

COLLECTION OF MULTICROP GERMPLASM FROM CENTRAL PARTS OF ARUNACHAL PRADESH

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ABSTRACT

An exploration trip was detaken in lower Subansiri, Upper Subansiri, West Siang and Papum Pare districts of Arunachal Pradesh. In cpurse of survey, a total 181 crop diversities, including the cultivars and wild pwecies have been collected from 38 sites. Naturally occurring pure cimmunity of wold banana was also collected from hillock from the lower elevation (600 to 1000 m) of Daporijo and Ziro area of Subansiri districts. *Musa velutina* Wendle. Et. Drude is the dominant ornamental wild banana species occur in this zone, which seems to be frost resistant. Apatani platesu of Ziro districts is rich in indigenous paddy cultivation. Apatani tribe of this area still holds the local landraces of paddy like as Patkigo, Ampor, Amku, Patpakha and Papiyanpapo. The patkigo landrace of rice used for making local beer knows as Apong. Practice of Jhum cultivation wa not seen in this plateau. Cultivation of Ifnger millet (*Eleusine coracana*) is popular among the farmers.

INTRODUCTION

Arunachal Pradesh is the largest hill state of northeastern region. It is blessed with rich forest cover, animal resource and wild life. The population of the state is 864558 and 87.0 % of the total population is rural (NEC, 1995). The state has total geographical area of 83,743 km² and its 51,540 km² (61.54 %) falls under forests of which unclassified state forest constitute 62.17 % (i.e., 32,039 km²). The unclassified state forests are different kinds of ownership depending on the local land use (Pant, 1997) system.

The major areas of each districts is covered with tropical to subtropical forest elements and the agricultural activities concentrated in jhum (cleared forest area). River bed areas and hill crevices, whereas, water flows throughout the year. The rice cultivation practices is solely depending on natural rain. The management of natural water for irrigation purpose in Apatani plateau is really an excellent innovative idea and practice of local farmeres. They to for some selective landraces of rice cultivars even at this altitude of 1500 m. the geographical belt which was explored is fully dominated by the tribal, whose bsic livelihood dependent up on agriculture. Their major food items are derived from rice and mllets (finger and foxtail millets). Fruits (orange, pineapple and banana) and other tuber crops (taros and yams) cultivation is in limited scale but the cultivation practices of vegetables has not yet geared up among the tribal farmers of the locality.

MATERIALS AND METHODS

The collection of germplasm was focused in the area where maximum diversity of the species is found (Table 1). The area covered was thus remained in between 260 90' - 280 10' N latitude and 92 0 50' - 94 0 25' E longitudes with altitudinal range between 400 - 2000 m . the climate of this area is subtropical type, receiving annual rainfall in between 2000 - 4050 mm. May and June are the hottest

months (30 0 - 35 0 Max. and 17 0 -21 0 C Min.) while December and January are the coldest months (15 0 C Min.). The soil is generally brown in color and texture is sandy -loam, with high percentage of micronutrients. The collecting routes followed and the sites of collection of Germplasm are shown in Fig. 1. During this survey, a total of 181 collections were gathered from Lower Subansiri, Upper Subansiri, West Siang and Papum Parc district of Arunachal Pradesh (Table 3). Tribal villages of Yazali, Lichi, Ziro, Hapoli, salang, Pancham, Pamruk, Lumpia, Tajang, Raru, Pine Groove, Saddle, Laa, Gadak, Gami, Moir, Babla, Pichko, Bazam Gigi, Tagala, Don, Udhar, Mega, Rading, Mara, Timba, Nacho, Siyum, Dumporijo, Maro, Tapi, Rehi, Eime, Along, Do, Doje and Likabali and adjoining area were surveyed for various fruits and agricultural diversities. Genetic variability was critically studied and suitable genotypes were collected for various agricultural and horticultural crops. Individual and selective sampling methods were adapted for horticultural crops while population samples were collected in randomly selected or in bulk from an agricultural crop. Mostly local landraces and primitive cultivars were collected during the trip. Information pertaining to ethno-botanical knowledge, their utilization pattern, indigenous technical knowledge (ITK), pattern of cultivation and conservation, were documented. The cuttings of vegetatively propagated materials and the seeds extracted from the fruits and vegetable were subsequently planted in the experimental field of the station at Barapani, Meghalaya for regeneration and multiplication.

