HORTICULTURE IN ASSAM

Dr. Harshajyoti Barooah

A look at horticultural scenario in Assam gives a picture of tradition, diversity, potentiality and a highly demanding sector. If the vastness of various components of horticultural sector is the beauty of it, Assam is endowed with this vastness almost in totality of tropical domain of world horticulture. This contributes to its uniqueness of accommodating wide range of fruits, vegetables, flowers, spices, tuber crops, nut crops, medicinal & aromatic crops besides the hidden world of mushroom and honey bees. It is breeders paradise, it is doctors nutritional prescription, it is traders basket, it is florists dreamland, it is architects landscape and the list goes on and perhaps finally terminates at a point where the investors may like to comment this sector of Assam as a sleeping giant.

The crops at a glance:

Fruits:

Now from investors’ point of view, what they primarily need is products of excellence from farmers, they need new areas or crops to explore; they need consistency in availability at subsequent phases. Now, before going in to other aspects, it has become necessary to assess whether this primary requirement can be fulfilled by Assam. As regards fruits, perhaps no other
State can claim of having so much of crops in its basket; what Assam can provide for choice. The list contains Banana, Pineapple, Orange and so many citrus fruits like Assam Lemon. Round Lemon, Satkora (Citrus macroptera), Guava. Litchi, Mango, Papaya, Jackfruit, Plum etc. Another important asset of fruits world is that take any crop like Banana or Citrus, it is not confined to a single variety. The Banana in Assam is an unique world. It is at least 10 plus in number, if someone wants to count the number of varieties each having its own appearance, flavour, taste and unique organolactic qualities. The Orange sector in Assam is now regaining its past glory after years of set back due to citrus decline phenomenon. Assam exported Orange valued at Rs. 3.60 crores during 2007. The citrus world of Assam is fascinating with many commercial species. It may be mention that parts of Assam & Meghalaya is under world citrus belt. When this list of common fruits ends, another list appears which contains more than 15 fruits which are termed as minor fruits. These fruits are unique in taste, appearance, food value and medicinal properties. They are the crops like Carambola, Olive, Amla, Fig, Amora, Letuku, Poniol, Thereu, Bael etc. and the list contains many other unfamiliar names but can be familiarized commercially due to their nutritional, medicinal and value addition qualities.

Minor fruits:

Indigenous nutritious minor fruits of Assam are an indication of strength of horticultural bio diversity. A large number of them were part of grandmo’s prescription when some one was ill in our old days. Carambola juice, preserved round lemon, amla pickles etc. are still an integral part of common Assamese kitchen. But they are the products now being targeted by Multi National Companies (MNC) to develop further with commercial blending.

Let us see what some of them have to project.

Carambola (*Averrhoa carambola*)

Local name: Kordoi.

The fruits are rich sources of reducing sugar, ascorbic acid, minerals such as Potassium, Calcium, Magnesium, Phosphate with Vitamin A content of 560 IU/10 gm. They have high medicinal value and can be used for preparing squash and pickles.
Wood apple (*Aegle marmelos*)
Local name-Boel

Every 100 gm of pulp contains 1.08 gm of Protein, 0.39 gm of Fats, 1.70 gm of Minerals, 31.8gm of Carbohydrates, 55mg of Carotene, 0.13 mg of Thiamine, 1.19 gm of Riboflavin, 1.1 mg of Niacin and 8 gm of Vitamin C. Pulps can be used for preparing squash.

Passion fruits (*Passiflora edulis*)
Local name- Kothbael

The fruit juice derived from 100 gm of pulp (edible portion) are good source of Vitamin A, Ascorbic Acid (30mg), Riboflavin (0.1mg), Niacin (1.5 mg) and have high mineral content (16.3mg) Juices are becoming very popular in the country and abroad.

Amla (*Phyllanthus emblica*)
Local name- Amlokhi

The highly nutritive fruit contains Vitamin E (440-600mg/100 gm). Can be used for preparing sauce, candy dried, chips, tablets, jellies, pickles. The fruits has many medicinal properties.

Hogplum (*Spondias mangifera*)
Local name-Amora

Fruits are rich source of Vitamins and ideal for delicious pickles.

Sapida (*Buccareaa sapida*)
Local name- Letuku

It is a highly juicy fruit with 1.93% acidity and 13.69% sugar.

Jack fruit (*Artocarpus heterophyllus*)
Local name- Kothal

Assam is the highest produce in India. The fruit contains 1.9% Protein (on fresh weight basis) 2.64-11.77 mg of Ascorbic acid and 250-1740 mg of Protein besides Vitamin A, Thiamine, Riboflavin, Vitamin C and minerals like Ca, P, Fe and K. It has high demand on vegetable on fruits and for uses like ice-cream and pectin extraction.

Garcinia (*Garcinia cowa roxb*)
Local name - Thekera

Its Vitamin C content is 4.05 mg/100gm. Slices used for preparation of dishes.

Dillenin indica L
Local name- Autenga

Excellent jam can be prepared and it is a rich source of protein and Vitamin C.

