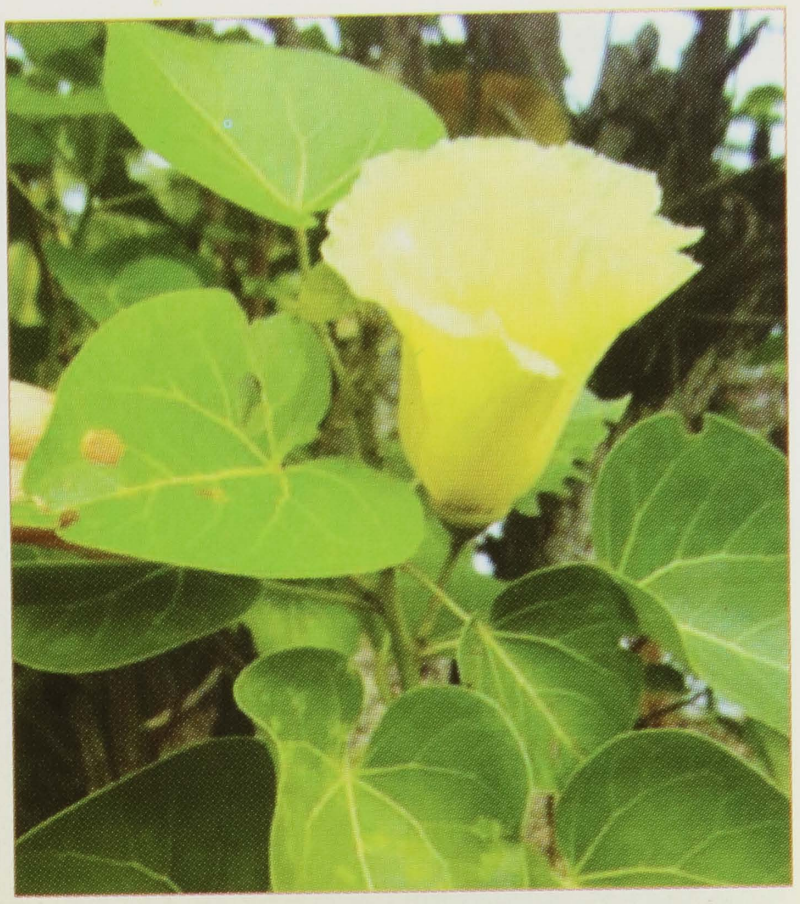
Training of green palmyrah leaves to thatch the roof

Palmyrah, the palm is an awesome resource of the Northern Region – innumerable young palms established due to the non interference of human activities – a potential venture for the extraction of petiole fibre for small scale industries.

Dried palmyrah leaves were spreaded in the field before the land preparation

Palmyrah products become an income generation to the people living in palmyrah based farming.

Gliricida plant



Thespesia leaves

Clausena indica leaves

Callotropis plant

In some parts of the Jaffna peninsula especially in Vadamardchi area farmers practice incorporating green leaf manures in their cultivation since ancient time. Cash crops such as onion, chilli and tobacco receive such green leaf manures.

One such possible approach is to minimize the use of inorganic fertilizers especially nitrogenous fertilizers like urea. As an alternative to substitute the reduction of inorganic fertilizers, organic materials have to be added. One such measure is incorporating green manures and green leaf manures to supplement the loss of nitrogen. Green

Animals are tied up in a small hut kept in the field

manures are the crops grown in the field itself and at the time of 50% flowering the crop will be buried *in situ* at its next plough. Leguminous crops such as sunnhemp, green gram and black gram are the green manures grown and incorporated *in situ* in the soil. Green leaf manures are the leaves obtained from the life fences and trees/shrubs grown somewhere else and brought to the field and incorporated in to the soil while preparing the field for transplanting.

Among the green leaf manures *Thespesia, Callotropis, Clausena indica* and *Gliricidia* are commonly used. In saline soil farmers incorporate dried palmyrah and tamarind leaves to reclaim salinity. Especially at the coastal fields once sea intrusion was recorded the water and field become saline. This problem was solved by applying these leaves to certain extent.

These native plants are grown naturally in barren lands and they are cut and ploughed into the soil.

Animals kept within barrack inside banana field

Banana pseudostem is safely covered by palmyrah petiole preventing animals damage

Household rearing of goats of local breeds is common in villages

School students visit the medicinal herbal garden, identify the plants and their values.

Paddocking:

Paddocking is a practice famous in the Northern Province. Cattle in a group of about 200 will be kept enclosed within a barrier made by wooden plank to allow them to excrete urine and dung in the same place. Through night the animals are directed with an area demarcated and their urine and dung will get trampled and incorporated into the soil. This facilitates the soil conveniently mixed with urine and cow dung and the soil is finally enriched with these animal wastes. This helps to grow crops without or least application of inorganic fertilizers.

