Pineapple sector in Kerala:
Status, opportunities, challenges and stakeholders

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Introduction

Pineapple (*Ananus comosus*, Bromeliaceae) is a wonderful tropical fruit having exceptional juiciness, vibrant tropical flavour and immense health benefits. Pineapple contains considerable calcium, potassium, fibre, and vitamin C. It is low in fat and cholesterol. Vitamin C is the body's primary water soluble antioxidant, against free radicals that attack and damage normal cells. It is also a good source of vitamin B1, vitamin B6, copper and dietary fibre. Pineapple is a digestive aid and a natural Anti-Inflammatory fruit. A group of sulfur-containing proteolytic (protein digesting) enzymes (bromelain) in pineapple aid digestion. Fresh pineapples are rich in bromelain used for tenderising meat. Bromelain has demonstrated significant anti-inflammatory effects, reducing swelling in inflammatory conditions such as acute sinusitis, sore throat, arthritis and gout and speedy recovery from injuries and surgery. Pineapple enzymes have been used with success to treat rheumatoid arthritis and to speed tissue repair as a result of injuries, diabetic ulcers and general surgery. Pineapple reduces blood clotting and helps remove plaque from arterial walls. Studies suggest that pineapple enzymes may improve circulation in those with narrowed arteries, such as angina sufferers. Pineapples are used to help cure bronchitis and throat infections. It is efficient in the treatment of arterioscleroses and anaemia. Pineapple is an excellent cerebral toner; it combats loss of memory, sadness and melancholy. Pineapple fruits are primarily used in three segments, namely, fresh fruit, canning and juice concentrate with characteristic requirements of size, shape, colour, aroma and flavour.

Global scenario

Pineapple exhibits increasing demand world wide, over the years. The global trade is around 50% as fresh fruit, 30% as canned product and 20% as juice concentrate. World trade on fresh pineapple has shown 100 % increase during the last one decade. Even though India is the sixth largest producer of pineapple in the world with a share of about 8% in production, its share in the world market is negligible. The main pineapple producers are Brazil, Thailand, Philippines, Costa Rica, China, India and Indonesia. The different Asian countries and the countries around the Indian Ocean are importing about two lakh tonnes of pineapple in a year, mostly coming from distant countries. The leading exporters are Costa Rica, Belgium, Cote d'lvoire, Philippines, Ghana, Netherlands, USA and France. Major importers are USA, Belgium, France, Italy, Germany, Japan and UK. MD2 or Dinar pineapple developed through hybridisation by Del Monte scientists in Costa Rica is the most popular variety in the international market because of its colour, flavour, shape, life span and ripeness being superior to other varieties.

National scenario

India ranked sixth with a share of about 8 % of the world production of pineapples. The total area under pineapple cultivation in India is 88700 hectares with a production of 1415400 tonnes. India exports pineapple mainly to Nepal, Maldives, United Arab Emirates, Saudi Arabia, Kazakhstan, Oman, Bahrain, Bangladesh, Zambia, Pakistan and Qatar. 'Kew' and 'Mauritius' are the two varieties of pineapple grown in India. It is grown in Karnataka, Meghalaya, West Bengal, Kerala, Assam, Manipur, Tripura, Arunachal Pradesh, Mizoram, and Nagaland. It is also cultivated on limited areas in the coastal belt of Tamil Nadu, Goa and Orissa. Though Assam has the largest area under pineapple West Bengal is the largest producer. Karnataka, West Bengal

and Bihar are the three states reporting high productivity. Overall, Indian productivity of 16.00 t/ha poorly compares with the world average of 22.58 t/ha.