Olive (*Elaeocarpus floribundus*)
Local name- Jolphi

Ideal for preparing pickles and olive oil. A very good source of calcium. phosphorus, iron, A-carotene, Vit. B, & Niacin

Fig (*Ficus carica*)
Local name- Dimorou

Fresh Fig contains protein (4mg) Calcium (200mg), Iron (4mg), Vit. A(100U) an Thiamine (0.10) per 100gm of edible portion. It grows wildly in Assam.

Flacourtia (*Flacouritia gangamos*)
Local name - Ponial

It is a rich source of Protein (3.65%), Vit. C (217.99 mg/100gm), Phosphorus (146.80mg/100gm), Calcium (175.50mg /100gm), Protein (158mg/100gm) and Iron (118.30mg/100gm). It is also a source of several essential amino acids.

Myrobalan (*Terminalia chebula*)
Local name- Silikha

The fruit is historically known for very high medicinal value and as major ingredient for ayurvedic medicine.

Jamu (*Syzygium cumini*)
Local name - Jamu

The fruit has calorific value of 83K/100gm and contains approximately 28.2% moisture, 19.7% Carbohydrate, 0.7% Protein, 1% Fat, 0.9% Fibre, 4% Mineral matter, 1% Iron, 0.02% Calcium and 0.01% Phosphorus. Fruit syrup is very useful for curing diarrhea. Dry seed powder has therapeutic value against diabetes.
Pummelo (Citrus grandis Osbeck)

Local name: Robab Tenga

The pulp contains 88% water, 6% Protein, 0.5% minerals, Fibre 0.6%, Carbohydrate 10.2%, Calcium 0.03%, Phosphorus 0.03%, Iron 0.1% and Calorific value 45K/100gm, Vit. A200 IU/100gm, Vit. B 30mg/100gm, Nocotinic acid 0.2 mg, Vit. C 20mg/100gm. The juice is used to get relief from stomach problem, constipation and anemia. The antioxidant present in juice is said to have reduced the risk of having disease like cancer.

Some other fruit crop of importance are, Thereju (Prunus jenkinsii, HK) (Very commonly used as desert fruits) Noga Tenga (Rhus semialata Murr), Pyrus pashina, Elaeurus lanifolita, Prunus nepalensis), Myrica freguariana etc. are also found in a scattered way in the State.

The species sector:

The world of spices of Assam is equally rich in diversity and quality. Keeping aside the commercial plantation of Chili, Coriander, Ginger, Turmeric and other field spices, Assam posses the chilli which contains highest scoville heat unit in the world. According to Dr. Boslard. Chilli Pepper Institute, New Mexico State University it is about 1 Million unit.

Birds Eye Chilli is another local chilli variety awaiting commercial exploration. Assam has got number of Ginger varieties like Moran, Mizo, large which are equally fit for value addition and also for fresh market. Ginger worth Rs. 2.22 Crore and Rs. 2.21 Crore were exported from Assam during 2006-07 and 2007-08 respectively. Agri Export Zone (AEZ) on Ginger is being set up in the State. Assam is heading for huge marketable surplus of Black Pepper in next 2-3 years because of intervention of Horticulture Technology Mission in last couple of years particularly in districts like Jorhat & Lakhimpur.

Cashewnut is another thrust areas for Assam and efforts are on to build up a strong production base of this crop in specific identified districts. There is substantial improvement in acreage under this crop in last 6 years which has increased to 2200 hectares from a negligible area of 50 hectare during 2001-02. As regards quality attributes, we are producing as many as 5 qualities of Cashewnuts including the export grade. There are 11 nos. processing units in Mankachar area of Dhubri district adjoining Meghalaya. Capacity building at farmers’ level, officials are being taken care of by National Research Centre, Cashew, Puttur, Karnataka. The Cashew & Cacao Development Board has already recognized one cashew nursery as a Regional Nursery for production of cashew nut grafts of elite varieties.

Floriculture:

Floriculture is the fastest growing sector in Assam and besides crops like Gerbera, Gladiolus, Marigold, Tuberoses, 2 new commercial flowers
are successfully introduced viz. Anthurium and Orchids. Considering agro climatic feasibility and market access, initially 2 districts viz. Kamrup and Kokrajhar are targeted to boost up in this sector. About 70 SHG’s mostly women are on the job. Our products are already channelized and marketed in Metropolis like Kolkata, Delhi, Bangalore. About 30000 cut flower of Anthurium in has reached Japan also in last 2 months. This is being a new area, services of export houses are being utilized for input support, technology, planting material of varieties having export demand and crops are being grown under buy back arrangement. Excellent results are pouring in on floriculture as a gainful activity amidst enthusiasm amongst growers.

The MAP sector :
A look at the world of MAP will again establish the fact that Assam is nothing but a hot spot medicinal and aromatic flora. There are more than 300 species of medicinal and herbs. Considering agro climatic feasibility and scope of commercialization, the State has already prioritized 15 crops in case of Aromatic and Medicinal plants as detailed hereunder.

