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Linguistic Structures, Ecological Knowledge, and Cultural Semantics: Noun Class Derivation in the Plant Nomenclature of Chasu (Tanzania)

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Abstract: *This paper examines the interclass derivational relationships between plant names and plant product names in Chasu, a North-East Bantu language spoken in Northern Tanzania, addressing the fundamental question of how morphological structure encodes and organizes ethnobotanical knowledge across noun class systems. Despite extensive research on Bantu noun class systems, the systematic interclass derivational patterns between plant names and their associated products, including fruits and non-typical plant products, remain insufficiently explored, particularly regarding how these morphological relationships reflect culturally salient categorization strategies and cognitive patterns in botanical nomenclature. Employing a descriptive qualitative approach grounded in cognitive linguistic theory, the study collected primary data through fieldwork conducted in Same and Mwanga districts, Kilimanjaro region, Tanzania, utilizing free listing exercises, walk-in-the-wood interviews with nine adult native speakers selected for their specialized ethnobotanical expertise, and analysis of written Chasu plant name texts. The findings reveal three systematic interclass derivational relationships: first, fruits designated in noun classes 5/6 derive from plants in classes 3/4 (e.g., i-takataka 'snot apple' and m-takataka 'snot apple tree'); second, non-typical fruit products in classes 9/10 derive from plants in classes 3/4 (e.g., ndangu 'bitter apple' and m-dangu 'bitter apple plant'); and third, identical noun class assignment for both plant and product in classes 3/4, 5/6, 7/8, and 9/10 (e.g., i-yombo 'tannia cocoyam' for both plant and product). Additionally, the study demonstrates that plant naming transcends referential classification through secondary noun class manipulation for diminutive (classes 12/13) and augmentative (classes 5/6) functions, enabling speakers to encode evaluative dimensions including size, desirability, maturity, and quality, a finding that extends theoretical understanding of noun class derivation beyond grammatical agreement to expressive morphology. These findings make both empirical and policy contributions by documenting and preserving indigenous ethnobotanical knowledge systems while providing linguistically-grounded frameworks for biodiversity conservation, cultural heritage preservation, and sustainable resource management in multilingual contexts. The study concludes that Chasu plant nomenclature exemplifies how grammatical structure, cultural experience, and ecological knowledge converge in systematic lexical categorization, recommending cross-Bantu comparative research on plant-product derivation and morphophonological factors influencing noun class shifts to further illuminate these complex relationships.*

Keywords: *Derivational morphology; Plant nomenclature; Interclass relationships; Cultural cognition; Bantu linguistics*

1.0 Background Information

The relationship between language structure and ethnobiological knowledge represents one of the most productive interfaces in contemporary linguistics, offering critical insights into how human communities categorize, conceptualize, and interact with their natural environments (Berlin, 1992; Atran, 1998; Hunn, 1999). Within this interdisciplinary domain, the Bantu noun class system has emerged as a particularly revealing locus of investigation, as its intricate morphological architecture not only organizes grammatical agreement but also encodes culturally salient categorization strategies that reflect centuries of accumulated ecological knowledge (Denny & Creider, 1976; Contini-Morava, 2000; Van de Velde, 2019). The systematic assignment of nouns to distinct classes, marked through a complex network of prefixes and concord patterns, provides speakers with a powerful linguistic resource for differentiating entities based on semantic properties including animacy, shape, size, function, and cultural significance (Maho, 1999; Aikhenvald, 2000; Katamba, 2002; Marten, 2021).

The domain of plant nomenclature presents an especially fertile ground for examining these morphosemantic relationships, as plants constitute fundamental components of human subsistence, medicine, material culture, and spiritual practice across African societies (Pakia, 2005; Leyew, 2011; Lusekelo & Amir, 2022; Mziray & Lusekelo,

2023). In Bantu-speaking communities, the naming of plants and their products, including fruits, seeds, tubers, leaves, and other economically or culturally significant parts, frequently involves systematic derivational relationships across noun classes, where the same lexical stem appears with different class prefixes to distinguish between the plant itself, its fruit, and other derived products (Legère, 2020; Marten, 2021; Mziray, 2025). These interclass derivational patterns are not merely grammatical curiosities but represent fundamental cognitive operations through which speakers organize and transmit ethnobotanical knowledge across generations (Leyew, 2011; Lusekelo, 2023).