STATEWISE AREA, PRODUCTION AND PRODUCTIVITY OF PINEAPPLE IN INDIA
(Area in 000'ha, production in 000't, productivity in t/ha)

	2008-09			2009-10			2010-11		
State	**Area**	**Production**	**Productivity**	**Area**	**Production**	**Productivity**	**Area**	**Production**	**Productivity**
West Bengal	9.6	283.9	29.7	9.6	293.8	30.5	9.9	303.7	30.6
Assam	12.9	225.1	17.5	14.2	223.0	15.7	14.0	220.7	15.8
Karnataka	3.0	186.3	61.7	2.8	177.2	63.3	3.0	186.1	62.0
Bihar	4.7	119.5	25.5	4.7	125.0	26.4	4.9	129.4	26.5
Meghalaya	10.8	106.8	9.9	10.8	106.8	9.9	9.7	86.0	8.9
Kerala	12.5	102.4	8.2	9.8	80.8	8.2	10.2	85.5	8.4
Tripura	6.3	101.2	16.1	6.8	117.5	17.3	6.8	153.3	22.6
Manipur	8.6	78.5	9.1	12.1	103.5	8.6	12.2	104.4	8.6
Nagaland	3.7	57.5	15.5	3.7	57.5	10.0	3.7	57.5	15.5
Arunachal Pradesh	9.3	37.8	4.1	10.9	0.0	3.2	10.9	34.4	3.2
Others	2.4	41.9	17.3	2.2	44.8	20.6	3.5	54.5	15.6
TOTAL	**83.7**	**1340.8**	**16.0**	**91.9**	**1386.8**	**15.1**	**88.7**	**1415.4**	**15.9**

Source : National Horticulture Board, Ministry of Agriculture, Govt. of India.

State scenario

In Kerala, pineapple is cultivated in an area of 10200 ha with a production of 85500 t with a low productivity of 8.4 t/ha, consistently stable over the last few years. The congenial humid climate has favoured the cultivation of pineapple. The finest quality 'Mauritius Pineapple' comes from Kerala. The produce of Kerala is very much in demand as a fresh fruit throughout India and also in foreign countries because it is considered the best in quality, sweetness and has good flavour. Although pineapple cultivation is practised in almost all districts, the extent and trend of cultivation differs widely among Kerala's districts. The major pineapple producing district of Kerala, Ernakulam accounts for more than 60% of the area under pineapple cultivation. In Ernakulam district pineapple cultivation is more concentrated in and around Vazhakulam. Ernakulam district was ranked first having a share of over 60% of the total production.

In Kerala, pineapple is grown mainly as an intercrop in rubber and coconut, and also as pure crop in garden land and in converted paddy fields. Pineapple fruits are produced round the year. There is immense potential to increase the area under pineapple in Kerala as it can be grown as an intercrop in coconut and rubber plantations. Coconut is grown in about 8 lakh hectares and if pineapple is grown as an intercrop in coconut garden it will give an additional income, especially in root wilt affected areas it will be a solace to the farmers. Special attention can be given for intercropping pineapple in coconut in root wilt affected areas. Out of the 5 lakh hectares of rubber grown, about 15000 hectare is replanted every year. Pineapple is grown as intercrop for the first three years in rubber at the time of replanting. Pineapple cultivation in rubber will give income to farmers during the period when there is no income from rubber. However, only less than two percent of the potential area in Kerala is cultivated with pineapple.

Kerala advantage

Kerala has exclusive advantage in producing Mauritius variety, which is highly suitable for export market. The pineapple growers to a large extent are now adopting the modern cultivation practices like high-density planting, hormone application for uniformity in flowering and other management practices. The pineapple fruits are consumed as fresh fruit or made into products like jam, squash, candy etc., for value addition. The variety proposed for cultivation is Mauritius since huge internal market as well as export potential is available. Its advantages include longer shelf life, sweetness and can be consumed as fresh fruits. Sea shipment protocol for export of pineapple has been developed. Supply chain for pineapple from Kerala is identified to be the most competitive for the domestic market due to the varietal advantage as there is price difference in the range of 1-2 Rs./kg between Mauritius and Kew in favour of Mauritius. Consumer preference for Mauritius is huge due to the fact that it is most suitable for table purpose and Giant Kew and Queen are best suitable for processing. Kerala Agricultural University has released a new hybrid pineapple *Amritha*. It is a hybrid between Kew and Ripley queen. It has spiny leaves and 13-15 months duration. Fruit is cylindrical, tapering slightly from near base, weighing 1.5-2.0kg. Crown is small weighing 80-100g; ratio of fruit weight to plant weight is medium. Fruit is green when unripe and uniformly yellow when ripe; fissure and eye corking absent, spirals are left oriented. Fruit is firm with mild external aroma, skin 6 mm thick, flesh firm, non-fibrous, crisp and pale yellow in colour with rich aroma. Taste is good with high total soluble solids and low acidity.