Aromatic plants :
1. Patchouli (Pogostemon cablin Benth)
2. Citronella (Cymbopogon winterianus Jowitt)
3. Lemongrass (Cymbopogon flexuosus Wats)
4. Vetiver (Vetiveria zizanioides Linn)
5. Sugandhamanta (Homalomena aromatica Schott)
6. Agar (Aquilaria agallocha Roxb)

Medicinal Plants :
7. Sarapagandha (Rauvolfia serpentina Benth)
8. Pipli (Piper longum Linn)
9. Amlaki (Emblica officinalis Gaertn)
10. Silkha (Terminalia Chebula Retz)
11. Bhomora (Terminalia belerica)
12. Arjuna (Terminalia arjuna Wight & Arn)

Other crops of economic importance :
13. Stevia (Stevia rebaudiana Hamsl)
14. Vanilla (Vanilla planifolia Andrews)
15. Brahmi (Bacopa monnieri Wett.

Field Management Committees, Self Help Groups, Joint Forest Management Committees can be associated for contractual farming with these crops under buy back arrangement and in fact the process has already started in some pockets.

The processing sector is gaining ground in Assam and already five numbers of horticulture based processing units are producing various processed products. They are utilizing local mostly organically grown products like Pineapple, Orange, Potato, various Vegetables, Papaya and Spices. The Rity Food Products Ltd. Set up 2 years back has recently sent 40 MT, 20 MT and 20 MT of Pineapple cubes to Germany, South Africa and Kuwait respectively. The concept of contractual farming under PPP module is gradually spreading and it is a grand success in case of Potato and it is spreading at least in 2 districts of Nagaon and Darrang. The state has 12 nos. of Cold Storages with a storage capacity of more than 61000MT.

Modern horticulture must be technology base and market driven. Buyers, investors are at one end and producers at another end. The horticultural play ground must be accordingly well diversified with full of options between them. And, this is what Assam can offer. Diversification towards horticultural components is extremely promising. There are examples in Morigaon district where typical paddy land is being converted to Banana plantations owing to profitability. The option may be lying in uncommon sectors also like Mushroom, Honey, Bamboo, Horti Tourism. Blending horticultural production system with organic base may open up new chapters for horticultural industry. Efforts are on to develop organic production belts in 2 hilly districts and foothill areas of Assam adjoining Bhutan, Arunachal Pradesh and Meghalaya.
Besides agro climatic and bio diversified advantage, there is locational and geographical advantage. It is the gateway of North East and proximity to South East Asian emerging market is another contributing factor. It has the advantage of organic production system. North East India accommodates 18% of India's population 6.5% of world population lives in the hinterland of Eastern India. Nepal, Myanmar, Bangladesh and Bhutan. Govt. of Assam is offering attractive incentive packages like subsidy on sales tax, capital investment, working capital loan, captive power generation, feasibility study, technical know-how, marketing assistance, draw of power line etc. The Export Promotion Industrial Park (EPIP) is operating and a food processing park is under construction. The State Govt. is committed to act as facilitator who ever comes for investment in agri-horticultural sector and allied industries. On the question of sustainability, one can see how more than 700 large and old tea garden and 3000 small tea garden in Assam are operating with a most well organized labour forces. Summing up, time has come for all the stakeholders in horticultural sector to convert this land of missed opportunities into a vibrant Assam with horticultural avenues for which this State of India is looking for. Assam may be a unique winning combination for your investment.
Fruits Diversity of Assam

Mowsam Hazarika

The diversified ecology of Assam is unique for growing a large number of fruits of tropical, sub-tropical and temperate origin. During the pre-independence period, several renowned English botanists took initiatives for identifying indigenous fruits and vegetables in Assam, some of which are not found anywhere in the world. During post-independence period, such initiatives were renewed by the Botanical Survey of India (BSI) to explore further floristic wealth of Assam and its adjoining states. NBGPR and research stations under Assam Agricultural University (AAU) are also maintaining germplasm repository of various food crops including fruits and vegetables contributing thereby towards conservation of such kind of plant species.

Assam is exceptionally rich in citrus and banana germplasm. Another unique feature of the state is the occurrence of aquatic fruits like makhana or gorgon fruit (*Eurale ferax*). Besides large numbers of minor fruits of medicinal and therapeutic values are grown all over the state either in backyard gardens or in forests.

Most cultivars of cultivated banana are derived from two species *Musa acuminata* and *M. bulbisana*. The banana cultivars found in Assam are Cheni champa, Bhimkal, Amit sagar, Agnisagar, Dwarf Cavendish, Juhaji, Kabuleejahaji, Giant Cavendish (Bar Juhaji), Dijioa, Honda, Konnaibashi, Saapokal, Champa, Malbog, Seker champa, Kachkal, Jatikal, Dhusary, Bhios, Mustia, Monohar etc.

