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Review Article

Agricultural innovations in the Ancient Near East and beyond

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Shahal Abbo & Avi Gopher. 2022. *Plant domestication and the origins of agriculture in the Ancient Near East*. Cambridge: Cambridge University Press; 978-1-108-49364-2 hardback £75.

Sureshkumar Muthukumaran. 2023. *The tropical turn: agricultural innovation in the Ancient Middle East and the Mediterranean*. Oakland: University of California Press; 978-0-520-39084-3 paperback £30.

There is a rich and diverse body of research dedicated to understanding the cultural and biological processes that led to plant domestication and the development of agriculture in both the Old and New Worlds. Work continues to refine and challenge proposed models for the process of plant domestication, the likely centres of origin and subsequent spread of plant crops and agricultural innovations. This research is taking place in the light of new archaeobotanical evidence and the development and application of novel scientific techniques. As such, publications that bring together new lines of research and evidence, and how these inform our current understanding of plant domestication and agriculture, are an important resource for both specialist and non-specialist audiences.

The subjects of the two books under review concern plant domestication and agricultural innovations in prehistory, but the focus of each book is different in terms of the time period and the range of plant-based crops discussed. Shahal Abbo and Avi Gopher present a corpus of research and concepts regarding the process of (primarily) plant domestication and the origins of agriculture during the Neolithic period in the Near East, while Sureshkumar Muthukumaran discusses the impact of the westward expansion and adoption of a selection of sub-tropical and tropical crops from South Asia, which occurred during the Bronze Age. The topics of the two books are complementary and are reviewed here in chronological order of prehistoric periods covered.

Plant domestication and the origins of agriculture in the Ancient Near East draws on a rich body of archaeological, archaeobotanical, scientific and experimental evidence to describe and advocate the basis for the authors' theoretical model for the process of plant domestication and subsequent adoption of agriculture in the Old World. The book brings together decades of research by Abbo, Gopher and their colleagues, placing it in the context of the wider corpus of research into plant domestication and the development of agriculture in the Near East in a format that is accessible to both specialist and non-specialist audiences. The book will be of interest to specialists in the fields of archaeobotany and environmental archaeology and Near

Eastern archaeology, and it also aims to appeal to non-specialists and potentially plant breeders, agronomists and farmers. The authors state that the book should not be viewed as a botany or archaeology textbook but was written for "a wider intellectual readership of knowledge-seekers" (p.4).

Abbo and Gopher's research is particularly focused on the northern and southern Levant, which reflects their view (based on the archaeological, ecological, scientific and environmental evidence they present) that the process of plant domestication took place in a geographically localised area within northern Syria and south-eastern Türkiye. The book focuses on the domestication of the Neolithic 'founder crops', comprising: three cereal crops with emmer wheat (*Triticum dicoccum*, in the book referred to as *T. turgidum*), einkorn wheat (*T. monococcum*) and barley (*Hordeum vulgare*); three pulse crops with chickpea (*Cicer arietinum*), bitter vetch (*Vicia ervilia*) and pea (*Pisum sativum*); and the oil crop flax (*Linum usitatissimum*). Plant domestication in the Neolithic period of the Near East occurred within the region known as the 'Fertile Crescent', which refers to an arc that stretches across parts of present-day Israel, Palestine, Jordan, Lebanon, Syria, Türkiye, Iraq and Iran. The publication highlights the archaeological, archaeobotanical and ecological evidence from the southern Levant (Israel, Palestine, Jordan and Lebanon) and the northern Levant (including parts of northern Syria and south-eastern Türkiye).

Fifteen chapters present a thematic discussion of plant domestication and the agricultural revolution in the Ancient Near East. The publication describes evidence for the shift from hunter-gatherer lifeways to the development of agriculture, proposed models for the process of domestication, the ecology and geographic distribution of domesticated plants and their wild progenitors, crop evolution under traditional and modern farming systems and the differences between cereal and legume crops. In addition, Chapter 11 covers later plant domesticates in the Ancient Near East (notably fruit trees including grape vine, fig, olive, date palm and pomegranate), while Chapter 13 is dedicated to the global phenomenon of plant domestication in Asia, Africa and America. The topic of Chapter 14 is animal domestication, which discusses the 'big four' (cattle, pigs, sheep and goat) and is a contribution by Gila Kahila Bar-Gal (Koret School of Veterinary Medicine, Hebrew University of Jerusalem).