Vazhakulam pineapple

Pineapple has been commercially grown in Vazhakulam area for more than 50 years. It is excellent fruit for fresh consumption. Vazhakulam area is ideally suited for the production of pineapple for table purpose. Planting is done in almost all the months, except during the heavy monsoon days. Hence, fruits are available round the year. Vazhakulam is considered as the biggest pineapple market in India from where the fruit is being transported to all the South Indian states and most of the North Indian states. It is grown in the districts of Ernakulam, Kottayam, Pathanamthitta and the low elevation areas of Idukki district in Kerala. It is the centre of pineapple trade in Kerala and India. Vazhakulam pineapple was Registered as Geographical Indication (GI) No. 130 under Agricultural-Horticultural product at the GI Registry, Chennai on 4th September 2009. GI registration is the process of endorsing brand protection under WTO guidelines to the producers of any product known for quality and marketed in the label of a geographic area. The registered proprietors of the intellectual property attached to Vazhakulam Pineapple are Nadukkara Agro Processing Co. Ltd (NAPCL), Avoly P.O., Muvattupuzha-686677; The Kerala Agricultural University, Vellanikkara, KAU Post, Thrissur-680656 and Pineapple Farmers' Association Vazhakulam-686670, Muvattupuzha, Kerala. Vazhakulam pineapple locally known as '*Kannara'* is a Mauritius variety coming under the queen group of the species *Ananas comosus*. The plant is about 85-90 cm height, leaves spiny, gives yield within 12 months. The average fruit weight is 1.2-1.5 kg. The fruit has a pleasant aroma, slightly conical in shape, fruit 'eyes' deeply placed, fruit flesh is crisp and golden yellow in colour, juice is sweet with 14-16° brix and its acidity is 0.50 - 0.70%. The fruit withstands post harvest handling damages and long distance transport. Vazhakulam pineapple is unique in aroma, flavour and sweetness due to its high sugar content and low acidity. The GI registration has boosted the export of pineapple from the state considerably, besides the high reputation fetching premium price in the international market. The need of the hour is a concerted effort to adopt a logo for Vazhakulam pineapple and the promotion of exports.

Opportunities

The state offers great opportunities for expanding the cultivation of pineapple. Important among them are listed below.

- Formation of Kerala Pineapple Mission for strengthening the sector and speedy actions
- Some districts are traditional growers of pineapple such as Mauritius and Kew
- Well established and organized Pineapple Farmers' Association
- Research and development support from Kerala Agricultural University
- Industry support especially from NAPCL
- Markets at Vazhakulam and nearby areas and VFPCK markets in all districts available
- GI registration of Vazhakulam pineapple has boosted the export from the state considerably
- Farmers have locally available planting material
- Farmers have knowledge of pineapple cultivation
- Farmers are increasingly following commercial cultivation
- The traders in the market are generally vibrant and relatively organised
- Farmers and promoters are interested in pursuing sustainable agriculture, which reduces costs and increases farmers skills to manage food security concerns
- The opportunity for niche organic market exists
- The production within all the potential areas can be increased.

Challenges

Expanding area under cultivation and increasing productivity are very challenging. Major challenges are listed below.

- Identification of specific varieties for fresh fruit, canning and juice segments suitable for cultivation ensuring sustained economic return.
- Provision of improved technology and production inputs for each segment.
- Post harvest management & value addition
- Storage and marketing support.
- Crop specific training support to the stakeholders
- Exploration of new fields viz, high-density planting, tissue culture, organic farming, vermi-composting, etc.
- Staggering of pineapple production through chemical induction and round the year production, peak synchronizing with summer season when demand is highest.
- Labour resource mobilization especially through NREGS to promote agriculture and food security in rural areas.
- Issues of mosquito-borne infectious diseases as Leptospirosis, Malaria, Dengue, Chikun gunya, etc
- Climate and market uncertainties causing farmers' suicides.
- Risk of ecological/environmental degradation
- Problems of bio-waste management

