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Prospect of Cultivation of Few Exotic Fruits in Salari, West Kameng (Arunachal Pradesh)

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Abstract

From the time immemorial fruits constitute an important component of dietary habit having immense positive impact on health benefits. They provide essential phytonutrient supplements like antioxidants, vitamins, minerals, fibre and are rich source of energy. These nutrients are vital components of healthy balanced diet. Recently, people have become more conscious about its regular consumption in their dietary habit. Native fruits viz. Mango, Papaya, Guava, Litchi, Citrus fruits, Banana, Apple, Grape, Gooseberry, Pineapple etc. account for majority of consumption pattern of Indian mass. Apart from these native fruits, cultivation of exotic fruits in recent years have gained immense popularity especially in northern and north-western states of Himalayas mainly due to optimal climatic conditions. These exotic fruits have played a critical role for the sustenance of ethnic communities and also as a source of income through sale in local markets. Despite of having immense potential of cultivation of exotic fruits in North-Eastern states of India, its cultivation prospect has not been fully utilized yet.

Cultivation of exotic fruits may add a new dimension to the sustenance and income generation effort, ultimately leading to the enhanced nutrition security prospect to the North-Eastern part of India. Keeping this in mind, we have cultivated three tropical exotic fruits viz. Loquat, Passion fruit & Dragon Fruit in Salari region, West Kameng, Arunachal Pradesh [Fig.1]. The main objective of the cultivation was to assess the suitability of the tropical exotic fruits in the subtropical climate of Salari region of West Kameng district of Arunachal Pradesh.

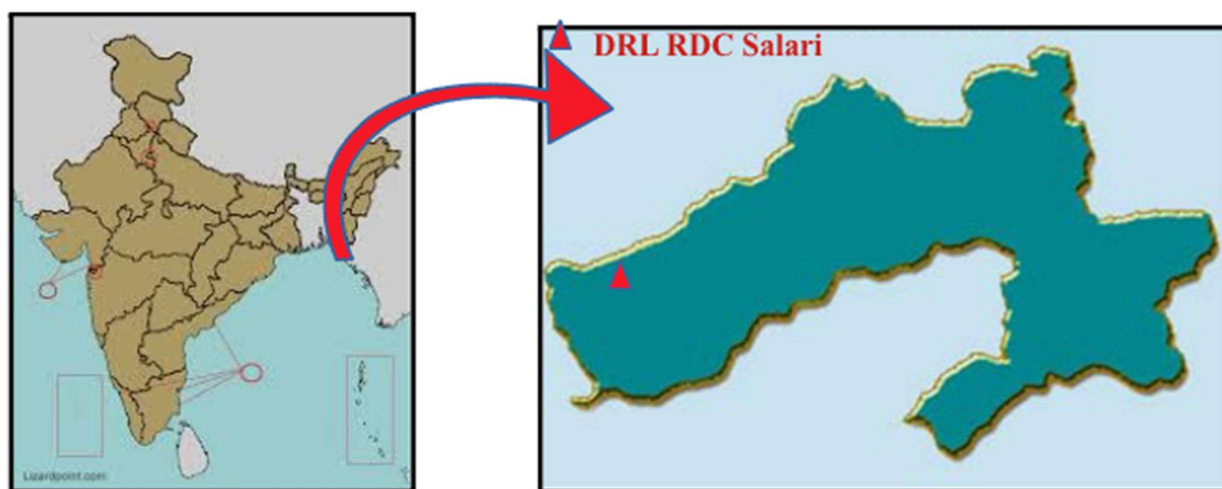


Figure 1. Map of Arunachal Pradesh showing cultivation site

Exotic plant saplings of Loquat (Grafted), Passion Fruit (Var. Thailand) & Dragon Fruit (White Flesh & Red Flesh) was procured from Daffodil Nursery, Sonapur, Guwahati, a two-star nursery. Plantation was done in the month of August at Defence Research Laboratory (DRL), DRDO, Research & Development Centre (RDC) at Salari, West Kameng district of Arunachal Pradesh (Fig 1.) located at 27°32' N latitude, 92°44' E at an altitude of 1229 m (4033 feet) having an average maximum and minimum annual temperature of 24.8 °C and 17.8 °C respectively. Sun dried 3 kg of mule dung and 2 kg of FYM was applied during pit filling three weeks before planting the saplings. Uniform cultural operations and irrigation were applied in all saplings under study during growth phase of the plant.

