Jeypore Tract Revisited

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The southern region of Orissa is famous as a centre of genetic diversity of cultivated rice and also a probable centre of origin of this species. Studies indicated that southeast India, of which this forms a part, is probably the centre of origin of "seihr (southeast Indian hill rice)" ecogenetic group of *Oryza sativa*. In recent years documentation of ownership of landraces of rice has been done to protect the intellectual property right of the farmer-conservers.

Key Words: Genetic Diversity, Jeypore Tract

The southern part of Orissa, known as Jeypore tract has drawn the attention of rice biosystematics, geneticists and conservationists for the last half a century. In recent years, the area has gained again importance with regard to farmers' rights and on-farm conservation, which are new dimensions of genetic resources conservation. It is, therefore, desirable that the situation should not only be reviewed but also understood in proper perspective.

History

Place

The spatial aspect of the origin of the Asian cultivated rice has been much debated. Watt (1891) and Ramiah and Ghosh (1951) considered that Asian rice originated in peninsular India. Ting (1957) strongly believed that China is the center of origin of *Oryza sativa*. According to Hamada (1949) and Burkill (1953) Indo-China is the center of origin of cultivated rice. Gustchin (1938) proposed that rice might have originated on the slopes of Himalayas both on Indian as well as Chinese sides. Rochevich (1931) and Chatterjee (1951) considered that the whole region of south and Southeast Asia could have been the place where rice was domesticated. On the basis of ecotype inter-relationships, Morinaga (1968) proposed that the sub-Himalayan India could have been the center of origin of cultivated rice.

The relationships among the various ecogenetic groups within the cultivated species as well as their relationship with the progenitor species can, therefore, throw much light on the place of origin of cultivated rice. In this context, the Jeypore Tract of Orissa deserves special mention.

The so-called "Jaypore Tract" is now an obsolete term with no distinct geographical or political boundary. During the British rule, the areas around the Jeypore town (in South Orissa) were governed by the Zamindars (feudal lords) and supervised by a political agent. The area was known as Jeypore agency area. After independence, major part of this area was merged with the Orissa state and formed Koraput district of this state. Koraput used to be the southern most district of Orissa and is located between 20°08' and 17°50' and 81°27' and 84°01' E (Fig. 1). Around mid-nineties, this district has been split into further four districts, *i.e.*, Koraput, Nabarangpur, Malkangiri and Rayagada. However, all these four districts continue to be refereed to as "undivided" Koraput district.

Tribes

According to 2001 census the four districts have a population of 3.5 million out of which male population is 1.75 million. The population density, 131/km^2 is quite less comparing with other districts of Orissa. More than half (about 55%) of the State's Scheduled Tribe (ST) and 15.66% of the Scheduled Caste (SC) population reside in this region (in the sense that these tribes and castes are recognized and listed in the Indian constitution to receive special privileges). The Kandha, Langia Soura, Paroja, Bhatra, Gadaba, Amanatya, Halva, Bonda, Koya and Didayi tribes are the original inhabitants of the forests and hills of this area. The Kandha, Bonda, Paroja and Langia Soura tribes still practise shifting-cultivation along with settled cultivation. The Indian Government has rehabilitated Bangladesh refugees in the districts of Nabarangpur and Malkangiri. The refugees are different from the tribals of this region with regard to their culture, language and cultivation practices.

Hills

The district lies on a section of the Eastern Ghats and consists of five natural divisions having mean elevations of 154m, 30m , 615m, 769m and 923m above