Tasks ahead

The important tasks before us are the following

- Sustaining past achievements and moving ahead with tempo
- Resource mobilization, especially labour
- Market strengthening and support price fixation and creating storage facilities
- Extending loan facilities for cultivation on leased lands
- Strengthening existing processing units and starting new ones
- Fast intervention by Pineapple Mission to overcome local problems
- Control of emerging infections and lifestyle diseases
- Affordable and accessible and quality health care to all

Kerala Pineapple Mission

Kerala Pineapple Mission is established by the Government of Kerala as per the GO (MS) 168/2013/Agri. Dt. 20.05.2013. Kerala Pineapple Mission is registered as a society under the Travancore Cochin Literary, Scientific & Charitable Societies Registration Act 1955 with District Registrar, Ernakulam (Reg. No. EKM/TC/565/2013 dated 31.08.2013).

The control, administration and management of the mission vest with the Governing Council consisting of 19 members. The Honorable Minister for Agriculture, Government of Kerala is the Chairman and the Honorable MLA, Muvattupuzha is the Vice Chairman of the Governing council of the Kerala Pineapple Mission. Director/Special Officer of the Mission is the Additional Director of Agriculture (CP). Officials from various Departments of the Government, Financial institutions, Industry, Trade, other related institutions and Farmers comprise the other members of the Governing Council. The mission also has Executive Committee and District Level Committees with the chairmanship of District Collectors.

The objective of the Kerala Pineapple Mission is to achieve holistic growth of the pineapple sector through enhancing and improving production, post-harvest management, processing, marketing and export by empowering the growers through access to technology, skills, inputs, credit and infrastructure.

Kerala Pineapple Mission can be contacted over phone: 0485-2261547, 2261451, Email: napcjive@gmail.com, jiveagrofruit@gmail.com

Vazhakulam Agro and Fruit Processing Company

Under the Kerala Horticulture Development Programme, Nadukkara Agro Processing Company Limited (NAPCL), a modern fruit processing factory, for the commercial processing of pineapple, mango and other fruits was established in the heart of Kerala's Pineapple growing area Nadukkara, Avoly panchayat near Muvattupuzha in 2000 at a cost of Rs.21.5 crores. NAPCL was established as a public limited company with 582 farmers holding 70% share and the Government of Kerala 30% share. The plant has a state of the art technology and the latest equipment because of the support from the European Union during the initial period. The factory has aseptic packaging as well as canning units. NAPCL has ISO 9002/HACCP certifications and its own brand of pineapple juice called "JIVE" and can process 70 t of pineapple per day. The company initially produced 200 ml Jive tetra-pack, 256 kg dump bag juice concentrate, besides ginger candy. Today, company markets seven different types of natural cool drinks under Jive brand without using any preservatives. They have become very popular as '*the drinks of nature'*. The Jive plant has a production capacity of 6000 packs/hour. Capacity utilization is much more efficient as the factory also processes mangoes during off-season of pineapple. NAPCL also

provides for contract processing to other processors in the private sector. The company procures pineapple from the market when the price goes below a threshold level so as to maintain a reasonably good market price. The company has 92 employees and provides employment to another 150 indirectly. NAPCL organizes trainings and seminars for farmers for the popularisation of pineapple and promotes MD2 pineapple variety for cultivation to meet the challenges of global competition in the WTO regime. The company has also taken initiative for getting GI indication registered for Vazhakulam Pineapple. NAPCL has recently commissioned an '*integrated pack home for export of fresh pineapple'* with facility for pre-cooling, packing, branding and certificate labeling having a capacity of 700 t/day at a cost of Rs.3.7 crores fully funded by APEDA. It has recorded a growth rate of 500% during the last 5 years.

