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Language as a Repository of Indigenous Agricultural Knowledge: Insights from the Traditional Minangkabau Agricultural Lexicon

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A B S T R A C T

This review paper examines the critical role of language as a repository for indigenous agricultural knowledge, with specific focus on the traditional Minangkabau agricultural lexicon of West Sumatra, Indonesia. Drawing upon interdisciplinary perspectives from ethnolinguistics, ethnobotany, and cultural anthropology, this study synthesizes existing literature to demonstrate how agricultural terminology encodes generations of ecological wisdom, sustainable farming practices, and cultural values. The Minangkabau people, renowned for their matrilineal social system and strong cultural traditions, have developed a rich vocabulary related to rice cultivation, agroforestry, and land management that represents an invaluable repository of traditional ecological knowledge. This review identifies the structural characteristics of the agricultural lexicon, examines its role in transmitting indigenous knowledge across generations, and discusses the threats posed by modernization and language shift. The findings underscore the urgent need for documentation and revitalization efforts to preserve this linguistic heritage as a foundation for sustainable agricultural development and biocultural diversity conservation.

Contribution to Sustainable Development Goals (SDGs):

SDG 2: Zero Hunger

SDG 4: Quality Education

SDG 11: Sustainable Cities and Communities

SDG 12: Responsible Consumption and Production

SDG 15: Life on Land

1. INTRODUCTION

1.1. Research Background

Language is more than a means of communication; it is a repository through which communities preserve and transmit ecological knowledge, cultural values, technological innovations, and practical experience across generations (Murmu et al., 2026). In agricultural societies, specialized lexical systems encode knowledge about landscapes, crops, cultivation techniques, post-harvest processing, and resource management. These lexical systems therefore represent an integral component of indigenous agricultural knowledge, enabling communities to preserve

farming practices and environmental wisdom beyond formal written documentation.

In recent decades, however, agricultural modernization has transformed traditional farming systems worldwide. Mechanization and technological intensification have substantially improved productivity while simultaneously simplifying many traditional agricultural practices. As cultivation and post-harvest activities become increasingly standardized, numerous specialized lexical items associated with these practices are gradually falling into disuse. The disappearance of agricultural vocabulary therefore represents more than linguistic change; it reflects the gradual erosion of procedural knowledge, ecological understanding, indigenous technologies, and cultural memory accumulated through generations of farming experience.



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This issue is particularly relevant in Indonesia, one of the world's most linguistically diverse countries, where hundreds of regional languages preserve unique systems of environmental knowledge and sustainable agricultural practices (Stark & Hassan, 2023). Among them, the Minangkabau language provides a compelling case because its agricultural lexicon reflects centuries of interaction between people, landscapes, and farming traditions. As one of the world's largest matrilineal societies, the Minangkabau have developed sophisticated agricultural systems encompassing wet-rice cultivation, dryland farming, agroforestry, plantation agriculture, and traditional food processing (Ahmad & Zulfidar, 2023). Their language contains specialized lexical items that distinguish farming landscapes, crop varieties, cultivation techniques, harvesting methods, agricultural implements, post-harvest processing, and agricultural by-products, collectively preserving an integrated system of indigenous agricultural knowledge.

The Minangkabau philosophy *alam takambang jadi guru* ('nature as the ultimate teacher') further illustrates that farming practices are inseparable from broader ecological and cultural values (Rahayu et al., 2026). Agricultural knowledge is embedded not only in farming activities but also in the linguistic categories through which those activities are conceptualized and transmitted. Lexical items referring to rice cultivation, rubber tapping, gambier processing, and other traditional agricultural practices encode sequences of actions, technological skills, ecological observations, and locally adapted resource-management strategies developed through generations of farming experience.

Despite growing scholarship on indigenous knowledge, traditional ecological knowledge, and language documentation, relatively little attention has been paid to agricultural lexicons as repositories of procedural and sustainability-related knowledge. Existing studies have primarily documented agricultural terminology, ethnobotanical inventories, or farming systems, while the ways in which lexical organization preserves agricultural workflows, traditional technologies, and sustainable resource-management practices remain underexplored. This review addresses that gap by synthesizing interdisciplinary literature and illustrating, through representative evidence from the Minangkabau agricultural lexicon, how language functions as a repository of indigenous agricultural knowledge and why documenting agricultural lexical heritage contributes to knowledge sustainability in the context of agricultural modernization.

1.2. Literature Review

This review positions agricultural lexicons not merely as linguistic resources but as repositories of indigenous agricultural knowledge that support language preservation, knowledge sustainability, and sustainable agricultural development.

First, documenting traditional agricultural lexicons contributes to language preservation by recording specialized vocabulary that is increasingly threatened not only by language shift among younger generations (Mare & Leba, 2025) but also by the transformation of traditional farming practices resulting from agricultural modernization.

Second, agricultural lexicons preserve traditional ecological knowledge together with procedural knowledge, indigenous technologies, and locally adapted resource-management strategies that remain relevant for sustainable agriculture,

biodiversity conservation, climate resilience, and food security (Siahaya et al., 2016). Rather than functioning merely as labels for agricultural objects or activities, these lexical systems encode farming practices, post-harvest technologies, and adaptive strategies developed through long-term interaction with local environments.