Understanding these linguistic-cognitive relationships carries profound implications for multiple domains. First, it provides crucial documentation of indigenous knowledge systems that are increasingly threatened by language shift, ecological degradation, and cultural change (Ruffo *et al.,* 2002; Yohana, 2009; Charwi *et al.,* 2023). Second, it contributes to broader theoretical debates in cognitive linguistics regarding the relationship between linguistic structure, cultural experience, and conceptual organization (Croft & Cruse, 2004; Evans & Green, 2006). Third, it offers practical applications for biodiversity conservation, sustainable resource management, and culturally responsive education in multilingual contexts (Berlin, 1992; Hunn, 1999; Legère, 2020). The current study addresses these interconnected concerns by investigating the interclass derivational relationships between plant names and plant product names in Chasu, a Northeast Bantu language spoken in Northern Tanzania.

The Bantu noun class system has attracted substantial scholarly attention, with research focusing on its morphological structure, semantic organization, and cognitive underpinnings (Maho, 1999; Contini-Morava, 2000; Van de Velde, 2019; Marten, 2021). A foundational debate centers on whether noun class prefixes should be characterized as inflectional or derivational, with scholars such as Mufwene (1980) and Kahigi (2005) arguing for a primarily inflectional function while others, including Marten (2021), demonstrate that noun classes serve both inflectional and derivational roles. This dual functionality is particularly evident in plant nomenclature, where derivational relationships between trees (classes 3/4) and fruits (classes 5/6) operate alongside inflectional relationships marking singular and plural distinctions within the same lexical stem (Marten, 2021; Mziray & Lusekelo, 2023).

Empirical contributions have established several systematic patterns in Bantu plant nomenclature (Denny & Creider, 1976; Contini-Morava, 2000; Legère, 2020). The default assignment of trees and large plants to noun classes 3/4 (or 9/10 in some languages) has been documented across numerous Bantu languages, while fruits typically appear in classes 5/6 (Maho, 1999; Katamba, 2002; Van de Velde, 2019). Researchers have identified a productive derivational relationship whereby the stem used for the fruit name appears with class 3/4 prefixes to name the tree (Marten, 2021). However, beyond this broad generalization, substantial language-specific variation exists, particularly in the classification of non-typical plant products such as edible leaves, roots, seeds, and medicinal parts (Legère, 2009; Leyew, 2011; Lusekelo & Amir, 2022).

Regional studies have contributed crucial data on these patterns. In East Africa, research on Kiswahili has provided foundational insights into noun class derivation in plant names (Contini-Morava, 2000; Marten, 2021), while studies on other Tanzanian languages including Vidunda (Legère, 2009), Nyamwezi and Sukuma (Lusekelo & Amir, 2022), and Hedzabe (Lusekelo, 2023) have documented both shared and language-specific patterns in plant nomenclature. Similarly, research on Ethiopian languages (Leyew, 2011) and Kenyan coastal languages including Digo (Pakia, 2005) has expanded the comparative base, revealing how ecological context, cultural practice, and grammatical structure interact in shaping ethnobotanical classification. The work of Charwi and colleagues (2023) on Kuria medicinal plants further demonstrates the importance of documenting indigenous knowledge systems before they are lost to language shift and cultural change.