Assam has been growing numerous orms of citrus and it also abounds in wild forms. Hence, it is considered by many to be the ‘Creator Center’ of citrus flora of India. It may be that the diversity of soil and climate offers optimum condition for growth of different citrus types that flourish and multiply in one part of the state or the other making it a natural repository for this important group of fruits. The citrus cultivars found in Assam are Bira jora-true citron (*Citrus medica*), Mitho jora (*Citrus medica*), Kata Jamiri (*Citrus jambhiri*), Sinduri nemu, (*Citrus...
jambhiri), Nemy tenga (Citrus jambhiri), Abhayapuri lime (Citrus auratiformis), Karimganj lime (Citrus auratiformis), Rangpur lime (Citrus auratiformis), Alitha Kaghzi (Citrus limeta), Karunj jamin (Citrus aurantium), Gonth Huntra (Citrus aurantium), Nagoon rabab (Citrus grandis), Khonapara rabab (Citrus grandis), Kamrup rabab (Citrus grandis), Jeneru tenga (Citrus nobilis), Bor tenga (Citrus megalocarpa), Humika tenga (Citrus megalocarpa), Jamir tenga (Citrus megalocarpa), Adjajmir (Citrus assimensis) etc. Among the commercial types, C. sinensis (Sweet orange), C. reticulata (Kahsi mandarin) and C. limon (Assam lemon) are distributed throughout the state.

cowa), Tepor tenga (Garcinia xanthochymus), Rupahi tekhara (Garcinia lanceeafolia), Nuni (Morus accissa), Daim (punica granatum, Thereju (Prunus jenkinsii), Mirika tenga (Paremaria polyneura), Paramlaki (Phyllanthus acidus), Naga tenga (Rhus semiolata), amara (Spondias maginifera), Pani letaku (Tamarindus indica), Bhomara (Terminalia belerica), Silikha (Terminalia chebula), Tetoli (Tamarindus indica), Leilong tenga (Willoughbyia edulis), Bogori (Ziziphus jujube) Bon-bogori (Ziziphus apetata).

Over and above, the state is a treasure house of various important fruit crops. There are several distinct types of pineapple (Ananas comosus) viz., Jaldhup, Bakhat, Ravunumiria belonging to the Queen group of pineapple available in Assam. The allied species of mango (Mangifera indica) like Mangifera sylvatica and Mangifera foetida are said to be indigenous to Assam. The state is also exceptionally rich in Jackfruit germplasm. Both the cultivates type (Artocarpus heterophyllus) and wild type (Artocarpus heterophyllus) of jackfruits are available in Assam. Some unusual type flake less jackfruit is also found to occur in the state. Another unique feature of the state is that it harbors several arid zone fruit crops like date palm, ber, mahua, etc., and temperate fruits like pear, peach, plum, etc.
Its journey to number one position as the world’s hottest chilli is an interesting one. In the year 2000, Mathur, a scientist from Defense Research Development Organization (DRDO), Tezpur, Assam first reported it to be the hottest chilli. However, its fame spread around the world only after a British couple Joy and Michael Michand from Dorschester, U.K. laid their hands on a few fruits of this variety in an oriental store in UK. In 2004, the couple sent a sample out of curiosity to a laboratory in USA and was stunned when their sample recorded an unbelievable 923,000 SHU.

