Ethnobotanical and biophysical properties of wood species used in the traditional Uzbek cradle (beshik)

O.K. Khojimatov, Rainer W. Bussmann, Z.Z. Kosimov, O.T. Turginov, Sh.A. Kuramatova, R.X. Esemuratova, G.A. Ibrokhimova, G.B. Vaisova, N.Z. Arabova, X.P. Burieva, R.M. Bakhramov, T.A. Madumarov, Kh.E. Tursunboev, B.Z. Ashirovich

Correspondence

O.K. Khojimatov[1]*, Rainer W. Bussmann[2,3], Z.Z. Kosimov[4], O.T. Turginov[5], Sh.A. Kuramatova[6], R.X. Esemuratova[7], G.A. Ibrokhimova[8], G.B. Vaisova[9], N.Z. Arabova[10], X.P. Burieva[11], R.M. Bakhramov[8], T.A. Madumarov[8], Kh.E. Tursunboev[7], B.Z. Ashirovich[12]

[1]Tashkent Botanical Garden named after Academician F.N. Russanov at the Institute of Botany of Academy of Science of the Republic Uzbekistan, 100140 Bogishamol str., 232 B, Tashkent, Uzbekistan
[2]Department of Botany, State Museum of Natural History, 76133 Karlsruhe, Germany
[3]Department of Ethnobotany, Institute of Botany, Ilia State University, 0105 Tbilisi, Georgia.
[4]Institute of Botany of Uzbek Academy of Sciences, 100125, Durmon Yuli, st. 32, Tashkent, Uzbekistan
[5]Faculty of Biology and Ecology, Mirzo Ulugbek National University of Uzbekistan, Tashkent 100174, Uzbekistan.
[6]Asian Medical University, Fergana 150100, Uzbekistan
[7]Karakalpak State University, Nukus, Uzbekistan
[8]Department of Ecology and Sustainable Development, Andijan State University, Andijan 170100, Uzbekistan.
[9]Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Tashkent, Uzbekistan
[10]Department of Medicine, Alfraganus University Tashkent, Uzbekistan
[11]Turan University, Department of Natural Sciences, Karshi, Uzbekistan
[12]Bukhara State Medical Institute, Bukhara, Uzbekistan

*Corresponding Author: zikirmagistr@mail.ru

Ethnobotany Research and Applications 34:23 (2026) - http://dx.doi.org/10.32859/era.34.23.1-11
Manuscript received: 06/04/2026 - Revised manuscript received: 18/04/2026 - Published: 18/24/2026

Notes on Ethnobotany

Abstract

Background: Traditional infant care systems constitute an important component of cultural heritage shaped by long-term interactions between human societies and their natural environment. In Central Asia, the Uzbek cradle (beshik) represents a distinctive traditional infant care device that integrates cultural practices with ecological and functional design. Despite its widespread use, the ethnobotanical basis and biophysical properties of materials employed in cradle construction remain insufficiently investigated.

Methods: Ethnobotanical data were collected through semi-structured interviews with 46 traditional craftsmen across four regions of Uzbekistan (Tashkent, Fergana, Samarkand, and Kashkadarya). The study integrated ethnographic observations, literature analysis, and comparative assessment of material properties. Tree species used in cradle construction were identified and taxonomically verified using international botanical databases, and their functional and cultural roles were systematically analyzed.

Results: The study identified four principal tree taxa used in cradle construction: *Salix* spp., *Populus* spp., *Morus alba* L. and *Juglans regia* L. Among these, *Salix* spp. was the dominant material, accounting for approximately 89-90% of cases, primarily due to its high elasticity, low density, and ease of processing. In contrast, *Morus alba* and *Juglans regia* were mainly associated with symbolic and cultural functions. Structural analysis demonstrated that the cradle incorporates a semi-arched support system capable of generating rhythmic, low-amplitude oscillations, which may contribute to infant stabilization and comfort. Additionally, ethnobotanical practices involving aromatic and medicinal plants were documented.

Conclusions: The findings indicate that the Uzbek cradle represents an integrated system shaped by traditional ecological knowledge, combining functional material selection with cultural values. This interdisciplinary approach elucidates the relationships between plant resources, traditional craftsmanship, and infant care practices, and provides a scientific basis for future research on ethnobotanical systems and biofunctional design.