Paddocking in three ways:

1. **Cattle hut model**

Movable small cattle shed is kept in fields and 3-4 cattle are tied during the night. During day time these cattle are allowed to graze in the surrounding fields. The dung collected will be incorporated into the field and sometimes collected and later incorporated. These movable cattle shed are changed from its place from time to time facilitating its application at field level.

2. **Paddocking in banana field**

Farmers join together and practice this kind of paddocking in their fields. They keep their cattle at a temporarily confined space made by them within the banana field. These cattle are allowed to stay during

Animals are confined within the barrack

The Barrack is kept rotating

Preparation of open cage using wooden planks

Preparation of open cage using wooden planks

night in that confined place and during such period they trample the dung and urine into the soil. In this way the soil is enriched with the mixture of dung and urine. Neighbouring farmers join together and take the cattle to graze in the fields and during day time farmers engage labourers and allow the cattle to graze in the grazing lands. One farmer has a maximum of 50 cattle and 4-5 farmers join together and allow the cattle to graze freely.

Animals trample dung and urine and incorporate into the soil

Paddocking in *Amaranthus* field

Green leafy vegetables are much preferred by every one in the Jaffna peninsula. Among the green leafy-vegetables *Amaranthus*, Gotu kola, and *Alternanthera* are commonly used in daily dishes to supplement fibers, vitamins and nutrients. These leafy vegetables are grown using almost organic manure through the activities like paddocking.

Cattle are kept confined during night in the field. They are allowed to graze during day time. The barrack is made by tying temporary wooden planks and is kept for two days at the same place and then it will be shifted to new place within the field itself.

Amaranthus is grown in the field already incorporated with cow dung and urine

The owner of the animals himself prepares the open cage in the evening before the animals return from grazing. He uses already prepared wooden planks and makes a temporary barrack which will remain in the field for two days. This allows the owner of the animals to rotate the barrack according to his needs. It is learned that farmers keep this kind of paddocking once a year and this is sufficient for them to grow *Amaranthus* without adding inorganic fertilizers. *Amaranthus* is a leafy vegetable hardly occupies the field more than 30 days and is a quick profit yielding leafy vegetable and these farmers has a clear vision of producing good vegetable with the minimum application of inorganic chemicals.

A total of 200 animals are kept in each paddocking activity. The number of animals may vary depending upon the need of the farmer.

Plants growing at a commercial nursery at Thellipalai

A sum of Rs 5/= is charged per animal for a night stay. In addition the labourer charge of Rs 200/= is paid for the person, who serve as security personnel during that night and Rs. 300/= is paid for two labourers who look after and guide the animals during grazing on the whole day. Altogether Rs 1500/= has to be paid for a day. Upon rotation in the field the paddocking will be done yearly. If the farmer owns his own a vehicle then he takes these animals daily to enrich the soil little by little.

Seed and seedling Production:

SEEDCO is a cooperative society owned by the Jaffna farming community that receives support from the District Secretariat/Jaffna and Office of Deputy Director (Extension), Agrarian Services and Development and the Faculty of Agriculture, University of Jaffna for the production of seeds of a variety of crops. It has infrastructure facilities to produce good vegetable seeds for the peninsular distribution. Farmers are trained in nursery techniques, seed testing and monitoring. In addition, there are self help groups who produce seedlings and plantlets on a commercial platform. For example, a self motivated innovative youth from Thellipalai produces seedlings and plantlets commercially the needs support to widen his business venture. He is a skilled self developed person very familiar in grafting and budding plants.

The establishment of Plant nurseries in different areas of the Northern Province is essential to supply adequate seedlings and plantlets to the public. The production of seedlings will assist regular supply of seedlings to the public and therefore their production could be sustained. Further grafting and budding techniques are skill oriented and experience based, therefore youths can be trained to develop plants through these skills by giving hands on experience to them. The success of the establishing nurseries could be replicated to other districts too there by the required number of seedlings could be supplied.

Effective utilization of these waste materials are reused for propagating plants attracts everyone to think about the materials we waste and dump on the road sides. This kind of innovativeness should receive attention and should to be rewarded.

Medicinal plants of the Northern Province

Medicinal Garden at Navakiri

Medicinal herbal garden at Thirunelvely

Medicinal herbal garden at Araly

These medicinal plants have potential to use for indigenous medicine. To create awareness among the public medicinal gardens were established in different locations to educate the public to conserve, collect and cultivate the herbs. Through collecting and cultivating these herbs they can earn money and it will be an income generating venture along with the cultivation of crops.

The potential medicinal plants are listed and few of them are given with their natural existence. These plants have medicinal value and are given prominence to cultivate in the home gardens, school gardens as well as in farmers fields. The demand for these medicinal herbs is high for their drug production and such herbs have been given importance to establish in large scale to meet local requirements. For

Herbal garden at Navakiri established by the Provincial Department of Indigenous Medicine

The Ashwagantha Plant

Roots of Ashwagantha

example a kilogram of Ashwagantha called *Withania somnifera* roots are sold at Rs 1000/= in the market. Such demand on these medicinal plants are existing at present and these medicinal crops have to be considered as alternate crops to generate income to the farmers. In addition, this will support the indigenous medicine to obtain ample amoun of the herbs locally produced for their drug manufacture.

