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Assessment of Local Cultivars of Banana Under Coconut in Tribal Areas of Car Nicobar Island

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Abstract: *Production of local cultivars of banana as intercrops in coconut evaluated in farmers field (Tuhet garden) on participatory approach in eight tribal villages of Car Nicobar (Nicobar district)in the year 2012-13.This approach aims at improving livelihood security of Nicobarese community through improving household nutrition, income and employment generation. The tribes are living in a social system called Tuhet (joint family) and have no individual land right. Majority (73.4 per cent) of the house hold heads comes under active work force with workers consumer ratio of about 60 per cent. The coconut is the predominant century long crop occupying 84 per cent of the agricultural area. Car Nicobar contributes an area of around 9027 hectare under coconut cultivation with an annual average production of 33.38 million nuts with a productivity of 3698 nuts hecater^{-1} against the national average of 6863 nuts heacter^{-1}. However Banana is the second most important fruit crops grown as an intercrop under coconut in Car Nicobar Islands with an area of 152 hectare (2011-12).*

Key words: *Intercrops, Tuhet garden, Nicobarese, Predominant, Century, Productivity, Islands.*

INTRODUCTION

The Andaman and Nicobar group of Islands are situated about 1200 km away from mainland (India) in the Bay of Bengal. They form an arched string of about 572 islands, islets and rocks stretching from Burma in the north to Sumatra in the south between 6^0 and 14^0 North latitudes and 92^0 and 94^0 East longitudes. They are summits of a submarine range of mountains connecting Arrakkan Yoma of Burma now Myanmar in the north and Pegungan Barrisan of Sumatra in the south enclosing the deep Andaman Sea between this archipelago and Malayan peninsula. Geographically these islands are distinguished in two groups, i.e. the Andaman group and Nicobar group, separated by 10^0 N channel. The total land area of these islands amounts to only about 8249 sq.km of which about 86 percent is covered by lush green tropical rain forests. These islands have a typical maritime climate and are endowed with both Southwest and Northeast monsoons with an average rainfall of 3100 mm distributed over eight months (April to November). The native of these islands in the true sense are the primitive tribes of which only Nicobarese are in large numbers. Other tribes include Great Andamanese, Onges, Jarwas, Sentinelese and Shompens are in very small numbers and they are classified as Particularly Vulnerable Tribal Group (PTGs). They are essentially hunters and gatherers. All the tribal groups in the Andaman and Nicobar

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Islands are in areas covered by the A & N Islands (Protection of Aborginal Tribes) regulation, 1956.

Car Nicobar (Pu in the local language) is a small island inhabited by Nicobarese tribal, having only 127 km^2 is the northern most of the Nicobar Islands. The Nicobarese are having strong family and social bondage, each has its own local governing body which consists of three tiers. First one is *Tuhet* above which Village Councils exist and which are controlled by the Tribal Council. There is no political party system for election of these local bodies. This system has proved to be very efficient in controlling the local disputes and maintaining the rich traditional and social customs of Nicobarese. They believe in joint family system called *Tuhet* and it consists of number of families which are controlled by the *Tuhet Head*. The senior most male member among the relatives of a joint family is generally selected as *Tuhet Head*. He has the control over the entire agricultural land (coconut plantation) and pigs reared by the family members. He allocates the plantation to the members of the *Tuhet* and on need basis a part of the earnings from the plantation is given to the *Tuhet Head* for looking after the general affair of the *Tuhet*. The system is proven to be an effective to feed and care the entire family members without much disparity. Any work within the *Tuhet* accomplished by systematic planning and united efforts of members of *Tuhet* under the leadership of *Tuhet Head*. Every member comes together and contributes liberally for higher education, expense incurred for treatments and occasion such as marriage, festivals. Dispute within the *Tuhet* is sorted out by the *Tuhet Head*. Above the *Tuhet* comes the Village Council, at present the total number of Tuhet is 299 in Car Nicobar.