Third, linguistic analysis provides important insights into the cognitive and cultural frameworks through which indigenous communities organize and transmit agricultural knowledge (Harvey, 1996). By integrating perspectives from ethnolinguistics, indigenous knowledge studies, and sustainable agriculture, this review argues that traditional agricultural lexicons should be understood not simply as specialized terminology but as organized linguistic systems that preserve ecological, procedural, technological, and cultural knowledge, thereby contributing to both cultural continuity and knowledge sustainability.

1.3. Research Objective and Scope

This review aims to synthesize interdisciplinary scholarship on language, indigenous knowledge, and sustainable agriculture to examine how traditional agricultural lexicons function as repositories of indigenous agricultural knowledge. Specifically, it seeks to: (1) examine the relationships among language, indigenous knowledge, and sustainable agriculture; (2) characterize the structural and semantic organization of the traditional Minangkabau agricultural lexicon; (3) analyze how agricultural lexical items encode ecological, procedural, technological, and cultural knowledge embedded in traditional farming practices; (4) examine the impacts of agricultural modernization on the vitality of traditional agricultural lexicons and the sustainability of indigenous agricultural knowledge systems; and (5) propose strategies for documenting and preserving agricultural lexical heritage as part of sustainable agricultural and cultural development.

The review draws upon studies in ethnolinguistics, linguistic anthropology, cognitive linguistics, ethnobotany, traditional ecological knowledge, agricultural studies, and sustainability research. Representative examples from the Minangkabau agricultural lexicon are used to illustrate broader conceptual relationships between language, indigenous agricultural knowledge, and knowledge sustainability rather than to provide an exhaustive inventory of agricultural terminology.

2. MATERIALS AND METHODS

2.1. Theoretical Framework

2.1.1. Language as a Repository of Indigenous Knowledge

Language is widely recognized not only as a means of communication but also as a repository through which communities preserve, organize, and transmit knowledge across generations. Rather than functioning as a passive system of symbols, language reflects the accumulated experiences, cultural values, environmental observations, and practical knowledge developed through long-term interaction with particular ecological and social contexts (Murmu et al., 2026). Within this perspective, lexical systems constitute cognitive resources that

encode culturally significant distinctions and organize knowledge in ways that are meaningful to their speech communities.

This view is supported by ethnolinguistic and cognitive linguistic perspectives, which emphasize that language both reflects and shapes the conceptual organization of human experience. While the principle of linguistic relativity suggests that linguistic categories influence how speakers perceive and interpret the world (Harvey, 1996), contemporary approaches place greater emphasis on language as a system for organizing culturally salient knowledge rather than determining thought itself. Lexical distinctions therefore reveal how communities classify their environments, technologies, and everyday practices according to locally developed systems of understanding.

For indigenous agricultural communities, language preserves not only the names of crops, landscapes, and farming tools but also the knowledge associated with cultivation techniques, harvesting procedures, post-harvest processing, and resource management. Agricultural lexicons thus function as repositories of indigenous agricultural knowledge, enabling practical experience, environmental understanding, and cultural values to be transmitted across generations despite the absence of formal written documentation.

2.1.2. *Agricultural Lexicons as Organized Knowledge Systems*

Agricultural lexicons should not be understood merely as collections of specialized vocabulary describing farming activities. Rather, they constitute organized knowledge systems in which lexical items encode relationships among agricultural environments, cultivation practices, technologies, production processes, and cultural traditions. The semantic organization of agricultural vocabulary reflects the ways in which farming communities conceptualize agricultural activities and structure practical knowledge accumulated through generations of experience.

Within these lexical systems, different semantic domains preserve different types of knowledge. Terms referring to landscapes and crop varieties encode ecological knowledge; verbs describing cultivation, harvesting, and post-harvest activities preserve procedural knowledge; names of agricultural implements reflect indigenous technological knowledge; while lexical items referring to agricultural by-products document traditional strategies of resource utilization and environmental adaptation. Together, these interconnected semantic domains form an integrated linguistic representation of indigenous agricultural knowledge rather than isolated inventories of agricultural terminology.

Consequently, analyzing agricultural lexicons requires attention not only to lexical meaning but also to the knowledge structures embedded within semantic organization. This perspective shifts the focus of agricultural lexicon studies from documenting vocabulary to understanding how language preserves and organizes indigenous agricultural knowledge.

2.1.3. *Indigenous Agricultural Knowledge and Traditional Ecological Knowledge*

Traditional Ecological Knowledge (TEK) refers to the cumulative body of knowledge, practices, and beliefs developed by indigenous communities through long-term interaction with their environments (Ma et al., 2024). It encompasses ecological

observations, resource-management practices, social institutions, and cultural values that guide human relationships with nature. In agricultural communities, TEK is expressed through knowledge of soils, seasonal cycles, crop diversity, water management, and environmental adaptation (Duakaju & Imang, 2021).

However, indigenous agricultural knowledge extends beyond ecological understanding alone. Farming also involves procedural knowledge concerning cultivation and post-harvest processing, technological knowledge embodied in locally developed tools and techniques, and cultural knowledge reflected in customary practices, rituals, and collective labor systems. These complementary forms of knowledge are frequently encoded in specialized agricultural lexicons that preserve not only what communities know about the environment but also how agricultural activities are performed and transmitted across generations.

Accordingly, this review adopts a broader perspective by treating traditional ecological knowledge as one component of a more comprehensive system of indigenous agricultural knowledge. This perspective enables agricultural lexicons to be interpreted as linguistic repositories of ecological, procedural, technological, and cultural knowledge that collectively support the continuity of sustainable agricultural practices.

