



GOVERNMENT OF MEGHALAYA
DIRECTORATE OF FOOD PROCESSING

MISSION Jackfruit

2018-2023





GOVERNMENT OF MEGHALAYA
DIRECTORATE OF FOOD PROCESSING

MISSION
Jackfruit
2018 -2023

Conrad K. Sangma
Chief Minister
MEGHALAYA



MESSAGE

Office : 0364-2224282
PABX : 2200
FAX : 0364-2227913
Mobile No. : 9856001009



We live in a State blessed by an abundance of natural resources - the commonly available Jackfruit, numbering close to a million trees being one of them. This versatile fruit tree globally hailed as a miracle crop for its nutritional and health properties, potential for value addition, food security and climate change resilience is also one of the most neglected trees evidenced by the loss of around Rs 400 crores annually, due to its underutilization and consequently, wastage. However, there is a growing resurgence of interest and demand for the value added products of Jackfruit in our country and across the world, which we will take advantage of, through the launch of the first ever Mission Jackfruit in the country. On the 6th July 2018, the draft Mission document was released for people to offer their comments and suggestions. I am happy to know that a number of constructive responses have been received and incorporated into this final Mission Jackfruit document 2018-2023.

The release of the Mission Jackfruit document 2018 -2023 marks an important chapter in Meghalaya's developmental history. In what can be deemed as a paradigm shift, the Mission aims to encourage entrepreneurship in processing the fruit so it can open up opportunities for enterprising people, especially women, in the value chain. This five-year mission will leverage upon the areas where we already have our strengths. It is my strong conviction that for the State to progress, we need to stop selling raw products and instead market only the processed products that can command a wider market. To lend support to the Mission, the Government has created a new Directorate of Food Processing that will anchor, guide and implement the Mission Jackfruit. As I see it, this Mission has the potential to transform rural Meghalaya and the most vulnerable are going to be the beneficiaries of this initiative.

Even as the document is comprehensive in its scope, I am sure that as we move forward, new opportunities will emerge in the sector and several managerial challenges will arise but the officers will need to stay the course and work with perseverance and fortitude. The Mission is supple enough to accommodate emerging opportunities and has the requisite administrative elasticity to adapt and evolve. This is a Mission and therefore has to be implemented with great speed. I am certain that the Directorate of Food Processing will gear up to manage this challenge ahead of them. Sustained government support to the Directorate of Food Processing to achieve the objective will be ensured. I wish the people of Meghalaya a great success!

(Conrad K. Sangma)

BANTEIDOR LYNGDOH,
Minister,

Sports & Youth Affairs,
Agriculture, Horticulture,
Sericulture & Weaving,
Meghalaya, Shillong.



Yojana Bhavan, Room No. 408
Phone : (Off) 0364-2224568
PABX - 2640
Mobile No. 8415903344
7085960297



MESSAGE

I would like to congratulate the Directorate of Food Processing, MIE and its officers for coming up with the Mission Jackfruit document 2018-2023. This is a mission that has long been overdue despite its potential to dramatically uplift the incomes of our farmers. Most of the jackfruit is wasted across the state every season and it is important that we did some meaningful action to remedy the situation. Meghalaya is the first state in the country to have a Mission dedicated to this humble fruit often referred to as the poor man's food and as the Minister for Agriculture it is a matter of pride for me that we are the first state in the country to have put in place a dedicated mission for Jackfruit.

Not only is this Mission the first of its kind in the country but it is also the first such Mission to focus on the value chain development and therefore, adopt an innovative approach to ensure the participation of entrepreneurs through SMEs and Nano or home-scale enterprises targeted especially at women. This approach I believe will ensure the success and long term sustainability of both the Mission and the enterprises. The consequent benefits to the people of the state will be tangible.

The task before the Department is not small and it is going to take a lot of innovation, dedication and hard work on the part of the personnel of the Directorate to make this Mission a success. I wish them all success in the implementation phase, which quite understandably, is going to be a stupendous task and would like to assure them that the Government stands committed to the Mission.

Banteidor Lyngdoh

CONTENTS

1.	Chapter- One - MISSION JACKFRUIT	01
2.	Chapter Two - BACKGROUND	04
3.	Chapter Three - MISSION COMPONENTS	12
4.	Chapter Four - MONITORING AND EVALUATION	20
5.	Chapter Five - SYNERGIES & CONVERGENCE	25
6.	Chapter Six - FINANCIALS OF THE MISSION	27
7.	ANNEXURE - I	28
8.	ANNEXURE - II	30
9.	ANNEXURE - III	39
10.	ANNEXURE - IV	41
11.	END NOTES	46

ABBREVIATIONS USED

1. MIDH -	Mission for Integrated Development of Horticulture
2. MOFPI -	Ministry of Food Processing Industries
3. SFAC -	Small Farmers' Agri Business Consortium
4. ICAR -	Indian Council of Agricultural Research
5. MBDA -	Meghalaya Basin Development Authority
6. MIE -	Meghalaya Institute of Entrepreneurship
7. IBDLP -	Integrated Basin Development & Livelihood Promotion
8. RTC -	Ready to Cook
9. TIC -	Techno Incubation Centre
10. KVK -	Krishi Vigyan Kendra
11. UAS -	University of Agricultural Sciences
12. COHS -	College of Home Sciences
13. LAMP -	Livelihood Access to Market Project
14. CLEMP -	Community Led Ecosystem Management Project
15. KfW -	Kreditanstalt Für Wiederaufbau
16. WEEFI -	Women Economic Empowerment through Financial Inclusion
17. STEP -	Support to Training and Employment Programme for Women
18. EDI -	Entrepreneurship Development Institute of India
19. IIP -	Indian Institute of Packaging
20. NIRD&PR-NERC	National Institute of Rural Development & Panchayati Raj North East Regional Centre
21. IIE -	Indian Institute of Entrepreneurship
22. CFC -	Common Facility Centres
23. NID -	National Institute of Design
24. BFC -	Business Facilitation Centre
25. IIHM -	Indian Institute of Hotel management
26. MUDRA -	Micro Units Development & Refinance Agency
27. FSSAI -	Food Safety and Standards Authority of India
28. NIFTEM -	National Institute of Food Technology Entrepreneurship and Management
29. RMK -	Rashtriya Mahila Kosh

30. ATMA -	Agricultural Technology Management Agency
31. BTM -	Block Technical Manager
32. ATM -	Assistant Technology Manager
33. FBEI -	Focused Behavioural Event Interview
34. FGD -	Focused Group Discussion
35. COLKS -	Centre of Learning, Knowledge and Services
36. NEC -	North Eastern Council
37. SHG -	Self Help Groups
38. FIG -	Farmer interest groups
39. NEHU -	North Eastern Hill University
40. IIT -	Indian Institute of Technology
41. CFTRI -	Central Food Technological Research Institute
42. DRDO -	Defence Research and Development Organisation
43. IIFPT -	Indian Institute of Food Processing Technology
44. iTEAMS -	Integrated Technology Enabled Agri Management System
45. CAU -	Central Agriculture University
46. IIHR -	Indian Institute of Horticultural Research
47. PMU -	Programme Management Unit
48. DBT -	Direct Benefit Transfer
49. FMP -	Farmers Mobilization Project
50. IRMA -	Institute of Rural Management Anand

Executive summary

Jackfruit is one of the most abundant tree crops in the state but yet one of the most neglected. The crop is available in abundance in almost the entire state & almost all districts, yet every year tons of jackfruit falls to the ground and rots. A conservative estimate from the Garo Hills alone pegs the wastage of ripe jackfruit at around 10.87 lakh metric tonnes valued at a staggering Rs. 434 crores per season.

Yet jackfruit is one of the most versatile fruit tree crops which has been hailed as a miracle food crop for its nutritional and health properties with every part of the tree having some utility or the other right from the fruits and seeds for value addition, food security and medicinal purposes, the leaves for animal fodder, the timber for furniture and construction and the roots for water conservation. In addition the tree is also an excellent candidate for incorporation into a climate change adaptation program due to its versatility and hardiness.

In mainland markets tender or raw jackfruit is in high demand as a vegetarian meat substitute while the ripe fruit and seeds can be turned into a variety of value added by-products like squash, sweets, flour, cakes, chips, papad, noodles etc. Recent advances in processing technology combined with the increasing awareness of consumers about the health and nutritional benefits of jackfruit has sparked off demand and catalyzed the development of new products like Ready to Cook tender jackfruit, dehydrated / freeze dried unripe jackfruit chips and jackfruit seed flour. In fact a conservative estimate by the Jackfruit Consortium of Kerala puts the number of products that can be made from jackfruit at more than one hundred.

With a view to leverage and make use of this tremendous and abundant natural resource, which is currently being wasted, a five year MISSION JACKFRUIT is proposed to be launched with the following objectives.

- To catalyze and promote sustainable rural and urban livelihoods through the processing and value addition of jackfruit by small scale and nano enterprises.
- Creation of a value chain for jackfruit products and generating employment opportunities along the value chain for unemployed youth.
- Addressing food security and nutritional issues of the state in the long run.
- Protection and preservation of catchment areas through promotion of the widespread cultivation of jackfruit for its food, timber, health and soil amelioration benefits.
- Providing an additional source of income for rural and urban families through the commercialization of its processing and value addition.
- Developing the markets for jackfruit and its value added products through a focused and professional go to market and field to fork strategy.

The Mission aims to achieve the above through adoption of the following implementation strategy.

- i. An Action Research programme for Local Varietal identification, germplasm survey, technology sourcing & transfer.
- ii. Planting material availability through the introduction and propagation of improved varieties / grafts via nurseries in both public and private sectors
- iii. Demand driven product and process technology development and sourcing, design and development of equipment, improved storage, shelf-life, packaging etc
- iv. Promotion of jackfruit cultivation in 3000 hectares of catchment areas and promoting the formation of ten jackfruit collection, aggregation, agro processing clusters & FPOs
- v. Establishment of 2 Techno-Incubation Centres (TICs) one each in the Garo and Khasi Hills for

providing hands on training, technical assistance and incubation to entrepreneurs and to also to act as a common processing facility for jackfruit.

- vi. Promoting the establishment of 70 SMEs in jackfruit processing through a credit linked start-up fund
- vii. Promoting the establishment of 300 Nano jackfruit processing enterprises at village level through a credit linked Nano start-up fund
- viii. Conduct of Hands on Training for 4290 partners, entrepreneurs, housewives, officials, Chefs and Master Trainers in the incubation centres / offsite over the next 3 years.
- ix. Conduct of Village level Go Mobile awareness and skill development programs on plant management and minimal processing for 58,500 partners over the next 3 years.
- x. Development and creation of IEC materials, training manuals, publications, Z-cards etc
- xi. Organization of Jackfruit Melas / awareness camps in all 11 (eleven) districts every year for the next five years.
- xii. Organization of a State Jackfruit Festival to celebrate the fruit every year for the next five years.
- xiii. Training cum Exposure visits on Value Addition of Jackfruit for around 2080 partners over the 2 years.
- xiv. Creation of a Jackfruit brand, hygienic and modern packaging, brand building, Advertising, trade promotion and Marketing.

COMPONENT WISE SUMMARY COST OF THE MISSION:

SUMMARY OF COSTS FOR MISSION JACKFRUIT					
Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
1	Action research	State wide action research on Local Varietal identification / selection, germplasm survey, technology sourcing & transfer.	1	10000000	10000000
2	Planting material	Propagation nurseries for improved varieties in the public sector @ 100% for 4 ha	10	2500000	25000000
		Propagation nurseries for improved varieties in the private sector @ 50% for 1 ha	10	750000	7500000
3	Technology Development & Sourcing	Demand driven R&D for product and process development, design and development of equipment, improved storage, shelf-life, packaging etc		20000000	20000000
4	Jackfruit cluster formation	Formation of jackfruit collection, aggregation, processing clusters & FPOs	10	2000000	20000000
		Promotion of jackfruit cultivation in the catchment areas (Ha)	3000	60000	180000000

5	Establishment of Techno Incubation Centres (TICs) in Garo and Khasi Hills	Machinery, equipment etc	2	18730290	37460579
6	Startup funds for jackfruit SMEs	Machinery, equipment etc	50	1000000	50000000
7	Startup funding for nano processing units	Equipment	200	300000	60000000
8	Training	Hands on Training in the incubation centres for entrepreneurs, officials, chefs & Master trainers	1943	6450	12531700
9	Village level training	Village level awareness & skill development for 246 batches	246	200000	49200000
10	Promotional materials	Z-Cards, Manuals, Brochures, leaflets etc	200000	12.5	2500000
11	Awareness / Melas	Organizing awareness camps / jackfruit melas / mobilization camps in all 11 districts for 5 years	55	439000	24145000
12	Festivals	State jackfruit festivals for 5 years	5	2386000	11930000
13	Exposure	Training cum Exposure visits on Value Addition of Jackfruit outside the state for 52 batches of 20 partners	52	752000	39104000
14	Marketing	Packaging & Branding, advertising, marketing / trade promotion / buyer seller meets etc			88000000
				SUB TOTAL	637371279
15	Mission management	Mission management & operational expenses @ 4%			25494851
16	M & E	Monitoring & Evaluation	LS		8000000
				GRAND TOTAL	670866130
				SAY	67,08,66,000

(Rupees sixty seven crores eight lakhs, sixty six thousand) only

CHAPTER TWO

BACKGROUND

Jackfruit is a tropical fruit tree species found in tropical, high rainfall, coastal and humid areas of the world. It belongs to family Moraceae. Scientifically *Artocarpus heterophyllus*, it is the favorite fruit of many, owing to its sweetness. The jackfruit tree is widely cultivated in tropical regions of India, Bangladesh, Nepal, Sri Lanka, Vietnam, Thailand, Malaysia, Indonesia and the Philippines. Jackfruit is also found across Africa, e.g., in Cameroon, Uganda, Tanzania, and Mauritius, as well as throughout Brazil and Caribbean nations such as Jamaica. However, India is considered to be the native place of Jack fruit.