It breathes fire and proudly pronounces so by its bright red wrinkled and ominous looking flesh. Its saga of fierceness, however, remained obscure for hundreds of years to the people beyond the North-Eastern region of India until it captured the imagination of the world in 2006 having earned the distinction of being the hottest chilli in the world. Locally known as ‘Bhut Jolokia’ (Vernacular meaning Bhut=‘ghost’, Jolokia=‘chilli’), ‘Bih Jolokia’ (meaning poison chilli) and ‘Naga Jolokia’ (Named after the once ferocious ‘Naga warrior of North East India) it belongs to the species Capsicum chinense Jacq. This cultivar is being grown and consumed in different states of the region like Assam, Nagaland, Manipur and Mizoram from the immemorial. So hot is the chilli that local people handle and consume it with respect. Any normal person who dares a ripe fruit to eat a whole Bhut Jolokia would almost certainly require hospital treatment. Nevertheless, because of its refreshing aroma, palatability and medicinal properties, people have been using it for pickle preparation, flavoring curries and for home remedies of ailments like gastritis, arthritis and chronic indigestion problems. Rise to glory Its journey to number one position as the world’s hottest chilli is an interesting one. Although for hundreds of years people of North East India must have sweated and sworn by its name with watery eyes every time after consuming Bhut Jolokia, but nobody really bothered to compare its heat with other record setters. In the year 2000, Mathur a scientist from Defense Research Development Organization (DRDO), Tezpur, Assam first reported it to be the hottest chilli. However, its fame spread.
around the world only after a British couple Joy and Michael Michand from Dorschester, U.K. laid their hands on a few fruits of this variety in an oriental store in U.K. They grew the plants in poly tunnel because low temperature was not convenient for proper growth of Bhut Jolokia. They knew that the fruits were very hot because they had to wear gloves and remove the seeds outdoor while preparing them for drying. In 2004, the couple sent a sample out of curiosity to a laboratory in USA. Till that time Red Savina Habanero held the Guinness Book of Records for being the hottest chilli in the world with a rating of 570000 Scoville Heat Units (SHU). The couple was stunned when their sample recorded an unbelievable 900000 SHU. A fresh sample was then sent to a lab in New York just to recheck the ratings but the result was once again an astounding 923000 SHU. An independent analysis of heat of Bhut Jolokia by the Chile Pepper Institute, New Mexico University, USA in 2006 revealed a rating of 1001304 SHU, almost double than that of red Savina, which established beyond any doubt that the chilli originally from North East India is the hottest. A plant of Bhut Jolokia. The pungent principle The fiery sensation of chilli is caused by a compound ‘capsaicin’ localized mainly in the placenta and the flesh of a chilli fruit. It survives both cooking and freezing and dissolves in fat. Capsaicin is found only in chillies and not in other plants and animals. Detectable to the human taste buds to one part in one million, this powerful alkaloid is extracted from chillies as an oleoresin (thick oil). The oleoresin is refined into a white crystalline powder which is the pure capsicin. The measurement of heat of a chilli was originally done by tasting a dilute solution of chilli extract and giving a value to it. In 1902, Wilbur Scoville had developed this method and so the heat value was expressed as Scoville Units. Nowadays, heat of chilli is tested using spectrometer or HPLC (High Pressure Liquid Chromatograph) to rate the chillies in Scoville units which indicate parts per million of capsaicin. The Scoville units of pure capsaicin are between 150,000-160,000,000. Use of capsaicin. Capsaicin is becoming more popular every day is applications that range from the storage to the ingenious. Capsaicin has been found to trigger the brain to produce endorphins, a sense of well being. There are now dozens of brands of capsaicin creams in the market to combat the pain of arthritis and for topical use for disease like shingles, psoriasis, and other skin disorders. Researchers are putting new twists on these medications almost weekly. One recent application format is the capsaicin patch used for pain relief. Other medical developments include the introduction of capsaicin products more efficacious as pain killers for minor muscleaches, joint arthritis, backaches, bruises and sprains. Other uses of the compound include manufacture of police grade pepper spray that comes handy in riot control, subduing criminals and even as a self defense kit for lonely woman. Capsaicin has been suggested for coating fiber-optic cables to prevent rodents from gnawing on them. Capsaicin is also used as animal and insect repellent, specially, ants and cockroaches. In fact, many experts believe that capsaicin’s use as a medicine has a great future that scientists are just beginning to discover. **Plant description** This particular chilli belongs to the species Capsicum chinense Jacq. It is a self pollinated species, however considerable cross pollination (up to 10%) may occur when insect population is high. The plant behaves as a semi perrenial if grow under optimal condition. In North Eastern India, plant height range from 50-100 cm. Under semi perrenial situation it may grow even taller. The stem is green, with anthocyanin (dark color pigments) pigmentation on the nodes. The surface of the leaf has the characteristic crinkle look as in other C. chinense species. Leaves are ovate in shape and size ranges from 10-14 cm in length and 5.5-7.5 cm in width. Flowers are pendant, with creamy white corollas, often with a touch of light green. The anthers are blue while the filaments are purple. It has clustering flowering habit with 2-3 flowers per node but at maturity there are rarely two fruits per node. The elongated fruits are 5 to 7 cm in length, 2.5 to 3.0 cm in diameter (at shoulder), with an undulating surface. Depending on the soil and climate, fruit shape also seems to differ a bit. Fruits color ranges from light green to green to bright red/bright orange at maturity. The fruit possess 4-5 hollow locules and bears about 25-35 slightly wrinkled seeds. The average fruit weight is around 5g and under.
field condition, in a single season a plant produces around 15-20 full sized fruits and 10-14 smaller fruits. Growing bhut jolokia that it can be grown under diverse soil and climatic conditions is apparent from the fact that it is already grown in few parts of India and neighbouring countries like Sri Lanka and Bangladesh. It has been grown experimentally even in the U.S.A. and U.K. However, for optimum growth, it requires well drained sandy loam, clay loam or laterite soils. Seeds should be extracted from completely matured fruits and dried. It is advisable to wear gloves during manual extraction of seeds. After drying, the seeds can be immediately germinated. However, the germination of seeds take long time (about 15-20 days) so it is advisable to treat the seeds with fungicides and insecticides to Cluster flowering habit avoid damage of the seeds due to fungal or insects attack during the germination period. The dried seeds should be stored in air tight containers/polythene packets under refrigeration as the germination percentage decreases rapidly in high ambient temperature. Seeds should be sown in seed beds established in sunny areas. Normal treatments of the seed bed should be followed. After 30 days, the seedling should be transplanted in the main field prepared with the fertilizer doses of normal chilli. In North Eastern region there are two planting time. Kharif and rabi. Kharif cultivation, practiced in the hilly states, starts in Feb/March and harvesting is done from May-June onwards. In the plains, it is grown as rabi crops during Sept-Oct. The productivity and pungency of rabi grown crop is generally more than Kharif crop. During the crop growth several diseases infest the plants in the North-East. The most common diseases are ‘die-back’, anthracnose and ‘leaf curl’ and as such adequate plant protection measures should be taken. The chilli pods are picked when they are bright red/bright orange in colour. As in other chilli, several picking has to be done for complete harvesting. In the North East, the Bhut Jolokia is mainly traded as fresh fruits and only a limited portion is traded as dried products. Drying of this chilli is easier because of its thin flesh and 4-5 sun drying is enough to dry it completely. The chilli retains its lustrous colour even after drying. The average fresh fruit yield of this chilli is around 80-100g/ha under rainfed condition while dry weight ranges from 10-12g/ha. In the local market, a kilo of fresh bhut jolokia fetches around Rs 100-150 depending upon the season. Prospect of bhut jolokia Bhut Jolokia may definitely be the most ideal chilli variety of India for extraction of oleoresin and capsaicin as it is characterized by very high capsaicin content of 3-5%. Most of the Indian chilli varities are unsuitable for the purpose as they contain less than 1% capsaicin, a standard needed for commercial extraction of Capsaicin. The oleoresin and capsaicin has very high market demand both at domestic and international level and it is a very costly product. Fresh & dried fruit in the recent years chilli has made a dramatic entry in the world market. It is not only a hot favorite of the Asians but even the western world is shedding bland palatte to embrace the chilli. Restaurants take pride in placing several red hot chilli in their menu cards. Often, the chillies are main ingredients of the dish. Recipe with chilli is in great demand with those seeking an instant solution to nasal blocks. The chillies are a big business now. The Bhut Jolokia with its high pungency, high vitamin-C content and medicinal properties will surely cut a niche in the international markets. It will be a hot favorite in chilli eating competitions of Europe and USA and may be used in preparation of red hot chilli sauce for the Mexican preserve. Thus, bhut Jolokia is poised to become number one in the existing hierarchy of hot chillies. In Assam, already local initiative have been started to export value added products made from this chilli to European and US markets. Commercial cultivation of bhut jolokia thus appears to be an attractive proposition for Indian farmers.
The SWEETNESS OF TEZPUR

