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A survey study on fruit diversity in Chotanagpur plateau region

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Abstract : In order to assess available genetic diversity of different fruit crops in the Chotanagpur plateau region, a survey was conducted in 11 horticultural diversity rich districts in Jharkhand, Purulia and Midnapur district of West Bengal and Jashpur district of Chhattisgarh. During the survey, information on people's perceptions and priorities on genetic resources of horticultural crops in their vicinity were collected through field visit, personal interaction and collection of data on predesigned questionnaire. A total of 47 numbers of fruit species belonging to 40 genera could be identified in the surveyed villages. With respect to availability status, the fruits like Bael, Custard apple, Lakoocha, Papaya, Longan, Kend, Aonla, Fig, Mahua, Mango, Guava, Kusum, Jamun and ber could be found in almost all the localities surveyed. With respect to extent of consumption, fruits like Guava, Bael, Banana, Custard Apple, Ber, Jackfruit, Pear, Litchi, Jharber, Mango, Chironji, Papaya, Tamarind, Citrus, Pomegranate, Aonla, Date Palm and Jamun were responded to be amongst the frequently consumed fruits. Fruits like Bael, Ber, Custard apple, Kadam, Jackfruit, Harra, Mango, Jhar ber, Chironji, Kend, Jungle jalebi, Fig, Imli, Aonla, Paniala, Bahera, Phalsa, Kusum, Bhelwa and Jamun were responded to be having high variability in the Chotanagpur plateau region. As perceived by the respondents, the fruits like Guava, Singara, Jackfruit, Harra, Chironji, Papaya, Kusum and Jamun can be considered to have high genetic erosion whereas fruits like Bael, Cashew, Custard apple, jackfruit, Chironji, Papaya, Citrus, Coconut, Aonla, Litchi, Mango, Banana, Peach, Guava, Pomegranate, Pear, Jamun, Tamarind and Water Chestnut have high potential for commercial cultivation.

Key words: Fruit diversity, people's perceptions and response, genetic diversity, Chotanagpur plateau

INTRODUCTION

The Indian gene center has rich array of fruits, vegetables, ornamental, medicinal and aromatic plant wealth distributed in diverse agro-ecological habitats and geographical regions. The horticultural biodiversity play a significant role in food and nutritional security and health of the growing human population. Hence, a systematic survey to collect the genetic diversity from natural habitat and their conservation is the utmost priority in the right perspective of mankind. Chotanagpur plateau region is one of the hot pockets of biodiversity of horticultural crops. The plateau includes many small and high rising hills with an abundance of flora and fauna making an enriched plateau. A major part of Chotanagpur plateau comprises Jharkhand which shares 2.45% area of the country. The

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plateau is largely under cultivation with greenery throughout the year. But many places are still virgin and are untouched from human intervention. The hills like Parasnath, Tundi, Rajmahal, Dalma, Chutupalu in Jharkhand, Susunia, Biharinath, Bagmundi, Ayodhya in West Bengal, etc. are the eminent ones showing diversity of this land. Rapid shrinkage of area under agricultural purpose due to the ever expanding human habitation in this region is resulting in largescale genetic erosion of horticultural biodiversity in the region. Being a region with a variety of tribal populations inhabiting, the region enjoys adequacy of knowledge on ethnobotany due to the close interaction of the population with their surrounding nature. However, continuous utilization of the plant biodiversity without their replanting due to the essentially collection based economy of the indigenous population, has led to severe erosion state of plant genetic resources. This warrants for a systematic

appraisal of status genetic resource of horticultural crops in the fragile ecosystem of the Chotanagpur plateau region. Keeping this in view a study was undertaken to assess the status of genetic resources different fruit crops of the region.