Passion Fruit:

Passion fruit is a tropical fruit belonging to the *Passifloraceae* family. It is a vigorous, shallow rooted perennial vines that climbs up by the means of tendrils. It has tough outer rind and the juicy edible inner portion filled with seeds. It comes in various colors viz. purple, yellow, red and green of which yellow and purple type are most common. It is rich in nutrient content especially fiber, Vitamin C and Provitamin A. Raw passion fruit contains 70% water, 22% carbohydrates, 2% protein and 0.7% fat. It contains Vitamin A

(25%), Vitamin C (50%), Calcium (1%), Iron (8%), Vitamin B6 (5%) and Magnesium (7%) [1]. Passion fruit is a high acid food (pH~ 3.2) due to the predominance of two acids, citric and malic acid [2].



Figure 2. Passion Fruit Sapling

Twenty saplings of Thailand variety of Passion fruit were procured from Daffodil Nursery, Sonapur, Guwahati, Assam and planted at the experimental site [Fig. 2]. Passion fruit saplings were planted in pits of size 0.45m x 0.45m x 0.45m each spaced at 3 meters apart [Fig. 3]. Vertical trellising was done immediately after transplantation. Flowering takes place during the month of April-May whereas fruit harvesting was done in the month of Aug-Sept [Fig. 4]. Pruning was done after harvesting of the fruit in the month of December. The various vegetative growth and fruit parameters of Passion fruit in Salari region is tabulated in Table 1.

Table 1. Vegetative growth and fruit parameters of Passion fruit.

Sl. No.	Parameter	Value
01.	Average number of branch	17.17
02.	Average fruit diameter (cm)	2.02
03.	Average weight of fruit (g)	100
04.	Average length of fruit (cm)	6.83

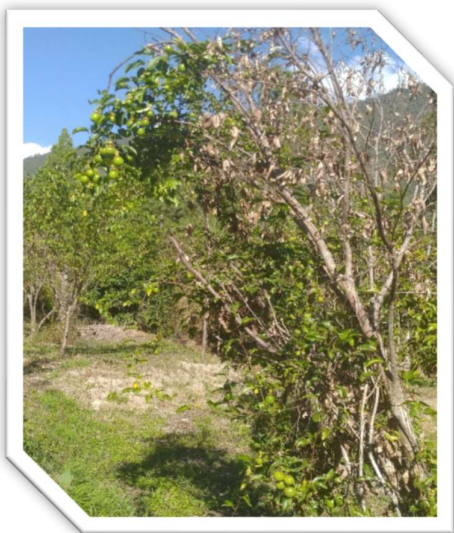


Figure 3. Passion Fruit Orchard at DRL RDC Salari

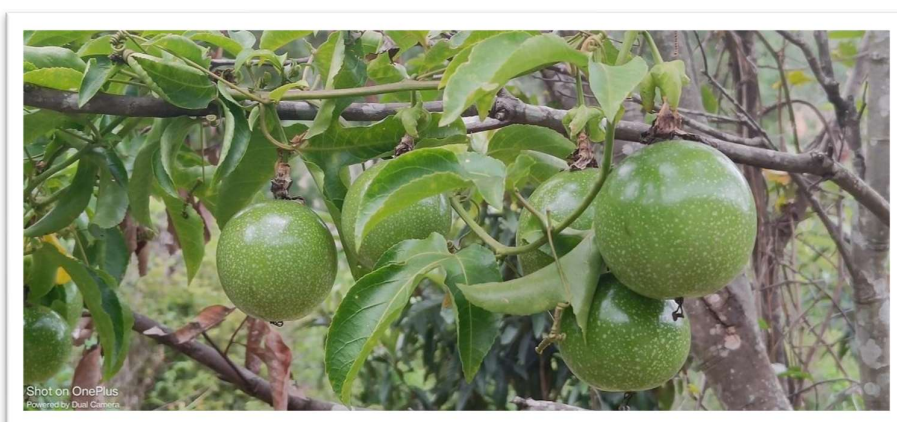


Figure 4. Fruiting in Passion Fruit at DRL RDC Salari

Average fruit yield per plant and average TSS (Total soluble solids) was found to be 1.9 kg and 13.6 °Brix. Proximate analysis of passion fruit was done at Food Quality Control Laboratory, Department of Food Engineering and Technology, Tezpur University, Tezpur, Assam. The various parameters of proximate analysis is tabulated in Table 1.