Keywords: ethnobotany; traditional ecological knowledge; cradle; wood properties; Central Asia; infant care; biomaterials; biomechanics

Background

Throughout human history, traditional infant care practices have been shaped by the cultural experiences of different societies, their ecological conditions, and the transmission of practical knowledge across generations (Hewlett & Lamb, 2005; Small, 1998). Studies in cultural anthropology demonstrate that many infant care practices have evolved not only in response to biological needs but also under the influence of social and environmental factors (Rogoff, 2003; Konner, 2010). In many parts of the world, specialized infant sleeping devices, such as cradles or cradleboards, are widely used and have been extensively examined in anthropological and ethnographic research (Gottlieb, 2004; Konner, 2010).

In Central Asia, one of the most important traditional infant care devices is the Uzbek cradle (beshik). The beshik differs significantly from other infant sleeping systems in terms of its structural design, hygienic features, and cultural significance (Karimova, 2008; Kislyakov, 1969). It represents an integral component of the traditional lifestyle of Central Asian peoples, including Uzbeks, Kazakhs, Kyrgyz, and Turkmen (Kislyakov, 1969). Ethnographic studies interpret the beshik not merely as a functional object for infant care, but as a cultural institution closely associated with family traditions, social rituals, and the continuity of generations (Snesarev, 1983). In particular, the traditional Uzbek ceremony known as the “beshik toy” marks the first placement of a newborn into the cradle and represents an important social and cultural event (Karimova, 2008). Through this ritual, the child is symbolically introduced to the community, and the continuity of the family lineage is affirmed (Karimova, 2008).

Despite its cultural importance, most existing studies describe the beshik primarily from ethnographic or folkloric perspectives, while its ecological, biological, and material-related aspects remain insufficiently explored (Cotton, 1996; Albuquerque *et al.* 2014). In particular, the selection of wood species used in cradle construction, their physical properties, and their potential biophysical implications for infant care have received limited scientific attention. However, traditional craftsmen intentionally select specific tree species, such as *Morus alba*, *Juglans regia* and *Populus* spp., based on accumulated ecological and technical knowledge (Berkes, 2018). Such knowledge is commonly recognized as part of traditional ecological knowledge (TEK) systems (Berkes, 2018).

Furthermore, the structure of the cradle may be associated with important biophysical factors influencing infant care (Field, 2010; Thoman, 1990). Mechanical oscillations, the elasticity of wood materials, and structural stability may potentially affect infant sleep patterns and vestibular system development. Contemporary research also emphasizes that the design, hygiene, and material characteristics of infant sleeping systems can significantly influence child health (Blair *et al.* 2020). Therefore, the beshik should be considered not only as a cultural artifact but also as a biomechanically and ecologically shaped traditional system of infant care.

From this perspective, the study of the beshik represents an interdisciplinary research field situated at the intersection of ethnography, ethnobotany, and biophysics (Albuquerque *et al.* 2014). Such an approach enables the identification of ecological and biological foundations of traditional practices and facilitates their scientific interpretation (Turner *et al.* 2000; Berkes, 2018).

Accordingly, examining the beshik as a complex system integrating ecological, material, and biophysical factors is of considerable scientific relevance. In particular, the ethnobotanical analysis of tree species used in its construction, along with

the evaluation of the biophysical properties of wood materials, provides valuable insights into traditional craftsmanship and indigenous ecological knowledge. This approach also contributes to a deeper understanding of the relationships between cultural practices and plant-based natural resources.

Therefore, the main objective of this study is to identify the tree species used in the construction of the traditional Uzbek cradle and to analyze their ethnobotanical significance and biophysical properties. In addition, the study examines the structural elements of the cradle and their functional roles. The findings aim to elucidate the practical manifestations of traditional ecological knowledge in infant care and to provide a scientific interpretation of the relationship between cultural heritage and plant resources in Central Asia.

Materials and Methods

Research area

This study was aimed at investigating the ethnobotanical and biophysical properties of the traditional Uzbek cradle (beshik), a widely used infant care system in Central Asia. The research was conducted across different ecological and cultural regions of Uzbekistan.

Field observations and ethnobotanical data were collected from four major regions of the country: the Fergana Valley, the Tashkent oasis, Samarkand, and the Kashkadarya region. These areas were selected as representative study sites due to their diverse natural and geographical conditions, as well as the preservation of traditional craftsmanship practices, particularly cradle-making.

Uzbekistan is characterized by a predominantly continental climate, with extensive desert, steppe, and foothill landscapes. In these regions, locally available wood resources commonly used in traditional craftsmanship include *Morus alba*, *Juglans regia*, *Populus* spp. and *Salix* spp. These tree species have historically been utilized for the production of various wooden items, including traditional cradles.