Coconut is considered as the only remunerative crop of the Nicobarese tribal .The livelihood and socio - economic status of the tribes is almost entirely dependent on coconut. plantation , 9027 hectares covered under coconut with an annual average production of 33.38 million nuts with a productivity of 3698 nuts $hectare^{-1}$ against the national average of 6863 nut $hectare^{-1}$. Plantation crops occupy 84 per cent of agricultural area followed by fruit crops (4 per cent). There is no substantial area under vegetable except for some tuber crops (Directorate of Statistics 2011). The crops like banana, papaya, pineapple, tapioca, sweet potato, greater yam, colocasia and alocasia are grown in home / Tuhet gardens to a limited extent. As the food grains like rice, wheat, pulses are not grown in this island (2012-2014), are supplied through Public Distribution System (PDS). The tubers, pandanus, coconut and sea food are important constituents of their daily diet. However the consumption of fruits, vegetables and egg are very minimal far below the recommended dietary allowance (ICMR - 2010) due to non-availability at local level and higher cost. The promotion of agricultural diversity through intercropping of different fruits and vegetables will have positive impact on food and nutritional security at household level (Caouette *et al.,* 2002). Intercropping of fruit crops like banana and plantain (Sabji kela) with allied enterprises provides a possible solution to meet the demand for food commodities to ensure nutritional security of tribal households while supporting the stability of agro - ecosystem components existing in this area.

MATERIAL AND METHODS

A field survey was conducted during the month of November, 2012 to April, 2013 in Car Nicobar, head quarter of Nicobar district. The respondents were Nicobarese tribes from different villages viz. Mallaca, Arong, Small lapathy, Big lapathy. Chuk chuka, Tamaloo, Muss and Perka. The data was collected from twenty Tuhets of eight villages using semi – structured forms and recorded from selected tribal (Head man) through personal interviews (Table 1) randomly. During the survey we used Nicobarese educated well trained youth (Tata Institute of Social Science, Mumbai) as enumerators (who speak Hindi and understand) to get better information about the subject during interaction (Table 2). During the survey work identified different local cultivar types of banana and their package of practices like planting techniques, de-suckering, removal of old leaves, propping etc. were followed. Observation like , plant height at the harvest, plant girth at one meter height from the ground level during the harvest, days taken for shooting, days taken for harvest, bunch weight,

number of hands bunch^{-1}, hand weight, number of fingers hand^{-1}, individual finger weight, finger length, finger girth were recorded. The banana scenario since 2009 - 10 shows a rising trend and significant changes have been recorded in banana where production increased from 1250 tons (2009 – 10) to 1825 tons (2011-12) which happened due to improvement in productivity and expansion of area through intercropping in coconut plantation and suddenly declining from 2012 to 2014 from 55.50 hectares to a production of 410 tons (Table 3). However, intercropping of banana under coconut have not been systematically studied or indentified suitable cultivars. Therefore this study was initiated with the objectives to find out the local cultivar of banana under coconut and to study the performance of various cultivars.

Table 1
Nicobarese Tuhet system and their cultivable areas

SL. No.	*Tuhet No.*	*Name of the Tuhet*	*Name of the Head Man*	*Name of the Village*	*Area (Ha) occupied*
01	289	Urehengrom	Mr Fulbert Wilfred	Big Lapathy	**7.9**
02	216	Pincham	Mr Harban Daniel	Big Lapathy	**12.0**
03	186	Ol-Op-Tahong	Mr Jacob Veslie	Big Lapathy	**8.2**
04	02	Agra	Mr Herbert Sen	Malacca	**3.6**
05	128	Kerala	Mr Minus Arthur	Malacca	**8.5**
06	250	Taichsa	Mr Stephen	Malacca	**6.6**
07	36	Elsah	Mr George Helin	Mus	**5.0**
08	93	Hongchex	Mr Earness Tiang	Mus	**5.0**
09	267	Tosa - Ovkuk	Mr George lamok	Mus	**5.0**
10	110	Horoh	Mr E Silvester	Tamaloo	**5.2**
11	160	Linok	Mr Enock Thomson	Tamaloo	**5.7**
12	247	Soot	Mr Zakaria Philip	Tamaloo	**6.1**
13	43	Fanlala	Mr Victor	Perka	**5.7**
14	175	Miseur	Mr Francies	Perka	**9.2**
15	208	Otvani	Mr Michae Thomas	Perka	**6.2**
16	42	Fangta	Mr Martin Gabrial	Arong	**9.8**
17	84	Hong chamoka	Mr Christopher John	Arong	**9.8**
18	72	Hengum	Mr Aberdeen	Kinyuka	**11.9**
19	276	Uichka	Mr Edwin	Kinyuka	**5.9**
20	176	Mitoi	Mr Seeon Raqheal	Chukchuka	**11.7**