From the outset, Abbo and Gopher state that the book is written from their standpoint that plant domestication in the Ancient Near East was a deliberate (conscious), knowledge-based, rapid event that occurred in a geographically localised area in south-eastern Türkiye and northern Syria, which they refer to as the 'core area'. Their proposed model for the domestication of plants in the Near East was first published over 20 years ago (Lev-Yadun, Gopher & Abbo 2000) and the current publication draws on more than two decades of further research that includes fieldwork, experimental studies and archaeological, archaeobotanical, ecological and scientific evidence. While the authors are openly polemic in their views on the process of plant domestication and agriculture, they do discuss other models, which are signposted in the further reading section if the reader wishes to explore in more depth. The book is well structured; at the start of each chapter, the aims and structure are outlined and at the end there is a list of key points. To make the book accessible to non-specialists, there is a useful glossary of some of the archaeological, biological and scientific terms and concepts that are referred to in the text. Within the chapters there are boxes highlighting salient information, which elaborate on the archaeological evidence and research concepts, alongside

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photographs and images. All of the images are clear, well labelled and relevant to the associated text. Although the published images are in black and white, in-text links to an online archive are provided to allow the reader to view the images in colour.

Abbo and Gopher acknowledge that the model they present as the most likely scenario for the process of domestication is accepted by a minority of scholars compared to alternative models (for example, a protracted or co-evolutionary process, with unconscious or semi-conscious selection and multiple centres of origin within the Fertile Crescent). This book provides a useful resource for understanding the basis, development and evidence for one of the models that seeks to explain the process of plant (and animal) domestication and development of agriculture in the Ancient Near East.

Sureshkumar Muthukumaran's *The tropical turn* details the westward spread of a selection of economically important crops that are native to tropical and sub-tropical South Asia (including rice, cotton, citruses, cucumbers, taro and sissoo), as a discourse for the impact that the dispersal of South Asian crops had on the ancient cultural entities of southwest Asia and the Mediterranean from the Bronze Age onwards. The book will be of interest to those whose research lies in agriculture, environmental archaeology and cultural archaeology, but is written in a way that is accessible to non-specialists. Drawing on a wide range of archaeological, archaeobotanical and biological evidence and historical sources, Muthukumaran presents evidence for the early stages in the globalisation of Old World plants of economic value that goes beyond the traditional Neolithic founder crops of the Ancient Near East. I particularly liked the author asking the reader to imagine countries 500 years ago, without the agricultural produce that they are synonymous with today—such as Colombia without coffee, Italy without tomatoes or India without chillies—as an illustration of the impact of past exchanges of flora and fauna on cultural identities of the present day.

The book consists of nine chapters. The first places the research in historical context, setting the scene of the temporal and geographic range covered by the research and drawing on environmental evidence and sociocultural considerations. The following seven chapters are each devoted to a crop that is native to sub-tropical and tropical Asia, outlining its natural distribution and ecological preferences, before chronicling its dispersal westwards to the Middle East and the Mediterranean. The seven crops are: the cereal crop Asiatic rice (*Oryza sativa*); the fibre crop cotton (*Gossypium arboreum*); the pulse crop Egyptian bean (*Nelumbo nucifera*); the tuber crop taro (*Colocasia exculenta*); fruit crops citron (*Citrus medica*) and lemon (*C.* x *limon*); vegetable crops collectively referred to as Eastern cucurbits (including cucumbers, melons and gourds); and the timber crop sissoo (*Dalbergia sissoo*). Crops selected for the book are those that were subsequently taken into cultivation in the Near East and the Mediterranean, rather than crops that were available as long-distance commodities, but were not grown in the region.