These medi cinal plants are potential sources of income to the farming groups especially women headed families to establish in their home gardens.

Multipurpose trees

Indigenous multipurpose trees are very valuable in terms of sustaining biodiversity and to be used for various purposes. These trees usually grow in life fence to provide physical strength, shade, as green leaf manure, fodder to cattle, medicinal purposes and leafy vegetables.

Trees are grown so as to enrich the agro-forestry by incorporating several species of the trees locally available in the region as well as to be introduced for certain specific purpose such as fodder etc.

Gymnema sylvestre leaf used for diabetic mellitus

Unexploited Plants

Gymnema sylvestre garden at BioTec (Pvt) Ltd., Jaffna

Unexploited plants are available mainly in the Northern Province. Especially creepers, climbers and shrubs are very useful plants in terms of medicinal value. Though we declare them as weeds these native plants possess medicinal as well as commercial values. For example the dry land weed, *Cyanodan dactylon* is an unpleasant plant in dry land cultivation and farmers spend money to uproot and destroy it. However this is now emerging as a potential crop in terms of its use as a medicinal drink to keep the body fit for the working people. Mangroove forest species such as *Avecennia, Rhizophora, Lumntzera, Bruguiera sexangula, Clerodondron, Cyperus corymbosus*

and *Fimbristylis ferruguinia* are also under this category. These plants have to be correctly identified and later complaining about them is not a healthy practice.

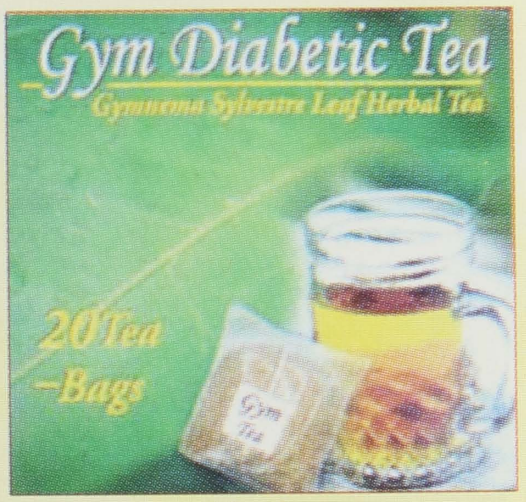
The tsunami incidents were carved on a Nuna tree (Morinda umbellata, Family Rubiaceae) of 8 feet height and 10 feet circumference by the artist Mr. A.V.Ananthan from Thellippalai, who is the recipient of Presidential award in 2008.

Local agro products

Many agro products are produced in the Northern Province. These agro products had steady demand before 2009. However after the year 2009, unexpected flow of many products into the Jaffna Peninsula becomes the problem for the local products. These agro products have to be improved for a national scale business. BioTech Ltd produces wines, soft drinks especially for diabetic patients, diabetic tea, and hair oil. This industry established 1 acre *Gymnema sylvestre* plantation for the collection of leaves even from the public.

There are many more companies that exist in this Province. Anna Insustries Pvt. Ltd produces all the household items in a usable form especially coffee powder, V.S.P group Pvt Ltd markets pure gingelly oil and Tholakaddy nelli crush, Jesuby cordial etc. In addition, there are industries that import the products and market locally competing with the locally produced ones.

BioTec products



BioTec diabetic tea (export)

Anna Pvt ltd product

Potential and risks in agriculture

The Northern Province is the richest source for the agriculture and the fisheries sector. Though it is classified as dry zone, its performance is incredible. People in this region have the courage to request and deliver important things. The locally available resources should be identified and utilized in an efficient manner without disturbing the structure of the ecosystem. All the flora and fauna have to be protected and conserved.

The resources of farming

1.1.1 Water

A river in Jaffna called 'Valukkai aru' has greater impact on agriculture in the Valigamum areas. The World Bank sponsored Ministry of Economic Development – reawakening project of Valukkaiaru is a good example to quote. Approximately 300 million rupees project helped to arrest the sea water intrusion from Araly barrage and renovated the barrage, main and sub cannels, several water ponds, and given provision to store water inside.

Valukkai aru, the only seasonal river in the Jaffna Penninsula renovated by the Ministry of Economic Development with the financial assistance from the World Bank

Valukkai Aru scheme

Over extraction of water is a major threat for drinking water

Iranamadu reservoir in Kilinochchi, the largest inland lake in the Northern Province, is set to be one of the fresh water fishing hubs. The catchment area goes upto Mankulum and this reservoir has irrigation system to irrigate water during dry months.