Table 2
Common language used by the Nicobarese

Nicobarese language	*International name*	*Nicobarese language*	*International name*
Chon Tanyukngö	Banana plant	Kiltyuyo	Banana flower
Reh roonti Tanyukngo	Banana Rhizome	Heng Maha	Banana bunch
Kaha Tanyukngo	Pseudostem	Milaha Tanyukngo	Hand
Roi Tanyukngo	Banana leaf	Kanok Tanyukngo	Banana stalk
Tonyoroi Tanyukngo	Banana dry leaf	Kulol	Rhizome
Rong Tanyukngo	Short leaf	Uk kaha Tanyukngo	Banana skin
Rit mainy	Roots	Ellon Tanyukngo	Flower tube

Table 3
Area (hectors) and Production (metric tons) of fruits crop grown in Car Nicobar

Fruits	*Area and production of major fruit crops for last five years*									
	2009-10		*2010-11*		*2011-12*		*2012-13*		*2013-14*	
	Area	*Prod*	*Area*	*Prod*	*Area*	*Prod*	*Area*	*Prod*	*Area*	*Prod*
Mango	10.20	17.90	10.00	16.00	9.50	18.50	9.50	45.50	10.00	50.00
Banana	146.00	1250.00	146.00	1290.00	152.00	1825.00	55.50	865.50	40.00	410.00
Citrus	3.80	5.60	4.00	6.00	5.00	7.50	5.00	23.50	5.00	40.00
Papaya	31.00	179.40	31.00	180.00	30.00	195.00	31.50	280.50	10.00	95.00
Pineapple	11.50	21.50	12.00	30.00	7.00	75.00	8.50	24.50	1.00	5.00
Sapota	3.00	4.50	3.00	10.00	3.00	15.00	3.50	65.40	0.12	0.17
Misc.	7.00	21.50	7.00	50.00	13.00	15.00	10.50	70.10	50.00	201.83
Total	212.50	1500.40	213.00	1582.00	219.50	2151.00	124.00	1375.00	116.12	802.00

Source: Department of Agriculture, A & N Islands, 2013 -14.

Varietal description of local varieties of banana

Red Banana

Vernacular name - Lal Kela, International name - Red Banana, Ploidy – AAA. Its plant is very tall and robust in stature (250 – 350 cm tall and 70 – 80 cm girth). The pseudo stem, petiole, midrib and fruit skin are purplish – red in colour. The fruit is of good size, slightly curved with a blunt apex. A good bunch weighs about 10 - 12 kg can be harvested after 540 days of planting under coconut shade , with 5 – 7 hands having 50 – 60 fruits. The bunch is compact with attractive red rind fruits. The length of fruits is 15 – 18 cm and girth 15 -16 cm. Fruit is less sweet and pulp is orange yellow with a characteristics flavor. The fruit skin is thick and purplish – red. It is a long duration cultivars and takes 15 to 18 months from planting to harvest.

