

Origin of Agriculture in India: Problems and Issues

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Introduction

The domestication of animals and cultivation of certain plants were great steps forward taken by mankind as these mark the beginning of man's intervention in nature. So long as man was a hunter and food gatherer, he was a part of nature, like animals and birds. But once he invented agriculture and the art of domesticating animals, he was no longer a part of nature. With the beginning of cultivation of cereals, man increased his control over environment, a process which is believed to have begun by 8000 b.c. (Moore, 1982: 232; Hillman *et.al.* 1989: 240).

Scholars have tried to differentiate between the term 'cultivation' and 'domestication'. Cultivation denotes the whole of man's efforts to look after plants and in this sense it is quite possible to cultivate wild plants. Domestication involves genetic and accompanying morphological changes by which the plants become more suited to conditions of a man-made environment and less to those of a natural environment (Glover, 1979: 10).

Changing Paradigms

The domestication of plants and animals has been a topic of global interest and natural scientists and

archaeologists in different parts of the world have been trying to understand this process. In this context, mention may be made of the pioneering studies of Hans Helback, Jack Harlan, Daniel Zohary, Joseph Hutchinson, L. Costantini, T.T. Chang, Gordon C. Hillman, M.E. Kislev, W. Van Ziest, Maria Hoff and many others. So far as theoretical discussions on this topic are concerned, mention may be made of V. Gordon Childe, Mark Nathan Cohen, Barbara Bendere, Sonia Cole, Philip E. L. Smith, Peter Ucko, W.B. Dimbley, David R. Harris, Jack Golson, Kent V. Flannery, L.R. Binford and many others.

Presently, a vigorous debate is raging as to the origins of agriculture and crop domestication. Not only does the question arise of when and where a particular crop was first domesticated but also of how and why. The root causes of the development of an agricultural economy has now become one of the archaeologists' main concern—though until quite recently such questions were largely ignored. In this connection mention may be made of three related hypotheses proposed to explain the shift from foraging to farming. The first is through climatic changes, changes in sea-level, increased competition from other species, or similar causes, the diminishing of naturally available food resources this becoming

necessary to supplement them by growing food plants and domesticating animals. V. Gordon Childe was the foremost proponent of the view that the development of food production in the Near East was the result of 'desiccation', following the retreat of the ice sheets of the last glacial. He envisaged the focused concentration of human, animal and plant populations in the river valleys and around oases as leading to domestication and the adoption of food-producing economy, but he did not suggest what precise processes of adoption might have been involved in the establishment of this new mode of subsistence. Childe's hypothesis has been challenged on the ground that no clear archaeological evidence exists for major post-glacial climatic changes in the Near East.

Another factor frequently seen as a determining condition in the adoption of agriculture is that of demographic growth. The proponent of this theory Mark Nathan Cohen believes that modern man, who originated in Africa, gradually spread through Africa and the adjacent continents, dispersing in order to maintain population densities at which survival was easy. As population densities inexorably increased, man was gradually forced to occupy less favourable environments and to switch to less palatable diets. Eventually, as his diet

came to include less and less game and more and more plant foods, man became a farmer.

Theories of Agricultural Origins

As regards the problem of where and when agriculture began, several models have been proposed. The 19th century botanist Alphonse de Candolle was the first to attempt to locate the region of origin of the various cultivated plants. In his book *The Origin of Cultivated Plants* published in 1883 he wrote:

Agriculture came originally, at least so far as the principal species are concerned, from three great regions, in which certain plants grew, regions which had no communication with each other. These are—China, the southwest of Asia (with Egypt) and inter-tropical America.

Taking up Candolle's notion of agricultural centres of origin, Vavilov, in his book, *Origins, Variation, Immunity and Breeding of Cultivated Plants*, published in 1926 concluded that it was possible to define at least eight independent centres of origin of the worlds' most cultivated plants, including Chinese, Indian, Central Asian, Near Eastern, Mediterranean, Abyssinian and South Mexican and Central American, and South American centres.