2.1.4. *Agricultural Modernization, Lexical Attrition, and Knowledge Sustainability*

Agricultural modernization has transformed farming systems through mechanization, technological intensification, and the simplification of production processes. While these developments have improved efficiency and productivity, they have also reduced the use of many traditional cultivation and post-harvest practices. As agricultural activities become increasingly mechanized, the specialized vocabulary associated with traditional techniques gradually loses its functional relevance within everyday communication.

The decline of agricultural lexicons should therefore be understood not merely as lexical loss but as an indicator of broader knowledge erosion. When traditional agricultural activities disappear, the procedural knowledge, indigenous technologies, ecological observations, and cultural practices embedded within their associated vocabulary also become increasingly vulnerable. Lexical attrition thus reflects the gradual weakening of intergenerational knowledge transmission.

From this perspective, documenting agricultural lexicons contributes not only to language preservation but also to knowledge sustainability. Recording traditional agricultural vocabulary preserves evidence of how indigenous communities conceptualized agricultural environments, organized farming activities, developed locally adapted technologies, and maintained sustainable relationships with natural resources. Agricultural lexicon documentation therefore represents an important strategy for safeguarding indigenous agricultural knowledge in the context of continuing agricultural modernization.

2.1.5. Conceptual Framework

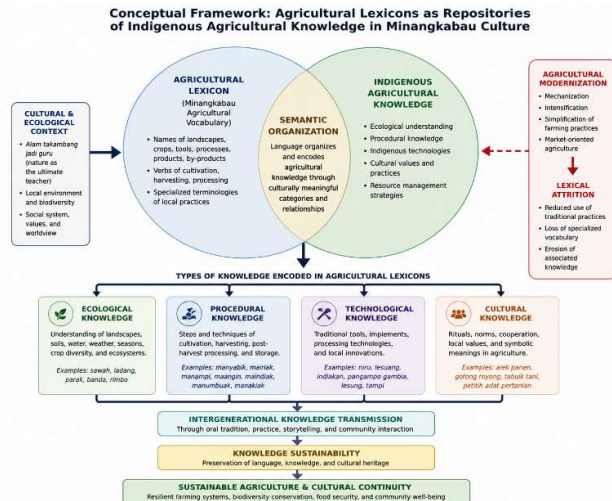


Figure 1. Conceptual framework illustrating the relationship among the Minangkabau agricultural lexicon, indigenous agricultural knowledge, and knowledge sustainability.

The framework shows that agricultural lexicons organize ecological, procedural, technological, and cultural knowledge, while intergenerational transmission of this knowledge contributes to sustainable agricultural development. Agricultural modernization simultaneously poses a challenge through the risk of lexical attrition and knowledge erosion.

2.2. The Minangkabau Cultural Context of Indigenous Agricultural Knowledge

2.2.1. Ecological Landscape and Agricultural Environment

The Minangkabau people inhabit the province of West Sumatra, Indonesia, a region characterized by remarkable ecological diversity ranging from coastal plains and river valleys to volcanic highlands and tropical forests. This environmental diversity has shaped a variety of agricultural landscapes, including irrigated rice fields (*sawah*), upland cultivation areas (*ladang*), traditional agroforestry systems (*parak*), and customary protected forests (*rimbo larangan*). Rather than representing simple geographical categories, these landscapes constitute culturally managed ecological systems that have supported agricultural production while maintaining biodiversity and environmental sustainability over generations.

Among these landscapes, *parak* occupies a particularly significant position within the Minangkabau agricultural system. Rather than referring merely to a garden or plantation, *parak* denotes a traditional agroforestry landscape consisting of mixed tree gardens established on hillsides between villages and protected forests (Michon, Mary, & Bompard). Characterized by multilayered vegetation and high species diversity, *parak* integrates commercial crops such as cinnamon, coffee, nutmeg, fruit trees, and seasonal crops with naturally regenerated forest species. Its ecological structure closely resembles that of natural forests, allowing continuous production while maintaining ecological functions. The existence of a specialized lexical item for this landscape demonstrates that the Minangkabau language

encodes sophisticated ecological knowledge concerning sustainable land-use systems rather than simply naming physical environments.

The intimate relationship between language and landscape is further reflected in other culturally significant ecological concepts such as *rimbo larangan*, the customary protected forest governed by indigenous regulations. This traditional conservation system illustrates how environmental management is embedded within both cultural institutions and linguistic categorization, providing ecological services while ensuring the sustainable use of forest resources (Alandra et al., 2018). Together, these landscape lexicons reveal that environmental classification in the Minangkabau language reflects ecological functions, management practices, and long-term interactions between people and nature.

2.2.2. Indigenous Agricultural Systems and Sustainable Land Management

Agriculture has long formed the economic and cultural foundation of Minangkabau society, with wet-rice cultivation representing its most important subsistence system. Over centuries, Minangkabau communities developed integrated agricultural practices that combine irrigated rice farming, upland cultivation, agroforestry, and forest conservation into a resilient production system adapted to local ecological conditions. Ethnobotanical studies demonstrate the remarkable richness of this system, documenting more than 150 food plant species utilized by Minangkabau communities, with rice (*Oryza sativa*) occupying the highest cultural importance while coconut (*Cocos nucifera*) exhibits the greatest diversity of traditional uses (Agesti et al., 2023).