The jackfruit has played a significant role in Indian agriculture for centuries. Archaeological findings in India have revealed that jackfruit was cultivated in India 3,000 to 6,000 years ago. Findings also indicate that the Indian Emperor Ashoka the Great (274–237 BC) encouraged arbori-horticulture of various fruits including jackfruit. Varahamihira, the Indian astronomer, mathematician, and astrologer, wrote a chapter on the treatment of trees in his *Brihat Samhita*. His treatise includes a specific reference on grafting to be performed on trees such as jackfruit.

Botanical Description:

Botanically, this popular Asian tropical fruit belongs to the family of Moraceae, genus: *Artocarpus* and is closely related to figs, mulberry, and breadfruit. Jackfruit (*Artocarpus heterophyllus* Lam.) is the largest tree borne fruit in the world, reaching up to 50 kg in weight and 60-90 cm in length (recently an 81 kg fruit was also reported from Panrutti, India). A mature tree produces up to 700 fruits per year, each weighing 0.5 to 50 kg. On an average, 50-80 tons of fruits can be harvested from a hectare of land. The tree is monoecious, producing male and female flowers. The stem of this plant is straight and rough whereas bark is green or black, 1.25 cm thick and exudes milky latex; leaves broad obovate, elliptic, decurrent, glabrous, entire; inflorescence solitary axillary, cauliferous and ramiflours on short leafy shoots. It has also been reported that the evergreen leaves are oblong, oval or elliptic in shape, 10-15 cm in length, alternate, glossy and dark green in colour. The juvenile leaves are lobed.

Propagation:

Propagation is usually by seeds, which can be kept no longer than a month before planting. Germination requires 3 to 8 weeks. The seedlings should be moved when no more than 4 leaves have appeared. A more advanced seedling, with its long and delicate tap root is very difficult to transplant successfully. Cutting-grown plants and grafted seedlings are possible. Jackfruits mature 3 to 8 months from flowering. When mature, there is usually a change of fruit colour from light green to yellow-brown. After ripening, they turn brown and deteriorate rather quickly. Cold storage trials indicate that ripe fruits can be kept for 3 to 6 weeks at 52° to 55° F and relative humidity of 85% to 95%. Immature fruit is boiled, fried, or roasted. Chunks are cooked in lightly salted water until tender and then served. The only handicap is copious gummy latex which accumulates on utensils and hands unless they are first rubbed with cooking oil. The seeds can also be boiled or roasted and eaten similar to chestnuts. In Southeast Asia dried slices of unripe jackfruit are sold in the markets. The ripe bulbs, fermented and then distilled, produce potent liquor.

Origin and Distribution:

The jackfruit is native to parts of South and Southeast Asia and is believed to have originated in the

rainforests of Western Ghats of India and is cultivated throughout the low lands in South and Southeast Asia. Major jackfruit producing countries are Bangladesh, India, Myanmar, Nepal, Thailand, Vietnam, China, the Philippines, Indonesia, Malaysia and Sri Lanka. Jackfruit is also found in East Africa e.g. Uganda, Tanzania and Mauritius as well as throughout Brazil and Caribbean nations such as Jamaica. Jackfruit is the national fruit of Bangladesh and is one of the three auspicious fruits of Tamil Nadu in India along with mango and banana.

Uses:

Jack fruit has many uses. Mature jack fruit can be prepared as a vegetable by boiling or cooking. Ripe jack fruit is a very popular fruit. Both young jack fruit, as well as jack fruit seeds are prepared as a vegetable, while jack fruit seeds are also cooked to produce a delicious traditional dish. Its many uses have been summarized below.

1. As a nutritious food – Mature jack fruit, young jack fruit and the jack fruit seeds provide high nutrition value food sources
2. Fruit – ripe jack fruit is a popular fruit
3. Value added processed food – dehydrated jack fruit, canned/bottled jack fruit, chips and other snacks based on jack fruit.
4. Timber – Jack fruit tree provides an excellent medium hardwood timber that shows termite resistance. This timber is widely used for making furniture, doors, boats, windows & musical instruments.
5. Firewood – branches are used as firewood
6. Ecological and environmental use – Provides perennial cover, reducing the impact of rain drops and provides shade and serves as a wind break.
7. Medicinal value - various parts of the tree and the fruit are used in traditional medicine in many south east Asian countries.
8. Cultural value - Chips of heartwood when boiled yield yellow dye, used to colour the robes of Buddhist monks. People of Hindu communities use leaves to decorate temples and other places of worship.

The primary economic product of jackfruit is the fruit which is used both when mature and immature. When unripe (green), it is remarkably similar in texture to pulled pork / chicken, making jackfruit an excellent vegetarian substitute for meat. In fact, canned jackfruit (in brine) is sometimes referred to as "vegetable meat". Jackfruit seeds (nuts) can be roasted like chestnuts, boiled or ground into flour for making noodles, papad and pastries. The fruit pulp is sweet and tasty and used as dessert or preserved in syrup. The fruits and seeds are also processed in a variety of ways for food and other products. Jackfruit value added products include chips, papads, pickles, ice cream, jelly, sweets, beverages like squash, nectar, wine and preserved flakes, etc. It can be simply eaten as dessert, a snack or fruit. Additionally, jackfruit leaves, bark, inflorescence, seeds and latex are used in traditional medicines. Dairy farmers have also reported that there is an increase in milk yield when cows are fed jackfruit leaves.

The wood of the tree is also used for various purposes. Everything from its wood, which is purported to be better than teak, is used to make boats, musical instruments, doors and furniture, to its sweet edible bulb and seeds, can be used for a variety of products, either wholesomely or as additives. Furthermore there is growing evidence that the tree is highly suitable for incorporation into a climate change adaptation and food security program due to its natural pest resistance, soil moisture retention property, resilience, widespread availability and nutritional content while being virtually maintenance and input free.

Nutritional Composition:

Jackfruit is a nutritious fruit rich in carbohydrates, proteins, potassium, calcium, iron, and vitamin A, B, and C. Due to high levels of carbohydrates; jackfruit supplements other staple foods in times of scarcity

in some regions. The flesh of the jackfruit is starchy and fibrous, and is a source of dietary fibre. The presence of isoflavones, antioxidants, and phytonutrients in the fruits indicate that jackfruit has cancer-fighting properties. It is also known to help cure ulcers and indigestion. In common with other tropical fruits such as durian, banana, etc., it is also rich in energy, dietary fibre, minerals, and vitamins and free from saturated fats or cholesterol. Only a cup of the fruit contains 155 calories and only 4 grams of fat. The fruit is also low on saturated fats, cholesterol and sodium. Jackfruit is rich in vitamin A and, as well as niacin, riboflavin, thiamine and folate. Aside from the vitamin content, the fruit is also rich in essential minerals. The simple sugars present in jackfruit can improve your overall health. A cup of jackfruit contains 11% of the daily recommended allowance of fibre which will improve your digestive system.

Medicinal properties:

Jackfruit can successfully treat colorectal cancer which is a difficult disease and which affects more than 1.17 million people in the USA annually according to the National Cancer Institute. Jackfruit is rich in phytonutrients, isoflavones, lignans and saponins which have powerful anti-cancer properties. These nutrients will fight free radicals in the body and have the ability to prevent cancer and other diseases.

Phytonutrients prevent the developmental stage of cancer cells and they can only be found in plant-based foods. Jackfruit contains enough of them to help your body fight conditions such as stomach ulcers. At the moment, research is underway to see what makes these compounds so powerful against cancer.

Saponins are powerful anti-cancer agents which are especially useful in fighting colon cancer. According to a study, saponins induce mycotic arrest in leukaemia cells, which lead to remission in some cases. These phytonutrients bind to the outer layer of cancer cells and prevent their growth.

Lignans and isoflavones bind to receptors in the same way estrogens do, and according to studies, they significantly reduce the risk of endometrial cancer. A study from 2006 which included 500 women showed that jackfruit can considerably reduce the risk of several types of cancer due to the presence of these phytonutrients.

The antioxidants in the fruit will prevent the action of free radicals and protect your body from oxidative damage. Jackfruit is also rich in fibre which cleans the colon, removes toxins from the digestive tract and reduces the risk of colon cancer. Strengthens the immune system - Jackfruit is rich in vitamin C and simple sugars that will reinforce your immune system. According to an animal study, the polysaccharides in jackfruit can improve phagocytic cell function and the function of the immune system.

With many crops showing a decreased level of production, due to erratic weather, triggered by climate change, scientists, globally, have found jackfruit, a good prospect in their quest for alternatives. The Janambhumi group organised a festival of silk and dye whereby Assam's marigold, betel leaves, jackfruit, hibiscus, black berry, turmeric, tea leaves are some of the plant species from which natural dye can be extracted and applied on clothes and other purposes. Recently Jackfruit is gaining popularity in Goa due to its nutritional benefits.

The greatest advantage of this wonderful tree is that once it is planted, it can take care of generations due to its hardy nature, wider adaptability, no pest and disease problem and it is the only fruit which requires minimum care and considered to be truly organic fruit which can be grown as an economically viable fruit crop compared to other fruit crops. Jackfruit is grown mainly on homestead farms and produces multiple products for food, feed and industry as well as contributing towards soil management for sustainable environments. Although the importance of jackfruit for these purposes has been recognised, little research has been done. There is a lack of understanding of the taxonomy and origins of jackfruit, of the needs for quality planting materials and in particular, the availability of appropriate technologies for propagation, production, post harvest handling, processing of products and their marketing. In spite of such a vast potential and usefulness, jackfruit remains an underutilized fruit species and deserves to be given the needed thrust for research and development.

GLOBAL SCENARIO

Till recently, jackfruit was an insignificant, scattered or boundary crop the world over. However once

some countries realised its importance, their governments started giving support to its farming and value addition. Vietnam, with 15 years history of jackfruit plantations already has a whopping 50,000 hectares under jackfruit cultivation now. Malaysia, Philippines, Cambodia and even Sri Lanka are making aggressive efforts to promote jackfruit. Initiatives to promote manufacture of value-added products are taking place especially in Sri Lanka, where agencies under the ministry of agriculture have been giving training to homemakers, street vendors and entrepreneurs in minimal processing of the fruit to arrest its wastage and create livelihoods in rural areas. Tender jackfruit in brine and canned tender jackfruit curries are popular in the country. More than a dozen companies produce a few jackfruit products for export. Scientists and activists in Sri Lanka have gone on record saying that because of jackfruit, their country would never starve if ever food becomes scarce.

Vietnam is the number one in the world in making value-added jackfruit products. Sixty per cent of their production goes to industries—for mainly making vacuum-fried chips. Malaysia has also included jackfruit in its national policy.

China started jackfruit cultivation only in 1992 but the production has gone up. It encourages jackfruit plantations and planting of jackfruit trees by the roadside.

Philippines is offering e-learning courses on cultivation of jackfruit. They are investing on research and development of technologies that would be helpful for processing jackfruit. Realising the potentialities of jackfruit as a viable livelihood and business opportunity especially for rural families, these countries are today actively encouraging the commercial cultivation of jackfruit. - (Excerpt from an interview with Shree Padre in Down to Earth Magazine— 8th July 2015)

JACKFRUIT IN INDIA

India is the second biggest producer of the fruit in the world and is considered as the motherland of jackfruit. Chakka, its Malayalam name, according to some, has given birth to the English name jackfruit. In our country, the trees are found distributed in southern states like Kerala, Tamil Nadu, Karnataka, Goa, coastal Maharashtra and other states like, Assam, Bihar, Tripura, Uttar Pradesh and foothills of Himalayas.

Commercial cultivation of jackfruit is still at a primitive stage in India, primarily because of the difficulty in procuring elite planting materials. Jack is easily propagated through seeds. The seedlings take 8-10 years to bear fruits. Due to the highly cross pollinated nature of the crop, vegetative propagation is essential in order to get true to type plants. In India, the total area under jackfruit cultivation is approximately 1,02,552 hectares, of which, an estimated 1,00,000 trees are grown in back yards and as intercrop in other commercial crops (betel nut, coffee, pepper and cardamom plantations) in south India. In India, the major area under jackfruit is in Kerala state and it was regarded as heavenly fruit in the ancient periods. Recently Kerala declared jackfruit as the State fruit. It is grown in an area of 97,536 ha with annual production of 348 million fruits and productivity of 3,568 fruits per ha. In Assam, though the area and production has not shown any change, but the productivity has been improving. The value of jackfruit in Karnataka has been calculated to Rs. 12,718 lakhs (Anonymous, 2011).