Some archaeologists strongly believed that the domestication of plants was such a revolutionary concept that it could only have occurred once in human history. V. Gordon Childe was the strongest proponent of this theory. He believed that the earliest farming settlements known were those of the Near East, and it was here that wheat and barley were first domesticated and pottery and weaving invented. From this unique centre of origin, the new

technology and the sedentary way of life associated with it gradually diffused to other parts of the world (Childe, 1941, 1954).

This notion was outright rejected by the geographers Carl. O. Sauer in 1952. He proposed that the first domesticators were not agriculturists but horticulturists probably fisher-folk living in a mild climate in afforested zone. Sauer postulated three hearths of plant domestication: one in mainland Southeast Asia and two in America, from which the idea of plant cultivation gradually diffused (Sauer, 1952). Sauer's provocative hypothesis found support from a number of excavations carried out in Southeast Asia. The vegetable remains discovered at Spirit Cave in North Thailand have been tentatively dated to 8000 Before Present. The results of excavations at Non Nok Tha and Ban Chiang show a continuous progression from an early economy based on foraging and plant-tending to the domestication of palustrine species (taro and rice) and eventually to a behaviour reliance on rice-farming.

On the basis of widespread evidence for early plant domestication in tropical zones, Harlan has proposed three mutually independent systems of domestication, each with a centre and a non-centre.

- i. A Near East centre and an African non-centre.
- ii. A North Chinese centre and a Southeast Asian and South Pacific non-centre.
- iii. A Meso American centre and a South American non-centre.

He visualizes some stimulation and feedback in terms of ideas, techniques on materials between centre and non-centre in each system.

A survey of the above hypotheses demonstrates that from Childe's unique Near Eastern cradle to the number of centres proposed by Vavilov, the question of diffusion versus independent discovery assumes importance. If as Childe and Hawkes believed, agriculture was only 'invented' once, then clearly some mechanism of diffusion must have been responsible for the appearance of agriculture in other parts of the world. On the contrary, several scholars have argued that plant domestication, the manufacture of pottery and so on, are such natural adaptations to widely-replicated needs that they must have developed quite independently, if more or less contemporaneously in different parts of the world.

In the light of the above, we may now consider how different theoretical positions have affected interpretations of the origins and spread of agriculture in India.

In India, the history of agriculture has attracted the attention of scholars from time to time. While literary sources on this topic have been tapped by R. Gangopadhyaya, G.P. Majumdar, S.P. Raychaudhuri, K.L. Mehra, P.K. Gode and others, the study of archaeo-botanical data obtained from archaeological excavations is still in its infancy, mainly due to lack of expertise. A beginning in this direction was made by K.A. Chaudhury and Vishnu Mittre which was followed by G.M. Buth, K.S. Saraswat, M.D. Kajale, Gail G. Wagner and S.A. Weber. Taking into account the two sets of evidences (literary as well as archaeo-botanical), M.S. Randhawa made a brilliant effort to reconstruct the *History of Indian Agriculture* in four volumes. However, as the first volume of his book dealing with ancient India

appeared more than two decades ago, an evaluation of the data obtained during the last two decades is a desideratum.

Antiquity of Agriculture in India

In the present state of research it is difficult to pinpoint the origin and antiquity of agriculture in India. We have been told that *cerealia* type of pollen, considered to be the progenitor of cultigens were obtained from Salt lake of Rajasthan (Buth *et al.* 1986) as also from Haigam lake in the Kashmir valley.

The earliest evidence regarding cultivated cereal plants comes from Mehargarh where the antiquity of cultivated cereals goes back to the seventh millennium b.c. This site is located in the north Kachi plain where three environmental zones (hill, plains and perennial rivers) come together and thus the region is well-suited to the early development of farming economy. The North Kachi plain is a semi-arid region where the natural xerophytic vegetation is fragile and with the coming of farmers and herders, the natural balance can be upset and a process of environmental change might begin. It has been postulated that during the late Pleistocene, hunter-gatherers fed themselves by collecting wild grasses and fruits in foothills and by hunting animals on the open slopes and on the plains near watering points (Jarrige, 1985: 28) but by the early seventh millennium b.c., cereal cultivation in flooded fields played an important role in the subsistence economy in this area (Costantini, 1989: 31).