MATERIALS AND METHODS

The study was carried out during April to November, 2006. In order to assess available genetic diversity of different fruit crops in the region, a survey was conducted in 11 horticultural diversity rich districts in Jharkhand (Ranchi, Gumla, Hazaribagh, Saraikela, East Singhbhum, Sahibganj, Palamu, Lohardaga, Simdega, West Singhbhum, Deoghar), Purulia and Midnapur district of West Bengal and Jashpur district of Chhattisgarh. During the survey, information on people's perceptions and priorities on genetic resources of horticultural crops in their vicinity were collected through field visit, personal interaction and collection of data on predesigned questionnaire. In each district, two key informants from each sampled village were interviewed. Data on availability of different fruit genotypes were collected by personal visit to the plants and data on major locations of availability, pattern and extent of consumption, extent of variability and genetic erosion status were collected by interacting with the key informants at the locality. Although, regional variation with respect to perceptions about major locations of availability, pattern and extent of consumption, extent of variability and genetic erosion status could be observed, the majority of response under each criterion was considered for the respective fruit.

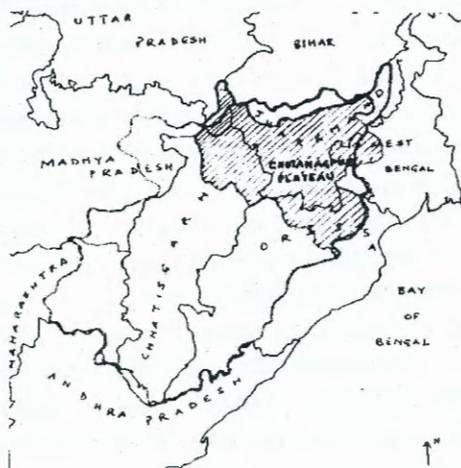


Fig. 1. Map showing Chotanagpur plateau region

RESULTS AND DISCUSSION

The Chotanagpur plateau region harnesses a wide diversity of different fruit crops. However, efforts on documentation of available biodiversity of fruit crops in this region have been meager. The comprehensive description of fruit diversity in the region by Haines (1910, 1921-25) is one of the earliest systematic works on this aspect. A review of the Haines's description indicates the presence of a wide array of fruit genotypes in different parts of the Chotanagpur plateau region. A perusal of the Haines's description indicates distribution of different edible fruits (84 numbers) belonging to 21 families in different parts of the region during the period of documentation. The fruits like *Mangifera indica*, *Semicarpus anacardium*, *Spondias mangifera*, *Carica papaya*, *Tamarindus indica* etc were reported to be widely distributed throughout the region, whereas the fruits like *Buchanania latifolia*, *Rhus semilata*, *Odina wodier*, *Dillenia aurea* etc have been reported to be distributed mostly in the hilly tracts of the region. Fruits like Hartaki, Jungle Jalebi, Kimbu (*Morus laevigata*), Narangi (*Citrus aurantium*), Barsa pakor (*Grewia sapida*), Bangeb (*Dyospyros cordifolia*), katbael etc are found in the plateau area whereas *Dillenia*, *Casaria*, *Ficus comesa*, *Ficus glomerata*, *Musa rosea*, *Eugenia operculata* and *Eugenia lanceaeafolia*, *Citrus aurantium* and *Citrus medica* are reported as available in the valley area. Kend, European fig, Gulab jamun, Khirkhejur and Phalsa (*Grewia asiatica*) are found locally scattered in different places as cultivated, semi-wild and wild varieties. Indian Almond is found in the humid tropical area while Chalta is reported to be found in comparatively dry places and Kend (*Diospyros*), in deep rocky ravines.

Variability status in horticultural crops: In order to assess the present status of fruit biodiversity in the region, survey of different biodiversity rich areas of the region was conducted. Interaction with local residents of different villages helped in obtaining a better picture about their perception on available diversity of fruit germplasm in their locality. A total of 47 numbers of fruit species belonging to 40 genera could be identified in the surveyed villages of Chotanagpur plateau region (Table 1). According to the perceptions of the local people, the different species have different levels of variability and erosion status. With respect to availability status, the fruits

like Bael, Custard apple, Lakoocha, Papaya, Longan, Kend, Aonla, Fig, Mahua, Mango, Guava, Kusum, Jamun and ber could be found in almost all the localities surveyed. Harra, Kadam, Jackfruit, Karambola, Chironji, Pinal, Citrus, Fig, Phalsa, Litchi, Bhelwa, Amra, Tamarind, Behera were found to be moderately distributed. The fruits like Jharber, Singara, Cashew, Palmyra palm, Coconut, Chalta, Jalpai, Rose apple, Star apple, Kaith (Wood apple), Paniala, Khirni, Banana, Jungle jalebi, Date palm, Peach, Pomegranate, pear were found in localized pockets. Apart from this, the name of the fruits like Balamkhira, Kanwa, Katai, Papra, Pithor, Porho, Satau were mentioned by respondents from different villages to be available in their locality which could not be identified taxonomically.