Beyond crop diversity, Minangkabau agriculture embodies sophisticated indigenous technologies and sustainable management strategies inherited across generations. Traditional rice cultivation historically relied on buffalo-powered plowing (*mambajak*) using wooden plows, demonstrating adaptation to flooded paddy ecosystems without dependence on fossil-fuel-based machinery. Likewise, agroforestry systems such as *parak* and conservation practices represented by *rimbo larangan* illustrate how agricultural production has traditionally been integrated with biodiversity conservation, soil protection, and sustainable resource use.

Importantly, these agricultural systems have generated a rich body of specialized vocabulary describing agricultural landscapes, farming activities, traditional technologies, crop varieties, and post-harvest processing. The existence of this extensive lexical repertoire indicates that language functions not merely as a means of communication but as a systematic record of ecological adaptation, technological innovation, and sustainable farming practices accumulated through generations of agricultural experience.

2.2.3. Agriculture as Cultural Knowledge

Within Minangkabau society, agriculture is understood not merely as an economic activity but as a knowledge-based cultural practice. Farming success is traditionally perceived as the result of ecological understanding, technical competence, and accumulated experience rather than physical labor alone. This philosophy is encapsulated in the well-known Minangkabau proverb:

Ka ladang di hulu tahun, ka sawah di pangka musim; hasia banyak nakarano jariah, hasia buliah karano pandai.

Literally, the proverb advises people to cultivate upland fields at the beginning of the agricultural year and rice fields at the appropriate planting season, emphasizing that abundant harvests result not only from diligence (jariah) but also from knowledge and skill (pandai). Beyond its moral message, the proverb encodes indigenous understandings of seasonal timing, appropriate land-use strategies, and agricultural expertise. It distinguishes physical effort from knowledge-based farming, demonstrating that successful agriculture depends upon understanding environmental conditions, selecting appropriate farming practices, and applying accumulated local experience.

This knowledge-oriented philosophy is further reflected in the remarkable specificity of the Minangkabau agricultural lexicon. Traditional farming activities are not described through a few general verbs but through highly specialized lexical items corresponding to successive stages of agricultural production. The language distinguishes between sowing seeds (mambaniah), raising seedlings (manayamai), uprooting seedlings (mancabuik baniah), transplanting (batanam), protecting crops (manggaro), harvesting (manyabik), post-harvest cleaning (mangirai and maangin), dehusking (maindiak), winnowing (mannampi), drying (mangaka), and further processing (manumbuak bareh). Together, these lexical distinctions demonstrate that the Minangkabau language preserves sequential procedural knowledge, reflecting a highly organized understanding of the entire agricultural production cycle.

2.2.4. Language, Oral Tradition, and Knowledge Transmission

The preservation of indigenous agricultural knowledge in Minangkabau society extends beyond practical farming activities into oral traditions that function as mechanisms of intergenerational knowledge transmission. Proverbs, customary expressions, oral narratives, and traditional performances communicate ecological observations, farming ethics, seasonal knowledge, and practical experience accumulated through generations. Rather than serving purely aesthetic or literary purposes, these oral traditions reinforce the values, skills, and environmental awareness necessary for sustaining agricultural life.

Traditional forms such as *manujai* (lullabies), *kaba* (oral narratives), and *petatah-petiti* (proverbs) contribute to the transmission of cultural values while simultaneously preserving local understandings of nature and human-environment relationships (Syahrul, 2025; Hayati et al., 2024). Agricultural proverbs, in particular, demonstrate how linguistic expressions condense complex ecological observations into memorable forms that facilitate long-term cultural transmission. Through repeated use in everyday communication, these expressions ensure that agricultural knowledge remains embedded within the linguistic practices of the community.

Together, specialized agricultural lexicons and oral traditions constitute an integrated indigenous knowledge system in which language functions simultaneously as a medium of communication, a repository of ecological knowledge, and a mechanism for transmitting sustainable agricultural practices across generations. This cultural and linguistic foundation provides the basis for understanding how the Minangkabau

agricultural lexicon preserves multiple dimensions of indigenous knowledge, which are examined in the following section.

2.3. The Minangkabau Agricultural Lexicon

2.3.1. Structural Characteristics

The agricultural vocabulary of indigenous Indonesian languages displays characteristic structural patterns that organize knowledge into meaningful categories. Research on Sundanese traditional agricultural systems identified vocabulary divided into four grammatical classes: verbs and verbals, nouns and nominals, numeralia, and adjectives (Aras, 2017). The structural forms include base forms and derivative forms, with derivatives created through affixation, reduplication, acronym formation, and word combination. Semantic meanings refer to tools and equipment, cultivation activities, paddy conditions, planting processes, places and containers, time references, traditional ceremonies, community leaders, rice pests, and measurement units.

Similarly, research on the Manggarai people of East Nusa Tenggara documented 253 agroforestry-related lexicons absent from the Indonesian language (Sanubiaranto et al., 2025). These lexicons fall into three categories: nouns for agroforestry plants, nouns for agroforestry tools, and verbs for agroforestry stages. The findings reveal that agroforestry lexicons represent an integral, albeit archaic, component of the regional language. Such patterns likely characterize the Minangkabau agricultural lexicon, which encompasses terminology for rice varieties, cultivation techniques, land management, seasonal cycles, and ritual practices.