In Meghalaya, Tripura, Assam and Arunachal Pradesh, Jackfruit is the most popular fruit among the local fruits. The states offer a huge potential and scope for jackfruit resource exploitation, production and value addition owing to the availability of diverse local genotypes since several years and favourable climatic condition. Rich jackfruit resources have been found both in the hilly slopes and plains. In the peak season there is huge market glut. Fruits are marketed to neighbouring states and also exported to Bangladesh. Apart from being used as a table fruit, raw jackfruit is very popular as vegetable throughout the year. Cut pieces of vegetable type of jackfruit costs about Rs. 40.00 in peak production season and in the off/ lean season (September to January) per kg of cut pieces of vegetable types cost about Rs. 80.00-100.00. There is a tremendous potential for identification of superior genotypes and systematic cultivation with increasing area, production, productivity and preparation of different value added products in these states.

Jackfruit mostly grows as a scattered tree in India. Large-scale commercial cultivation takes place only in Panruti in Tamil Nadu where many people grow jackfruit as a monocrop. Middlemen buy the fruit and take

it to big cities such as Mumbai, Bengaluru and Hyderabad. But growers get at least Rs 70-100 per fruit.

Jackfruit is available round the year in Panruti. In a few areas—for instance in Idukki district of Kerala and Tumkur in Karnataka—it is available for 10 months. The jack husk industry in Hyderabad and Diva Foods, a chips unit in Thiruvananthapuram, run their production unit for 10 months a year. A Karnataka farmer, Channegowda of Hassan district, is developing a 30-acre jackfruit orchard in which he has planted carefully selected cultivars that will yield at different times of the year.

Though jackfruit is a neglected crop and generally looked down upon as a poor man's fruit, success stories around the fruit are slowly coming to light. Vinutha P. Hegde of Sirsi, a housewife, has produced three tonnes of jackfruit bar in the past five years. Shridhar Dgale, a Devgad-based farmer, is producing preserved tender jackfruit (phanas bhaji) for making vegetables. He is the first farmer to export jackfruit pulp to the UK for making ice-creams. He has recently also started marketing jack seed. Radhika, who used to be a daily wage earner, is running a very successful jackfruit papad industry in Moodabidri, Karnataka. Jackfruit pulp making, preserved tender jackfruit—two technologies that are practiced in Maharashtra—also have good scope for use in rural Meghalaya.

With these successes the countdown for jackfruit development has begun in the country. Kerala has adopted jackfruit as its State fruit. Many civil society groups have started organising jackfruit festivals. In the past decade, about 75 jackfruit festivals have been conducted in Kerala and Karnataka, two in Tamil Nadu, one in Maharashtra and two in Meghalaya. With growing awareness of the health and nutritional properties of the fruit and sustained efforts of jackfruit farmers and entrepreneurs across the country, it is anticipated that the jackfruit will definitely become the most sought after fruit in the coming years. Meghalaya, through this Mission, would be well placed to take full advantage of this emerging market for the benefit of its people.

JACKFRUIT IN MEGHALAYA:

Jackfruit is one of the most neglected tree crops grown in the state of Meghalaya and reliable data on its area, yield, productivity is not available nor has its genetic diversity been studied. Though the fruit is available from end January to August / September the crop does not figure in the list of fruit crops interventions of the line departments. The tree is found in abundance especially in the Garo Hills region, southern slopes of East Khasi Hills, parts of West and South West Khasi Hills, Jaintia hills and Ri Bhoi district. The Garo Hills region of the State has tremendous potential to produce huge number of jackfruits but due to lack of intervention, suitable infrastructure, processing, packaging and market access, enormous quantities of Jackfruit is wasted every year. Rough estimates put the number of trees in Meghalaya at between 10 to 14 lakh trees. An assessment done by the Basin Development Unit, East Garo Hills estimated a loss of Rs. 434.00 crore each season as villagers leave the fruit rotting in the open. In East Garo Hills alone, it is estimated that the villagers lose more than Rs.118.00 crore every year by under-utilizing the fruit due to the lack of awareness among the rural communities.



Value addition of jackfruit is still a new concept in the state and market penetration of the value added end products is still not there in the North Eastern Region due to lack of awareness and the fact that the ripe fruit in its original form is difficult and bulky to handle. However this is a golden opportunity to tap into the latent market for jackfruit value added products like canned bulbs, chips, papad, juices, flour etc and would give the state a first mover advantage. An assessment of the current Market scenario of Jackfruit in India shows that the demand is more in the Northern, Western and Southern parts of the country in comparison to the Eastern part while there is substantial demand in the export market especially to the UK, Middle East and USA.

Seeing the potential of the fruit and more importantly, it's by products, as an extremely viable opportunity for the sustainable promotion of livelihoods and both rural and urban enterprises, the Meghalaya Basin Development Authority (MBDA) in collaboration with the East Garo Hills District Basin Development Unit (BDU) had conducted a two-day "Jackfruit Festival" on July 11, 2014 at Williamnagar. The festival included cooking of jackfruit products, jackfruit eating and biggest jackfruit competitions. During the event the College of Home Science, Tura, Bethany Society from Tura, Mendipathar Mutli purpose Cooperative Society from Mendipathar, Sangma Bakery from Willimanagar, Marak Bakery from Williamnagar, Romgpi Food Paradise from Williamnagar, DCIC, East Garo Hills, MRDS, East Garo Hills and 12 Self Help Groups displayed various value added Jackfruit based products in 20 stalls. The products included Jackfruit Cakes, Jackfruit Muffins, Jackfruit Chips, Jackfruit Biscuits, Jackfruit Bread, Jackfruit Chocolates, Jackfruit Pickles, Jackfruit wine, Jackfruit Juice and Jackfruit Jam.

The BDU, West Garo Hills in collaboration with the Meghalaya Institute of Entrepreneurship (MIE) had also organized a jackfruit festival on the 3rd of July 2015 (The Telegraph July 4th 2015 edition) to spread awareness about the fruit. As a follow up to the event the Meghalaya Institute of Entrepreneurship (MIE) under the IBDLP had also conducted three workshops in Shillong, Tura and Guwahati to create awareness and to sensitize policy makers, implementers, entrepreneurs and farmers on the potential of Jackfruit for Livelihood and Enterprise promotion.

As recently as the 23rd of May 2018 a soft launch of jackfruit themed dishes titled "Jack of the Day" was held in Dylan's Café, Shillong, which was catalyzed by the MIE and organized by the Centre of Learning, Knowledge and Services (COLKS) in collaboration with Dylan's Café and which featured dishes like jackfruit noodles, jackfruit crab cakes, jackfruit wraps and burgers. These workshops and events threw up a lot of ideas including the formulation of a specific Mission Jackfruit to leverage this abundant natural resource for livelihood, enterprise and food security of the people.

MARKET POTENTIAL:

Weight, spoilage and high transportation costs are the major constraints related to marketing of jackfruit coupled with a lack of reliable price information at the farm gate level. The price per fruit varies from market to market. The fruits are bought from the farm gate at very low prices as compared to when sold in the main markets. Therefore, initiatives on helping farmers and farmer-entrepreneurs to take shorter routes to final consumers while keeping consumer prices reasonable is the prerequisite action which needs to be explored in the state. This can be done through processing of jackfruit at the small scale / village level, for example, preparation of products such as jackfruit chips, jackfruit mixture, squash, jam and sip ups, jackfruit seed flour and selling into the market directly or exploring tie ups with higher end aggregators and wider markets.

Possibilities and opportunities exist for small / nano food producers to process jackfruit for local income generation and employment and the popularisation of the crop and its value addition fits in very well into the objectives and goals of the NEC 2020 vision and the SDG Goals. In rural areas of jackfruit producing countries, food processing is a major source of employment. It is not only important to the national micro economy but is also one of the fastest growing sectors particularly relevant to marginalised and vulnerable women.

Small but significant instances of the market potential of jackfruit and how it has turned around the lives of farming families can be found in Kerala where there is a growing movement around the processing and value addition of jackfruit led by the Jackfruit Consortium spearheaded by noted farm journalist Shree Padre. The Jackfruit Company formed by Annie Ryu in 2011 and sourcing from 350+ farming families of Kerala today has a turnover of \$ 24 million dollars and more than 70 retail outlets across the United States. The Artocarpus Food Pvt Ltd Company formed by entrepreneur Subhash Kurodh from Kerala is one of India's first full-fledged jackfruit processing company sourcing from local farmers and exporting processed jackfruit products to the USA and the Middle East.

Growers can make good income from jackfruit if they are organised and have good market connectivity but there are some issues related to harvesting. Each fruit matures at different times and it is not feasible

for a farmer to take it to the market, particularly because it is also huge. However if they are organised and have direct market linkage, they can make a good earning. There are farmers even in the perennially-drought-affected Vidarbha in Maharashtra who earn Rs. 5,000-10,000 by selling jackfruit locally as a vegetable to Nagpur which consumes around one (1) metric tonne of the fruit per day as a meat substitute. In Toobugere village in Karnataka, farmers started earning Rs. 100-200 per fruit after they formed a jackfruit growers' association, the first and only such association in the country, and built direct connectivity to the market. This was facilitated by Bengaluru's University of Agricultural Sciences.

Similarly Odisha's Indian Institute of Horticulture Research has trained tribal women in minimal processing procedures of the fruit and given them small, handy machines to peel the outer rind which has helped them increase their income. From Kerala, about 50,000 tonnes of raw jackfruits are sent to cities like New Delhi as a vegetable. Middlemen buy it for Rs 5-10/- per fruit and sell it to retailers in markets of faraway cities for over Rs. 25/- per kg where it is a rich man's vegetable – this despite the fact that Kerala suffers from a huge shortage of vegetable and fruits.

In the North East it is believed that a market for both the ripe fruit and for value added products can emerge and be sustainable provided jackfruit be made more accessible by giving consumers a convenient packaging, as opposed to having to buy a 7-10-kilogram fruit and through a well thought out and properly executed supply chain and go to market strategy.

RESOURCE AVAILABILITY

Jackfruit (*Artocarpus heterophyllus* Lam) is grown at low to mid altitude areas in Meghalaya such as in the whole of Garo Hills region, southern slopes of East Khasi Hills, parts of West and South West Khasi Hills,



parts of Jaintia hills and entire Ri Bhoi district with substantial quantities of the fruit being produced from the five (5) districts of the Garo Hills where almost each and every household has an average of 5 trees per household. Though no accurate records exist as to its area, yield, variety and population, an estimate of the quantum of production of the fruit was made by the then Deputy Commissioner of East Garo Hills district, Shri. Vijay Mantri, in 2012, under the aegis of the Integrated Basin Development and Livelihoods Promotion Programme (IBDLP). The estimate assumed an average population of 5 trees per household for 2,71,804 households (2011 census), with each tree yielding an average of 50

fruits per season and an average weight of 20 kgs per fruit which resulted in an estimated population of 13,59,020 trees and a production of 13.59 lakh metric tonnes. Assuming that 20% of the fruits were consumed locally, the marketable surplus of jackfruits still threw up a staggering figure of 10.87 lakh metric tonnes.

People of the producing areas normally consume the ripe fruits and seeds locally with some quantity of fruits finding their way to the markets of Assam. However due to the bulk and weight of the fruit and its perishability, long distance markets are unreachable and most of the fruit is left to rot in the orchards. In the Garo Hills, jackfruit is a source of pig feed whereby pigs are tied to the jackfruit tree and feed on the fruits that fall down. In some other parts of the state the jackfruit leaves are also used as goat and cattle fodder.

To say that jackfruit is an underutilized fruit crop across the state would be an understatement. Aside from scattered home scale pickle and chips making there is no significant value addition activity happening anywhere in the state with most of the consumption happening at the household level. Despite the fact that there is a demand for jackfruit value added products in the mainland, fruits are rotting under the tree due to transportation hurdles, negligence and non availability of value addition opportunities including awareness about its potential for income generation amongst both the rural and urban communities. It is estimated that the country as a whole could be wasting jackfruit worth Rs 2,000 crore. The actual loss

could be much higher. In the Garo Hills region of Meghalaya alone, jackfruit worth Rs. 434.00 crore was wasted in 2012. Even in progressive states such as Kerala too, the fruit is still considered a poor man's crop though the situation is slowly changing due to the efforts of the Kerala based Jackfruit Consortium.

Across the country only two agriculture universities (UAS, Bengaluru and IIHR, Odisha) and the CARD-KVK ((Krishi Vigyan Kendra), Thiruvalla, have done pioneering work on jackfruit despite jackfruit being classified as a "minor fruit" and doesn't have a mandate for research. In Meghalaya, the College of Home Sciences, Tura, under the Central Agriculture University and the ICAR have been conducting training of farmers and some basic research on identification of processing cultivars under a Mission sponsored by the Ministry of Science & Technology. Though there is need for lot of R&D on jackfruit and on the potential of jackfruit as a food security and climate change adaptation crop, nothing concrete has been happening as compared to other producing countries.

