# Overlooked but not Forgotten: India as a Centre of Agricultural Domestication

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## Locating Domestication in South Asia

India possesses a unique Neolithic transition that has shaped the cultural and ecological trajectory of the subcontinent. Much archaeological research has focused on the Indus Valley civilization. In contrast, little is known about the Neolithic roots of the wider subcontinent.

During the early Holocene, South Asia was a subcontinent of hunter-gatherers and by 2000 years ago it was mostly inhabited by farmers, with densely populated river valleys, coastal plains, urban populations, states, and even empires. While some of the crops that supported these early civilizations had been introduced from other centers of origin (the Near East, China, Africa), a large proportion had local origins from wild plants native to the subcontinent.

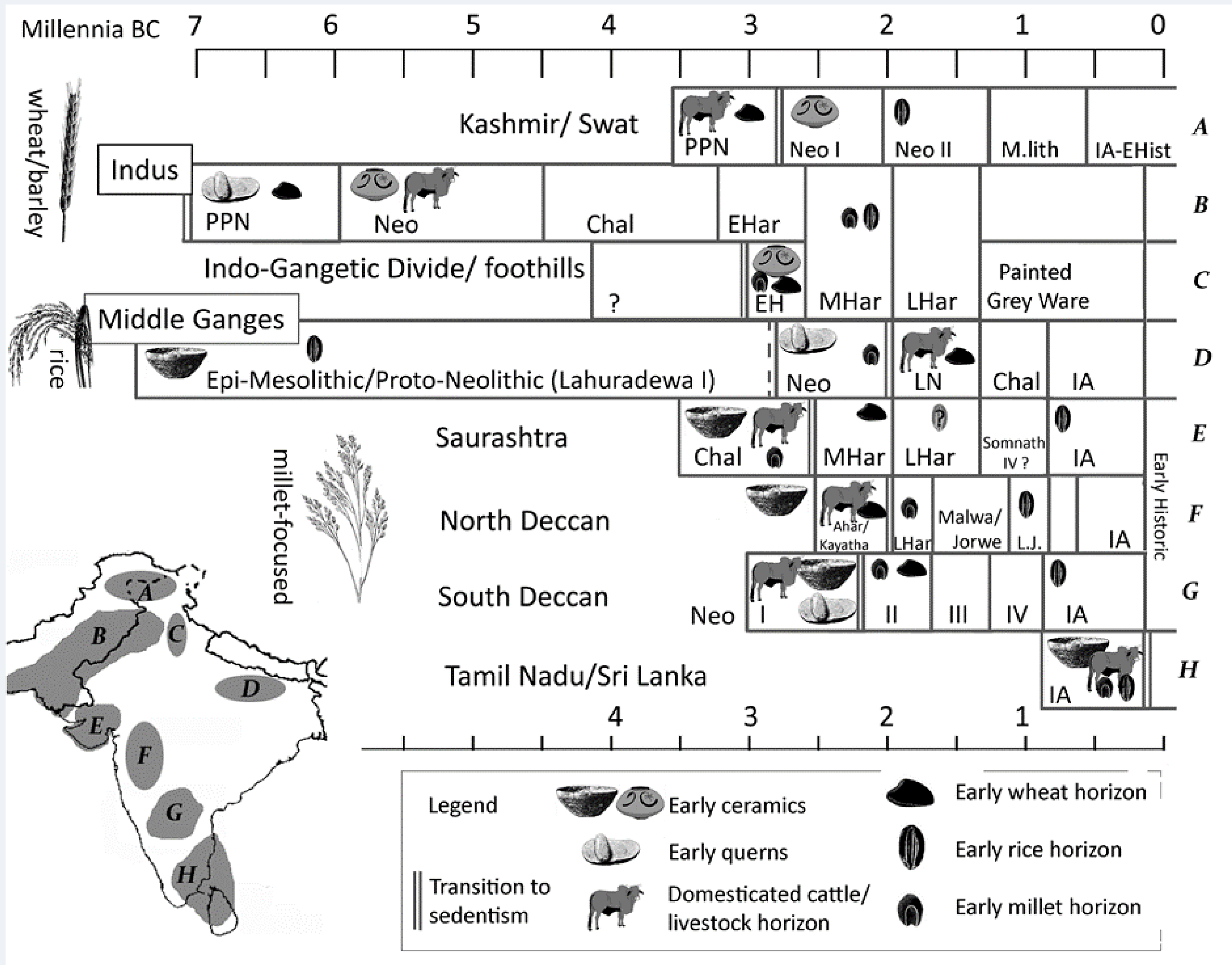



**Figure 1. Comparative chronology of the early food-producing traditions in South Asia, indicating the earliest periods of sedentism, ceramics, livestock and staple grains in each region.**

The bio-geographical evidence for the wild progenitors of a number of plant species, together with their occurrence early in regional Neolithic traditions, argues for their local, independent origins and subsequent domestication in India. The ecological niches of these wild progenitors varied but ranged from the savannahs to the nearby moister deciduous woodlands which include the South Deccan, Gujarat, and the western Himalayan foothills, as well as the Ganges basin.