2.3.2. Semantic Domains and Knowledge Categories

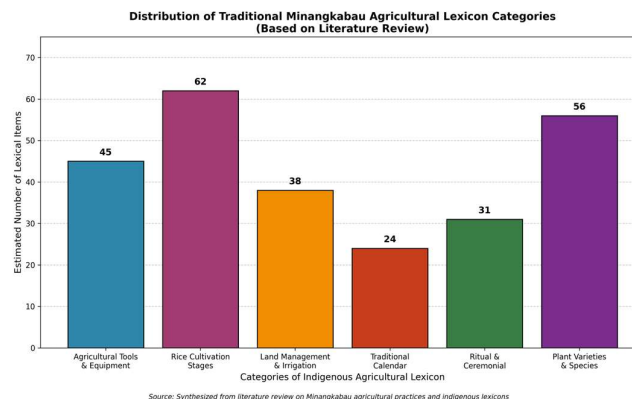


Figure 2. Distribution of traditional Minangkabau agricultural lexicon across major semantic categories, illustrating the breadth of indigenous agricultural knowledge encoded in language. (Source: Synthesized from literature review on Minangkabau agricultural practices and indigenous lexicons)

The agricultural lexicon encompasses multiple semantic domains that organize ecological and practical knowledge. Based on comparable studies of Indonesian indigenous agricultural systems, the Minangkabau lexicon likely includes:

2.3.3. Traditional Ecological Knowledge Encoded in Lexicon

Indigenous agricultural vocabulary encodes sophisticated ecological knowledge developed through generations of observation and practice. Research on traditional rice cultivation in Indonesia documents how communities incorporate local

knowledge and collective understanding about rice plants, including knowledge of various rice varieties and paddy field management (Kusuma et al., 2023). Although modern agriculture has introduced semi-modern techniques, traditional ecological knowledge persists in community practices, cultural behaviors, and biodiversity maintenance.

The Dayak Tunjung communities of East Borneo demonstrate how traditional ecological knowledge integrates food production, forest management, and local culture (Siahaya et al., 2016). Local villagers manage rice cultivation combined with forest succession based on traditional ecological knowledge that has evolved over many generations. This knowledge relates

to ecological reasons for different shifting cultivation stages, selection of suitable cultivation plots, soil classification, and culturally embedded "signs of nature" indicating appropriate timing for agricultural activities. Such integrated knowledge systems characterize Minangkabau agricultural traditions as well.

Table 1. Major Semantic Domains of Indigenous Agricultural Lexicon

Domain	Description	Examples of Knowledge Encoded
Rice Cultivation Stages	Terminology for planting cycle phases	Seedbed preparation, transplanting, harvesting
Land and Soil Types	Classification of agricultural landscapes	Paddy field types, soil fertility indicators
Water Management	Terms for irrigation practices	Canal systems, water distribution schedules
Agricultural Tools	Names for farming implements	Traditional plowing, harvesting equipment
Plant Varieties	Nomenclature for crop cultivars	Local rice varieties, companion crops
Seasonal Calendar	Terms for agricultural timing	Planting seasons, harvest periods
Ritual and Ceremonial	Vocabulary for farming rituals	Pre-planting ceremonies, thanksgiving rites
Pest and Disease	Names for agricultural threats	Insect pests, plant diseases, control methods

2.3.4. Rice Cultivation Terminology and Practices

Rice holds central importance in Minangkabau culture, reflected in extensive vocabulary related to its cultivation, processing, and ceremonial uses. Traditional rice farming systems across Indonesia incorporate indigenous calendars and traditional ecological knowledge that coordinate planting schedules with environmental conditions (Hidayat et al., 2020). Farmers historically coordinated planting according to indigenous calendars known as kalender tani or pranata mangsa, using inputs originating from the village with minimal reliance on purchased external supplies.

The Bonokeling indigenous community of Central Java exemplifies how traditional practices integrate rituals throughout the rice-farming process, from pre-planting to post-harvest (Budiyoko et al., 2025). These practices are deeply rooted in spiritual beliefs and closely tied to the natural environment, serving as symbols of reverence for divine forces and contributing

to environmental sustainability and agricultural resilience. The Minangkabau similarly integrate spiritual dimensions with practical farming knowledge, encoded in specialized vocabulary for each stage of rice cultivation.

2.4. Language as a Medium of Knowledge Transmission

2.4.1. Intergenerational Knowledge Transfer

Language serves as the primary vehicle for transmitting traditional ecological knowledge across generations. The role of language is central to the intergenerational transmission of indigenous knowledge, requiring collaborative documentation as part of conservation and preservation efforts (Hisa et al., 2019). Research on sago ethnobotanical-linguistic documentation among the Marori people demonstrates how socio-cultural and economic significance of traditional crops is encoded in vocabulary that faces endangerment as younger generations shift to dominant languages.

Traditional oral literature plays an important role in preserving and transmitting local linguistic knowledge (Mare & Leba, 2025). Mother tongue stands as a crucial identity marker for cultural continuity within communities. Studies reveal that oral texts contain rich lexicons related to natural environments, social systems, traditional practices, kinship relations, and moral values reflecting worldview and cultural identity. These lexical items function not only as linguistic units but as cultural symbols maintaining collective memory and enabling intergenerational knowledge transmission.