NAPCL was taken over by state government and functioned in the name of Nadukkara Agro Processing Factory (NAPF) for some time. It is being renamed as Vazhakulam Agro and Fruit Processing Company with a proposed share holding of 51% by Government of Kerala, 30% by farmers and 19% by VFPCK, out of 10,000 shares in total. Vazhakulam Agro and Fruit Processing Company can be contacted over phone: 0485-2261547, 2261451, Email: napcjive@gmail.com, jiveagrofruit@gmail.com and Website: www.napcl.com

Pineapple Farmers' Association (PFA)

Farmers face many problems in the cultivation and marketing of pineapple. So a group of farmers decided to form an association of Pineapple farmers in 1990 and registered the Pineapple Farmers' Association, Vazhakulam under the Charitable Societies Act. Anybody residing in Kerala doing pineapple farming can be a member. There were 120 members when the Association started. Now more than 500 members are there in the association doing very good pineapple farming. The service area of PFA is Kerala State. The main objectives of PFA are to unite and strengthen the pineapple farmers, make awareness about farming, marketing and other related subjects, promote marketing and processing facilities and help farmers to avail financial and technical assistance from govt. and non govt. organizations and banks. The PFA is distributing good quality planting materials, fertilizers, pesticides, herbicides, growth regulators etc in subsidised rates to the members. The leaders of PFA go to farmers and give timely technical advice to them. In the marketing places if any problem arises, PFA will reach and extend their assistance to farmers.

The PFA used to conduct Agricultural Seminars and meetings for farmers and give classes by experts in farming and diseases and pest control, post harvest management, loans etc. Every year the PFA conducts a three day Agriculture Fair at Vazhakulam. This is a festival of Pineapple farmers. The association presents the 'Pineapple Sree' Award to the best Pineapple Farmer. The best Pineapple Farmer in Kerala is selected by a team of Experts from Kerala Agricultural University and the Department of Agriculture. The pineapple cultivated by the farmers of Vazhakulam is the sweetest pineapple available in India. Hence Vazhakulam is also known as the city of Pineapple. Mauritius is the main variety cultivated in Kerala and Kew variety is rarely grown. The cultivation of Pineapple started here during 1940-50s. Now pineapple is cultivated in almost all districts of Kerala. However, big farms of pineapple are mainly in Ernakulam, Kottayam, Pathanamthitta, Idduki and Kozhikode districts. PFA strived very much for getting GI indication registered for boosting the export of Vazhakulam pineapple. PFA can be contacted over phone: 0485-2261161, 2262615 and Website: www.pineapplecity.org

Pineapple Research Station (PRS)

The Pineapple Research Station at Vazhakulam was established on 2nd January 1995 to give research and development support to pineapple farmers. Since then, this research centre of the Kerala Agricultural University has been steadily growing and serving as a subvention to the pineapple growers of the state and the country as well. The research centre strives to become the ultimate authority and provider of excellent quality technology, products and services in the pineapple sector through concerted research and development efforts sustained by best human resource and infrastructure development.

The centre had a humble beginning on 2.1.1995 as "Pineapple Research Station & Pest and disease Surveillance Unit" under Kerala Horticulture Development Programme (KHDP). For the construction of the office-cum-laboratory building of the station, 15 cents of land was transferred from the Revenue Department to Kerala Agricultural University on 24.6.1996. It was delinked from KHDP and became a constituent research centre of Kerala Agricultural University under central zone on 1.7.1997. The present building was occupied on 27.6.1998. The centre is located close to the pineapple market at Vazhakulam, 10 km east of Muvattupuzha on the Muvattupuzha - Thodupuzha road in Ernakulam District, Kerala. It is about 40 km from Cochin International Air port, Nedumbassery; 50 km from Aluva railway station and 80 km from the Cochin harbour.

The mandate of the research centre is to give research and development support to the pineapple growers, provide quality technology, products and services to the pineapple sector and undertake basic and applied research in pineapple and other fruit crops of Kerala. The station has taken up research in pineapple on various aspects like intercropping in rubber and coconut, plant spacing and density, organic and chemical fertilizer requirement etc. besides experiments on development of new varieties. Based on continuous surveillance and laboratory studies the station has identified the presence of PMWA virus in pineapple in Vazhakulam area. Based on all the findings this station has formulated the Package of Practices Recommendations for the popular variety Mauritius and included in the POP and all the technology developed are being transferred to the pineapple growers extensively. Vazhakulam pineapple has been registered in the Geographical Indication Registry to boost the export of pineapple.