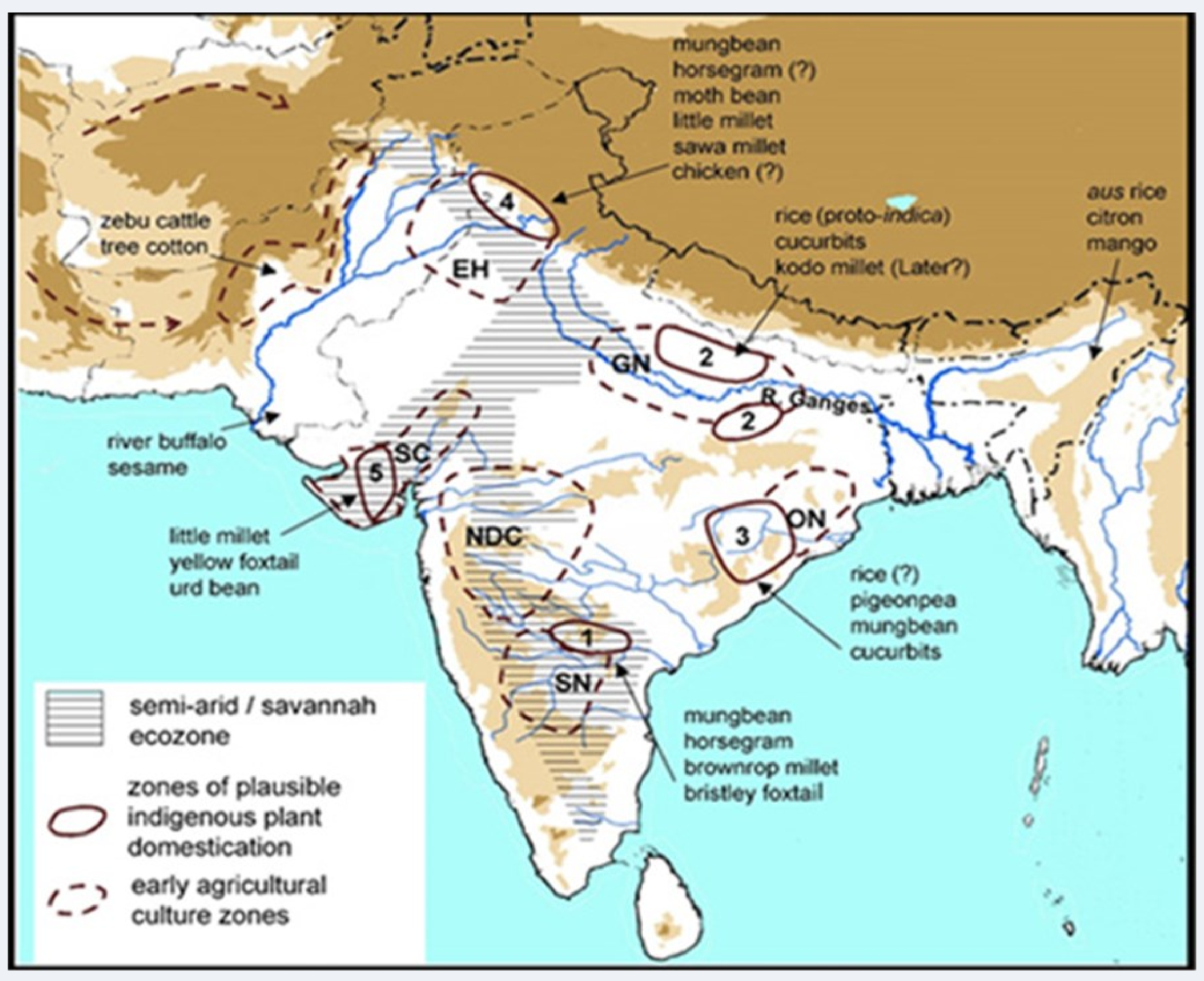



**Figure 2: Zones of early farming Neolithic/ Chalcolithic culture areas: (1) Southern Neolithic (2) Middle Ganges and/or Vindhyas Neolithic (3) Orissa Neolithic in the Upper Mahanadi, (4) Eastern Early Harappan in the Foothills of the Indo-Gangetic Divide, (5) Southern Chalcolithic in Saurashtra or Southern Aravallis. The semi-arid savannah habitat zone and adjacent woodlands are posited as important areas for most millet and pulse domestications (updated from Fuller 2011)**

This is largely due to recent archaeobotanical sampling which have shown that a number of the earliest staples of the Southern Neolithic were crop domesticates such as horsegram (*Macrotyloma uniflorum*), mungbean (*Vigna radiata*), and browntop millet (*Brachiaria ramosa*), native to the wild flora in the Deccan plateau of South India.

## Horsegram as a Case Study

Horsegram (*Macrotyloma uniflorum*) is among the most important pulse crops of prehistoric India and remains a major vegetable protein source for hundreds of millions of Indians today. Horsegram typically outnumbers millets or other crops in South Indian Neolithic samples. Morphometric measurements were carried out on both modern and South Asian archaeological assemblages of horsegram to document evolutionary rates of change during domestication over the course of the Southern Neolithic. Herbarium specimens were consulted to measure and map 'wild' specimens.