With respect to extent of consumption, fruits like Guava, Bael, Banana, Custard Apple, Ber, Jackfruit, Pear, Litchi, Jharber, Mango, Chironji, Papaya, Tamarind, Citrus, Pomegranate, Aonla, Date Palm and Jamun were responded to be amongst the frequently consumed fruits whereas Singada, Cashewnut, Mahua, Dahu, Amra, Palmyra Palm, Mulberry, Kend, Jungle Jalebi, Coconut, Fig, Rose Apple, Star Apple, Woodapple and Phalsa were responded to be moderately consumed. The fruits like Kadam, Peach, Karambola, Pinal, Harra, Chalta, Jalpai, Longan, Bahera, Paniala, Khirni, Kusum and Bhelwa were responded to be among the occasionally consumed fruits.

The extent of variability of the different fruit genotypes in the surveyed region varied from low to high. Fruits like Cashew, Banana, Peach, Pear, Karambola, Litchi, Jalpai, Coconut and Date palm were responded to be having low variability whereas, fruits like Bael, Ber, Custard apple, Kadam, Jackfruit, Harra, Mango, Jhar ber, Chironji, Kend, Jungle jalebi, Fig, Imli, Aonla, Paniala, Bahera, Phalsa,

Kusum, Bhelwa and Jamun were responded to be having high variability in the Chotanagpur plateau region. The moderately diverse fruits were Guava, Singara, Mahua, Dahu, Palmyra palm, Pinal, Amra, Papaya, Khirni, Citrus, Chalta, Longan, Pomegranate, Rose apple, Star apple and Wood apple.

As perceived by the respondents, the extent of utilization of the timber from the fruit plants is a major measure of the status of genetic erosion of the particular fruit. Apart from this, uprooting of plants for fulfilling the land demand for the growing population was also responded to be another cause for genetic erosion. According to the respondents, the fruits like Guava, Singara, Jackfruit, Harra, Chironji, Papaya, Kusum and Jamun can be considered to have high genetic erosion whereas fruits like Bael, Amra, Cashewnut, Banana, kadam, Litchi, Karambola, Khirni, Paniala, Mulberry, Kend, Jalpai, Aonla, Wood apple, Bhelwa and Bahera have low rate of genetic erosion.

The potential for commercial cultivation of any fruit species is an indicator of the need for intensification of genetic resource management activity for the particular species. According to the respondents, fruits like Bael, Cashew, Custard apple, jackfruit, Chironji, Papaya, Citrus, Coconut, Aonla, Litchi, Mango, Banana, Peach, Guava, Pomegranate, Pear, Jamun, Tamarind and Water Chestnut have high potential for commercial cultivation. Fruits like Carambola, Palmyra palm, Longan, Dillenia, Kend, Ber, Rose apple, Star apple, Phalsa, Mahua, Mulberry, Date palm, Kusum, Bhelwa, Bahera and Harra have medium commercial potential and fruits like Kadam, Dahu, Pinal, jalpai, Wood apple, Bat, Fig, Paniala, Khirni, Jungle Jalebi, Amra and Jhar ber have low commercial potential.

Table 4. Perception of local people about fruit diversity in their locality

Botanical name of fruits	Common name	Major locations of availability (Districts)	Mostly found in Forest	Back yard	Agricultural land	Major Pattern of consumption	Extent of consumption	Extent of variability	Status of genetic erosion	Potential for commercial cultivation
<i>Aegle marmelos</i>	Bael	Ranchi, Palamu, West Singbhum, Deoghar, Purulia	✓	✓	✓	Fresh fruit, Sherbat	High	High	Low	High
<i>Anacardium squamosa</i>	Cashew nut	Saraikela, Hazaribagh	✓			Fruit and nut	Medium	Low	Low	High