The Meghalaya Institute of Entrepreneurship (MIE) had conducted 3 (three) workshops on Jackfruit in Shillong and Tura including an Interactive Workshop on Jackfruit in the Indian Institute of Entrepreneurship (IIE) Guwahati, under the leadership of Dr. B.D.R. Tiwari, IAS, Secretary Planning in collaboration with the University of Agriculture Sciences, Bangalore and the CARD-KVK, Kerala, to create awareness on the livelihood and enterprise potential of Jackfruit. 100 (one hundred) farmer entrepreneurs have been sent for training on "Value Addition of Jackfruit" to ICAR- CARD KVK, Kerala and University of Agricultural Sciences (UAS), Bangalore. Three batches of 20 farmer entrepreneurs of the Garo Hills have also been sent for training on "Value addition of Jackfruit" in the College of Home Sciences, Tura, West Garo Hills district and an Awareness programme on the Potential of Jackfruit was held in Sohlait Thymmai village, Ri Bhoi district on the 2nd April, 2015. Post the trainings, some of the farmer entrepreneurs especially the cooperative societies, have started the collection and small scale production of jackfruit products like squash, chips, and mixture. The Centre of Learning, Knowledge and Services (COLKS), the MEG factories of Shillong and Dainadubi have also been working on value added products of Jackfruit. Seeing the keen interest that the trainees have expressed in jackfruit the MIE is assisting them in the development of packaging and branding of their products.

While the efforts of the MIE has been focused on skilling and capacity building of such farmer entrepreneurs to value add jackfruit, its capacity to scale up the value chains is limited due to the unavailability of required facilities for training and skilling within the state. To this end and to address this perceived need, the Mission proposes to set up two Techno Incubation centres in Shillong and Tura, to cater to a wider audience of farmer entrepreneurs who may not be able to travel to either Bengaluru or Kerala for training. Keeping in view the size of the market there is enough potential for large numbers of small enterprises to be incubated and to link them to a centralized marketing channel through the incubation centres.

MISSION IMPLEMENTING AGENCY

The Mission will be implemented in a phased manner by the newly created Directorate of Food Processing in coordination with the Meghalaya Institute of Entrepreneurship (MIE) as the Programme Management Unit (PMU) for the Directorate.

CHAPTER THREE

MISSION COMPONENTS

a) Mission Focus

The Mission will mainly focus on the development, promotion and up scaling of value addition of jackfruit and creation of holistic value chains for movement of the finished products to consuming markets of the country through a process of incubating private enterprises (both small and medium) so as to take full advantage of an existing readily available natural resource for engendering sustainable livelihoods opportunities for farmers and farming families across the state.

b) Operational Area

The Mission will cover all jackfruit growing areas of the state and be initially targeted at entrepreneurs, SHGs, well functioning cooperative societies, farmer interest groups (FIGs) etc clustered into 10 jackfruit clusters encompassing approximately 822 villages in the first phase, keeping in view the peculiarities of the fruit and of the need for intensive training, testing, aggregation and bulking up of the produce. While certain components like training, exposure and cluster formation will be conducted in a phased manner, other components like Techno Incubation Centres (TIC) will be established at project start in Shillong and Tura at locations with well developed infrastructure like hostels, water, electricity, buildings etc. Hands on trainings in the incubation centres will be imparted to batches of partners from all districts and Jackfruit Melas / awareness camps in all 11 (eleven) districts over the next five years will be organized. Small rural and medium urban processing enterprises are going to be promoted amongst the entrepreneurs, SHGs, cooperative societies and FIG to be trained and already trained who have existing minimum infrastructure facilities like work sheds, large jackfruit plantations and working capital. Aggregation and exit facilities are also proposed to be established in the Garo Hills and Ri Bhoi, in locations with existing required infrastructure of work sheds and space, for aggregation.

c) Action Research

As stated earlier, jackfruit is a neglected crop with immense potential for generating sustainable livelihoods and enterprises both in the rural and urban areas. As there has been virtually no R&D work done on the subject within the state, it is imperative that the Mission be grounded on sound scientific and technical foundations for its success. To this end the Mission would take up action research on the following areas.

- i) Local varietal survey with the objective of germplasm preservation and improvement, identification of elite jackfruit genotypes for various purposes viz., table, squash, tender fruit as vegetable, chips, papad, seed and bulb flour preparation to be used in industry.
- ii) Identification and sourcing of appropriate technologies for the value addition of jackfruit in consultation with the Universities and technical partners.
- iii) Block and village level surveys with the objective of mapping, identifying, creating and organizing production and aggregation clusters for the supply chain.

This component will be implemented during the first two years of implementation upon Mission launch through the Directorate of Food Processing, Directorate of Horticulture and the MIE with assistance from Govt. of India, KVKs / ICAR to be able to zero in on the areas with maximum production for the purpose of cluster mobilization, formation and formulation of the supply chains. The action research would also help in zeroing in on the most suitable local varieties for processing into various types of by products so that they can be further multiplied and improved upon. This component would also look at the various processing technologies and equipment available both within and outside of the country and at their suitability to the local conditions in collaboration with the technical institutions.

d) Planting material

Preliminary work done by the MIE in collaboration with the UAS, Bengaluru and CARD-KVK, Kerala

has indicated that the JF varieties of Meghalaya may not be suitable for all forms of processing and value addition. Meghalaya especially lacks early fruiting varieties that can fruit throughout the year which are suitable for use and processing as a vegetable. However such grafted varieties have been developed by both UAS and Kerala and are available for multiplication subject to their suitability to our agronomic conditions. Through action research and if found suitable, such varieties could be introduced into the state and multiplied by nurseries to be set up under the mission both in the public and private sector through the Mission for Integrated Development of Horticulture (MIDH) for large scale vegetative propagation of plants. In the case of private sector such interventions would be credit linked under MIDH.

e) Technology Development & Sourcing

The arena of JF processing and value addition is just beginning to catch the attention of the scientific and industrial community across the country beginning with Kerala, Tamil Nadu and Maharashtra. Protocols, standards and equipment for processing and value addition are still being fine tuned by institutions and industry. A lot of the equipment in use in these states has either been adapted from conventional fruit processing equipment or imported from countries like Vietnam, Malaysia, Sri Lanka or China. As Meghalaya conditions differ from these states there is a need for demand driven product and process technology development, design and development of equipment, improved storage, shelf-life, packaging etc, suited to the unique conditions of the state, which could be conducted in collaboration with or outsourced to institutions like Agri Universities, NEHU, IITs, Indian Institute of Packaging, CFTRI, DRDO, IIFPT, NIFTEM etc with assistance from the externally aided Farmers' Mobilization Project of the KfW Development Bank

f) Jackfruit cluster formation

Jackfruit is a heavy fruit which presents unique supply chain challenges in the movement of the fruit from the producing farms to markets. As things stand today the fruit is sold in its raw form in local and roadside markets sometimes at throwaway prices. Many farmers do not even harvest the fruit and allow it to rot on the ground due to the difficulties of transporting it and the very low prices that they get. For the processing and value addition of the fruit to take off on a commercially viable scale there is a need to create agro processing clusters that can function as collection/aggregation centres located within the producing areas and to encourage entrepreneurs and the formation of FPOs/FIGs or cluster groups that can take on the responsibility of aggregation and perhaps to a certain extent carry out primary or minimal processing of the fruit before shipping it to a larger facility. 24 such potential clusters covering around 1950 villages have been identified across the state which can be linked to market /processing/aggregation centres through the 1917iTEAMS platform of the Department. Cluster formation will be implemented in two phases (I & II) based on parameters like Jackfruit population, household sizes, availability of space, infrastructure, accessibility etc. The current Mission phase will initially take up 10 clusters covering 822 villages to start with in phase – I and then take up phase – II depending on the experiences of phase – I and the traction gained. For this component the Mission will link up with the Pradhan Mantri SAMPADA Yojana, Ministry of Food Processing Industries (MoFPI) or the Small Farmers' Agri Business Consortium (SFAC), Govt. of India.

g) Area Expansion

Furthermore in view of the well known property of Jackfruit to ameliorate soil moisture regimes and its climate change resiliency, clusters and villages can be encouraged to take up systemic area expansion of the tree for catchment areas and springsheds protection in collaboration with the Community Led Landscape Management Project (CLLMP) in 3000 hectares which will not only ensure the continued existence of the catchment and springs but will also provide livelihood and enterprise opportunities to the cluster / villages through aggregation and value addition. For this component the mission will link up with the CLLMP project for support.

h) Techno Incubation Centres

The Mission will establish two (2) Techno Incubation Centres (TICs) with KfW funding support in

Shillong and Tura at the start of the Mission, at locations with well developed infrastructure like hostels, water, electricity, buildings, work space, classrooms, laboratories etc like the College of Home Science (COHS), Tura or IIHM. The COHS, Tura under the Central Agriculture University (CAU), Imphal, is already a nodal agency for jackfruit in Meghalaya and had been implementing a jackfruit germplasm Mission of the Department of Biotechnology, Ministry of Science & Technology, Govt. of India which is now over. The MIE has partnered with the College in training some of the Garo farmer entrepreneurs in small scale processing of jackfruit.

The Techno Incubation Centres have been conceived of as Centres for Training and Technology Support for local entrepreneurs and groups interested in the business of promoting jackfruit. The Centres will be equipped with the necessary essential equipment / facilities and training by the partner Universities under this Mission and will be a place where prospective entrepreneurs can get an idea of and be trained on the essential infrastructural requirement for setting up a processing unit for jackfruit based value added products. Training will be a major activity under the Techno-Incubation Centre, so that a large number of people could derive benefit from it. This benefit could be translated into an income generating activity not only for the entrepreneurs, but also for the jackfruit farmers through backward integration. The TICs will also function as Common Facility Centres (CFCs) for entrepreneurs, Self Help Groups and Cooperative society members who can utilize the facility to process their produce by paying a nominal user fee and earn profits from sale of the produce, without investing too much in the establishment of machinery and equipment. The objectives of the TICs would be:

- To organise awareness, training programmes on value addition of jackfruit to stake holders viz., farmers, entrepreneurs, officers of agri / horti Departments.
- To provide hands-on training on preparation of value added products from jackfruit.
- To provide incubation facilitation to prospective entrepreneurs for the production of value added products from jackfruit.
- To provide technical assistance to innovative entrepreneurs for product development in jackfruit.
- To act as a production/processing unit of jackfruit based products for its widespread popularisation.
- To effectively disseminate the value addition technologies, as more and more people would become convinced about the benefits of the technology by producing the various products by themselves.

The TICs would be equipped with the following units and equipment (Details in Annexure – II)

Processing Units:

- Fried chips manufacturing unit (FCMU)
- Squash making unit
- Pickle making unit
- Powdering / Dehydrated products making unit
- Jackfruit Preserve, bites, jam and jelly making unit
- Quality control lab

Products of the TICs

The TICs will provide training and incubation on the following value added products of Jackfruit:

- Ripe jackfruit Preserve
- Jackfruit Chips

- Jackfruit pulp
- Jackfruit Mixture
- Dehydrated Ripe jackfruit: Bites
- Dehydrated Ripe jackfruit pulp: Chew
- Ripe Jackfruit Squash
- Jackfruit Pickle
- Dehydrated Tender Jack fruit
- Dehydrated raw Jack fruit
- Ripe Jackfruit frozen RTS juice
- Ripe Jackfruit Jam
- Ready to cook tender jackfruit
- Jackfruit seed flour
- Raw jackfruit flour
- Jackfruit leathers/jerky

The establishment of the TICs will be done with the active collaboration and technical support of institutions of higher and technical learning like the University of Agricultural Sciences, Bangalore, the ICAR-CARD KVK, Kerala and the College of Home Sciences, Tura. Personnel of the TICs will be trained at the three institutions so that a cadre of Master Trainers can be incubated to further propagate the knowledge and technologies to the larger audience. The Directorate of Food Processing and MIE will work together to bring all the various stakeholders, mobilize resources, identify entrepreneurs, incubate and handhold them after their trainings. Since the facilities of the TICs are also common and applicable to the processing of other fruits and vegetables, the TICs would also train entrepreneurs in their processing during the jackfruit off season so that the facilities are not idle and are able to deliver maximum benefit to the people of the state. To ensure immediate takeoff, the TICs would initially focus on incubating the 300 odd entrepreneurs and society members already identified and capacitated by the MIE. During the trainings the trainees will be simultaneously screened and evaluated through socio economic and psychometric analysis tools to assess their potential as prospective entrepreneurs for further incubation.