Under the 'Uthuru vasanthaya' (Northern Spring) programme fishing canoes were distributed to the resettled civilians in the area to make living and uplift their livelihood while raising their income level. Initiatives have already taken to supply water from Iranamadu reservoir to Jaffna.

This helped to reclaim the cultivable lands from salinity and the water to use for drinking and irrigation purposes. Beginning from Kadduvan and ending in Araly, this artificial river has a great impact on agriculture in the Jaffna peninsula.

Organic/biodynamic farming

The farmer owns cows, bulls, goats and poultry. These farm animals are fed with the straw from paddy; the greens available after harvesting of crops, the bran from the grains and the protein rich residue of oil cake after extraction of gingelly and coconut oils. These animals give protein rich nutritious food for the members of the farm family. Their fecal and urine waste, and kitchen solid organic wastes decompose to good organic compost manure for all their crops including paddy. The long term nutritional needs of plants while being met by burying fresh greens and palmyrah leaves, their short term requirements are fulfilled by supplementing with compost manure.

The organic manure increases not only microbial activity in the soil but also the number of earthworms that loosen the soil leading to increased nitrogen fixations. The multicropping with the rotation of crops prevents the spread of plant pathogens and pests. This integrated farming system is in vogue even today.

Progressive farmer with vermicompost

Vermicomposting cement blocks

Risks associated in agriculture

Inputs to farming:

Consumption of inorganic fertilizers is at maximum and over and above the departmental recommendation for the cultivable crops in the Jaffna peninsula for a long period. As a result the excess fertilizers especially nitrate nitrogen get drained along with the seepage water and reaches the water resources like agro wells. It's not a surprise that 65% of the agro wells used for drinking as well as irrigation purposes are above the WHO standards in nitrate nitrogen. This increased level of nitrate-nitrogen in the agro - well water is at its high risk level according to the WHO standards. This in tern is also believed to be indirectly resultant in having higher cancer incidents in Jaffna compared to other parts of the country. Over use of inorganic fertilizers cause deleterious effects in the agro-ecosystem and hence it is urged to adopt a feasible measure to bring down the pollution of nitrate nitrogen in water obtained in agro-wells to acceptable levels.

Crop-Livestock Boost for Organic Agriculture

One of the beneficial effects of the war is the adoption of crop-livestock combination in cultivation. The embargo on availability

of inorganic fertilizers in the northern region paves the way to find alternatives to supplement the nutrient to crops. Hence the crop-livestock combination was intensified and plant and animal wastes were used to grow crops.

Cattle grazing in Jaffna

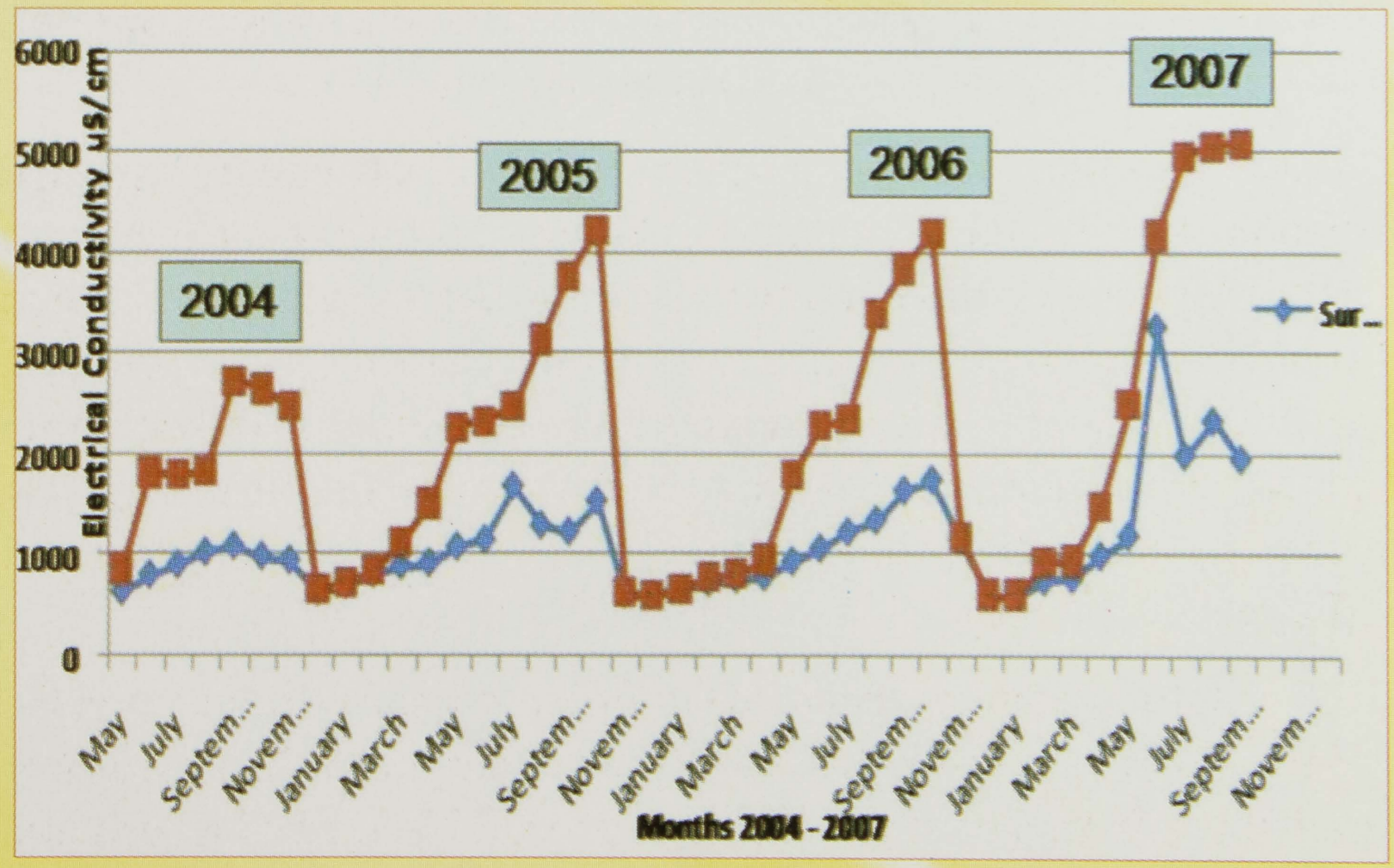
This combination has had good effects as it has no hazards to the environment and supports the nutrient balance through their products. Livestock excreta are well utilized to adopt organic farming and are a preferred practice by many farmers thereafter. Mass exodus and subsequent displacements caused irreparable losses of crops and animals that created problem to small scale farmers to recover from the damage.