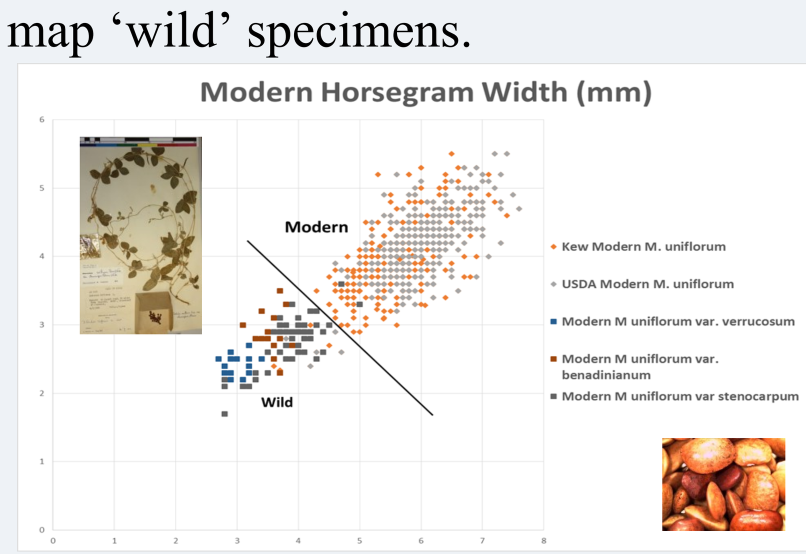



**Figure 3: Scatterplot of width (mm) of modern specimens of Horsegram**

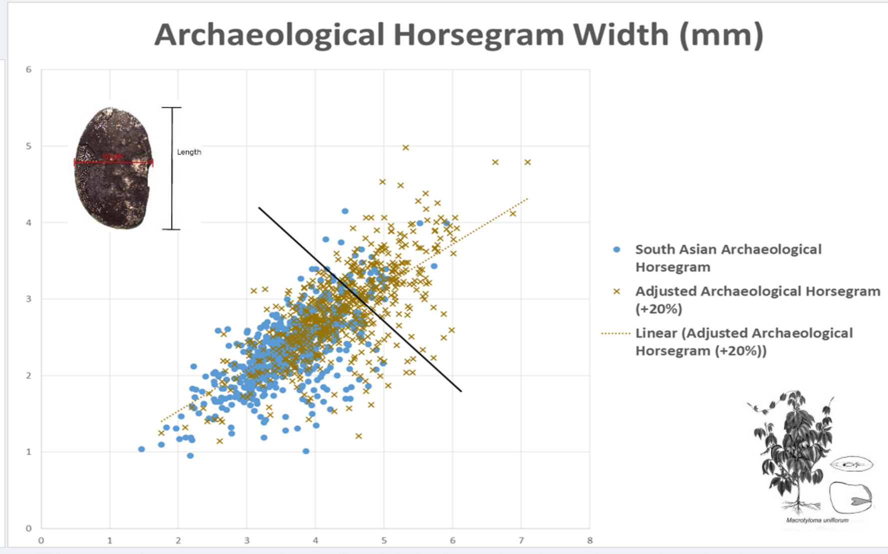