RESULTS AND DISCUSSION

Upland Rice, maize and millets grown in jhum, are basically the dominant crop in the explored area, while lowland rice cultivated in hill crevices, and low-lying areas where water is available. Oilseeds like soybean are introduced in the area. Pulses like French bean, rice bean, cowpea are seen to be indigenous and most of the ones are native to this place. The area is quite rich in wild banana (*Musa velutina*) and cultivated orange (*Citrus reticulata*). Hore (1999) have identified the lower Subansiri, Upper Subansiri, West Siang, Tirap, Lihit and Dirang valley districts of Arunachal Pradesh with an altitudinal range between 300 -1200 m above mean sea level as the major area of diversity of banana germplasm. Among Tuber crops Taros and Yams are cultivated in jhum to some extent. The people of Arunachal Pradesh consume large number of plants from their natural habitats. Maikhuri and Ramakrishnan (1992) listed 52 plant species, which are used as leafy or stem vegetable. Predominantly the consumed plant species are *Ardisia grandifolia*, *Bauhinia purpurea* and *Dendrocalamus hamiltonii*. The roots and tuber crops collected from wild are largely consumed including the cultivars of *Colocasia esculenta* and *Dioscorea bulbifera*. Observation on collected crop diversity are as follows.

Paddy diversities : this is divided according to their respective ecologies i.e. upland (jhum) and lowland (WRC) condition. Grains of primitive type (awned) were found in course of this survey. The landraces mainly - Remi, Piyti, Namni, Am-tapu, Longro, Mikka, Bankar-Am, Yarte, Radhe-Am, Batkili, Piyaping, Papi-Am, Lomrok-Lomngro, Am-Litchi, Pana-Am, Am-Ngrnre, Aray-Am, Mesa pala, Am-Kese, Ralo, Makhung, Pucho, Choko, Mikar, Kelang, Paki was collected in this trip. Apatani tribe of this area still holds the local landraces of paddy like as Patkigo, Ampor, Amku, Patpakhe and Papiyanpapo. The 'Patkogo' landrace of rice used for making local beer, known as 'Apong'.

Maize variabilities : there were different shape, size, colour of cob in maize varieties and these were collected. Among these, the notable prominent indigenous varieties were - Tapio, Tami, Topp, Top-Puli and Pui-Riteji. The length and diameter of collected cob(s) ranges from 5-9-x 1-2 cm. The cob colours were yellow, white, black, and purple to deep purple.

Millets : Locally, this group comprises of finger millet (*Eleusine coracana*), foxtail millet (*Setaria italica*), Jowar (*Sorghum bicolor*) and Job's tear (*Coix lacryma-jobi*). The cultivars of finger millet are most suitable and the local tribes cultivate it for making local drinks, the crop can withstand local adverse situation and free from diseases. They vary in colour and mostly brown, bluish brown varieties are

available. Hairy surfaced inflorescence of foxtail millets collected from Apatani plateau is a rare collection for the crop.

Grain Legumes : Diversities of French bean and rice bean were found dominant in this belt. Soybean, cowpea are introduced in this area. Variability in French bean crop was found in terms of their colour, size, shape and sculpturing of seeds.

Spices : the major spices i.e. *Allium tuberosum*, *Zingiber zerumbet*, *Capsicum annum* and *Coriandrum sativum* were distributed in explored area. However, the hilly tribe does not prefer spices in their food and thus they cultivated in a small scale.

Medicinal plant : Rudraksha (*Elaeocarpus ganitrus*) are very common spices in the forest of Arunachal Pradesh. The beads are used in many socio-cultural rituals and belief. These beads and ashes are known to possess capabilities to cure many ailments like high blood pressure, heart problems, cough, mental & gynecological problems. Its ash with black pepper powder in equal proportion when taken with water can cure small pox, and it has been in use since ages.

However, Haridasan et. al. (1990) has reported 90 such plant species, which are consumed in the state of Arunachal Pradesh. The widely adapted high yielding varieties of rice have not been accepted by the farmers of Apatani plateau, due to their short stature and thereby unsuitable for panicle harvest using the existing manual practices. The in-situ conservation of these valuable local rice landraces of Arunachal Pradesh, is therefore, highly desirable for preserving the ethical, scientific and cultural value of respective tribes (Hore, 1999). The state is endowed with wild germplasm of kiwi, which is the latest sensation in the world of horticulture. Sharma et.al. (1999) has found the wild kiwi fruit vines in Dirang, Bomdila and Ziro area in between 1500-1600 msl. Monpas, a local tribe of Arunachal Pradesh call it Thumri and Khusugung and it has desirable trait like clustering fruit habit, non-hairy fruit surface and small in size. It can be an important genetic material for the improvement of commercial varieties. The Botanical Survey of India is engaged in floristic survey work and to study the entire other ecosystems of Arunachal Pradesh (Sharma, 2002).