The geographical location of the study area and the regions where ethnobotanical observations were conducted are presented in Figure 1.

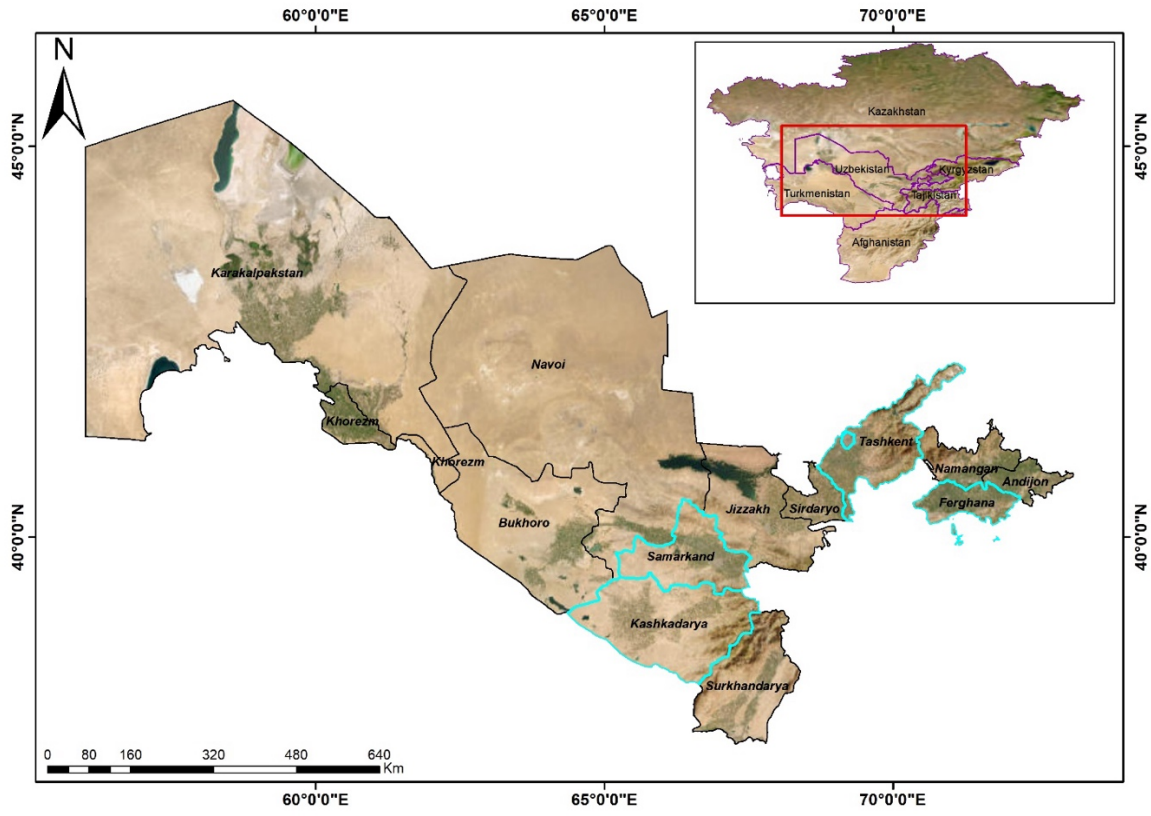

Figure 1. Study area showing the regions of Uzbekistan included in the ethnobotanical investigation of traditional cradle construction.

Ethnographic context

The traditional Uzbek cradle (beshik) represents an important element of the material culture of Central Asian peoples and serves as a widely used infant care device. It is employed across almost all regions of Uzbekistan and is characterized by a complex construction designed to ensure infant safety, stabilize sleep patterns, and maintain hygienic conditions. The process of cradle production is largely based on traditional craftsmanship practices and knowledge systems that have been transmitted across generations, forming an integral part of traditional ecological knowledge.

In this study, cradle-making traditions, wood selection practices, and the practical knowledge of craftsmen were investigated using an ethnographic approach. Semi-structured interviews were conducted with local craftsmen to collect information on the tree species used in cradle construction, the criteria for material selection, and the structural characteristics of the cradle.

In addition, historical and cultural aspects related to the cradle were examined through the analysis of existing ethnographic sources. In particular, classical studies on the material culture of Central Asian peoples, traditional infant care practices, and cradle-related rituals (Kislyakov, 1969; Snesarev, 1983; Karimova, 2008) were reviewed. These sources provided an important theoretical framework for interpreting the historical development of the cradle and its role within regional cultural traditions.