Tuhet garden

Tribal farmer

China Kela

Vernacular name - China Kela, International name – Karpooravalli, Ploidy - ABB (Triploid). China kela produces very sweet fruits. The plants grow to a height of 300 cm and 40 – 50 cm girt. They produce hardly 1-2 suckers per plant initially. Bunches of 10-12 kg can be harvested after 365 days of planting under coconut shade, whereas under open condition, it takes 3-4 weeks less duration. Each bunch has got 7-10 hands, with 14-15 fruits or fingers per hand. Each hand weighs 1.26 to 1.50 kg. Fruits are of medium size, yellow in colour, weighing 90 - 100 g, 12 -13 cm long and of 3.0 3.3 cm diameter. Pulp is creamiest and very sweet. It has got long

China Kela (ABB)

China Kela bunch with tribal farmer

Tribal farmer transporting banana

A hand of China Kela

shelf life. Even after skin starts turning black, the pulp keeps good quality.

Khata Champa

Vernacular name - Khata champa, International name – Poovan, Ploidy - AAB (Triploid). A very common and popular cultivar of banana cultivated through Bay Island. They grow to a height of around 290 cm and a plant girth of 42 cm before harvest of bunches. They produce 1-2 suckers per plant initially. Bunches of 11-13 kg can be harvested after 400 days of planting under coconut shade, whereas under open condition, it takes 3-4 week less duration. Each bunch has got 12-13 hands, with 15 -16 fruits or fingers per hand. Each hand weighs an average of 1 kg. Fruits are golden yellow in colour, of medium size weighing 70 -80 g, 12-14 cm long and of 3.5 -4 cm diameter. Pulp is yellowish, juicy soft, tastes a blend of sweet and acidic and a unique flavor.

Vegetable Banana

Vernacular name - Sabji Kela, International name – Monthan, Ploidy - ABB (Triploid). It is a cooking type of banana. The well matured unripe banana fruits are used for culinary purposes. The plant grows to height of 400 cm and girth of 65 -70 cm. They produce 1 - 2 side suckers per plant initially. Bunches of 12 -13 kg can be harvested after 425 days of planting under coconut shade, whereas under open condition ,it takes 3-4 weeks less duration. Each bunch has got 6 - 8 hands, with around 10 fruits or fingers per hand. Each hand weighs 1.60 to 1.75 kg. Fruits are of big size weighing 160 -175 g, 19 - 20 cm long and of 3.7 - 4.0 cm diameter.

Khata Champa Inflorescence

Khata Champa Inflorescence with plant

Khata champa harvested bunch

A hand of Khata champa

Sabji Kela in Nicobarese Back yard

A mature plant

A Bunch of

A hand of plantain

Fruit Characters of cultivars evaluated

Cultivars	Fruit Characters of cultivars evaluated		
	Fruit length (cm)	Fruit diameter (cm)	Fruit weight (g)
China Kela	13	3.3	100
Khata Champa	14	3.5	70
Red banana	18	16	160
Sabji Kela	20	4.0	175

Vegetative characters of cultivars evaluated

Cultivars	Vegetative characters of cultivars evaluated		
	Plant height at harvest (cm)	Plant girth at harvest (cm)	No. of suckers per mat
China Kela	300	50	2.1
Khata Champa	290	42	2.0
Red banana	350	80	1.7
Sabji Kela	400	70	1.8

Duration of local cultivars of banana to shooting and fruiting under coconut shade

Cultivars	Duration of cultivars of banana to shooting and fruiting	
	No. of days taken to shooting	No. of days taken to fruiting
China Kela	245 days	365 days
Khata Champa	280 days	400 days
Red banana	420 days	540 days
Sabji Kela	305 days	425 days

Rainfall pattern

The Nicobarese tribal dominated, southern group of Islands viz. Car Nicobar, Nancowry, Katchal and Kamorta) are located in tropical region experiencing heavy intensive rainfall during monsoon period with precipitation exceeding evapotranspiration (ET) resulting water surplus from April to December (Fig). However, dry condition with water deficit occurs for three months (January to March) resulting in water scarcity even though total annual rainfall exceeds 3000 mm. The number of rainy days remains more than 15 in almost all the months during monsoon season with mean monthly rainfall of 22 mm. During dry period extending from January to March, minimum of 40 mm rainfall was received in about 2 to 4 rainy days which provides scope for small scale in situ water harvesting structures to tide over the water scarcity in cultivation of crops in these islands (T P Swarnam, January, 2015)

Soil parameters

The analysis of different soil parameters indicated spatial variability in soil fertility status in these four Nicobarese tribal dominated Islands (Table). The soil nutrient status especially nitrogen (n), phosphorus (P), and potassium (K) play an important role in crop production. The soil of Car Nicobar and Katchal Islands were neutral, on saline with mean organic carbon content of 2.03 %. The nitrogen (N), phosphorus (P) and potassium (K) were present in higher quantities in these Islands in compare to other.