2.4.2. *The Role of Elders and Knowledge Holders*

Elders within indigenous communities serve as repositories of specialized knowledge, including agricultural expertise encoded in traditional vocabulary. Research on the Semai community of Peninsular Malaysia demonstrates how elders possessing local knowledge accumulated over generations through direct experiences and participation serve as primary sources for documentation projects (Renganathan & Kral, 2018). These elders recognize the value and importance of transmitting local culture and knowledge to the next generation, while younger people assist with recording, editing, and language transcription.

Among the Hani people, ritual experts with botanical knowledge face the challenge of a lack of successors, resulting in the gradual diminishment of cultural diversity and traditional ecological knowledge (Ma et al., 2024). Some villages have even disappeared entirely, raising urgent questions about protecting and inheriting traditional ecological knowledge. The Minangkabau face similar challenges as traditional knowledge holders age without adequate mechanisms for transferring their expertise to younger generations.

2.4.3. *Ritual Practices and Symbolic Communication*

Ritual practices serve as important contexts for transmitting agricultural knowledge through symbolic action and specialized vocabulary. Research among the Hani people documented 36 plant species belonging to 18 families used in 11 traditional ritual practices related to agricultural activities (Ma et al., 2024). These rituals revolve around seeking blessings, peace, disaster prevention, and warding off evil spirits, with plant species carrying cultural meanings including divination, ancestral symbolism, exorcism, purification, auspiciousness, and fertility.

The Hani people showcase their agricultural culture through plant-based ritual performances that represent specific expressions and important carriers of traditional culture (Ma et al., 2024). The close association between plants and Hani people's culture demonstrates how ritual knowledge encodes ecological understanding. Studying ritual plants holds great significance for protecting terrace farming culture and biodiversity conservation. The Minangkabau similarly integrate agricultural knowledge with ritual practices, using specialized vocabulary and symbolic materials that encode relationships between humans, crops, and supernatural forces.

2.4.4. *Proverbs and Metaphorical Language*

Proverbs and metaphorical expressions encode practical wisdom and cultural values related to agriculture. The Minangkabau principle "alam takambang jadi guru" (nature as the ultimate teacher) exemplifies how philosophical understanding of human-environment relationships is expressed linguistically

(Rahayu et al., 2026). This proverb nurtures ecological awareness and moral reflection, guiding appropriate behavior toward the natural world.

Similarly, principles like "Duduak Samo Randah, Tagak Samo Tinggi" (sit low, stand tall) encode social values applicable to agricultural cooperation and resource management (Gucandra & Aprison, 2025). These egalitarian values inform community decision-making about land use, water distribution, and labor sharing. The traditional Minangkabau philosophy contains rich values that can be integrated into contemporary education and development initiatives while preserving cultural identity.

2.5. *Threats to Indigenous Agricultural Lexicon*

2.5.1. *Modernization and Agricultural Change*

The transformation of traditional agricultural systems poses significant threats to indigenous vocabulary. The Green Revolution introduced intensive agriculture, chemical inputs, and high-yielding crop varieties that marginalized local traditions throughout Indonesia (Praptanti & Alfian, 2023). In Central Kalimantan, the traditional rice cultivation system called Manugal, involving direct planting without artificial fertilizers guided by traditional calendar and religious teachings, has been marginalized by modernization. This transformation disrupts the contexts in which traditional vocabulary is used and transmitted.

The comprehensive modernization of agriculture in Indonesia, particularly in rice farming including institutional aspects, has eroded the role of local wisdom (Setiawan & Kurnia, 2021). While some communities maintain traditional practices, their existence is increasingly eroded across the agricultural system. Research on lowland rice cultivation reveals that sustainability of local wisdom is largely determined by regeneration, internalization, and protection processes. The replacement of traditional practices with modern techniques eliminates the contexts in which specialized vocabulary is learned and used.

2.5.2. *Language Shift and Endangerment*

Language shift toward dominant national and global languages threatens the survival of indigenous agricultural vocabulary. Nigeria's experience demonstrates how indoctrinated languages like English are sidelining major local languages, leading to gradual decline (Gordon & Ogbu, 2025). This language shift is driven by social, economic, and educational factors as well as urbanization. Local dialect extinction results in loss of cultural identity, traditions, and historical ecological knowledge tied to these dialects.

The global linguistic landscape faces an unprecedented crisis, with numerous languages teetering on the brink of extinction (Majumder, 2025). This alarming trend signifies not merely loss of vocabulary and grammar but profound erosion of cultural heritage, historical knowledge, and unique worldviews. The rapid disappearance of these languages severs communities from ancestral roots and diminishes the rich tapestry of human communication. Studies indicate that the digital realm presents significant challenges, with vast majorities of languages struggling to transition into the digital age.

2.5.3. *Intergenerational Knowledge Gaps*

Disruptions in traditional knowledge transmission create gaps between generations that threaten vocabulary survival. Research

on wild food plants among Minangkabau and Mandailing communities found that although both communities perceived wild food plants positively, consumption has declined over the last generation (L et al., 2020). The main reasons include decreased availability and changes in lifestyle. Contemporary barriers include time constraints and limited knowledge of nutritional value, while socio-economic factors and changes in agriculture drive dietary transitions.

The Kusunda language and culture of Nepal exemplify extreme endangerment, with language shifts occurring due to forced sedentarization, labor migration, exogamous marriage, and educational exclusion (Pokharel et al., 2025). With only one fluent speaker remaining, the systematic erosion of culture results from loss of traditional belief systems, deforestation, and agricultural expansion. Without integrated preservation measures, indigenous knowledge systems face extinction, demonstrating the urgency of documentation and revitalization efforts.