Pankaj Kr. Saikia

Tezpur, the administrative headquarters of Sonitpur district of Assam is an ancient town on the banks of the river Brahmaputra. The name Tezpur is derived from the Sanskrit “Teza” (meaning blood) and “Pura” (meaning town and city). Legend has it that the original name of this place was “Sonitpur” (‘sonit’ means blood) but when the battle between Krishna’s army and Bansura’s army fought for the rescue of Aniruddha (who was the grandson of Lord Krishna) there was so much bloodshed that the whole place was stained in red. This led to the name of the place becoming Tezpur.

Tezpur is located at 26°40’ N and 92°45’ E. It has an average elevation of 48 metres (157 ft.). The rivers in and around Tezpur are very fast flowing ones, especially towards the Himalayas foothills. The town is situated beside the river Brahmaputra. Tezpur has a number of small hillocks, so that flooding doesn’t occur during the monsoons.

Tezpur town is especially famous for the horticultural crops viz. litchi and pineapple for its unique characteristics.

Litchi (Litchi chinensis), under family Sapindaceae is the most popular sub tropical fruit originated in China where it is called as ‘Lychee’. India produces 454.7 thousand M. T. of litchi each year from an area of 57.8 thousand hectares, thus being the world second largest producer of litchi, next only to China. In Assamese. The litchi is called as ‘lichu’.

Tezpur Litchi :

Tezpur boast of a special type of litchi grown in ‘Lichu Pukhuri’ situated in the heart of the Tezpur town and village Horigon, just 3 km away from Tezpur. This Litchi varieties have special size, shape, attractive color, mouth watering flavor and delicious taste.

More About The Tezpur Litchi :

A) Litchi from ‘Lichu Pukhuri’ :

‘Pukhuri’ means a water structure as like as pond. The ‘lichu Pukhuri’ formerly known as ‘Palton Pukhuri covers a total area of about 5 bigha including the water body. It has a special micro agronomic-climatic condition on account of which, the litchi bears its special quality. From the history of ‘Palton Pukhuri; it is found that during 1922-24 Late Padmanath Gohain Baruah, who was the chairman of Tezpur Municipal Board brought some litchi layers from Kolkata and Mumbai and planted on the bank of the ‘pukhuri’.
Now the Lichu Pukhuri orchard has 26 nos. litchi trees, of which 18 are old and rest 8 are newly planted. The varieties found are as follows:

- Ilachi-2 nos.
- Piaji-2 nos.
- Deshi-15 nos.
- Bilaiti-5 nos.
- Bombaya-2 nos.

The average yield of Litchi is about 7000-8000 nos. from the old trees where as the new trees are yielding 3000-4000 nos of fruits per year per plant. The litchi plants of the ‘Lichu Pukhuri’ flowers during the month of February. Starts to bear in the month of March. The fruits mature during the month of May and is harvested sometime around June. It is marketed not just at Tezpur but exported to other parts of the country. The Tezpur litchi is grown completely under organic condition as no use of any chemicals reported.