Despite these substantial contributions, significant gaps remain in our understanding of interclass derivational relationships in Bantu plant nomenclature. First, while the plant-fruit relationship (classes 3/4 and 5/6) has received considerable attention, the systematic derivation of plants from non-typical fruit products assigned to classes 9/10 has been comparatively underexplored (Mziray & Lusekelo, 2023; Mziray, 2025). Second, the phenomenon of identical class assignment for both plants and their products, where the same noun class and stem are used for both, has been mentioned but not systematically analyzed across different noun class pairs (Maho, 1999; Legère, 2020). Third, the expressive use of secondary noun classes (diminutives and augmentatives) in plant naming has received limited attention in Bantu studies, with most research focusing on primary class assignment rather than the evaluative functions of class manipulation (Pakia, 2005; Legère, 2009; Lusekelo & Amir, 2022). Fourth, and perhaps most critically, there has been insufficient integration of cognitive linguistic theory, particularly usage-based approaches emphasizing token frequency and entrenchment (Croft & Cruse, 2004; Evans & Green, 2006), with morphosyntactic analysis of plant nomenclature, resulting in a gap between structural description and cognitive explanation.

The cognitive approach to grammar provides a particularly productive framework for addressing these gaps (Foley,

1997; Croft & Cruse, 2004; Evans & Green, 2006). This theoretical perspective emphasizes that linguistic knowledge emerges from patterns of language use, with mental representation shaped by both structural form and communicative function. Two key concepts from this framework are particularly relevant to the current study. First, the concept of token frequency suggests that repeated exposure to particular morphological patterns leads to their entrenchment as conventional grammatical units (Croft & Cruse, 2004). In the context of plant nomenclature, the frequent use of plant and product names in daily subsistence activities, medicinal practices, and cultural rituals should result in the cognitive entrenchment of interclass derivational patterns, making these morphological relationships highly systematic and productive (Leyew, 2011; Lusekelo, 2023; Mziray, 2025). Second, the concept of meaning construction emphasizes that words and grammatical constructions simultaneously encode both formal properties and experiential content, with linguistic categories shaped through usage and interaction (Evans & Green, 2006). From this perspective, noun class assignment in plant names should reflect not only structural regularities but also culturally salient features of the referent, including its utility, size, desirability, and ecological significance (Contini-Morava, 2000; Marten, 2021; Mziray & Lusekelo, 2023).

The theoretical gap addressed by this study concerns the application of cognitive linguistic principles to explain the systematic patterns of interclass derivation in Chasu plant nomenclature. While previous studies have described these patterns in other Bantu languages (Denny & Creider, 1976; Maho, 1999; Legère, 2020), few have explicitly employed cognitive grammar frameworks to explain how patterns of use shape the entrenchment of derivational relationships and the expressive manipulation of secondary noun classes. This study addresses this gap by investigating the morphological and semantic relationships between plant names and plant product names in Chasu and interpreting these patterns within a cognitive linguistic framework that emphasizes usage-based entrenchment and the encoding of culturally salient semantic features.

Chasu (also known as Chagga-Pare) is a Northeast Bantu language classified within the Chaga-Pare group of the E.50 cluster (Guthrie, 1967; Maho, 2003). The language is spoken by approximately 530,341 people in the Pare Mountains of Kilimanjaro Region, Northern Tanzania, predominantly in Same and Mwanga districts (LOT, 2009). The Pare Mountains constitute a significant portion of the Eastern Arc Mountain range, which is recognized globally for its exceptional species diversity and high levels of endemism (Ruffo *et al.,* 2002; Lovett *et al.,* 2006). This ecological richness has shaped Chasu speakers' relationship with the plant world for centuries, as evidenced by the existence of sacred forests (*mishitu ya ngathu*) used for youth initiation ceremonies and rituals, as well as the historical worship of large trees such as *mvumo* (*Ficus thonningii*) and *mdaria* (*Vangueria volkelnsii*) (Yohana, 2009).