The techno incubation centres will operate on a service driven revenue generating model through the incubation of entrepreneurs and enterprises, provision of processing, packaging, common facilities, training and capacity building services. Assets generated by the Mission will be operated and maintained by the respective TIC hosting institutions. The TICs will be set up under the aegis of the Farmer Mobilization Project with funding support of the KfW Development Bank.

i) Start-up funding for jackfruit SMEs

Post the training the Mission will facilitate the establishment and incubation of 50 small scale value addition / processing enterprises over a two year period and handhold them till marketing of their products. The units will be selected from amongst the best performing society / groups / entrepreneurs based on the socio economic / psychometric evaluation conducted during the training and based on their having in their possession existing minimum infrastructure facilities like worksheds, sufficiently large jackfruit plantations and working capital. The enterprises incubated through this Mission will be linked to buyers and markets nationwide by the Mission which will provide credit linked start-up fund support of Rs. 10.00 lakhs each for working capital and minimum processing equipment, while human resources and raw material will have to be met by the enterprises through their own investments or through bank linkages which will ensure greater stakeholder participation, ownership, continuity and sustainability of the enterprise. The Directorate of Food Processing and MIE will facilitate the establishment of the

enterprises in coordination with the Departments of Commerce & Industries, Cooperation, Labour, Legal Metrology, the FSSAI, financial institutions, insurance brokers, market strategists and brand designers to ensure a smooth take off. Assets created through this Mission will be operated and maintained by the respective enterprises. The indicative list of equipment for each enterprise is indicated at Annexure – II.

j) Start-up funding for Nano processing units

Jackfruit also lends itself admirably to home scale or Nano processing either as chips, pickles, kurkure, sweets, jams, papad etc which is yet another avenue for additional livelihood and income support especially for housewives, marginalized and vulnerable women. The processes are simple and with very little training and using commonly available household utensils, women can easily make such products at home which can then be sold in the local shops and markets. There is great potential under this component to target large numbers of households that can benefit from the jackfruit trees that grow in their own backyards. An example is that of Shri. K. Narashimaiah, a farmer cum teacher in Kachahalli village of Karnataka who earns around one lakh rupees per annum from only 6 trees in his backyard. In order to trigger off such nano enterprises a start-up fund of Rs. 3.00 lakhs per enterprise as working capital and for purchase of basic equipment has been earmarked for 200 women nano entrepreneurs under the mission either as a form of patient capital or linked to credit under MUDRA, WEEFI, RMK, STEP, Mahila E-Haat or similar schemes.

k) TIC Trainings/incubation

The TICs, the Directorate of Food Processing and the MIE will take up the training, skilling and incubation of 4290 partners, entrepreneurs, housewives, officials, Chefs and Master Trainers in batches over the next three years in a phased manner with phase – I targeting 1943 trainees. The trainings will be residential with each training spread over 4 to 6 days in the TIC campuses or offsite. Modules for the trainings will be developed by the Directorate of Food Processing and MIE in consultation with the UAS, Bengaluru, CARD-KVK, Kerala, IJHM, Shillong and COHS, Tura. Master trainers of the TICs will be trained by the COHS, Tura, the UAS, Bengaluru and the CARD-KVK, Kerala which already has a functioning TIC. Necessary manuals of operation and processing will be developed by the Directorate of Food Processing and MIE with inputs from all the concerned institutions. To start with the Mission will train 100 Block Technical Managers (BTM) and Assistant Technology Managers (ATM) of the ATMA who will then train a cadre of 510 Master Trainers drawn from the Farmer's Friends network of ATMA. These Farmer Friends will then move to their respective villages for conducting awareness and skill development programs for farmers and nano entrepreneurs. Four percent of the participants of every batch in the village level programs who exhibit interest and competencies will be selected for undergoing further training in the TICs.

The trainings will be structured to emphasise more on the practical aspects of processing, packaging, handling of machinery and equipment, food safety and hygiene. To this end the module is being tentatively structured to impart 2 days of theory cum practical and 4 full days of hands on processing practice. During the trainings an evaluation of the entrepreneurial competencies of the partners will be conducted by the MIE using socio economic and psychometric tools like the Focused Behavioural Event Interview (FBEI) to shortlist potential entrepreneurs for further facilitation in setting up their enterprises. Post training the TICs will follow up on potential entrepreneurs for incubation and handholding in coordination with the Directorate of Food Processing and MIE to assist the entrepreneurs in establishing their enterprises. This training component will be supported by the KfW under the Farmers' Mobilization Project (FMP)

l) Go Mobile Village level awareness & skill building

In order to take the concept and awareness about jackfruit value addition to the masses a concept of village level Go Mobile awareness & skill building programs will be conducted under the Mission wherein Master Trainers will move to the village clusters and stay there for 1 to 2 days to train farmers in the basics of plant management and minimal processing at the Nano enterprise / household level. The trainings will be conducted for 6 hours daily (3 hours morning and 3 hours evening) so that farmers

can go about their daily work with minimal disruption while availing training at their doorstep. Under this approach the Mission would be able to reach out and train twice the number of farmers in half the time and cost. A total of 585 batches of 100 farmers / batch are targeted for 2 years which would enable the Mission to reach out to about 58,500 farmers across the state. The trainings will also be implemented in two phases with phase –II dependant of the responses and traction under phase – I. The two training phases will be supported by the Mission for integrated Development of Horticulture (MIDH) with necessary training materials, promotional materials, manuals, Z-Cards etc developed by the Mission.

m) Awareness campaigns/Melas

To further add a fillip to the awareness and trainings and sensitize people and society at large about jackfruit, annual melas/campaigns to spread awareness about the fruit and its potentialities, will be organized in all 11 district headquarters of the state throughout the full project term to sensitize and draw the attention of policy makers and practitioners, Govt. Officials, farmers, civil society, citizens and entrepreneurs to the potential of jackfruit and encourage them to take up the jackfruit cause. These melas could be organised by the Directorate of Food Processing through the respective District Horticulture Offices (DHO) wherein potential / prospective entrepreneurs / groups / societies could be identified through these melas for linking them to the TICs.

The melas would be a platform in which entrepreneurs and processors can not only showcase and sell their products but they would also be an opportunity for them to interact with buyers, from within and outside of the district. The melas would feature jackfruit shows, jackfruit exhibitions and jackfruit competitions and would be the ideal opportunity to carry out the process of varietal identification and classification of the jackfruits on display by a team of experts to be drawn from the Universities and research institutions.

n) State Jackfruit Festivals

Awareness about jackfruit, its many benefits and opportunities amongst buyers, consumers, higher end entrepreneurs, makers and practitioners of policy, civil society, thought leaders etc is also an important aspect of the Mission in order to mobilize and shape public perception of the fruit and ensure their buy-in into the jackfruit cause for the benefit of farmers across the state. To this end State Level jackfruit festivals are important showcases and opportunities for entrepreneurs incubated under the Mission to showcase and market their products to a wider audience and interact with buyers, experts, scientists, source leads, negotiate deals, explore markets, technology options and gain knowledge from fellow entrepreneurs and processors etc. Such festivals constitute an integral part of the Mission and will be held for two days every year over the next five years of the mission lifecycle to showcase the farmers, the entrepreneurs, the products, the technology and the Mission.

o) Exposure visits

Exposure visits are an essential part of any training and incubation programme in order to open the minds and eyes of our entrepreneurs to the growth and business opportunities available outside of their village, block, district or state and to afford them an opportunity to interact and see how people of other states or even districts go about their livelihoods. An exposure visit is an inspirational experience and offers partners a chance to experience another culture, see different places, meet different people, see new and different technologies, eat different kinds of food, all of which opens up their minds to new ideas and increases the adoption rate of improved technologies and teachings. Over the Mission lifespan 2080 entrepreneurs in 104 batches of 20 partners each will be sent for exposure and training to places where jackfruit cultivation and value addition is being done on a commercial scale. The exposure visits would be conducted in two phases and will be organized by the Directorate of Food Processing, and anchored by the partner Universities and organizations with the support and assistance under the MIDH scheme of Govt. of India.

p) Packaging, branding and marketing

The most critical component of any enterprise, packaging, branding and marketing is the culmination of an entrepreneur's hard work, time, patience and sacrifice and deserves perhaps the maximum attention. As discussed earlier, in mainland markets, tender or raw jackfruit is in high demand as a vegetarian meat substitute while the ripe fruit and seeds can be turned into a variety of value added by products like squash, sweets, flour, cakes, chips, papad etc. A recent emerging demand is for RTC (Ready to Cook) tender jackfruit, dehydrated / freeze dried unripe jackfruit chips, Vacuum fried chips and jackfruit seed flour which are being increasingly seen on mid to high end market shelves, retail malls and speciality stores. This demand is being fuelled and driven by the growing awareness of jackfruit's health, nutritional properties and organic nature amongst a growing number of the health conscious middle and upper class population which is looking for healthier alternatives to highly processed and chemically laden packaged food. The growing number of nutritional research being done by researchers both in India and abroad and the never ending quest of the food industry for new products and cuisines is also driving this demand upwards especially amongst the diabetic and hypertension afflicted population while the wellness and health food industry is also on the lookout for natural and minimally processed organic produce. All these channels require the product to be certified, tested, packed hygienically and be well branded which makes this component so critical for the success of the mission and the enterprises incubated. A conservative estimate by the Jackfruit Consortium of Kerala puts the number of products that can be made from jackfruit at more than one hundred.

Advocates of climate change mitigation, food security and the organic lobby are also to a certain extent responsible for the increasing demand for jackfruit products as the tree is an excellent candidate for incorporation into a climate change adaptation program due to its versatility and hardiness requiring perhaps the lowest input of any tree crop while at the same time is an abundant source of easily accessible, cheap, nutritious food for marginal areas.

This demand is reflected in the number of start-ups that are emerging and taking up the processing of jackfruit both for the Indian and export markets. Companies like the Jackfruit Company, Artocarpus Foods Pvt Ltd, Jackfruit 365 etc have been making waves in the food industry and are quickly moving into a commanding position in the market. Like them there are numerous smaller full fledged companies especially in Kerala and in Maharashtra which are today shifting focus to the processing of jackfruit especially for exports. Export houses are also increasingly incorporating jackfruit as one of the desired products in their portfolio and the MIE has been receiving enquiries from such export houses.

However while jackfruit items like squash, chips, papad, jack flour etc can be made in the home or in cottage scale units, the newer products like RTCs, dehydrated jack, freeze dried jack, and pulp can only be made using high end equipment with strict quality control processes especially for the high end market and exports. Packaging and branding of jackfruit products is taking centre stage and is critical for effective market penetration, eyeballs, brand recollection and shelf space. Countries like Thailand, Sri Lanka, Philippines and Vietnam are investing heavily in the jackfruit industry with most of the leading equipment manufacturers located in these countries. Sensing the demand, the Indian equipment manufacturing industry is also gearing up to start the manufacturing of jackfruit processing equipment like vacuum fryers, jackfruit peelers etc within the country.

In view of the market potential for both low and higher end jackfruit products, the Mission will be making substantial investments in packaging, creation of a jackfruit brand and promotion of trade for jack products of the enterprises incubated and set up under this Mission. In order to achieve this, the Mission will work with the TICs to hand hold the enterprises in ensuring that quality, testing and certification norms are met and to develop a common brand for jackfruit products both for the low and high end market segments including exports. Road shows, advertising campaigns, buyer seller meets, online presence, trade fairs, B2B meetings, electronic and social media will all be leveraged to reach out to consumers and markets. The Mission will be engaging the services of reputed design houses, national institutions like the Indian Institute of Packaging (IIP), National Institute of Design (NID) and experts for shelf life certifications, packaging design and brand building as well as the extensive competencies / resources of the PMU to achieve this.

The Business Facilitation Centres (BFCs) proposed to be set up in the metros of Delhi, Kolkata and Mumbai will be intensively used to solicit buyers and facilitate the entry of our entrepreneurs into these markets and facilitate the participation of our entrepreneurs in national and international level trade events.

Tie ups with other jackfruit processors and buyers across the country and abroad are already being explored along with logistics, warehousing, distribution and cold storage operators. The Mission will also leverage upon the extensive enterprise facilitation network across the state to mobilize higher end entrepreneurs who could be players in the higher end value chain.

In order to achieve all this and build up cost efficient and sustainable value chains, the Mission will be adopting a strategy of domain specialization and de skilling whereby trained processors/entrepreneurs/nano entrepreneurs linked to the production clusters concentrate only on ensuring the production and packaging of quality jackfruit products. Transportation, warehousing, storage, branding, distribution, supply chains, promotion, advertising, will be taken up by either higher end local entrepreneurs and/corporate entities linked to the processors. This way it ensures that private sector domain expertise is brought into the Mission and that sufficient employment opportunities are generated across the value chain by the Mission. The ecosystem of the 1917iTEAMS is going to be extensively used to coordinate and bring together all these facets into an integrated chain that stretches from the farming clusters to the final consumer. In every step of the chain opportunities will be created for smart educated young people to involve themselves and also create employment and income generation opportunities for many others.

MISSION ROAD MAP

INTERVENTIONS	Year 1	Year 2	Year 3	Year 4	Year 5
Action Research					
Planting material production					
Technology Development & sourcing					
Cluster formation					
Establishment of 2 Techno Incubation Centres					
Establishment of SMEs					
Establishment of Nano enterprises					
Training & incubation					
Go Mobile village awareness & skill-ing					
Jackfruit Melas					
State festivals					
Exposure cum training					
Packaging, Branding, Marketing					

CHAPTER FOUR

MONITORING AND EVALUATION

The Mission will put in place an M&E system that would detail the monitoring procedures at various levels as well as guidelines for submission of various reports. Roles and responsibilities of various technical as well as project implementing staff with respect to MIS and monitoring & evaluation will be defined. Specific requirement with respect to training needs will be clearly indicated along with identified source for training arrangements. Key performance indicators for various activities under the Mission will be specified in order to ensure success of the Mission. The key highlights of the M&E function are as follows.