**Figure 4: Scatterplot of width (mm) of archaeological specimens of Horsegram**

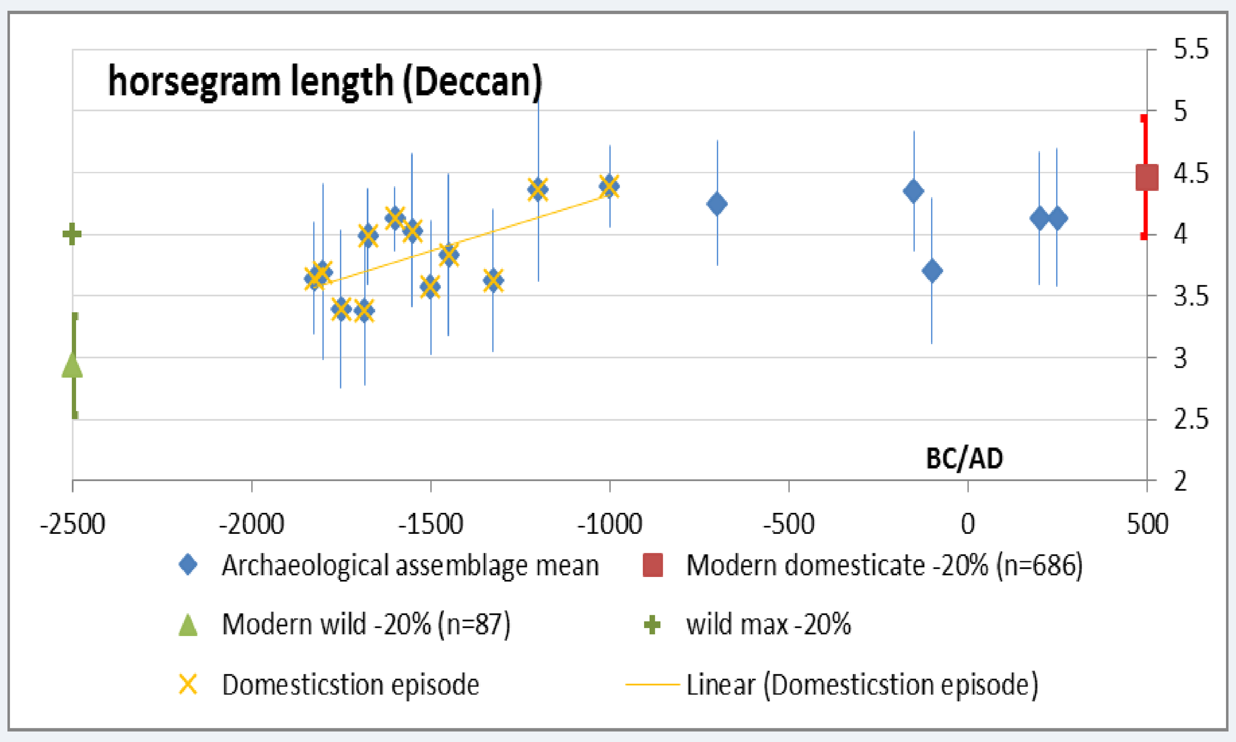
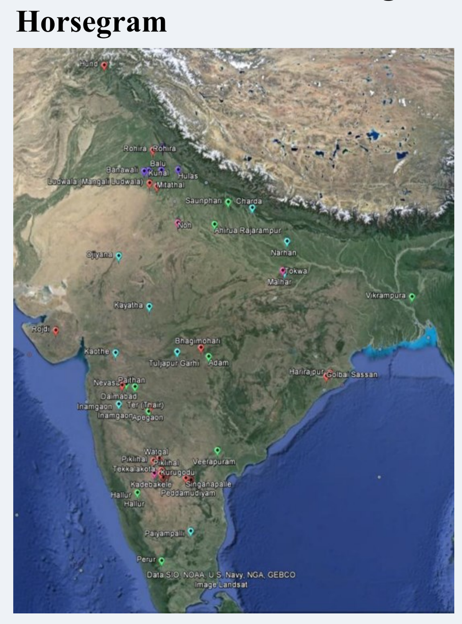