Data collection methods

A combination of complementary research methods was employed in this study, including (1) ethnobotanical observation, (2) ethnographic interviews, (3) literature analysis, and (4) comparative assessment of material properties.

To investigate traditional cradle-making practices, semi-structured ethnographic interviews were conducted with local craftsmen. Participants were selected using purposive sampling, focusing on individuals with extensive experience and knowledge of traditional cradle construction. Prior to data collection, informed consent was obtained from all participants. The interviews were carried out in accordance with standard ethical guidelines for ethnographic research, ensuring anonymity and voluntary participation.

Qualitative data obtained from the interviews were analyzed using thematic content analysis. Responses were systematically categorized based on recurring themes related to material selection, construction techniques, and ethnobotanical knowledge. To ensure data reliability and validity, the information collected from interviews was cross-checked with existing ethnographic literature and compared across different regions.

During the interviews, detailed information was collected on the main stages of cradle production and the criteria used in wood selection. The interviews were guided by a set of key questions addressing: (1) the tree species selected for cradle construction, (2) criteria for wood selection, (3) methods of wood drying and processing, and (4) traditional structural elements of the cradle.

The data obtained from interviews were further analyzed through comparative evaluation with information reported in ethnographic and scientific literature, allowing for a more comprehensive interpretation of the results.

Ethnobotanical analysis

The list of tree species used in traditional cradle construction was compiled based on data obtained from interviews with craftsmen and the analysis of ethnographic sources. The identified species were taxonomically verified according to modern botanical nomenclature, and their scientific names were cross-checked against international botanical databases.

Nomenclature was validated using Plants of the World Online (POWO) and World Flora Online databases to ensure taxonomic accuracy and consistency.

The study identified four principal tree taxa commonly used in cradle construction:

1. *Salix* spp. (willow)
2. *Juglans regia* L. (walnut)
3. *Populus* spp. (poplar)
4. *Morus alba* L. (mulberry).

The selection of these species was analyzed in relation to their physical properties, including mechanical strength, elasticity, workability, and hygienic characteristics. These factors were considered essential in determining their suitability for cradle construction.

Structural and biophysical analysis

To evaluate the biophysical properties of the cradle, its main structural components-frame, rocking mechanism, and center of gravity-were analyzed. The biomechanical characteristics of the cradle were assessed in terms of rhythmic motion and low-amplitude oscillations (Field, 2010; Provasi *et al.* 2011).

The rocking mechanism of the cradle was further examined through comparison with existing studies on infant vestibular system responses and sleep regulation. In addition, the elasticity and vibration-damping properties of the wood materials were evaluated based on established literature on the physical properties of wood (Forest Products Laboratory, 2010).

Literature analysis

To investigate the ethnographic, cultural, and technological aspects of the traditional cradle, a wide range of scientific literature was analyzed, including studies on the material culture of Central Asian peoples, anthropological research, and contemporary scientific publications. The selected literature was examined using a comparative approach, and the reported information was reinterpreted from ethnobotanical and biophysical perspectives.

Research approach

This study is based on an interdisciplinary approach, integrating concepts and methods from ethnobotany, ethnography, and biophysics. Such an approach enables the identification of ecological and biological foundations of traditional infant care systems and facilitates a scientific interpretation of cradle construction as a functionally and culturally adapted system.

Results

Ethnobotanical composition of wood species used in cradle construction

The results of the study indicate that traditional craftsmen exhibit a clear preference for specific tree species when selecting wood materials for cradle construction. Based on semi-structured interviews conducted with craftsmen from different regions of Uzbekistan, as well as the analysis of ethnographic sources, four main tree species were identified as commonly used in the production of traditional cradles: *Morus alba* L., *Juglans regia* L., *Populus* spp. and *Salix* spp. The functional and ethnobotanical characteristics of these species are summarized in Table 1.