B) Litchi from Harigaon

A 25 Bigha area in Harigaon is covered by the litchi orchard. The owner of the orchard is Mrs. Krishna Singh wife of Late Dilip Singh. The litchi orchard was started by Surya Prasad Singh in 1954. At present there are 200 nos. bearing old trees and 50 nos. newly planted trees. The litchi from that orchard are exported to Bombay, Delhi, Kolkata, Rajasthan and also to USA. In Harigaon orchard the varieties found are as follows (bearing):

- Ilachi: 10 nos.
- Piaji: 35 nos.
- Bilaiti: 80 nos.
- Bombaya: 10 nos.
- Haldia: 5 nos.
- Deshi: 60 nos.

The local price of good quality Tezpur Litchi varies from Rs. 3.00 to Rs. 8.00 per piece.

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>FRUIT SIZE/SHAPE</th>
<th>COLOR</th>
<th>FLESH</th>
<th>SWEELNESS</th>
<th>FRUITING HABIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ilachi</td>
<td>Round &amp; small. Seed small. Shape is Just like grapes</td>
<td>'Sendury'</td>
<td>Compact</td>
<td>Sugar sweet &amp; scented</td>
<td>Medium bearing</td>
</tr>
<tr>
<td>Bilati</td>
<td>Round &amp; very Large. Apple shaped and small seeded</td>
<td>Brick red</td>
<td>Compact &amp; scented</td>
<td>Sugar sweet</td>
<td>Profuse bearing</td>
</tr>
<tr>
<td>Bombay</td>
<td>Round &amp; very Large. Small seeded. Shape is Just like as strawberry</td>
<td>Brick red</td>
<td>Compact &amp; scented</td>
<td>Slightly Sour</td>
<td>Profuse bearing</td>
</tr>
<tr>
<td>Piaji</td>
<td>Elongated &amp; Medium large</td>
<td>Brick red</td>
<td>Loose pulp, scented like onion</td>
<td>Sugar sweet</td>
<td>Alternative bearing</td>
</tr>
<tr>
<td>Haldia</td>
<td>Elongated, Large seeded</td>
<td>Yellowish red</td>
<td>Compact</td>
<td>Sweet</td>
<td>Medium bearing</td>
</tr>
<tr>
<td>Others</td>
<td>Medium to large</td>
<td>Red</td>
<td>Compact</td>
<td>Sweet</td>
<td>Medium Bearing</td>
</tr>
</tbody>
</table>
B) The mouth watering pineapple of Tezpur:

Pineapple (Ananas comosus) is a tropical fruit which is native of Brazil. It was brought to the old world by Columbus during the end of 15th Century and was introduced in South India by Portuguese in 1550. Important Pineapple growing countries of the world are Singapore, Malaysia, Indonesia, Australia, USA (Hawaii), Brazil, West Indies and South Africa.

More about Tezpur pineapple:

The sweet and tasty pineapples of Tezpur are mainly grown in the two villages- Dewrigaan and Ketekibari. These pineapples of these two villages are unique due to its specific pH range and soil quality. The pineapple was first introduced in these villages from Dhandai Tea Estate in the 20th century by Late Chhindram Borah, a social worker of this locality. Its cultivation was done extensively during the period from 1930 to 1935 but since then it is gradually reduced as the areas are diverted to residential area. The planting time of Tezpur pineapple is September-October and the best flowering time is January-February which is harvested in July. The weight of the matured fruit ranges from 2.0-3.0 kg. About 60,000 fruits are harvested yearly from these locality which are sold locally @ Rs. 25-30/fruit.

Characteristics of Tezpur Pineapple:

Shallow eyed, rich in sugar content highly juicy, sweet flavor which virtually dissolve in the mouth due to its less fibre content. The color of the fruit is reddish-yellow when it is fully ripe.

It is worth mentioning here that pineapple farmers Late Chandra Nath Tamuli and Late Dehiram Borah of Dewrigaan were awarded the 1st prize at the ‘All India Pineapple Show’ organized by the Directorate of Extension, Ministry of Agriculture, Govt. of India, New Delhi held at the Nabin Bordoloi Hall, Guwahati on the 7th & 8th August 1971.

Acknowledgement
1. Mrs. Mrinidhi Chetia, Kalibari, Tezpur
4. Mrs. Krishna Shing, Harigaon, Porowa, Tezpur
5. Mrs. Padma Tamuli, Dewrigaan, Tezpur
SOME UNIQUE HORTICULTURAL WEALTH OF ASSAM

Pankajnabhar Das

BHIM KAL:

This banana species is locally known as Bhim Kal. With an average height of 4 to 5 meters and with bunch weight of 9 to 27 kg., this unique banana variety is seeded but tasty. This can be an industrial crop for production of highly nutritious baby food and other products like squash which can be preserved up to 2 years and used as readymade drinks with high medicinal properties. This is a very hardy crop grown traditionally in Assam.