<i>Annona squamosa</i>	Custard apple	Hazaribagh, West Singbhum, Gumla, Saraikela, Palamu, Lohardaga, Deoghar, Jashpur	✓	✓		Fresh	High	High	Medium	High
<i>Anthocephalus kadamba</i>	Kadam	Ranchi, Lohardaga, Hazaribagh, Purulia	✓	✓		Chutney	Low	High	Low	Low
<i>Artocarpus heterophyllus</i>	Jackfruit	Ranchi, Gumla, Palamu, Ramgarh, Hazaribagh, Deoghar, Jashpur	✓	✓	✓	Fresh as vegetable and fruit, pickle	High	High	High	High
<i>Artocarpus lakoocha</i>	Dahu	Ranchi, Hazaribagh, Gumla, Saraikela, Palamu, Lohardaga, Purulia	✓	✓		Fresh	Medium	Medium	Medium	Low
<i>Averrhoa carambola</i>	Carambola	Ranchi, Hazaribagh, Gumla, Lohardaga, Purulia		✓		Fresh fruit, Chutney	Low	Low	Low	Medium
<i>Borassus flabellifer</i>	Palmyra palm	Purulia		✓	✓	Consumed fresh, sap consumed fresh and processed	Medium	Medium	Medium	Medium
<i>Buchnanian langens</i>	Chironji	Ranchi, Gumla, Simdega, Lohardaga	✓			Fresh, pickled dried seed for use in confectionary	High	High	High	High
<i>Buchnanian latifolia</i>	Pial	Ranchi, Gumla, Palamu; Saraikela; Hazaribagh, Purulia	✓	✓		Fresh fruit	Low	Medium	Medium	Low
<i>Carica papaya</i>	Papaya	Ranchi, Hazaribagh, Gumla, Saraikela, Palamu, Lohardaga, Deoghar, Purulia, Midnapur		✓	✓	Fresh fruit (green and ripe)	High	Medium	High	High
<i>Citrus spp</i>	Citrus (Lime, Lemon, Orange, Pummelo)	Ranchi, Palamu, Sahebganj, Deoghar, Purulia, Jashpur	✓	✓	✓	Fresh, Pickled, Juice	High	Medium	Medium	High
<i>Cocos nucifera</i>	Coconut	Deoghar		✓	✓	Fresh, Processed	Medium	Low	Low	High

Bandhopadhyaya & Das : A survey Study on fruit diversity in Chotanagpur plateau region

<i>Democarpus longan</i>	Dhela (Longan)	Ranchi, Hazaribagh, Lohardaga, Palamu, Purulia	✓	✓		Fresh	Low	Low	Medium	Medium
<i>Dillenia indica</i>	Chalta	Ranchi, Sahebganj	✓	✓		Fresh as vegetable	Low	Medium	Medium	Medium
<i>Diospyrus tomentosa</i>	Kend	Ranchi, Gumla, Palamu, Saraikela; Hazaribagh, Sahebganj, Godda, East Singbhum, West Singbhum, Purulia, Jhargram	✓			Fresh fruit	Medium	High	Low	Medium
<i>Elaeocarpus floribundus</i>	Jalpai	Hazaribagh	✓	✓		Fresh fruit	Low	Low	Low	Low
<i>Emblica officinalis</i>	Aonla	Ranchi, Gumla, Palamu; Lohardaga, Saraikela, Hazaribagh, Purulia	✓	✓		Fresh fruit, dehydrated powder, pickle, Murrabba	High	High	Low	High
<i>Eugenia jambos</i>	Rose apple	Gumla		✓		Fresh fruit	Medium	Medium	Medium	Medium
<i>Eugenia malaccensis</i>	Star apple, Jamrul	Sahibganj		✓		Fresh fruit	Medium	Medium	Medium	Medium
<i>Feronia limonia</i>	Kaith	Hazaribagh, Sahibganj	✓	✓		Processed	Medium	Medium	Low	Low
<i>Ficus benghalensis</i>	Bat	Found throughout Chotanagpur region	✓	✓		Fresh fruit	Low	High	Medium	Low
<i>Ficus carica</i>	Fig	Ranchi, Gumla, Sahebganj, Lohardaga, Hazaribagh, West Singbhum, Purulia	✓	✓		Fresh as fruit and vegetable	Medium	High	Medium	Low
<i>Flacourtia indica</i>	Paniala	Purulia	✓	✓		Fresh	Low	High	Low	Low
<i>Grewia asiatica</i>	Phalsa	Hazaribagh, West Singbhum,	✓	✓		Fresh	Medium	High	Medium	Medium
<i>Litchi chinensis</i>	Litchi	Ranchi, Hazaribagh, Lohardaga, Gumla, Palamu, Deoghar, Jashpur		✓	✓	Fresh	High	Low	Low	High
<i>Madhuca indica</i>	Mahua	Ranchi, Saraikela, Hazaribagh, Gumla, West Singbhum, Deoghar, Purulia, Midnapur	✓	✓		Fresh fruit, processed flower for alcoholic drink	Medium	Medium	Medium	Medium