Table 1. Ethnobotanical and biophysical characteristics of tree species used in traditional Uzbek cradle construction

Voucher number	Species (Scientific name)	Family	Local name	Role in cradle construction	Ethnobotanical and medicinal uses
O‘ETB154	*Morus alba* L.	Moraceae	Tut	Lightweight, durable, and resistant to cracking; used in selected structural components; culturally associated with fertility and prosperity	Bark and roots used as expectorant and diuretic; leaves and fruits applied for fever reduction and gastrointestinal disorders
O‘ETB124	*Juglans regia* L.	Juglandaceae	Yong‘oq	Dense and highly durable wood; used for decorative and load-bearing elements; symbolically associated with abundance	Exhibits antibacterial and anti-inflammatory properties; leaves used for skin and inflammatory conditions
O‘ETB362	*Populus* spp.	Salicaceae	Terak	Lightweight, fast-drying, and easily processed wood; used in simpler structural components	Bark used in traditional medicine for anti-inflammatory and analgesic purposes
O‘ETB364	*Salix* spp.	Salicaceae	Tol	Elastic, flexible, and easy to process; primary material for cradle construction (≈89-90% of cases)	Bark and leaves used for anti-inflammatory, analgesic, and antimicrobial treatments

Note: The data presented in the table were synthesized based on field interviews and ethnobotanical sources.

Figure 2. Main tree species traditionally used for Uzbek cradle construction:
A - *Morus alba* L. (mulberry): general habit and fruits
B - *Juglans regia* L. (walnut): trunk morphology and fruits
C - *Populus* spp. (poplar): trunk morphology
D - *Salix* spp. (willow): generative branches and inflorescences

A total of 46 craftsmen were interviewed during the study. The sample size was considered sufficient to capture regional variation and ensure data saturation. The average age of respondents ranged from 45 to 57 years across regions, indicating that cradle-making practices are primarily preserved by highly experienced craftsmen. This observation further suggests that the knowledge associated with cradle construction is largely transmitted through generational continuity.

Quantitative analysis of interview data revealed that *Salix* spp. was the most frequently used material, accounting for approximately 89-90% of all recorded cases. In contrast, *Populus* spp. was used in approximately 10-11% of cases, while *Morus alba* and *Juglans regia* were not used in the primary structural components of the cradle. These findings demonstrate a strong preference for *Salix* spp. as the principal construction material. The regional distribution of tree species used in cradle construction is presented in Table 2 and Figure 2.

Table 2. Regional distribution of tree species used in traditional Uzbek cradle construction

Region	**Number of craftsmen interviewed**	**Mean age (years)**	***Morus alba***	***Juglans regia***	***Populus* spp.**	***Salix* spp.**
Tashkent	11	57	0	0	1	10
Fergana	13	45	0	0	2	11
Samarkand	10	47	0	0	1	9
Kashkadarya	12	51	0	0	1	11

Note: Percentages were calculated based on total observations (n = 46).

In contrast, *Morus alba* and *Juglans regia* are currently rarely used in the primary structural components of cradle construction. Instead, they are applied in a limited manner for internal or decorative elements. This pattern cannot be explained solely by mechanical properties but reflects a deeper ethnobotanical basis. As fruit-bearing trees, mulberry and walnut are traditionally associated with fertility, abundance, and prosperity in local cultural perceptions. Therefore, their inclusion in cradle construction carries symbolic meaning, representing wishes for well-being and reproductive continuity for the newborn.

The dominance of *Salix* spp., on the other hand, is primarily related to its favorable biophysical properties. This wood type is characterized by high elasticity, low density, ease of processing, and resistance to deformation (Forest Products Laboratory, 2010). In addition, *Populus* spp. is occasionally used due to its lightweight structure and workability. Notably, both willow and poplar are widely utilized in traditional agricultural practices, particularly for the production of tool handles such as hoes and shovels (Figure 3). This indicates the multifunctional role of these tree species within traditional rural economies.

Figure 3. Use of *Salix* spp. (willow) and *Populus* spp. (poplar) wood in traditional agricultural practices: handles of farming tools (hoes, shovels, and related implements).

Structural characteristics of the traditional cradle

Analysis of the examined cradle samples revealed that their construction consists of several main structural components, including the primary frame, rocking supports, lateral supports, and the infant fixation system.