Table 3. Proximate analysis parameters of passion fruit

Sl. No.	Proximate Analysis Parameter	Value
01.	Pulp yield (%)	49.08 ± 1.04
02.	Moisture (%)	83.06 ± 0.14
03.	pH	2.77 ± 0.01
04.	Titrateable acidity (% citric acid)	0.57 ± 0.09
05.	Vitamin C (mg/100 g)	61.58 ± 0.17
06.	Conductivity (mS)	5.34
07.	Total dissolved solids (ppt)	3.60
08.	Salinity (ppt)	2.90

Dragon Fruit:

Dragon fruit is a fast-growing vine cactus species belonging to the family Cactaceae [3]. It is a semi-epiphytic plant that prefers a dry tropical or subtropical climate with an average temperature of 21-29 °C but can withstand temperatures of 38-40°C and freezing temperature for short periods [4]. The fruits are rich in fiber, vitamins, calcium, phosphorus, magnesium, phytochemicals and antioxidants [5]. Flowers are usually white in color. The cuttings is usually planted with vertical support of pillar and its branches must be attached to the support with a wire. A circular or square shaped frame is attached to the top of the pillar to allow the plant to hang down.



Figure 5. Dragon fruit stem cuttings



Figure 6. Dragon fruit plantation at DRL RDC Salari

Two fifty stem cuttings of Dragon fruit were procured from Dream Dragon Fruit Farm, Razaphima, Dimapur, Nagaland and planted at the experimental site [Fig. 5]. Dragon fruit cuttings were planted in pits of size 0.6m x 0.6m x 0.6m each spaced at 2 meter apart [Fig. 6]. Flowering & fruiting takes place during the month of July-Oct. Average TSS (Total soluble solids) of Dragon fruit was found to be 8.8 °Brix. The various vegetative growth and fruit parameters of Dragon fruit in Salari region is tabulated in Table 2.

Table 2. Vegetative growth and fruit parameters of Dragon fruit.

Sl. No.	Parameter	Value
01.	Average vine length (m)	2.13
02.	Average number of flowers per pole	13.00
03.	Average number of fruits per pole	9.40
04.	Average fruit length (cm)	13.57
05.	Average fruit diameter (mm)	79.85
06.	Average fruit weight (g)	251.40



Figure 7. Data recording of Dragon fruit

Loquat:

Loquat is a subtropical evergreen fruit tree belonging to the Rosaceae family native to south-eastern China. Loquat fruits are rich in nutrients such as vitamins, minerals, and antioxidants, which provide various health benefits [6]. The leaves are glossy dark green while the flowers are white in color. The fruit is either consumed fresh or it can be processed to jam, jelly, chutney & beverage [7]. The composition of the loquat fruit varies depending on the variety and maturity stage of the fruit. On average, the fruit contains about 86% water, 13% carbohydrates, and less than 1% each of protein, fat, and ash [7]. In India, loquat is mainly grown in the northern states of Jammu and Kashmir, Himachal Pradesh, Uttarakhand and Uttar Pradesh, as well as in the southern states of Tamil Nadu, Kerala, and Karnataka [6].



Figure 8. Loquat sapling

Twenty saplings of grafted Loquat were procured from Daffodil Nursery, Sonapur, Guwahati, Assam and planted at the experimental site [Fig. 8]. The saplings were planted in pits of size 1m x 1m x 0.5m, having graft union above the soil level, each spaced at 4 meter apart [Fig. 9]. Organic matter were applied around the base of the tree to conserve moisture and prevent weed growth.



Figure 9. Loquat plantation at DRL RDC Salari

After five years of plantation, the fruit trees have attained an average height of more than 3 meters [Fig. 10]. Loquat trees start bearing fruit after three years of plantation. Average TSS of Loquat fruit was found to be 13.02 °Brix. The various vegetative growth and fruit parameters of Loquat tree in Salari region is tabulated in Table 3.



Table 3. Vegetative growth and fruit parameters of Loquat tree.

Sl. No.	Parameter	Value
01.	Average plant height (m)	3.29
02.	Average stem girth (cm)	19.73
03.	Average number of fruits per plant	36.80
04.	Average fruit length (mm)	41.14
05.	Average fruit diameter (mm)	16.61
06.	Average fruit weight (g)	21.25
07.	Average fruit yield per plant (kg)	0.82



Figure 10. Loquat tree after five years of plantation at DRL RDC Salari



Figure 11. Data recording of Loquat fruit

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