Mean surface soil properties of four Nicobarese tribal dominated, Southern Group of Islands.

Islands	pH	EC ($dS\ m^{-1}$)	O C (%)	Available macronutrients ($g\ kg^{-1}$)		
				N	P	K
Car Nicobar	7.1	0.06	2.03	0.164	0.010	0.105
Nancowry	5.3	0.07	2.09	0.159	0.005	0.105
Katchal	7.3	0.11	1.79	0.140	0.010	0.109
Kamorta	5.2	0.12	1.72	0.130	0.005	0.113

Source; ICAR - Central Island Agricultural Research Institute, Port Blair, A and N Islands.

RESULT AND DISCUSSION

Among all cultivars evaluated, China Kela was the earliest to flower (365 days) after planting followed by Khatta champa (400 days) and also evaluated their vegetative growth and stature of all the cultivars were fairly normal. A significant varietal differences was noticed in the plant stature traits of cultivars were evaluated. During main crop, Khatta champa was shortest in height with (290 cm.), whereas, Sabji kela was observed to be the tallest of all (400 cm.) followed by Red banana (350 cm.). Similarly, Red banana also recorded the maximum plant girth (80 cm.), followed by Sabji kela (70 cm.)

Khata champa recorded the plant girth (42 cm) followed by China kela (50 cm.).In respect to yield characters, the cultivars evaluated showed a great variation in bunch weight and were significantly different from each other. Sabji kela recorded the highest bunch weight (12-13 kg), followed by Khatta champa (11 -13 kg), China kela (10 – 12 kg) and followed by Red banana (10 -12 Kg) bunch^{-1} recorded. There are some constrains in the cultivation of banana which need to be removed so that farmers could adopt new technology to increase productivity. Strong wind during rainy season and drought like condition in dry period (January – April) affect yields. Therefore shooting during high wind time is avoided by adjusting time of planting. Non availability of the suitable planting materials and other inputs continues to be stumbling blocks for increase production. The inflow of research information to the farmers by the state agricultural agencies is very meager. The extension agencies concentrates mostly on coconuts and their attention in banana or other fruit crop is very limited. Lack of institutional credit, low level of fertilizer consumption, absence of banana based cropping system, absence of proper marketing machinery to ensure a fair and legitimate return to the producer. Lack of fruit processing unit are some of the institutional and technological problems for which

Figure: SOCIAL ACTIVITIES OF NICOBARESE TRIBAL OF CAR NICOBAR

Awareness Camp with the tribal Chief

Imparted training to the Tribal Leaders

Educated trained youth

Educated trained women

Participatory activities

Explaining about the impacts

Pre- Tsunami Nicobarese Hut

Post Tsunami Nicobarese House

Transporting banana

Transporting coconut

Distribution of seedlings

Tuhet family

the creditable success to be achieved by the production of banana is bound to suffer a setback. Experimental result on production of banana under coconut already indicated the banana is potential fruit crops of Car Nicobar Island. The production potential is found to be 10-16 kg /bunch. It can be also be interpolated in coconut to augment the additional income. It is pertinent to note that, when fruit plant like banana and pineapple are interpolated in coconut they tend to grow lanky with upright orientation of leaves. These could be the result in the reduced size of bunch/fruit. In view of this, it is advisable to plant them close to accommodate more number of plants per unit area in order to make good for the reduced fruit size. The marked attainment of banana in islands agriculture can make socio-economic upliftment of the tribal farming community of this island. Looking to the prospects and potential of banana in this island, an integrated investigation of crops soil-water relationship and appropriate crop designing is needed to increase production and productivity of banana.

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