The goal of M&E is to outline a strategy for the Mission which will help monitor the progress of the implementation and aid in informed decision making.

This section also aims to lay the foundation of setting up Monitoring and Evaluation systems to help achieve the programmatic goals.

This section aims to provide a structure of the activities to be undertaken under Monitoring and Evaluation, how progress will be monitored, periodic evaluations be undertaken by the M&E team, and how the team will interpret and add value all the information for effective decision making by the Mission Administration.

The proposed Strategy for Monitoring and Evaluation is based on three fundamental stages in a Programme /Project Life Cycle – Planning, Implementation, and Evaluation. These stages have been explained as under.

Figure: Programme / Project Life Cycle stages



Planning

The Planning stage would comprise concept planning, ideation, systems setup namely MIS and monitoring, processes and timelines for monitoring, setting up the team, appointment of professionals and their capacity building, gaining insights through research and studies, establishing indicator values, fixing milestones and targets for achievement. The proposed activities and their status is explained in the following sections.

1) Concept, Ideation and Planning

This would be the start off stage in the entire process of Monitoring and Evaluation and would involve concept development through prima-facie knowledge and reports available, planning activities, setting timelines against these activities, etc. Preparation of this Strategy paper is part of this stage.

Setting up systems, processes, M&E team and their capacity building

Based on the Strategy document and activities conceptualised and planned, the following activities will be undertaken.

1) Setting up the M&E team

A dedicated core team would be set up at the Mission HQ to monitor and report the progress of the project. This would include notification of personnel, their capacity building, establishing flow of information and value-add expected from each team member. This team may be supported by other team members based in districts for collection of information and its digitisation.

In addition to this core unit at Mission HQ, based in Shillong, staff in districts will also be nominated. A plan for capacity development of team members would also be formulated and operationalised.

The two primary functions of the team have been proposed as separate sub-units. Though majority of the tasks for these sub-units will be specific to their functions, they will not be limited to these specified tasks.

The Monitoring sub-unit would undertake tasks which would entail regular tracking of physical and financial progress of the programme, primarily through MIS.

The Evaluation sub-unit would be undertaking tracking progress of the Mission at regular time intervals and also as per the compliances of funding agencies. Their tasks would comprise surveys, impact studies, case studies / success stories, etc.

The team may undertake FGDs (Focused Group Discussions), case studies, qualitative and in-depth studies involving limited sample size (less than 30), in consultation with the reporting authority. In case of concurrent monitoring also, external agencies may be contracted to collect and synthesise data under the supervision of the M&E team. This will allow the team to focus on higher value add like analysis and interpretation for better decision making.

It is proposed that data collection and entry in computers be made mandatory under the supervision of the M&E team. However use of tablet computers or mobile phones for field data collection could eliminate the need to data entry, as data will be entered directly into tablets/phones rather than using a paper questionnaire and uploaded directly into a survey database.

2) Establishing reporting formats, requirements and calendar

This will be undertaken for the Mission and other projects under its ambit. Under this, outlines may be defined for undertaking Annual Outcome Studies, Thematic Outcome studies, KAP studies, Qualitative and case studies.

The reporting requirements for M&E will be established and the other outlines will be defined.

3) Designing MIS

This stage would include designing the MIS structure, indicators and flow along with defining the information requirement from institutions/stakeholders. It is suggested that trained personnel of DRDA may be engaged to design the MIS structure.

Gaining insights, Establishing indicator values, milestones and targets

1) Baseline Study

The Baseline Study would be undertaken before commencement of any project. Based on the values of indicators generated in the Baseline Study, mid-term and end-term assessments would indicate progress of the project.

2) Setting Milestones, timelines, targets

Based on the Baseline study and reporting requirements established, milestones, timelines and targets will be fixed annually. Along with, the periodicity of measurement would also be established.

Implementation of Plan and Concurrent Monitoring

In this stage, plans will be implemented, concurrent and regular monitoring mechanisms will be established. The M&E team, with assistance from district teams will periodically collect information and undertake its digitisation to monitor progress of programme and projects.

1) Launch of MIS

Concurrent monitoring will be undertaken with the help of quantitative information derived from MIS. It may be designed, developed, operationalised and maintained as a web enabled system which will provide continuous progress of the programme and projects on various indicators including project administration indicators like staff recruitment, sanction and release of financial tranches, receipt and expenditure, etc.

2) Output and outcome monitoring

This will ensure that the targets and milestones set are achieved in the stipulated timeline. This would be a regular exercise and agencies of the department may be utilised for undertaking these studies.

Annual outcome surveys

These will be undertaken to measure the outcomes of outputs that have been delivered in the last year or so. This would include indicators that will measure progress towards goals and objectives.

Thematic outcome surveys

These more focused surveys will be undertaken to provide information on the outcomes of specific interventions - particularly those which only affect a specific group of participants (like Lakadong farmers).

Progress monitoring

This will be undertaken on a regular basis to ascertain achievement of physical targets for project activities and outputs as set out in Annual Work Plans and Budgets and provide course corrections. This activity will be undertaken by the SMMU and will be based on reports generated and MIS.

3) Process monitoring

This will ensure that the process planned to achieve the targets and milestones are being followed and will also help in course correction.

KAP studies

KAP (Knowledge, Attitude and Practice) studies are widely-used for assessing uptake and acceptability of newly introduced technologies or income-generating activities (IGA). It comprises three components as explained below

1. Knowledge: does the trainee KNOW what to do (i.e. has she/he remembered the key points of the training?)
2. Attitude: based on her/his knowledge of the technical approach for the IGA, and knowledge of her/his own circumstances, does the trainee think the IGA is suitable for her/him (and if not, why not)?
3. Practice: She / he actually going to implement the new technology or IGA?

Case studies and success stories

These would be collected during the course of the project and would provide insights into the successes and aspirations of the target respondents, which will help in better design and delivery systems. These would be undertaken along with studies like Rapid Assessment, Baseline, Annual Outcome and Thematic Outcome. The M&E team can also, during their field visit, collect case studies and success stories.

Evaluation and Course Correction

In this stage, a periodic evaluation (half yearly and annual) would be undertaken and corrective measures suggested. All these would be compiled and prepared by the M&E team.

1) Evaluation

Based on reports from various studies, monitoring mechanisms and MIS, half yearly and annual progress reports will be compiled and submitted for review. Any issues of concern/red flags and suggestions for course correction will be included in these reports.

2) Planning for following year

At the end of the year, a planning exercise for M&E activities in the following year would also be undertaken and proposed.

In addition to the above the following evaluation studies will also be undertaken.

- Mid-term Assessment Study – this would be undertaken mid way through the project to ascertain the progress achieved and any mid-course corrections which need to be introduced. It would include indicators to measure progress towards goals and objectives.
- End-Term Assessment Study – this will be undertaken at the end of the project period (around the time of project completion) and will assess the achievement of the project during the tenure.

Social Cost Benefit Analysis:

The social cost benefit analysis of the various mission components will be worked out to understand the income gains to farmers, employment gains and other gains to the society. Various measures of project performance will be employed to study the direct and indirect benefits of the Mission. The impact of the Mission on the State Domestic Product (SDP) will be studied based on the data generated from MIS and monitoring reports.

Social Audit and Direct Benefit Transfer (DBT)

The Mission will be making substantial investments in area expansion, training and infrastructure like processing machinery and equipment. Funds under the Mission will be transferred to the enterprises

/ partners by Direct Benefit Transfer (DBT) to ensure transparency and speedy implementation in the field and the DBT will be linked with the Social Audit which will be deployed to monitor the progress of the Mission in the field. Social audit is a process in which the details of the resources, both physical and financial, used by the public agencies for the development initiatives are shared with the people, often through a public platform. It allows people to enforce transparency and accountability, thereby providing the ultimate users an opportunity to scrutinize the development initiatives. It is proposed under the Mission to create a social audit team involving beneficiaries of the Mission, civil society members, media personnel and reputed persons in the society to ensure transparency and accountability of the programme.

CHAPTER FIVE

SYNERGIES & CONVERGENCE

A Mission of this magnitude cannot be successful without the active collaboration and convergence of related agencies, Ministries, departments and institutions. The Directorate of Food Processing will be the focal point of convergence and coordination with the following.

- With the SFAC through the Horticulture Directorate to leverage upon the resources of the MIDH scheme.
- With the Directorate of Research, Training and Technology Incubation to leverage upon the resources of ATMA and the externally aided FMP of the KfW Development Bank.
- With the Cooperation Department in establishing aggregation and processing enterprises in the cooperative sphere.
- With the Department of Commerce & Industries in the establishment and registration of small scale processing units.
- With the Horticulture Directorate in terms of technical and professional support by horticulturists and field personnel.
- With the KVKs and the ICAR to leverage upon the technical and research ecosystem of these institutions for action research.
- With the TICs as their technical and capacity building programs are linked with the ICAR CARD-KVK, Kerala, the University of Agricultural Sciences, Bengaluru and the College of Home Sciences, Tura which are the national and state pioneers in jackfruit promotion. The Directorate of Food Processing through the MIE will explore and institutionalize technical collaborations with these institutions as over 100+ jackfruit partners have been facilitated by the MIE for training in these institutions over the last couple of years.
- The Mission will ensure close coordination and relationships with banks and financial institutions for leveraging financial assistance and loans for the enterprises to be set up. Schemes like MUDRA and StandUp India will be actively pursued especially for women groups / entrepreneurs.
- The Mission would leverage the resources of the District Horticulture Offices for mobilizing entrepreneurs, establishment of the value & supply chains, organising of jackfruit Melas and awareness campaigns.
- The Mission would also draw upon the professional expertise and marketing resources of the Meghalaya Livelihoods Access to Markets (MeghaLAMP) Mission.
- The Mission would integrate with the Springsheds initiative of the MeghaLAMP and CLLMP by encouraging jackfruit plantations in and around the catchment areas of springs and water sources.
- The Mission would also encourage jackfruit plantations through the Community Nursery initiative of the CLLMP in convergence with the Forest Department.
- The Mission would closely work with and leverage upon the cloud based resources of the 1917iTEAMS platform for evacuation logistics and for reaching out to buyers and sellers of jackfruit and its various by products whilst educating farmers through advisories of the platform.
- Other linkages built into the Mission are with the Food Safety and Standards Authority of India (FSSAI) and the Department of Legal Metrology.
- The Mission will also work closely with institutions like the Indian Institute of Entrepreneurship, Guwahati, the NIRD & PR – NERC, Guwahati, the Entrepreneurship Development Institute of India (EDI), Ahmedabad, Institute of Rural Management Anand (IRMA) to further capacitate our

entrepreneurs and to take the message and market of jackfruit across the North East which potentially could become a hub for jackfruit given the naturally occurring abundance of the crop in the region.

- Most importantly the Mission will link with the Ministry of Food Processing Industries (MoFPI) and establish a close working relationship with the Ministry and its affiliated bodies such that the state is able to leverage the multitude of schemes available with the Ministry for the benefit of the farmers and entrepreneurs of the state.

CHAPTER SIX

FINANCIALS OF THE MISSION

The Mission has set a target of reaching out and impacting 60,580 farmers (24,570 + 33,930 + 2080), 1180 Farmer Friends, 200 ATMA functionaries, 200 Chefs, 70 SMEs, 2340 entrepreneurs and 300 Nano enterprises over the next 5 years in two phases. A total financial outlay of Rs. 67.08 crores is proposed for Phase – I out of which Rs. 12.08 crores will be brought in as convergence from MIDH, Rs. 6.99 crores from the KfW, Rs. 2.00 crores from MoFPI or SFAC, Rs. 1.00 crore from the KVK / ICAR, Rs. 18.00 crores from the CLLMP and Rs. 23.66 crores from the Mission. A total of Rs. 40.07 crores will be the investment sought from the MIDH, KfW, SFAC, CLLMP and MoFPI for the Mission. Administrative support for the Mission has been kept at 4% of outlay amounting to Rs. 3.35 crores over 5 years and M&E at Rs. 80.00 lakhs. A total of Rs. 27.01 crores is therefore being sought from the Government of Meghalaya as support funds for Phase – I of the Mission over a period of 5 years.

CONCLUSION

Jackfruit and its value addition is a readymade golden opportunity for the state to improve livelihoods and generate employment opportunities in both the urban and rural areas through promotion of local enterprises and creation of its value chains while addressing issues of climate change, food and nutritional security. Judging from the experiences of entrepreneurs who have started venturing into this field, there is great scope for up-scaling value addition interventions for the crop as well as a ready market nationwide. More importantly the Mission will demonstrate the feasibility of turning a long ignored low input, low cost natural resource of the state into a high value product capable of sustaining and generating income for a long line of enterprises and entire communities. Our estimates are that even if only 10 % of the total production of jackfruit is tapped and channelized into the value chain, it would potentially generate livelihoods for around 50,000 households. Even more important is the demonstration impact that such a Mission can have on other states of the North East who also have extensive jackfruit plantations and who would be able to learn from the Meghalaya experience to also improve the livelihoods of their people - and that may be something worth investing in.