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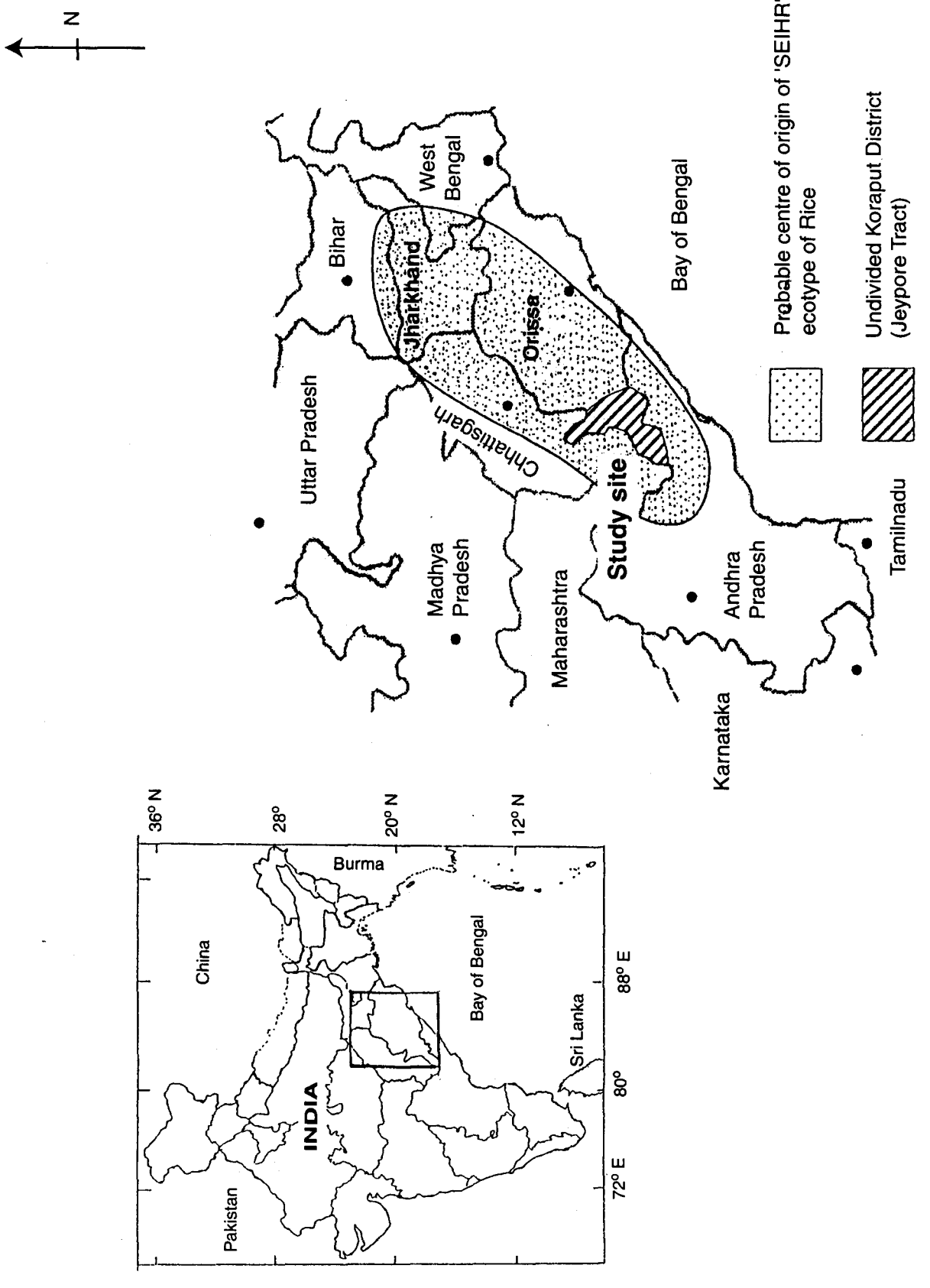

Fig. 1. Jeypore tract and the probable primary centre of origin of "Seihr" ecogenetic group of rice

mean sea level. A number of mountain ranges and isolated hills rise out of these tablelands.

Late Dr. K Ramiah (the renowned rice geneticist and breeder of India) visited the Jeypore agency area and was impressed with the morphological and ecological diversity of traditional rice cultivars. He remarked in his monograph (written before 1944 but published in 1953) on "Rice Breeding and Genetics" that this area might form another independent center of origin. Ramiah and Ghosh (1951) suggested that the Jeypore area might well be a "secondary center for origin of cultivated rice". Accordingly, he formulated a project on botanical survey of this tract for collection and study of these traditional rice varieties. This project was popularly known as Jeypore botanical survey and was executed by the Central Rice Research Institute (CRRI), Cuttack, Orissa during 1955-60. These collections (about 1750 altogether) are known as JBS collections in rice literature. The CRRI could study the morphological and agronomic characters only of these varieties and corroborated the views of Ramiah and Ghosh (1951) that this area could be a secondary center of origin of cultivated rice. The Japanese scientist H.I. Oka who studied the cultivated varieties and their wild relatives from this area proposed the view that the wild rice of this area have given rise to primitive landraces that have the capability to differentiate into *Japonica* and *Indica* ecotypes and hence he called the traditional rice varieties of this area as incipient *japonicas* and *indicas*.