Over extraction of water for intensive agriculture:

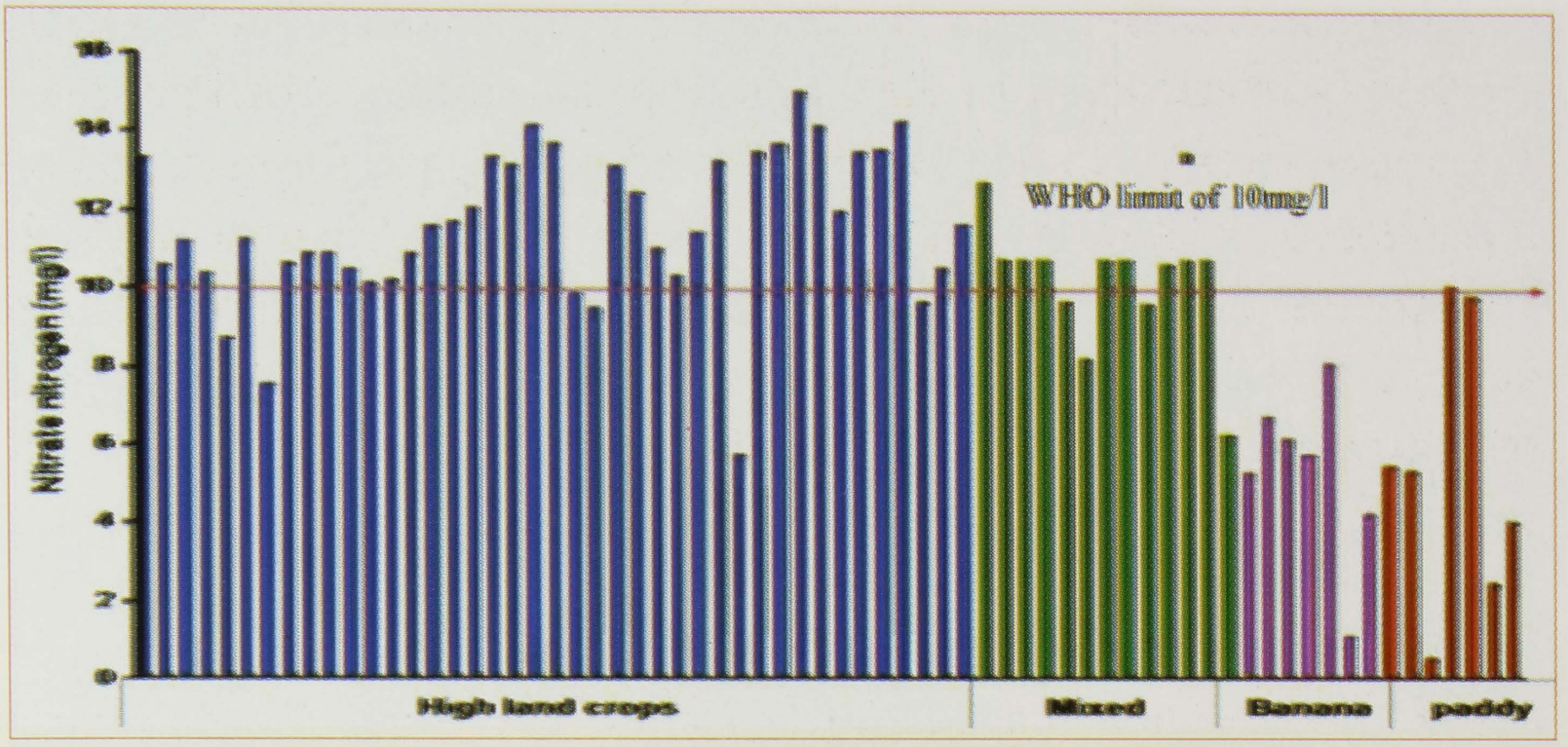
Intensive agriculture practiced in Jaffna mainly depends on availability of water. During the *yala* (March to June) season extraction of water is essential to irrigate the crops. As a result, over extraction of water is found. A well may have 5 outlets to extract water from these wells.