2.5.4. Environmental Degradation and Climate Change

Environmental changes reduce the relevance and application contexts for traditional agricultural vocabulary. Research in West Sumatra documents how recognition of forest benefits has declined, causing local wisdom on agroforestry technology to fade (Sanubianto et al., 2025). The loss of agroforestry lexicon jeopardizes not only linguistic diversity but also traditional ecological knowledge embedded within it. Without revitalization, sustainable practices balancing agriculture and forest conservation may vanish, further endangering local environments. Climate change introduces new challenges that traditional knowledge systems may not fully address, potentially accelerating vocabulary obsolescence. Research on disaster mitigation demonstrates that Minangkabau indigenous knowledge encompasses technical, social, spiritual, and ecological dimensions that remain relevant for contemporary challenges (Rahayu et al., 2026). Traditional architecture embodies earthquake-resistant principles, oral traditions transmit collective memories, and systems like rimbo larangan support environmental sustainability. However, rapid environmental change may outpace the adaptive capacity of traditional knowledge systems.

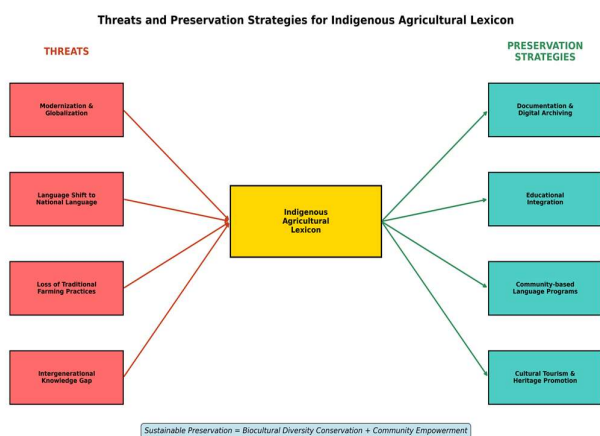


Figure 3. Threats facing indigenous agricultural lexicon and corresponding preservation strategies, illustrating the need for multi-faceted approaches to knowledge conservation. (Source: Author's synthesis from literature review)

2.6. Preservation and Revitalization Strategies

2.6.1. Documentation and Digital Archiving

Systematic documentation represents the foundation for preserving endangered agricultural vocabulary. The establishment of indigenous language archives developed in collaboration with institutional libraries works as an effective and accessible resource center for indigenous communities (R & Takhellambam, 2022). Localized repositories prove more effective than centralized data stores that collate all language data, which is the dominant method of language documentation globally. Active library involvement in language documentation and preservation of indigenous knowledge opens gateways for language revitalization.

Research on the Urarina language of Peru demonstrates how digitization and restoration of deteriorated documentation materials provides invaluable data supporting linguistic analysis and educational initiatives (Dorin et al., 2026). By converting handwritten notes into structured databases and enhancing analog audio recordings, such projects highlight the role of engineering and artificial intelligence in revitalizing pre-digital studies and expanding endangered-language preservation efforts. Similar approaches could preserve Minangkabau agricultural vocabulary before it disappears.

2.6.2. Educational Integration

Integration of indigenous knowledge and language into educational curricula supports preservation while maintaining cultural relevance. Research proposes contextual multicultural education models that synthesize universal educational principles with local wisdom (Gucandra & Aprison, 2025). Policy recommendations include reformulation of local content curricula, teacher training based on local wisdom, and school culture transformation. Such approaches ensure that agricultural vocabulary and associated knowledge remain part of young people's learning experiences.

Mobile learning applications designed for endangered language education demonstrate how technology can make learning engaging, accessible, and culturally immersive (Lidadun et al., 2025). Applications incorporating foundational vocabulary, common expressions with authentic audio pronunciation, and culturally relevant design elements support language acquisition while strengthening cultural identity. For agricultural vocabulary specifically, applications could contextualize terminology within farming practices, seasonal cycles, and traditional ceremonies.

2.6.3. Community-Based Language Programs

Community-driven initiatives form the most sustainable foundation for language preservation. Research on the Xitsonga language demonstrates how community-driven celebrations foster language pride, strengthen intergenerational transmission, and provide informal platforms for linguistic creativity (Ndukواني, 2025). Participants exhibit knowledge of vocabulary, idiomatic expressions, and proverbs while younger attendees demonstrate adaptive use in contemporary forms. Challenges include limited outreach and infrastructure, but such initiatives play pivotal roles in preserving language and maintaining cultural continuity.

The Yomitan Village initiative in Okinawa exemplifies community-led preservation through folklore documentation as

part of larger goals to restore language and culture (Ohara & Machida, 2023). Documentation of over 5000 stories recounted by over 700 community members provides material for teaching language and culture while illuminating relationships among history, politics, and knowledge. Indigenous critical pedagogy incorporating perspectives of hybridity and decolonization offers conceptual frameworks for teaching endangered languages.

2.6.4. *Integration with Agricultural Development*

Linking vocabulary preservation with sustainable agricultural development creates practical incentives for maintaining traditional knowledge. Research on cultural entrepreneurship in fishing communities demonstrates how leveraging local resources and knowledge generates economic benefits while preserving cultural heritage (Zamzami et al., 2025). Cultural entrepreneurship shows promise for sustainable economic development but requires targeted policy interventions focused on developing market relations and entrepreneurial skills.