ANNEXURE - I - OVERVIEW OF MISSION INTERVENTIONS & SUPPORTING MEASURES OVER 5 YEARS																		
	SUPPORTING MEASURES								MISSION INTERVENTIONS							GRAND TOTAL		
	KVK / GOI/ICAR	MIDH	MIDH	MIDH	MIDH	CLLMP	MOFPI / SFAC	KFW	KFW	KFW	KFW	MISSION	MISSION	MISSION	MISSION		MISSION	MISSION
Action Research	100																	100.00
Public sector nurseries		250																250.00
Private sector nurseries			75															75.00
Technology Development & Sourcing								200										200.00
Cluster formation						1800	200											200.00
Area Expansion																		1800.00
Establishment of TIC								375										374.61
Startup Funding for SMEs												500						500.00
Startup Funding for Nano Units													600					600.00
Training of Officials, MTs, Entrepreneurs etc																	125	125.32
Training of Farmers				492														492.00
Promotional Material														25				25.00
Awareness / Melas															241			241.45
State Festivals																119		119.30
Exposure visits										391								391.04
Marketing / Branding																	880	880.00
Quantities (No/Ha)	LS	10	10	2080	68250	3000	10	LS	2	1943	200	50	200	2 Lakh	55	5	LS	
Unit cost in lakhs	100.00	25.00	7.50	7.52	0.02	0.60	20.00	200.00	187.30	0.06	3.00	10.00	0.000125	4.39	23.86	880.00		

ANNEXURE - I - OVERVIEW OF MISSION INTERVENTIONS & SUPPORTING MEASURES OVER 5 YEARS																		
	SUPPORTING MEASURES								MISSION INTERVENTIONS							GRAND TOTAL		
	KVK / GOI/ICAR	MIDH	MIDH	MIDH	MIDH	CLLMP	MOFPI / SFAC	KFW	KFW	KFW	KFW	MISSION	MISSION	MISSION	MISSION		MISSION	MISSION
Mission outlay												500	600	25	241	119	880	2365.75
Mission Support outlay	100	250	75	391	492	1800	200	200	375	125								4007.96
Total Mission Outlay (Lakhs)	100	250	75	391	492	1800	200	200	375	125	600	500	600	25	241	119	880	6373.71
	MISSION SUPPORT MEASURES																	
1	Mission Management @ 4%																	
2	Monitoring & Evaluation																	
														MISSION OUTLAY				
														255				
														80				
														335				334.95
																		GRAND TOTAL
																		6708.66

(Rupees sixty seven crores eight lakhs, sixty six thousand) only

ANNEXURE – II - ESTIMATED COST PROJECTIONS FOR MISSION JACKFRUIT					
Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
1	Action Research	A. Action Research			
		State wide Local Varietal Identification / selection, germplasm survey, technology sourcing & transfer.	1	10000000	10000000
		A. Total			10000000
Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
2	Planting material	B. Varietal improvement			
		Propagation nurseries for improved varieties in the public sector @ 100% for 4 Ha	10	2500000	25000000
		Propagation nurseries for improved varieties in the community / private sector @ 50% for 1 Ha	10	750000	7500000
		B. Total			32500000
Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
3	Technology Development & Sourcing	C. Research & Development			
		Demand driven product and process technology development & sourcing, equipment design, improved storage, shelf-life, packaging etc		20000000	20000000
		C. Total			20000000
Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
4	Jackfruit cluster formation (Phase – I)	D. Cluster formation			
		Formation of jackfruit collection, aggregation, processing clusters & FPOs	10	2000000	20000000
		D. Total			20000000
Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
5	Area Expansion	E. Area Expansion			
		Promotion of jackfruit cultivation in the catchment areas (Ha)	3000	60000	180000000
		E. Total			180000000

Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
6	Establishment of Techno Incubation Centres (TICs) in Garo, Khasi and Jaintia Hills	F. Machineries & equipment			
		Electric Dryer	1	700,244	700244
		Automatic form fill packing machine	1	540,000	540000
		Continuous band sealer	1	30,000	30000
		Double jacketed steam kettle (100 lts)	1	90,000	90000
		vegetable cutting machine	1	72,600	72600
		Jackfruit cutter	1	50,700	50700
		Cutting table 5' X 2 ½' X 30" HT + 6"	2	25,200	50400
		Jackfruit peeling machine	1	84,000	84000
		Vacuum Frying Machine	1	600,000	600000
		Electrical Deep Fryer- Big	1	78,000	78000
		Finger Chips cutter	2	1,800	3600
		Squash Unit	1	1,755,000	1755000
		Weighing balance (50 Kg)	1	9,600	9600
		Weighing balance (1 kg)	3	1,800	5400
		Packing machines	1	30,000	30000
		Foil Sealer	2	9,000	18000
		Powdering machine	1	378,000	378000
		Dough Mixer (5 litre)	1	60,000	60000
		Fruit mill	1	72,000	72000
		Pulper cum Finisher	1	120,000	120000
		Multipurpose VAT	1	204,000	204000
		Jackfruit chips cutting machine for tender jack	1	12,000	12000
		Nitrogen flushing & sealing machine	1	56,400	56400
		Vacuum packing machine	1	72,000	72000
		Cold Storage	2	2,400,000	4800000
		Dry Ink coding machine	1	48,240	48240
		Quality control facilities / lab	1	3,600,000	3600000
Import duty, Freight & transportation charges		1,200,000	1200000		
Installation costs, electricals, civil works etc		2,640,000	2640000		
GST @ 18%		1,350,105	1350105		
		Total for one centre			18730290
		F. Total of 2 Techno Incubation centres one each in Garo & Khasi Hills			37460579

Sl no	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
7	Startup funding for jackfruit SMEs	G. Small & Medium Enterprises			
		Solar / electric dryer (small)	1	240000	240000
		Double jacketed steam kettle (50 lts)	1	48000	48000
		Jackfruit cutter	1	50700	50700
		Cutting table 5' X 2 ½' X 30" HT + 6"	1	25200	25200
		Electrical Deep Fryer- small	1	39000	39000
		Finger Chips cutter	1	1800	1800
		Weighing balance (50 Kg)	1	9600	9600
		Weighing balance (1 kg)	1	1800	1800
		Packing machines	1	30000	30000
		Foil Sealer	1	9000	9000
		Dough Mixer (5 litre)	1	60000	60000
		Fruit mill	1	72000	72000
		Nitrogen flushing & sealing machine	1	56400	56400
		Vacuum packing machine	1	72,000	72000
		Jackfruit chips cutting machine for tender jack	1	12000	12000
		Pre operating expenses			72500
Working capital loan			200000		
Total for one unit					1000000
G. Total of 50 units					50000000
Sl No	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
8	Startup funding for nano processing units	H. Nano enterprises			
		HDPE containers 50 liters with lid	20	1200	24000
		Steel container SS 316/304 (100 liters)	2	30000	60000
		Cost of 1 kg plastic pouches (kg)	20	500	10000
		Labelling	2000	6	12000
		Sealing machine	2	2000	4000
		Jackfruit cutter	1	12000	12000
		Vacuum packing machine	1	58,000	58000
Working capital loan			120000		
Total for one unit					300000
H. Total of 200 units					60000000

Sl No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
9	4 days Training of Deptt personnel (ATMA) (25 trainees / batch= 4 batches = 100 nos)	I. Training - I				
		Classroom charges with LCD	1	4550	4	18200
		Stationery	25	70		1750
		Boarding	25	450	4	45000
		Lodging	25	2000	5	250000
		Resource person fees	4	1000	4	16000
		Conveyance for resource persons	4	500	4	8000
		TA/DA for 25 officials	25	500	2	25000
		Documentation & reports	1	5000		5000
		Total for one batch				
I. Total of 4 batches in 2 months						1475800
Sl No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
10	6 days Hands on Training in the districts for Farmer friends as Master trainers (30 trainees/ batch= 17 batches = 510 nos)	I. Training - II				
		Classroom charges with LCD	1	4550	6	27300
		Stationery	30	50		1500
		Fooding	30	400	6	72000
		Accommodation	30	300	7	63000
		Resource person fees	4	1000	6	24000
		Conveyance for resource persons	4	500	6	12000
		TA/DA for 30 MTs	30	400	2	24000
Documentation & reports	1	5000		5000		
Total for one batch						228800
I. Total of 17 batches in 2 months						3889600
Sl No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
11	2 days village level awareness & skill development programme for JF farmers (100 farmers / batch= 246 batches = 24,570 partners)	I. Training - III				
		Training of farmers including transport	100	1000	2	200000
Total for one batch						200000
I. Total of 246 batches in 8 months						49200000

SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
12	4 days Hands on Training in the Incubation Centers for selected Entrepreneurs (4%) 30 partners / batch = 33 batches = 983 nos)	I. Training - IV				
		Classroom charges with LCD	1	4550	2	9100
		Practical area charges	1	4550	2	9100
		Stationery	30	50		1500
		Fooding	30	450	4	54000
		Accommodation	30	300	5	45000
		Resource person fees	4	2000	4	32000
		Conveyance for resource persons	4	500	4	8000
		Transport (pick up and drop) including POL for 30 partners	1	5500	2	11000
		Documentation & reports	1	5000		5000
Total for one batch						174700
I. Total of 33 batches in 5 months						5765100
SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
13	3 days Chefs Training in the Incubation centers (25 trainees / batch = 4 batches = 100 Chefs)	I. Training - V				
		Classroom charges with LCD	1	4550	1	4550
		Practical area charges	1	4550	2	9100
		Stationery	30	50		1500
		Fooding	30	450	3	40500
		Resource person fees	4	2000	3	24000
		Conveyance for resource persons	4	500	3	6000
		Transport (pick up and drop) including POL for 25 partners	1	5500	3	16500
		Documentation & reports	1	5000		5000
Total for one batch						107150
I. Total of 4 batches in 4 months						428600
SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
14	3 days village level training for Household nano units (50 trainees / batch = 4 batches = 200 women)	I. Training - VI				
		Practical area charges	1	4550	3	13650
		Stationery	50	20		1000
		Fooding	50	165	3	24750
		Resource person fees	2	1000	3	6000
		Conveyance for resource persons	2	500	3	3000
Documentation & reports	1	5000		5000		
Total for one batch						53400
I. Total of 4 batches in 2 month						213600

SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
15	6 days Hands on Training in the Incubation Centers for SMEs (10 partners / batch = 5 batches = 50 nos)	I. Training - VII				
		Classroom charges with LCD	1	4550	2	9100
		Practical area charges	1	4550	4	18200
		Stationery	10	50		500
		Fooding	10	450	6	27000
		Accommodation	10	300	7	21000
		Resource person fees	4	2000	6	48000
		Conveyance for resource persons	4	500	6	12000
		Transport (pick up and drop) including POL for 10 partners	1	5500	2	11000
		Documentation & reports	1	5000		5000
Total for one batch						151800
I. Total of 5 batches in 5 months						759000
SI No	ITEM	PARTICULARS	QUANTITY	UNIT COST		Total Cost (₹)
16	Promotional materials	J. Training materials				
		Z-Cards, Manuals, Brochures, leaflets etc	200000	12.5		2500000
K. Total of training materials						2500000

SI No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)
17	Organizing awareness camps/ jackfruit melas /mobilization camps in all 11 districts for 5 years	K. Awareness / Melas				
		Venue charges		LS	1	20000
		Construction of Exhibition Stall 10 nos. (100 sqft @ Rs.40 /sqft)	10	40	1	40000
		Construction of Food stalls (150 sq ft @ Rs.40 /sqft)	2	40	1	12000
		Hiring of chairs	500	50	1	25000
		Flex banner	3	1500		4500
		Printing of pamphlets, publicity, posters billboards		LS		20000
		Hiring of sound system with generator		LS	1	30000
		Resource person fees	3	1000	1	3000
		Conveyance for resource persons	3	500	1	1500
		Food, lodging and TA for 4 guests @ 4000/- each approx.	4	4000	1	16000
		Light Refreshment for approx. 600 participants @ ₹ 75/-	600	75	1	45000
		Transport expenses	500	150	1	75000
		Local artists	1	35000	1	35000
		Lunch for approx. 600 participants @ ₹ 145/- per head	600	145	1	87000
		Miscellaneous				25000
				Total for one program		
		L. Total of 55 programs				24145000

SI No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)		
18	State Jackfruit festivals	L. Festivals						
		Venue charges		LS	2	40000		
		Construction of Optanorm Exhibition Stall 10 nos. (100 sqft @ Rs.40 /sqft)	30	60	2	180000		
		Construction of Food stalls (150 sq ft @ Rs.40 /sqft)	4	40	2	24000		
		Construction of pandal & cover	1	600000		600000		
		Hiring of chairs	1000	50	2	100000		
		Flex banner	8	2500		20000		
		Publicity through print, electronic & digital media		LS		100000		
		Hiring of sound system with generator		LS	2	60000		
		Resource person fees	8	1000		8000		
		Conveyance for resource persons	8	500		4000		
		Food, lodging and TA for 8 guests @ 15000/- each approx.	8	15000	2	240000		
		Light Refreshment for approx. 1000 participants @ ₹ 60/-	1000	75	1	75000		
		Transport expenses	1000	150		150000		
		Local artists	2	45000		90000		
		Lunch for approx. 1000 participants @ ₹ 145/- per head	1000	145		145000		
		Prize money	10	50000		500000		
		Miscellaneous				50000		
				Total for one festival / year				2386000
				M. Total of State festivals for 5 years				11930000
SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	NO OF DAYS	Total cost (₹)		
19	Training cum Exposure visits on Value Addition of Jackfruit outside the state (20 partners / batch = 52 batches = 1040 partners)	M. Exposure						
		Train/air tickets	20	5600		112000		
		Training fees	20	13000		260000		
		Accomodation, fooding and outstation logistics	20			300000		
		Daily Allowance	20	280	10	56000		
		Local Transport	20	LS	2	24000		
		Total for one batch				752000		
		N. Total for 52 batches over 7 months				39104000		

SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
20	Marketing, Branding, advertising, trade promotion/buyer seller meets	N. Marketing			
		Packaging & Branding		LS	30000000
		Advertising, marketing & Trade Promotion		LS	50000000
		Buyer seller meets @ 2 per year	10	800000	8000000
O. Total					88000000
TOTAL (A+B+C+D+E+F+G+H+I+J+K+L+M+N)					637371279
SL No	ITEM	PARTICULARS	QUANTITY	UNIT COST	Total cost (₹)
21	Mission management	O. Management & Administration			
		Mission management & operational expenses @ 4%			25494851
	M & E	Monitoring & Evaluation		LS	8000000
P. Total					33494851
Grand Total					670866130
				SAY	67,08,66,000
(Rupees sixty seven crores eight lakhs, sixty six thousand) only					

ANNEXURE – III - MISSION ASSUMPTIONS & TRAINING PLAN

Training numbers & assumptions	Total QTY	PHASE -I	PHASE -II
Clusters	24	10	14
No of villages with JF assuming 60% villages have JF	3900	1638	2262
Assuming average 60 HH per village	234000	98280	135720
Assuming 50% JF Villages have high JF population	1950	819	1131
No of JF villages / cluster	81	82	81
HH Population @ 60 HH / JF village	117000	49140	67860
Assuming 50% HH interested in JF	58500	24570	33930

TRAININGS - PHASE - I	Nos	No of batches	Frequency	Time to completion (months)
Training of deptt personnel (ATMA) 4 days-25/batch x 4 batches	100	4	2 batches/month	2
Training of farmers' friends as MTs (6 days -30/batch)	510	17	11 batch / month	2
Village level awareness & skilling = 246 batches of 100 (2 days)	24570	246	30 batches / month	8
983 Entrepreneur trained in batches of 30 (6 days) in 2 TICs	983	33	6 batches / month	5
Chef Training 25 / batch for 3 days in TIC	100	4	1 batch /month	4
HH Units				
200 units in batches of 50 for 3 days	200	4	2 batches / month	2
50 SMEs advanced in batches of 10 for 10 days	50	5	1 batch / month	5
52 batches exposure of 20 for 10 days	1040	52	8 batch / year	7

Training Numbers for Phase - I	
Training nos under KfW	1943
Training nos under MIDH	24570
Exposure nos under MIDH	1040
TOTAL	27553

TRAININGS - PHASE - II	Nos	No of batches	Frequency	Time to completion (months)
Training of deptt personnel (ATMA) 4 days-25/batch x 4 batches	100	4	2 batches/month	2
Training of farmers' friends as MTs (6 days -30/batch)	670	22	11 batch / month	2
Village level awareness & skilling = 339 batches of 100 (2 days)	33930	339	40 batches / month	11
1357 Entrepreneur trained in batches of 30 (6 days) in 2 TICs	1357	45	6 batches / month	8
Chef Training 25 / batch for 3 days in TIC	100	4	1 batch /month	4
HH Units				
100 units in batches of 50 for 3 days	100	2	2 batches / month	1
20 SMEs advanced in batches of 10 for 10 days	20	2	1 batch / month	2
52 batches exposure of 20 for 10 days	1040	52	8 batch / year	7

Training numbers for Phase - II				
Training nos under KfW	2347			
Training nos under MIDH	33930			
Exposure nos under MIDH	1040			
TOTAL	37317			

PHASE - I TRAINING TIMELINE

TRAININGS (PHASE - I)	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19
Training of deptt personnel (ATMA) 4 days- 25/batch x 4 batches																			5
Training of farmers' friends as MTs (6 days -30/batch)																			
Village level awareness & skilling = 246 batches of 100 (2 days)																			
983 Entrepreneur trained in batches of 30 (6 days) in 2 TICs																			
Chef Training 25 / batch for 3 days in TIC						4													
HH Units																			
200 units in batches of 50 for 3 days																			
50 SMEs training in batches of 10 for 10 days																			
52 batches exposure of 20 for 10 days																			

ANNEXURE - IV

PROCESS FLOW FOR SOME JACKFRUIT VAUE ADDED PRODUCTS

DEHYDRATED RAW JACK

Selection of Good & healthy matured fruit (115-130days)
 Washing
 Cutting
 Separation of bulb from strands and seed
 Cut it into uniform size
 Blanching of Sliced bulb in boiling water for 10minutes
 Cooling
 Packed in polythene cover and keep in freezer at -18° C for 15hrs
 Thawing (1hr)
 Drying in drier at 55° C- 60° C till moisture below 10%
 Storage in 3 line flexible packaging or PP containers below 28° C.

-----XXXXXXXXXXXXX-----

DEHYDRATED TENDER JACK

Selection of jack fruit (65-80 days maturity)
 Washing & removing rind
 Cutting
 Dipping in saline solution (2%)
 Chopping, dipping in saline solution (2%)
 Blanching for about 10-12 minutes
 Draining
 Packing in polythene covers and keep in freezer at -18° C for 12hrs
 Thawing (1 ½ hr)
 Drying in drier at 55° C- 60° C till Moisture 10%
 Storage in 3 line flexible packaging or PP containers below 28° C.

-----XXXXXXXXXXXXX-----

JACKFRUIT MIXTURE

Select matured fruit either koozha or Varikka with optimum maturity (105- 125 days)
 Washing
 Cutting
 Remove rind and separate each part of jack
 Cut in to fine thin pieces including centre core (Optional)
 Avoid delay in handling of fruit
 Fix a raw material ratio (bulb+ strand+ seed+ core) and follow this for every lot
 Deep fry in edible oil (each part separately) till it is crispy.
 (Avoid overheating and repeated usage of oil)
 Drain out excess oil from fried pieces
 Mix all fried items well along with spices

TRAININGS (PHASE - II)	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30	M31	M32	M33	M34
Training of deppit personnel (ATMA) 4 days- 25/ batch x 4 batches		2													
Training of farmers' friends as MTs (6 days -30/ batch)			2												
Village level awareness & skilling = 339 batches of 100 (2 days)															
1357 Entrepreneur trained in batches of 30 (6 days) in 2 TICs															
Chef Training 25 / batch for 3 days in TIC															
HH Units															
200 units in batches of 50 for 3 days															
20 SMEs training in batches of 10 for 10 days															
52 batches exposure of 20 for 10 days							7								

PHASE - II TRAINING TIMELINE

JACKFRUIT CHIPS

Select matured fruit either Koozha or Varikka with optimum maturity (105- 125 days)

Washing

Cutting

Remove rind and separate bulb and seed

Remove two edges of jack to ensure uniform slicing for unique product appearance

Cut bulb and seed in to uniform size, Blanch seed (10min)

Avoid delay in handling of fruit

Fix a raw material ratio (bulb+ seed) and follow this for every lot

Deep fry in edible oil (each part separately) till it is crispy.

Avoid overheating and repeated usage of oil

Drain out excess oil from fried pieces

Mix fried bulbs and seeds well along with spices

Fix a composition/ratio for ingredients

(Garlic ginger paste, asafoetida, Chilly and pepper powder and salt)

For better shelf life, pack in laminated polyester pouches with nitrogen flushing for increased shelf life or air tight containers. Keep the fried items separately and mix together, along with spices during the time of marketing(Optional)

-----XXXXXXXXXXXXX-----

JACKFRUIT BAR/CHEW

Product specifications as per FSSAI:

Moisture- Not more than 15% Total Soluble solids- 75% Minimum Fruit Content- 25%

Selection of good healthy fruits (120-150 days) Both varieties

Washing, Ripening (up to semi ripe), Cutting

Take the bulb (Remove the seeds and strands)

Blanching of bulb (20 - 30seconds)

Extraction of pulp, Check TSS

Addition of powdered sugar (175gm)

(May vary according to the variety)

Addition of Citric acid (7gm)

(May vary according to the variety)

Ascorbic acid (1gm)

Potassium Meta bi Sulphate (700ppm)

Addition of additives

Colour – 1ml (solution 9:1), Essence- 1ml

Filtering (1mm sieve), Balance pH 3.5 TSS to 25 o

Evenly spread it in trays (1mm-2mm thickness)

Drying in drier at 55° C- 60° C till it is dry (Moisture 12-15%)

Storage – 3 line polyester laminated pouches and keep below 30° C

Fix a composition/ratio for ingredients

(garlic ginger paste, asafoetida, Chilly and pepper powder and salt)

For better shelf life, pack in laminated polyester pouches with nitrogen flushing for increased shelf life or air tight containers. Keep the fried items separately and mix together, along with spices during the time of marketing(Optional)

-----XXXXXXXXXXXXX-----

DEHYDRATED JACK SEEDS

Selection of Good & healthy matured fruit (115-130days)

Washing, Cut into uniform size

Blanching of Sliced seed in boiling water for 15-18 minutes, Cooling

Packed in polythene cover and keep in freezer at -18° C for 15hrs

Thawing (1hr)

Drying in drier at 55° C- 60° C till Moisture 10%

Storage in 3 line flexible packaging or PP containers below 28° C

-----XXXXXXXXXXXXX-----

JACKFRUIT PRESERVE

Minimum fruit: 55%

Minimum Total Soluble Solids: 68% Substances allowed: Fruit Juice/Pulp, sugar, citric acid, ascorbic acid, permitted colour, flavour and preservatives.

Selection of good healthy fruits (Koozha) with optimum maturity (120- 150 days)

Washing

Cutting

Take the bulb (Remove the seeds and strands) 1 kg

Blanching of bulb (1mts)

Addition of sugar crystals or powdered sugar 800gm-1 kg

Addition of Citric acid (10gm)

Keep covered for 12-18 hours

Remove bulbs from the syrup and boil syrup up to the brix 65°

Keep covered for 12-18 hours

Remove bulbs from the syrup and boil syrup up to the brix 70°

Keep covered for 12 hours

Remove bulbs from the syrup and boil syrup up to the brix 75°

Repeat the process till it maintains same brix value. Addition of additives

- Ascorbic acid:1gm

- KMS:700ppm

- Check final pH - 3.5

Packaging in air tight /sealed condition

-----XXXXXXXXXXXXX-----

End Notes and Acknowledgements

A mission mode approach gives a sense of purpose and the specific timelines usually infuse energy into the delivery machinery. As the global vegan population is increasing at a rapid pace, so will the demand for plant products that mimic meat - at least in the transition. So, as Einstein observed, nothing is more powerful than an idea whose time has come. The humble Jackfruit's time has come and so is the readiness of the state of Meghalaya, in launching the Jackfruit Mission.

The mission is intensely decentralized and seeks to invest on people so they can generate income through value addition, instead of selling the raw fruit that fetches a pittance. This Mission is oriented toward people who toil to make the ends meet on a daily basis. A massive effort to build their capacities and create an entirely new set of skills is what is entailed. Fortunately, for us, we don't have to grow the trees. They are all out there. There is no time lag. It will just be about collection, aggregation, adding value, creating a brand, and thereby, a market. For the population that is below the poverty line, this Mission could well be the life line in times to come. Much will however, depend upon how we can reach out to them.

I place on record my deep sense of gratitude to Shri Baphin Kerlang Sohliya, Director, MIE for the entire diligence that went into the making of this document. An indefatigable officer he is, and I hope he will one day explain to me, how he can beat the universally ordained circadian rhythm so effortlessly and still end the day with a smile. I thank him and his very fine young team members for the tireless work and for beating the stiff deadlines. The support rendered by the Department of Agriculture, headed by Shri Sampath Kumar, its Commissioner and Smt. M.N.Nampui, its Secretary; as also the Directorates of Horticulture and Food Processing are gratefully acknowledged.

This Mission is a part of the overarching vision set before us by the Hon'ble Chief Minister and Agriculture Minister, whose guidance and support have given us the energy to evolve this Mission. At the end of it, even if a portion of the currently wasted fruit is converted into value added products and expands the economy of the state, the effort would be worth it. I thank the Hon'ble Minister Agriculture and the Chief Minister, for empowering us to think in this direction. In a nutshell, it is a humble effort for a humble fruit – and for the humble people.

K.N.Kumar





Published by
Meghalaya Institute of Entrepreneurship
Govt. of Meghalaya
E-mail – mieshillong02@gmail.com

On behalf of the

Directorate of Food Processing
Govt of Meghalaya
E-mail - meghfp2018@gmail.com

Cover design:
Artful Arts
Mission Compound
Shillong

Printed at
Mawsawa Printing Press