Salinity affects in farming:

Due to the prolonged drought, salinity continues. Intensive agriculture demands continuous extraction of water for irrigation that ultimately allows the saline water to enter into the water lens of a well.



Increasing of salt in drinking water in the Jaffna Penninsula
Source: Sutharsiny et al., 2008.



Increase of nitrate nitrogen in well water in different cropping systems in Jaffna.
Source: Jeyaruba and Thushyanthy (2008).

The situation was further aggravated due to the intrusion of sea water at the coastal areas during the tsunami of December, 2004. Most of the coastal cultivable lands became saline due to sea water intrusion. In addition to this the continuous use of heavy inorganic fertilisers has led to an increase in nitrate nitrogen of the water in the wells in the intensive agricultural areas, with its levels recording above the WHO permissible limits of 10mg/l. This cautioned the poisoning of water for drinking purpose as well as salinity for irrigation.

Farms and farming activities in this region have to be conserved and renewed with newer technologies. Our farmers use old techniques of crop cultivation. Further, farming in the northern region has suffered greatly under the usage of excessive pesticides for the past two decades. This perhaps led miserably towards the unknown but largest consumption of toxic inorganic chemicals by the people through the consumption of vegetables (Mikunthan, 2002; Jeyakumaran and Mikunthan, 2008).

The Jaffna Peninsula recorded the highest consumption of inorganic chemicals in Sri Lanka which has had an impact on the highest cancer incidence in this country (Dissanayake, 1988). Initiatives have been developed to minimize the use of such inorganic chemicals. Incorporation of organic farming methods can reduce the usage of

Tamarind as a multipurpose tree, its leaves are used to reclaim the salinity

such chemicals and also improve the management of insects and other pests. Further, this can be a solution not only for the problems of inorganic toxic pesticides but is also good for the safety of crops and the living environment.

Plant Protection:

In the traditional sense, Integrated Pest Management (IPM) has an impact on pests of crops wherein various tactics are made available for operation. So far IPM had been misused and practiced only by adopting chemical pesticides alone. This concept was not well-perceived in developing countries and especially in Sri Lanka due to the non-availability of other control tactics. The small landholdings did not allow implementation of the methods in its fullest strength. Moreover, the practice of land partitioning as a social norm, especially to the women, made the situation more complicated for the implementation

of such technology in this region. However, if alternate methods are made available, the investment on chemical pesticides would be minimised to produce safe food.

Pests damage in Thespecia

Insect pest, thrips on Thespecia

Further, the reopening of the A9 route opens up free flow of materials into the Jaffna Peninsula. But this also poses challenges promoting inflow of excess agrochemicals into this province. Some agrochemical companies have their clients in Jaffna and may simply dispatch chemicals to boost their market sale after a long gap. These issues have to be considered very seriously and only the required quantity of agrochemicals must be allowed in to the Jaffna market. Mistakes made in the past should not be repeated any more. Alternatively, biological control has to be geared to manage the pests of all crops. This avenue has a big role to play in the future of the northern region agriculture industry.

Indigenous technology:

Extraction of gingelly oil is done using an extractor made out of timber – and animals are used to rotate the arm. Now the animals are replaced with two wheeled tractor and again the oil is extracted. The oil extracted from this wooden extractor is tastier and smells better than the one from the machine.

Extraction of gingelly oil –locally made extractor using animal power

Two wheeled tractor replaced animals to extract gingelly oil.

String hopper making device made out of thespecia timber

Prospects in agriculture

Small scale farmers dominate the population of farm families in Northern Province. These farmers have lost their family members, their partners, children and even their relatives in the last phase of the war. They have to be motivated to establish home gardens, generate self income, and improve their educational standards and living. Youth have to be educated with hands on training in various self income generating activities. Contribution of every family towards production should be ensured and their commitments will eventually result in self sufficiency in the food sector as well as generating employment.