<i>Mangifera indica</i>	Mango	Ranchi, Hazaribagh, Gumla, Saraikela, Palamu, Lohardaga, West Singbhum, Deoghar, Purulia, Midnapur, Jashpur	✓	✓	✓	Fresh, processed	High	High	Medium	High
<i>Miosops hexandra</i>	Khirmi	Sahebganj	✓	✓		Fresh fruit	Low	Medium	Low	Low
<i>Morus indica</i>	Mulberry	Sahebganj, Deoghar	✓	✓		Fresh fruit	Medium	Low	Low	Medium
<i>Musa spp</i>	Banana	West Singbhum, Deoghar		✓	✓	Fresh fruit	High	Low	Low	High
<i>Pethocelobiu dulce</i>	Jungle Jalebi	Barharwa in Sahebganj	✓	✓		Fresh fruit	Medium	High	Low	Low
<i>Phoenix dactylifera</i>	Date palm	Deoghar, Purulia		✓	✓	Fresh fruit	High	Low	Medium	Medium
<i>Prunus persica</i>	Peach	Palamu, Ranchi, Sahebganj, Lohardaga		✓		Fresh fruit	Low	Low	Medium	High
<i>Psidium guajava</i>	Guava	Found throughout the region		✓	✓	Fresh	High	Medium	High	High
<i>Punica granatum</i>	Pomegranate	Gumla, Deoghar		✓	✓	Fresh fruit, processed	High	Medium	Medium	High
<i>Pyrus pyrifolia</i>	Pear	Palamu, Jashpur	✓	✓	✓	Fresh fruit	High	Low	Medium	High
<i>Schleichera trijuga</i>	Kusum	Ranchi, Gumla, Simdega, Palamu, Purulia	✓	✓		Fruit and seeds consumed fresh (roasted) and seeds used for oil extraction	Low	High	High	Medium
<i>Semicarpus anacardium</i>	Bhelwa	Ranchi, Gumla, West Singbhum, Purulia	✓	✓		Fresh fruit, and medicinal purpose	Low	High	Low	Medium
<i>Sizygium cuminii</i>	Jamun	Found throughout the region	✓	✓	✓	Fresh fruit	High	High	High	High
<i>Spondias amaras</i>	Amra	Ranchi, West Singbhum, Purulia		✓	✓	Pickle	Medium	Medium	Low	Low
<i>Tamarindus indica</i>	Tamarind	Found throughout Chotanagpur region	✓	✓	✓	Fresh fruit, processed	High	High	Medium	High

<i>Terminalia bellirica</i>	Bahera	Ranchi, Gumla, Lohardaga, Purulia	✓			Used as medicinal preparation after drying.	Low	High	Low	Medium
<i>Terminalia chebula</i>	Harra	Ranchi, Lohardaga, Hazaribagh, Purulia	✓	✓		Used after processing for medicinal purpose	Low	High	High	Medium
<i>Trapa orientalis</i>	Singhara	Deoghar		✓		Fresh fruit, Processed	Medium	Medium	High	High
<i>Zizyphus mauritiana</i>	Ber	Ranchi, Gumla, Hazaribagh, Sahebganj, Godda, East Singhbhum, Palamu, West Singhbhum, Deoghar, Purulia	✓	✓	✓	Fresh fruit, Pickle,	High	High	Medium	Medium
<i>Zizyphus nummularia</i>	Jhar ber	Hazaribagh, Purulia	✓			Fresh fruit, Pickle	High	High	Medium	Low

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