Several characteristics make Chasu an ideal case for investigating plant-product derivation. First, the substantial plant diversity in the Pare Mountains ensures that speakers have extensive and varied botanical knowledge encoded in their language (Ruffo *et al.,* 2002; Lovett *et al.,* 2006). Second, the cultural significance of plants in Chasu society, spanning medicine, food, material culture, and ritual practice, means that plant nomenclature is both lexically rich and culturally salient (Yohana, 2009; Mziray & Lusekelo, 2023). Third, as a relatively understudied Bantu language in its northeastern location, Chasu offers opportunities to contribute new empirical data to the comparative understanding of Bantu noun class systems (Mziray, 2025). Fourth, language shift concerns in the region mean that documentation of Chasu ethnobotanical knowledge has both scholarly and practical urgency (Yohana, 2009; LOT, 2009).

The current study aims to investigate the interclass derivational relationships between plant names and plant product names in Chasu, examining how noun class morphology encodes both structural organization and culturally salient semantic features in ethnobotanical classification. Building on previous research in Bantu linguistics that has highlighted systematic connections between morphological structure and cultural knowledge (Denny & Creider, 1976; Contini-Morava, 2000; Marten, 2021; Mziray, 2025), this study addresses three interconnected objectives. First, it identifies and describes the systematic interclass derivational patterns through which plant names are related to their corresponding products, including both fruits and non-typical fruit products. Second, it examines the semantic motivations underlying noun class assignment and the expressive manipulation of secondary classes in plant naming, particularly for diminutive and augmentative functions. Third, it interprets these patterns within a cognitive linguistic framework, arguing that usage-based entrenchment and culturally salient semantic features motivate the systematic relationships observed.

To achieve these objectives, the study addresses the following research questions: (i) What are the systematic interclass derivational relationships between plant names and plant product names in Chasu, and how do these relationships manifest across different noun class pairs? (ii) How are fruits and non-typical fruit products systematically classified in the Chasu noun class system, and what semantic and cognitive motivations underlie these classifications? (iii) How do secondary noun classes (diminutive classes 12/13 and augmentative classes 5/6) function in Chasu plant nomenclature, and what evaluative meanings do they encode? (iv) What cognitive and cultural factors, as

understood through cognitive grammar frameworks, motivate the systematic patterns of noun class derivation observed in Chasu plant and plant product nomenclature?

This study makes several contributions to scholarship in Bantu linguistics, cognitive linguistics, and ethnobiology. Empirically, it provides the first systematic documentation of interclass derivational relationships between plant and product names in Chasu, contributing new data to the comparative Bantu literature. Theoretically, it extends cognitive linguistic frameworks, particularly usage-based approaches emphasizing token frequency and meaning construction, to explain the systematic morphological patterns observed in plant nomenclature. Methodologically, it demonstrates the effectiveness of combining descriptive qualitative fieldwork with cognitive linguistic interpretation for studying ethnobiological classification. Practically, it contributes to the documentation and preservation of indigenous ethnobotanical knowledge in the Pare Mountains, providing linguistically-grounded frameworks that can support biodiversity conservation, cultural heritage preservation, and sustainable resource management in multilingual contexts (Leyew, 2011; Legère, 2020; Mziray & Lusekelo, 2023).

2.0 Theoretical Framework

This study is anchored in the cognitive approach to grammar, specifically drawing on the tenets of usage-based linguistics and Construction Grammar as articulated by Croft and Cruse (2004) and Evans and Green (2006). This framework provides a robust lens for examining the systematic interclass derivational relationships between plant names and plant product names in Chasu, as it emphasises that linguistic knowledge emerges from patterns of language use, shaped by both structural form and communicative function. Within this perspective, the mental representation of grammatical forms is not determined solely by formal structural properties but is significantly influenced by usage patterns, contextual meanings, and the frequency with which particular constructions are encountered in everyday communication. As Croft and Cruse (2004, p. 292) assert, "each time a word (or construction) is used, it activates a node or a pattern of nodes in the mind leading to its ultimate storage as a conventional grammatical unit," a process central to understanding how Chasu speakers internalise the noun class assignment patterns evident in plant nomenclature.