Transport between the Jaffna Peninsula is opened again with the opening of the A9 road after the war came to an end in 2009. Road networks are improved, widened and finished with premixed bitumen carpet. Transport will become more convenient and cheaper after the installing the railway line. The works are progressing well and will be made available in the year 2013. The signal

of the railway line at Kandarmadam, Jaffna remains on, indicating its activeness and commitment towards future development.

Women involvement in farming

Even prior to the conflict, women played a key role as head of the household due to the fact that male members willingly shouldered the responsibilities of financial support through their farming activities. Women helped the male members in farming as family labour but their role was rather restricted to this area. This situation took a different turn during the period of the armed struggle. A number of youths were attracted towards the armed struggle and lost their lives which in turn increased the number of female-headed households who took the responsibility of providing financial support for the family. Many of these families are headed by women, who were widowed during the war.

The participation of women in agriculture has to be strengthened to help families headed by women and to provide job opportunities to promote self-earning. The "Cognitive Social Capital", which

Women assembled as a team to share activities in a temple festival

Elderly women involved in selling onion and earning for their family

Women in planing and executing livelihood activities

Women in self income generating activities

covers norms, values, attitudes, and beliefs or perceptions of support, reciprocity, sharing, trust, and it relates to what people "feel," operates in the name of '*Vidiyal*' in Theni district of Tamil Nadu, India and in Maldives can be thought of to demonstrate the power of social commitment among the villagers to realize the power of self-income generation. It can be considered to set an example to promote women's involvement in agriculture and thereby giving them confidence to stand alone in their own investment rather than depending on government free issues and the INGOs and NGOs relief aids. Free rations and issues never free the people from the clutches of poverty.

Women can be trained on various agricultural technologies and agro-based business activities especially in value-addition projects to improve their income status and to sustain their livelihood. Production of palmyrah-based industrial products is the best opted choice to expand its products, which has a good demand and market among the foreigners and those who have migrated to foreign countries.

Youth in farming activities

Education of children is the first priority of the Jaffna parents and they invest all of their earnings into it. This could be easily observed on the Z-score results of G.C.E A/L examinations of Colombo and Jaffna for university admission. These scores did not differ during the war period and students in Jaffna excelled in performance preparing themselves with the help of Lantern lights. After completing the ordinary level examination a sizable number of students sit for the Advanced Level examinations. While a limited proportion of youths from farming communities have the chance to get university education, the rest, faced tough situations during the war due to the lack of prospects for agriculture. Moreover, few prefer to remain in their lands and get involved in crop cultivation.

The traumatic experiences people faced until 2009 are crucial. It is now time to relieve the youths from this mental agony of unnecessary arrests and allow them to freely move around for farming and mental

Mobile technology is a gifted tool to disseminate farming information effectively to the farmers and it can be well utilized to develop knowledge based farming groups.

refreshment activities. Future projects need to be carefully aimed at relief and rehabilitation of these youths and to get them involved in nation building programmes under the ideology of '*Mahinda Chinthana*'. Intensive farming with well-planned programmes would help to make them productive members of this society. Agriculture has to be tuned with cost effective, innovative and advanced technologies to attract the youths into this sector. Youths have to be trained in various agriculture-based income generating technologies which are essential for them to initiate self-income generation. The support of information technology (IT) in its real sense would help to attract more youths. IT could be well utilised in farming by providing information of various aspects in agriculture. The Commonwealth of Learning project such as lifelong learning for farmers (L3 farmers project) involved in developing digital content to assist farmers through IT; an example of IT and agriculture. Establishing training institutes to disseminate knowledge to youth and give direction to their energy into well-defined constructive programmes of the national development is required for positive reinforcement. The youth should be seen as the building blocks of national development.

Education in Agriculture

Education is the top most priority and is the blood of the people in Northern region. There are educationists and experts in various fields who live in this region, who contributed immensely in making reforms in the educational, developmental and especially in administrative sectors of this country. Every parent's life time ambition is to educate their children to develop their career and this will materialize with the assistance of the government's feed education policy and financial and other assistance. The thirst in educating their children is visible and the parents invest and spend their money mainly for education. To this importance was given to the repository of books and reference materials in a library and the Public Library of Jaffna is the symbol of such endeavor. The worst in the history of Mother Lanka was the burning of the Public Library, which busted the educational dream of the public.