Some knotty problems relating to the origins of agriculture in India relate to the cultivation of rice and millets. In the following pages we have attempted to throw some light on the early cultivation of rice.

Antiquity of Rice Cultivation

Rice is annual grass belonging to the same family as wheat, barley, oats, rye and is the only major grain crop which is grown almost exclusively as human food. Hence, it was one of earliest plants to be cultivated or domesticated in both tropical and warm temperate region. T.T. Chang (1976a, 1976b, 1989) has shown that the original habitat of *Oryza* was the Gondwana sub-continent. When Gondwana broke up and became Africa, Antarctica, Australia, Malagasy, South America and Southeast Asia, *Oryza* species drifted into distinct geographical habitats (Swaminathan, 1984). It is interesting to note that wild rice is gathered by the tribal populations of the Jeypore tract of Orissa state, India and the Batticaloa district of Sri Lanka even today (Chang, 1989: 409).

As regards the origin of rice cultivation, Middle Ganga plains provides important evidence. That this cereal was harvested (though not cultivated as yet) in the Proto-Neolithic phase at Chopani Mando, has been documented. The tentative time-span of seventeenth-seventh millennium b.c. suggested by the excavators for this site, has also been supported by other scholars (Chakrabarti, 1988: 91). The presence of cultivated rice at Koldihwa, dating from 9,000 to 7,000 years Before Present provides the earliest record of rice cultivation in this subcontinent. Therefore, Wenming (2002: 152) is right in concluding that rice agriculture originated in India no later than 9000 years Before Present. The presence of cultivated rice at Lahuradeva (district Sant Kabir Nagar, U.P.) in the Neolithic context and dated by C-14 method to 5300 b.c. provides confirmatory data to the chronological framework given to Koldihwa and Mahagara (Tewari

et al. 2002). Domesticated rice is present in the lowest levels of Imlidih Khurd, Narhan, Senuwar and Chirand. Other early finds of cultivated rice beyond the Middle Ganga plain comprise Atranjikhhera (2000-1500 b.c.) and Lal Qila (1880 b.c.), but far more important are the evidences of rice cultivation as early as 2700-2800 b.c. in the region of Haryana. These early and mature Harappans in the northwest India were primarily growers of wheat and barley and rice moved to this region in competition to those crops at such an early stage. Commenting on the diffusion of rice from the mid-Ganga plains to the northwestern part of subcontinent, K.S. Saraswat (in press) writes. "The dissemination of rice cultivation would have been a slow moving process from the primary homestead or clan in the Gangetic plain to the northwest. The cultivation and early domestication could have taken place concurrently and independently in many localities and moved in northwestern direction through zigzag routes, combined forces of natural and human selection, diverse climates and soils and varied cultural practices must have led to the great ecological diversity in this crop."

It is interesting to note that the origin and antiquity of rice cultivation in China has undergone substantial change during the last three decades. By the late seventies and early eighties of the last century, many rice-remains dated from 6,000-5,500 years Before Present were found in Hemudu, Zhejiang Province, and some rice-remains from the early period were also found at Majiabang and Daxi sites. Therefore, it was believed that the lower reaches of the Yangtze valley might be one of the centres of origin. Soon after, rice-remains dated from even earlier time, 9,000-7,000 years Before Present, were found at Pengtoushan and Chengbeixi sites

located in the middle Yangtze Valley. Since these represented the earliest remains of rice-agriculture known at that time, the theory that it originated in the Yangtze Valley gradually became axiomatic. Recent discoveries from Yuchanyan, Hunan Province and Xianrendong and Diaotonghuan, Jiangxi Province, indicate that the origin of rice-agriculture goes back to more than 10,000 years ago. Using C-14 dating, the charcoal and pieces of pottery collected from Yuchanyan can be dated to 12,060±120 and 12,320±120 years Before Present respectively, and samples collected from the two sites in Jiangxi Province were nearly contemporary, dating to much earlier than the origins of domesticated wheat and barley in West Asia (Wenming, 2002: 151-52). As compared to the above evidence, the antiquity of rice cultivation in India is admittedly late by at least 3000 years and more field investigation in the Vindhya-Kaimur-Orissa belt is needed before the issue is finally resolved.

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