In situ conservation in more undisturbed forested area is desired due to the less population density. Landraces belong to various crop are needed to be popularized among the farmers and thus conserve adopting the on farm conservation strategy in diversity rich area of the farmers and thus conserve adopting the on farm conservation strategy in diversity rich area of the state.

REFERENCES

- Haridasam, K. ; Bhuyan, L.R. and Deori, M.L. (1990). *Arunachal Forest News*. 8: 1-8.
- Hore, D.K. (1999). Rice germplasm diversity in Arunachal Pradesh, *Indian J. Plant Genet. Resources*. 13: 302-306.
- Hore, D.K. (1999). Fruit germplasm diversity and its development in North East India. Proc. Nat. Conf. Sci & Tech, Shillong 101-106.
- Maikhuri, R.K. and Ramakrishnan, P.S. (1992). Ethno Biology of some tribal societies of Arunachal Pradesh in North Eastern India. *J. Econ. Tax. Bot.* (addl. Ser.) 10: 61-77.
- N.E.C. (1995). Basic Statistics of North-Eastern region, Published by North Eastern Council, Ministry of Home Affairs, Govt. of India, pp 297.
- Pant, R. (1997). Role of traditional institution in forest management : A case study from Arunachal Pradesh in North-East India. *Arunachal Forest News*, 15 (1&2) : 31-36.
- Sharma, B.D. (2002). Crop Genetic Resources of Arunachal Pradesh, In resource Mgmt. Pers. Of Arunachal Agriculture, (eds. K.A.Singh). 1-8, ICAR Research Complex for NEH Region, Basar, Arunachal Pradesh.

Sharma, Y.P. ; Singh, K.A. and Ohm, S. (1993). Occurrences and characteristics of wild kiwi fruits *Actinidi* sp. In Arunachal Pradesh. " International Seminar on Stratiefies for Agricultral Research in the North East", organized by NAAS, 11-13 Nov., 1999, ICAR Research Complex for NEH Region, Umiam, Mehglaya, (Abst), p31.

Table 1. Basic information on the explored districts of Arunachal Pradesh.

Districts covered	Geographical area in (km ²)	Agricultural land (km ²)	Head Quarter	Major tribes	major crops
Lower Subansiri	13010	7501 (58 %)	Ziro	Nissing, Apatanis, Solungs, Hill Miris	Rice, Maize, Finger millet, Foxtail millet, Banana
Upper Subansiri	7032	3734 (53 %)	Daporijo	Tagins, Hill Miris	Rice, Maize, Finger millet, Yams, Orange, Taro & Sugercane
West Siang	7422	4082 (55 %)	Along	Adi group including 10 Subgroup	Rice, Maize, Finger millet, Legumes, Banana, Taro, Yams, Chilli, Ginger and Turmeric
Papum Pare	2875	1064 (37 %)	Itanager	Adi, Daflas Solungs, Hill Miris, Nishang	Rice, Maize, Millets, Legumes, Banana, Leafy fegetable, Chilli, Ginger, Turmeric and Colocasia

Table 2. List of Crop Germplasm collected during the exploration tour in Lower Subansiri, Upper Sabansiri, West Siang and Papum Pare districts of Arunachal Pradesh

Crop Group	Crop (s)	Total Accessions
Cereal	Paddy (20) and Maize (18)	38
Grain Legumes	Soybean (04), Adzuki bean (02), Cowpea (06) French bean (06)	18
Pseudocereals	Amaranth (04), Finger millet (07) and Sorghum (01)	12
Oil Seeds	Sesame (06), Sunflower (03) and Perilla (09)	18
Spices	Garlic (03), Ginger (06), Dhanian (01), Chilli (12)	22
Vegetables	Bitte gourd (04), Palak (03), Ladies finge (06), Lai (04) Ridge gourd (05), Sem bean (02), Pumpkin (08), Radish (02), Brinjal (02), Musk melon(01), Cucumber (04) Bottle gourd (07), water melon (02)	50
Tuber crops	Colocasia (06) and Dioscorea (05)	11
Fruits	Banana (06) and Orange (01)	07
Miscellaneous	Member of Lamiaceae (01), Elaeocarpus (01), Alpinia (01) Hedychium (02)	05