Nutritive value:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrate</td>
<td>24.73%</td>
</tr>
<tr>
<td>Sugar</td>
<td>43.63%</td>
</tr>
<tr>
<td>Protein</td>
<td>2.97%</td>
</tr>
<tr>
<td>Total ash</td>
<td>1.60%</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.06%</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.12%</td>
</tr>
<tr>
<td>Calcium/100gm.</td>
<td>30.00 mg.</td>
</tr>
<tr>
<td>Iron/100gm.</td>
<td>6.28 mg.</td>
</tr>
<tr>
<td>Ascorbic acid/100gm</td>
<td>6.20 mg</td>
</tr>
<tr>
<td>Colorific Value</td>
<td>114.40K. Cal.</td>
</tr>
</tbody>
</table>

ASSAM LEMON (C. LEMON)

It is a citrus species grown in commercial scale although not in the form of large mandarin (C. reticulate) orchards. The fruit is unique in its taste highly juicy and may be termed as seedless and commercially potential.

Satkara (C. macroptera)

This unique citrus fruit of Assam, mostly grown in Southern Districts has a high demand in external markets of Bangladesh and Middle-East countries. It is used as a softening and flavoring agent in culinary preparation besides medicinal uses.

Nutritive Value:

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSS value</td>
<td>8.5%</td>
</tr>
<tr>
<td>Titrable acidity</td>
<td>7.0%</td>
</tr>
<tr>
<td>Juice content</td>
<td>100-125ml/fruit</td>
</tr>
</tbody>
</table>
BAMBOO SHOOT

Bamboo (Bambusa balcooa) shoot originates from the buds of rhizome. Harvested at the time of its emergence after which these are crushed and packed. Used extensively in different food preparations. It is a good source of nutrition and fiber.

Nutritive value:
- Carbohydrate: 6-8%
- Fat: 0%
- Protein: 1-3%
- Fibre/100gm: 60-65%
- Minerals: Calcium & Iron

MORAN GINGER:

Ginger is excellent for value addition. Found abundantly in Assam. Ample scope remains for commercial exploitation.

- Mean Yield: 25.21 MT/Ha.
- Maturity: 200 days
- Dry recovery: 20.0%
- Crude Fibre: 6.1%
- Oleoresin: 1.0%
- Essential oil: 1.90%

CAROMBULLA (AVERRHOA CARAMBULA)

This indigenous fruit of Assam is very popular for its medicinal value and an ideal fruit for various value addition and with medicinal properties.

Nutritive value:
- Juice content: 31-48%
- Reducing sugar: 6.07-8.25%
- Non-reducing sugar: 2.15-4.06%
- Total sugar: 7.5-11.50%
- TSS: 6.83-9.40%
- Ascorbic acid/100gm: 8.20-13.75 mg.
- Oxalic acid: 0.60-0.89%
- Titrable acidity: 0.44-0.94%
POMMELO (CITRUS GRANDIS)

Assam pomello occupies a major share in the citrus family. It is highly delicious, juicy and a fruit of attractive flavour with medicinal properties.

Nutritive value:

<table>
<thead>
<tr>
<th>Component</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>88%</td>
</tr>
<tr>
<td>Protein</td>
<td>0.6%</td>
</tr>
<tr>
<td>Fat</td>
<td>0.1%</td>
</tr>
<tr>
<td>Minerals</td>
<td>0.5%</td>
</tr>
<tr>
<td>Fibre</td>
<td>0.6%</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>10.2%</td>
</tr>
<tr>
<td>Energy</td>
<td>44 Cal.</td>
</tr>
<tr>
<td>Calcium</td>
<td>30mg.</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>30mg.</td>
</tr>
<tr>
<td>Iron</td>
<td>0.3mg.</td>
</tr>
<tr>
<td>Carotene</td>
<td>120mg.</td>
</tr>
<tr>
<td>Thiamine</td>
<td>0.03mg.</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.03mg.</td>
</tr>
<tr>
<td>Niacin</td>
<td>0.2mg.</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>20mg.</td>
</tr>
</tbody>
</table>

THE ORCHIDS OF ASSAM

So far potentiality is concerned, Assam is being referred as ‘sleeping giant’ by export. Assam is the natural habitant of over 600 species of orchid.

Orchids as a group of flowering plants exhibit wide range of habits and have specific macro climatic requirements for their growth, development and regeneration. Assam orchids show all the habits and growth forms found in Orchideaceous taxa. Mostly they are epiphytes. Goodyera procera and Spiranthis sinensis are adapted to aquatic habitant whereas Vanilla pilifera and Galeola altissima are climbers.

Orchids grow to their magnificent best in the Evergreen and Semi-Evergreen forest and to some extent in Moist Deciduous forests.

Species belonging to genera Acanthephippium, Anoectochilus, Apostasia, Agrostophyllum, Coelogyn. Cymbidium, Dendrobium. Eria, Oberonia, Calanthe, Euophria, Goeudorum, Habanaria, Malaxis, Nephelophyllum. Vanilla, Zeuxine, Didymoplexix, Galeola, Bulbophyllum, Camarots are the commonly found orchids.