**Figure 5: Archaeological horsegram length (mean +STDev) over time in the Indian Deccan (n=502). Expected wild and domesticated ranges indicated based on assumption of 20% shrinkage in charring. Orange line indicates inferred domestication episode, which has a phenotypic change rate of 0.0027 haldanes. Comparanda from Fuller & al 2014: *Vigna radiata* =0.006 h; *Lens culinaris* = 0.004h; *Glycine max* = 0.0033h; *Cicer arietinum* = 0.0011h; *Hordeum vulgare* grain width= 0.004h; *Oryza sativa indica* grain width= 0.0026h.**

**Figure 6: Map of archaeological sites from South Asia with measured archaeological Horsegram**



In India with the expansion of more savannah and with a more restrictive dry season the limited watering holes encouraged the creation of pulse and millet gardens, and territoriality of these wetter locales. Wild horsegram does not form extensive stands like wild wheats, barley, or wild rice, rather it is often found in local dense patches in favourable microenvironments, such as springs and at the base of slopes for millets and less disturbed scrub patches. Pulse millet gardens recruited weeds from savannah scrub and forest margins, including *Zaleya decandra, Spermococce* sp., and damp ground taxa like sedges and *Commelina,* as well as some weedy savannah grasses. Some of these decumbant species might have been harvested alongside uprooted horsegram, while taller taxa could have been cut with millets.

## Conclusions

India had a varied Neolithic transition from foraging to farming in different parts of the subcontinent with domestication and diffusion of different crop species including local domesticates, like horsegram. It is likely that local domestication events in India were occurring alongside agricultural dispersals from other parts of the world in an interconnected mosaic of cultivation, pastoralism, and vegetation management through burning and transplanting. As humans in South Asia increasingly relied on a narrower range of plant species, they became entangled in an increasingly precarious and fixed trajectory that allowed them greater subsistence levels to sustain larger populations and increased sedentism and in a context of distinctive cultural and food traditions.

## References

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