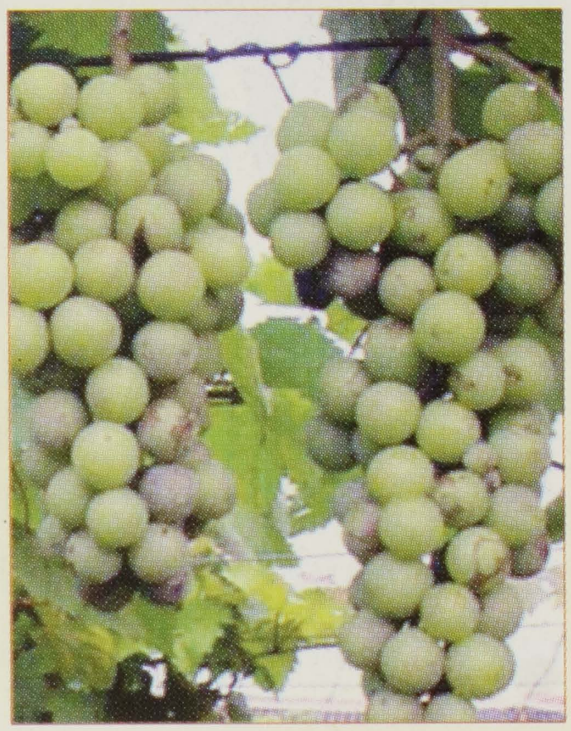
Proposed building for the faculty of agriculture at Ariviyal Nagar Kilinochchi

The top of this is the establishment of the University of Jaffna in 1974 at Jaffna as a higher educational institution and later for the development in agriculture, the faculty of agriculture was inaugurated in December, 1990 with six departments at Kilinochchi. The Faculty of Agriculture was in temporary buildings of the Department of Agriculture (partly in the buildings of Regional Agricultural Research Station and In-service Training Institute situated at Iranamadu Junction (155 mile post) at Kilinochchi until 1997. The faculty has produced many skilled graduates, as a means of human resource developments, who are in the key positions of the educational, administrative and private sectors. Due to the uncertain situation in Kilinochchi in 1997, the Faculty was shifted to temporary buildings in Jaffna and has been functioning by sharing a few buildings of the Faculty of Medicine, guest house and in private houses. In the Year 2011, His Excellency the President Mahinda Rajapakse has announced by accepting the request made by the Minister of Traditional Industries and Small Enterprises, Hon. Douglas Devananda that the Ariviyal Nagar building complex situated in 168 acres to relocate the Faculty of Agriculture and to newly establish the Faculty of Engineering in 2012. In addition the adjacent 400 acres land also reserved for the establishment of infrastructure facilities to both the the Faculties.

Marketing of agricultural products

Easy transport through the A9 road would help the farmers to supply their products to suitable markets in the Southern outlets ensuring dispatch of their products safely and economically. This will improve steady marketing of onion, chilli, banana, grapes, mango etc. And thus, provide a green signal to agriculture in the Jaffna Peninsula after a long time. The longstanding plight of the farmers in marketing their good quality produce would be solved through the opening up of the A9 route by getting a good price for their produce.

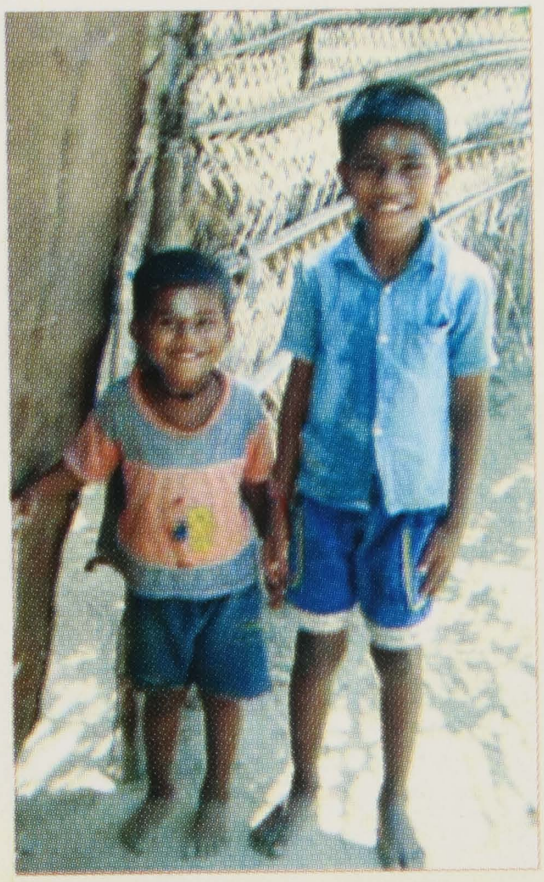
Banana - Kathali cultivar



Jaffna - Grapes

Mango - Karuththa Kolumban

Conclusion



This smile of the future generation has to be everlasting and is symbolical towards the building of peace in this country. Agriculture has a duel role to feed the people of the nation. We have to shoulder the responsibilities to nourish them with nutritious and pesticide free food as well as to contribute to the GDP by exporting the agro based products to the global market. Emergence of agro based industries and compete their products with international standards has to be the focus to raise the income level of the people and to provide the employment opportunities as well. The development taking place in this region witnesses the initiatives taken to improve the livelihood of the people and to develop sustainable farming. We have to join hands to provide a peaceful living environment to the future generation harmoniously and to live long by developing our country in to a paradise in the Asia. ■

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