The centre has established good laboratory facilities. The Plant Tissue culture, biochemistry and pathology labs are equipped with Gel documentation, ELISA Reader and washer, PCR, Colourimeter, UV- Transilluminator, Flame photometer, Centrifuge, Microscopes, Electrophoresis, Shakers, ovens, Precision Weighing balances, Deep freezer, BOD, Laminar Air Flow, still, etc. It has a leased farm of two hectares at NAPCL. The library has adequate specialised books and periodicals relevant to the sector. It has a sales counter for the public sale of Tissue Culture Plants, Seedlings, Rooted cuttings, Publications, etc. The centre undertakes basic and applied research and development activities in pineapple and other fruit crops of Kerala. The research and development projects are mainly in Participatory technology development (PTD) mode and funded by various agencies as KAU, State and central governments, ICAR, SHM, NHM, etc.

The centre has developed scientific technology for the commercial cultivation of Kew and Mauritius varieties of pineapple, including pure cropping, intercropping in rubber and coconut plantations and in reclaimed paddy lands. Technology is developed for organic production. Tissue culture protocols for various varieties of pineapple are available. Performance evaluation of MD2 pineapple is in progress at the centre. Participatory technology process and product development in association with sister institutions, Nadukkara Agro Processing Co.Ltd.

and Pineapple Farmers' Association for the stakeholders is a steady and continuing process at the centre. Technology transfer is effectively carried out through personal discussions, field visits, phones, emails, website, posts, radio, TVs, news papers, periodicals, publications, pineapple fests, seminars. trainings, etc. The centre produces and sells Tissue Culture Plants, Seedlings, Rooted cuttings and Publications and renders services such as Agriclinic & advisory, Training, Consultancy, Quality testing and Project work of UG and PG students.

The centre is looking ahead enthusiastically with pioneering research and development actions in the sector owing to many reasons. The pineapple cultivation in Kerala is dependent on fresh fruit market, supplying most of its produce outside Kerala. The Mauritius variety grown in Kerala is marketed in about 10 states in India including Delhi. It is also exported to Gulf countries in limited quantities. It is possible to increase its marketing by exploring new markets and techniques and also by increase in quality and quantity of fruit produced. It is essential to explore the possibility for marine exports to reduce cost. Consumer preference and marketing strategies need to be taken into consideration. There is immense potential to increase the area under pineapple in Kerala as it can be grown as intercrop in coconut and rubber plantations. However, only less than two percent of the potential area in Kerala is cultivated with pineapple. At present pineapple cultivation in Kerala is generating employment of about 60 lakh mandays among farmers, agricultural workers, people involved in loading, unloading, transporting, traders, retailers etc. By doubling the area under pineapple cultivation, an additional 50 lakhs work days per year can be created.

Earnest efforts are also being taken to acquire free government land nearby as a permanent farm for raising various fruit plants, conserving germplasm and conducting field research, besides establishing adequate infrastructure for further development and diversification, renaming the station as Tropical Fruit Crops Research Station (TFCRS). It is also proposed to establish a fruit processing laboratory with FPO registration at the centre for the efficient conversion of leftover fruits to value added products like squash, jam, syrup, etc.

Besides pineapple, since Vazhakulam and neighbouring areas are well-known for other fruit crops like banana, mango, jack, papaya, passion fruit, rambutan, mangosteen, etc, and there is no research station in the district catering to the needs of these farmers, Pineapple Research Station, Vazhakulam visualizes to be Tropical Fruit Crops Research Station (TFCRS) in the near future. This advanced research centre of excellence dreams to be the ultimate authority and provider of excellent quality technology, products and services in tropical fruit crops through concerted research and development efforts sustained by best human resource and infrastructure development in line with Our Motto 'Quality People & Infrastructure for Quality Technology, Products & Services and Merit alone counts for Quality suitable for the purpose'. Concerted research and development efforts coupled with excellent human resource and infrastructure development will ensure the way to ultimate success and supremacy in the sector. PRS can be contacted over phone: 0485-2260832, 9446010905 Email: prsvkm@kau.in, prsvkm@gmail.com and Websites: www.kau.edu/prsvkm, prsvkm.tripod.com