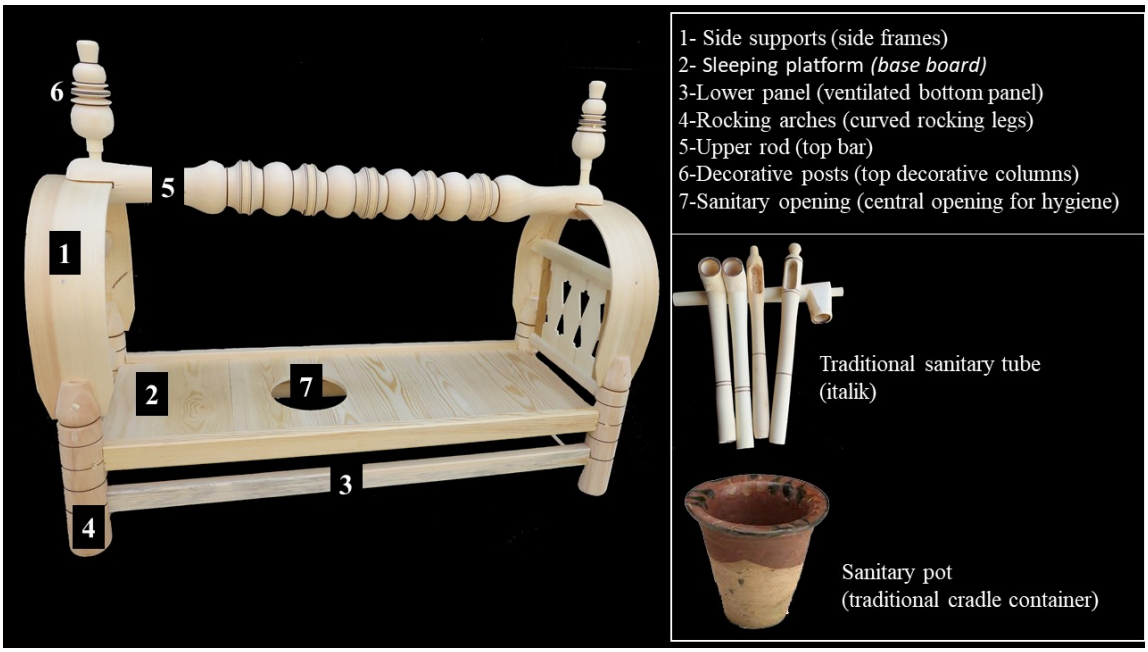

Figure 4. Main structural elements of the traditional Uzbek cradle: frame, rocking arcs, lateral supports, and hygienic system components.

The frame of the cradle typically consists of two longitudinal side elements connected by transverse supports. In the lower part of the structure, semi-arched supports are positioned to enable rocking motion. This design allows the cradle to maintain structural stability while facilitating controlled, rhythmic oscillations.

Within the cradle, a system of soft textile supports and fastening straps is used to maintain the infant in a stable position. In addition, the traditional cradle includes a hygienic system incorporating a small receptacle, which allows the infant to remain dry for extended periods.

Biophysical properties of the cradle structure

Analysis of the cradle structure indicates that it possesses distinct biophysical characteristics. The semi-arched supports generate rhythmic, low-amplitude oscillations that may help maintain the infant in a stable position.

Furthermore, the wood materials used in cradle construction exhibit moderate elasticity, enabling partial absorption of vibration during oscillatory motion. This property reduces abrupt mechanical impacts and contributes to a more stable and comfortable environment for the infant.

Overall, the results suggest that the combination of structural design and material properties forms a balanced biomechanical system capable of producing gentle, rhythmic motion that may contribute to infant comfort and stabilization.

Ethnobotanical practices associated with cradle use

During the study, several ethnobotanical practices associated with cradle use were documented. According to local traditional beliefs, the use of certain plant species in the immediate environment of the infant serves hygienic and protective functions.

For example, in some regions, the burning of *Peganum harmala* (harmal) or the placement of branches of *Juniperus* spp. near the cradle was observed. In addition, aromatic plants such as *Ocimum basilicum* and *Mentha* spp. were commonly kept in proximity to the cradle.

These practices are closely linked to traditional cultural perceptions and are often interpreted as measures aimed at protecting the infant from harmful influences and improving the surrounding microenvironment.

Figure 5. Decorative elements of the traditional Uzbek cradle: embroidered textile cover and an example of aesthetic design.

Discussion

The results of this study demonstrate that the traditional Uzbek cradle (beshik) is not only a widely distributed cultural artifact in Central Asia, but also a complex system shaped by ecological and biophysical factors. The selection of tree species and the structural characteristics of the cradle identified in this study indicate that traditional craftsmanship practices are grounded in long-term ecological observations and accumulated empirical knowledge.