Sharma and Shastry (1965) surveyed the whole of India including Jeypore Tract for the wild rice, collected samples of populations of wild rice far away from as well as near the cultivated rice fields, studied their progeny behaviour as well as morphological characters and came out with strong evidences about the existence of an annual wild species distinct and different from the perennial wild species (*O. rufipogon*) as well as from the natural hybrids (*spontanea*) and named it as *Oryza nivara* as this species lacked a valid name.

O. nivara is an annual wild species widely distributed in the Deccan Plateau of India particularly in its north-eastern part and in the central part of the Gangetic valley. It is also available in south and southeast China and in plateau regions of Southeast Asia.

The cultivated rice *O. sativa* and its close relatives, namely, the annual wild rice (*O. nivara*) and the perennial wild rice (*O. rufipogon,* syn. *O. perennis*) and the natural hybrids between the cultivated and these wild rice varieties form a complex, which has been rightly named as *Oryza sativa* complex by Tateoka (1962). All the elements of this complex have the same chromosome number (2n-24) and the same genome (AA) and the genetic barrier among them is incomplete so much so that the cultivated species hybridizes in nature with these wild species and forms hybrids which get back crossed to either parents to give rise to various types of interbreeds in nature. These intergrades known as *'spontaneas'* in rice literature can however be identified by their progeny behavior.

Prior to 1965, when *O. nivara* was not recognized as a different and distinct species, *O. rufipogon* (then popularly known as *O. perennis*) was considered to be the progenitor of the cultivated rice. But with the recognition of *O. nivara* as a different and distinct species, Sharma (1964) and Shastry and Sharma (1973) and Chang (1985) proposed that *O. nivara* could be the progenitor of *O. sativa.*

Any hypothesis regarding the origin of cultivated rice, however, must explain the origin of ecotype differentiation in this species. The cultivated rice (*O. sativa*) has two major ecotypes, namely, *japonica* and *indica* and their F_1 hybrids are often partly to highly sterile.

Biswal (1988), therefore, made collections of *O. nivara* from different parts of India, crossed the collections among themselves and studied their F_1 sterility. She observed that the wider the distance between two sites of collections of *O. nivara,* the greater the sterility of their F_1 hybrid. She, therefore, concluded that the sterility observed in the *japonica x indica* hybrids already existed in the progenitor species (*O. nivara*) and has merely been carried over to the progeny species (*O. sativa).*

Biswal (1988) also crossed the *nivara* collections with the landraces of Jeypore tract and with the seihr and *japonica* ecotypes and observed the same type of sterility as observed in *nivara x nivara* hybrids and concluded that *japonica* and *seihr* ecotypes have originated from two different populations of *O. nivara* one in southeast India and the other in south or southwest China.

The southeastern India *i.e.,* the northeastern Andhra Pradesh, eastern Madhya Pradesh, whole of Orissa (except coastal belt), southern Bihar, and the hilly tracts of southwestern. West Bengal form a contiguous geographical area having similar topography, climate, rainfall, etc. The Jeypore tract of Orissa, which has been considered to be a secondary center of origin of cultivated

rice by Ramiah and Ghosh (1951), Ramiah (1953) and Oka and Chang (1962) forms a part of this larger area. This area is inhabited by aborigines belonging to Proto-australoid ethnicity, practise primitive agriculture (including shifting cultivation) and still patronize the age-old landraces. These landraces show many primitive features and are most often photo-insensitive and early maturing.

Tripathy (1994) crossed these landraces with various other ecotypes of *O. sativa* and on the basis of pollen sterility of their F_1 hybrids as well as of F_1 hybrids of these landraces with their putative progenitors concluded that southeast India (that also includes Jeypore tract) could be the primary center of origin of 'seihr' ecotype. If so, the genetic diversity observed in the traditional rice varieties of southeast India becomes evolutionarily very significant and genetically very important as these cultivars might harbor many valuable genes that may prove useful in rice breeding.

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