Traditional farming practices increasingly gain recognition for their contributions to sustainability and resilience. Research documents how the System of Rice Intensification offers resource-conserving methods based on indigenous knowledge and practices (Kn, 2015). Integrating traditional vocabulary and associated knowledge with such sustainable agriculture initiatives maintains the relevance and utility of indigenous language while supporting food security and environmental conservation. The Minangkabau agroforestry systems and traditional forest management offer similar opportunities for linking preservation with development.

2.6.5. *Policy and Institutional Support*

Government policies and institutional frameworks play crucial roles in supporting preservation efforts. Research on cultural heritage conservation emphasizes that governmental policies and international agreements impact conservation significantly (Vicol, 2025). National laws on heritage protection and international collaborations foster sustainable practices.

Community engagement with heritage conservation experts, policymakers, and community-based organizations provides practical foundations for effective preservation.

The resistance of local language in West Sumatra's regional regulations demonstrates how policy frameworks can maintain local wisdom values (Delfia et al., 2023). Words and phrases of local language in special regional regulations represent and promote Minangkabau cultural values. Such policy approaches could be expanded to explicitly support agricultural vocabulary preservation through educational requirements, documentation mandates, and incentives for traditional practice maintenance.

3. RESULT AND DISCUSSION

3.1. *Synthesis of Key Findings*

This review demonstrates that the Minangkabau agricultural lexicon represents a sophisticated knowledge system encoding centuries of ecological understanding, sustainable practices, and cultural values. The vocabulary encompasses multiple semantic domains including rice cultivation terminology, land classification systems, water management practices, seasonal calendars, and ritual vocabulary. This terminology serves not merely communicative functions but actively shapes how community members conceptualize human-environment relationships and transmit knowledge across generations.

The threats facing this linguistic heritage are substantial and multifaceted, ranging from agricultural modernization and language shift to intergenerational knowledge gaps and environmental change. However, the literature also reveals promising preservation strategies including documentation and digital archiving, educational integration, community-based programs, and linkages with sustainable development initiatives. The Minangkabau cultural context—with its strong identity, institutional structures like the nagari system, and persistent cultural practices—provides foundations for effective preservation efforts.

Table 2. Priority Areas for Future Research on Minangkabau Agricultural Lexicon

Research Priority	Specific Focus Areas	Methodological Approaches
Lexicon Documentation	Comprehensive vocabulary collection, semantic analysis	Ethnolinguistic fieldwork, dictionary development
Knowledge Mapping	Links between terminology and practices	Participatory research, ethnobotanical methods
Transmission Analysis	Intergenerational vocabulary change	Longitudinal studies, comparative surveys
Revitalization Assessment	Effectiveness of preservation strategies	Program evaluation, community feedback
Policy Research	Institutional support mechanisms	Policy analysis, stakeholder consultation

3.2. *Implications for Research and Practice*

The findings hold important implications for multiple fields. For linguistics and anthropology, the Minangkabau case demonstrates the importance of documenting agricultural vocabulary before it disappears, following frameworks established for comparable endangered-language contexts. Interdisciplinary approaches combining linguistic documentation with ethnobotanical and agricultural research prove most

effective for capturing the full scope of knowledge encoded in terminology.

For sustainable development practice, the review underscores how traditional agricultural knowledge systems offer valuable resources for addressing contemporary challenges including food security, biodiversity conservation, and climate adaptation. Policies and programs that recognize and support traditional knowledge contribute to both cultural preservation and development outcomes. The integration of indigenous vocabulary

documentation with sustainable agriculture initiatives creates synergies benefiting both domains.

3.3. Limitations and Future Research Directions

This review is limited by the relatively sparse published literature specifically addressing Minangkabau agricultural vocabulary compared to more extensively documented languages and knowledge systems. Future research should prioritize comprehensive ethnolinguistic documentation of agricultural terminology in Minangkabau communities, including both semantic analysis and pragmatic contexts of use. Comparative research across generations would illuminate patterns of vocabulary loss and persistence, while interdisciplinary collaboration between linguists, agricultural scientists, and development practitioners would ensure documentation captures the full richness of encoded knowledge.

4. CONCLUSION

Language serves as a vital repository of indigenous agricultural knowledge, encoding not merely terminology but entire systems of ecological understanding, practical wisdom, and cultural values. The traditional Minangkabau agricultural lexicon exemplifies this function, encompassing sophisticated vocabulary for rice cultivation, land management, seasonal timing, and ritual practices that reflect generations of accumulated experience in West Sumatra's diverse environments. The preservation of this linguistic heritage faces significant challenges from agricultural modernization, language shift, intergenerational gaps, and environmental change. However, promising strategies exist including systematic documentation, educational integration, community-based programs, and linkages with sustainable development. The strong cultural identity and institutional structures of Minangkabau society provide foundations for effective preservation efforts. Urgent action is needed to document endangered agricultural vocabulary before it disappears, while simultaneously creating conditions for its continued use and transmission. Such efforts serve not only cultural preservation but also contribute to sustainable development by maintaining access to traditional ecological knowledge that remains relevant for contemporary challenges. The Minangkabau agricultural lexicon represents an invaluable heritage deserving sustained scholarly attention and practical support for its preservation and revitalization.

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