The findings show that cradle construction primarily relies on the use of *Morus alba*, *Juglans regia*, *Populus* spp., and *Salix* spp. The selection of these species is closely related to their material properties, including low density, elasticity, mechanical strength, and workability, all of which are essential for cradle construction. The process of material selection by craftsmen is based on long-standing practical experience transmitted across generations, which can be interpreted as a key component of traditional ecological knowledge (TEK). Similar patterns have been documented in other traditional craft systems, where the physical and ecological properties of locally available resources play a crucial role in material selection.

The analysis of cradle structure further suggests that it possesses distinct biomechanical characteristics. The semi-arched supports generate rhythmic, low-amplitude oscillations that are likely to help maintain the infant in a stable position. Such oscillatory motion may be associated with physiological processes related to the vestibular system and infant sleep regulation. Comparable findings have been reported for other infant care devices, where rhythmic and low-intensity motion has been shown to contribute to sleep stabilization (Field, 2010; Provasi *et al.* 2011). In this context, the traditional cradle can be interpreted as a biomechanically optimized system developed through empirical knowledge. For instance, *Morus alba* is not only used in cradle construction but is also widely applied in traditional paper production (Figure 6), further supporting its multifunctional ethnobotanical significance.

In addition to their role in cradle construction, the identified tree species demonstrate a broader multifunctional significance within traditional rural economies. For example, *Morus alba* is widely used not only for timber and paper production, but also as a primary food source for silkworms (Bombyx mori), highlighting its importance in sericulture. Similarly, *Populus spp*. and *Salix spp*. are commonly utilized in rural furniture production, agricultural tools, and construction materials. These multiple uses indicate that the selection of wood species for cradle construction is not solely based on their mechanical properties, but also reflects their availability, economic value, and long-standing integration into local livelihood systems.

Figure 6. One of the traditional uses of *Morus alba* L.: handmade paper production process, including bark processing and the final product.

During the study, several ethnobotanical practices associated with cradle use were also documented. In some regions, the use of plants such as *Peganum harmala* and *Juniperus* spp. around the infant was observed. Although certain species of these plants are known to possess antimicrobial or aromatic properties, as reported in scientific studies, their practical application in infant care is primarily associated with traditional beliefs and cultural perceptions (Duke, 2002). Therefore, the use of plants in the vicinity of the cradle can be considered as part of traditional ecological knowledge.

The findings of this study emphasize that the traditional Uzbek cradle should not be viewed solely as an ethnographic object, but rather as a system shaped at the intersection of cultural, ecological, and biophysical factors. Such an approach contributes to a deeper understanding of the scientific basis of traditional practices and the long-term interactions between humans and their natural environment.

At the same time, this study has certain limitations. In particular, the biophysical properties of the cradle structure were primarily evaluated through theoretical and comparative analysis. The lack of direct experimental measurements represents a limitation of the present study. Future research should include quantitative evaluation of mechanical parameters such as oscillation frequency, amplitude, and damping properties of cradle structures, as well as the physical properties of wood

materials under controlled conditions. Experimental investigation of these parameters would allow for a more comprehensive understanding of cradle mechanics and further strengthen this line of research.

In this study, the analysis of traditional plant resource use was expanded by incorporating their biophysical properties as a methodological approach. This integrative framework enables the interpretation of plant resources not only in ethnobotanical or cultural contexts, but also in relation to their physical and functional characteristics. From this perspective, the integration of biophysical properties into ethnobotanical research represents a promising direction for future studies.

Overall, the results demonstrate that the traditional Uzbek cradle is not only an important element of Central Asia's cultural heritage, but also a reflection of traditional ecological knowledge and accumulated experience in material selection. The structure of the cradle and the materials used in its construction embody both ecological and biophysical aspects of infant care, representing a system developed through centuries of empirical knowledge.

Conclusion

The results of this study demonstrate that the traditional Uzbek cradle (beshik) is not merely a cultural and ethnographic object, but a complex system formed at the intersection of ecological, material, and biophysical factors. The study identified that cradle construction primarily involves the use of *Morus alba*, *Juglans regia*, *Populus* spp. and *Salix* spp., with species selection closely linked to key material properties such as low density, elasticity, mechanical strength, and workability. This indicates that the process of material selection is not arbitrary but is based on long-term practical experience and traditional ecological knowledge (Berkes, 2018).

Biomechanical analysis of the cradle structure suggests that the semi-arched supports generate rhythmic, low-amplitude oscillations that may help maintain infant stability and create a soothing motion environment. This supports the interpretation of the cradle as a functionally optimized system developed through empirical knowledge. In addition, ethnobotanical practices associated with cradle use, including the application of *Peganum harmala* and *Juniperus* spp., further highlight the cultural and hygienic significance of plant resources in infant care.