On first reading, the style proved to be reminiscent of Alfred Crosby's ecological approach to cultural and biological exchange, with Europeans bringing their 'portmanteau biota' of plants, animals and diseases to the New World (Crosby 1986). In fact, Muthukumaran proceeds to draw direct reference to the 'Colombian exchange', a term coined by Crosby to refer to the exchange of populations, flora, fauna and diseases from the Old World to the New World, following the voyage of Christopher Columbus to the Americas in 1492 (Crosby 1972). Muthukumaran asserts that the Bronze Age 'Tropical turn' or 'Indian exchange'

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(i.e. the westward dispersal of South Asian crops) was of comparable significance to the Columbian exchange in terms of the long-term impact on cultural identities, local ecologies and access to new cultures, crops, livestock and produce of economic value and prestige. The subsequent chapters, charting the routes of exchange and adoption of the eastern crops to the westerly regions, provide a discourse on how significant and far-reaching the impact of this Indian exchange was during the Bronze Age.

The publication discusses how the Bronze Age dispersal of South Asian crops was made possible by pre-existing terrestrial and maritime links to the Near East and Mediterranean, and how trans-oceanic navigation and networking was shaped by monsoonal winds and seasonally reversing airstreams. Throughout, the author explores complementary lines of evidence as to why the selected eastern crops were taken into cultivation in the western regions; such as the ecological tolerances of the individual species and whether agricultural regimes were already in place and could be adapted to accommodate new crops. For example, were there pre-existing irrigation systems that could accommodate species such as cotton that require plentiful watering, particularly in arid regions? Alternatively, did taste preferences influence the successful adoption of certain species? For instance, there is mention in Roman and Greek literature that rice was not valued for its taste or digestibility and this may have been a contributing factor to its status as a minor crop in the Mediterranean. The final chapter identifies four stages associated with the process of introduction and adoption of the South Asian crops in the Near East and Mediterranean regions: 'familiarisation', 'experimentation', 'routinisation' and 'indigenisation'. All chapters have useful footnotes that expand upon and contextualise the points made in the text, as well as references to allow the reader to follow up cited evidence.

Muthukumaran seeks to bring together practitioners and readers in historical, archaeological and biological sciences and create an 'open dialogue' between the disciplines to "address the increasing demand for understanding Afro-Eurasia as a cohesive and meaningful historical unit underlain by recurring patterns of connectivity by land and sea" (p.xi). The author's engaging narrative illustrates the global impact that the transmission of South Asian crops had on the dietary habits and cultural identities of peoples that inhabited the Ancient Near East and Mediterranean regions. By bringing together cross-cutting archaeological, biological and historical research, *The tropical turn* demonstrates the fruitfulness of an open dialogue between the social sciences, biological sciences and historical research in order to address research questions. The book demonstrates the importance of viewing Afro-Eurasia as a cohesive unit by examining one of the most significant events (i.e. the Indian Exchange) within the dynamic and multi-directional Old World exchanges of crops and fauna.

Comparing these two books reveals the benefits of different research approaches. In Abbo and Gopher the model for plant domestication, agricultural innovation and dispersal is primarily based on archaeological evidence and informed by experimental studies (such as growth experiments) and scientific research (such as ancient DNA studies); *The tropical turn*, owing to its focus on a later period, is able to make extensive use of contemporaneous historical records and accounts. *Plant domestication and the origins of agriculture in the Ancient Near East* is written by two authorities in the subject area who have contributed greatly in the development of models that seek to trace and explain the origins of agriculture. Although

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some readers may consider their research stance for the origins of plant domestication and agriculture divisive, the book is a useful compendium of the research conducted by Abbo, Gopher and their colleagues, and it provides a well-structured overview of plant domestication in the Near East. I do feel, however, that while the book is an important resource, it should be considered in tandem with publications that offer other models for the process of plant domestication—for example, semi-conscious or unconscious selection, a long/protracted domestication process and multiple centres of origin.

Beginning from a point when the key crops were already domesticated, *The tropical turn* details research that demonstrates the spread and adoption of a selection of economically important South Asian crops to the Near Eastern and Mediterranean regions. Muthukumaran's integration of historical sources with archaeological and scientific evidence has enabled a more nuanced insight into crop dispersal during the Bronze Age period and the opportunity to corroborate written accounts with archaeological evidence, as earlier periods are not afforded with textual evidence. *The tropical turn* is a thought-provoking addition to the bookshelves of those interested in Bronze Age archaeobotany and the impact of the growing globalisation of food in the Old World during this period.

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