This study introduces an integrative methodological approach that incorporates the biophysical properties of plant materials into the analysis of traditional plant use. Such an approach enables a more comprehensive interpretation of plant resources by linking their ecological, cultural, and functional dimensions, and may contribute to the advancement of ethnobotanical research.

Overall, the traditional Uzbek cradle represents a unique example of cultural heritage shaped by centuries of accumulated knowledge, reflecting the integration of ecological understanding, material selection practices, and biomechanical principles. Future research should focus on experimental investigation of mechanical parameters, including oscillation frequency, amplitude, and damping properties, as well as the effects of cradle dynamics on infant physiology.

Declarations

Ethics approval and consent to participate: All ethnobotanical research activities conducted within this study complied with internationally accepted ethical guidelines for ethnobotanical research. Information obtained from local inhabitants was used exclusively in aggregated and anonymized form for scientific purposes. Oral informed consent was obtained from all participants prior to data collection.

Consent for publication: People shown in images gave their consent to have the image published.

Availability of data and materials: The ethnobotanical data supporting the findings of this study are stored by the authors and are available from the corresponding author upon reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: This research was conducted within the framework of the state program "Digital Nature" (2025-2029), implemented by the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan. The study was also supported by the fundamental research project FL-9024093685 entitled "Biodiversity Centers of Transboundary Regions of Uzbekistan and Their Current Status."

Authors' contributions: All authors contributed to the conception and design of the study. Data collection and analysis were performed collaboratively. All authors participated in manuscript preparation, critically revised the text, and approved the final version of the manuscript.

Acknowledgments

The authors express their sincere appreciation for the organizational and scientific support provided during the implementation of this study. We are particularly grateful to the local communities and informants who generously shared their traditional knowledge and ethnobotanical experience during the field surveys and data collection process.

This research was supported by the applied state program “Digital Nature” (2025-2029) implemented by the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan, as well as by research project A-FA-2021-144 (2021-2024), which contributed to the development and maintenance of the ethnobotanical database used in this study.

Literature Cited

Albuquerque UP, Cruz da Cunha LVF, Paiva de Lucena RF, Alves RRN. 2014. Methods and techniques in ethnobiology and ethnobotany. New York: Springer.

Berkes F. 2018. Sacred ecology (4th ed.). New York: Routledge.

Blair PS, Sidebotham P, Pease A, Fleming PJ. 2020. Bed-sharing in the absence of hazardous circumstances: Is there a risk of sudden infant death syndrome? PLos ONE 15(5):e0232993.

Cotton CM. 1996. Ethnobotany: Principles and applications. Chichester: John Wiley & Sons.

Duke JA. 2002. Handbook of medicinal herbs (2nd ed.). Boca Raton: CRC Press.

Field T. 2010. Touch for socioemotional and physical well-being: A review. Developmental Review 30(4):367-383.

Forest Products Laboratory 2010. Wood handbook: Wood as an engineering material. Madison, WI: U.S. Department of Agriculture, Forest Service.

Gottlieb A. 2004. The afterlife is where we come from: The culture of infancy in West Africa. Chicago: University of Chicago Press.

Hewlett BS, Lamb ME. 2005. Hunter-gatherer childhoods: Evolutionary, developmental and cultural perspectives. New Brunswick: Transaction Publishers.

Karimova GK. 2008. Ethnography of Uzbekistan. Tashkent: Fan.

Kislyakov NA. 1969. Ethnography of Central Asia. Moscow: Nauka.

Konner M. 2010. The evolution of childhood: Relationships, emotion, mind. Cambridge: Harvard University Press.

Provasi J, Anderson DI, Barbu-Roth M. 2011. Rhythm perception, production, and synchronization during the perinatal period. Frontiers in Psychology 2:1-10.

Rogoff B. 2003. The cultural nature of human development. Oxford: Oxford University Press.

Small MF. 1998. Our babies, ourselves: How biology and culture shape the way we parent. New York: Anchor Books.

Snesarev GP. 1983. Traditions and customs of the peoples of Central Asia. Moscow: Nauka.

Thoman EB. 1990. Sleeping and waking states in infants: A functional perspective. Neuroscience & Biobehavioral Reviews 14(1):93-107.

Turner NJ, Ignace MB, Ignace R. 2000. Traditional ecological knowledge and wisdom of aboriginal peoples in British Columbia. Ecological Applications 10(5):1275-1287.