The central to this theoretical framework for this paper are the two (2) interconnected cognitive process processes, namely: entrenchment and schematisation (Langacker, 2008; Schmid, 2017). Entrenchment refers to the strengthening of the mental representation of a linguistic structure through repetition, to the point where its use becomes automatic (Langacker, 2008; Schmid, 2017). In the context of the Chasu plant nomenclature, the frequent use of plant and product names in daily subsistence, medicinal practices, and cultural rituals results in high token frequency, which leads to a high degree of entrenchment. This makes the interclass derivational patterns highly systematic and easily accessible to speakers (Mziray & Lusekelo, 2023; Mziray, 2025). For instance, the recurring use of the stem *-takataka* in both the fruit name *i-takataka* (class 5/6) and the plant name *m-takataka* (class 3/4) entrenches the relationship between these noun classes and the associated conceptual categories of 'fruit' and 'plant'.

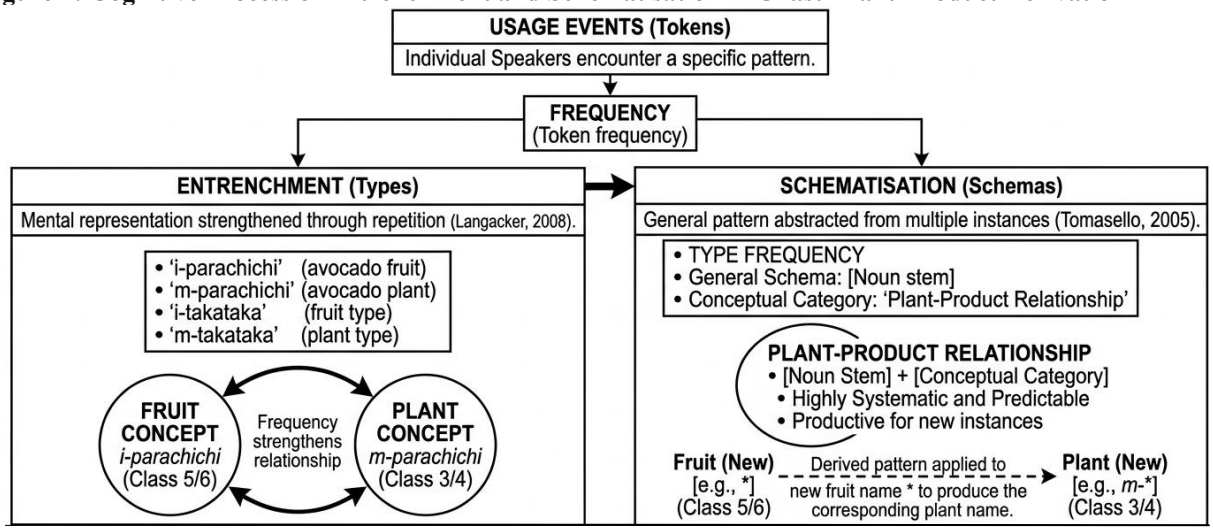
Schematisation, the second key process, is the discovery of similarities and abstraction of differences across multiple experiences to form a higher-level, more abstract representation (Langacker, 2008; Tomasello, 2005). Through frequent exposure to many tokens with a similar pattern, such as the numerous examples of class 5/6 fruits relating to class 3/4 plants, speakers extract a general schema or pattern (Bybee, 1995; Croft & Cruse, 2004). This process is driven by type frequency, the number of distinct items that instantiate a particular pattern (Bybee, 1995; Croft & Cruse, 2004). In Chasu, the high type frequency of nouns following the plant-fruit derivation pattern reinforces the schema, enabling speakers to productively form new plant names from fruit names or to understand the relationship between a plant and its fruit even for newly encountered or unfamiliar species. This relationship between frequency and entrenchment is visualised in Figure 1, which demonstrates how repeated usage events of specific lexical items (e.g., *m-parachichi* / *i-parachichi*) lead to the entrenchment of their forms and, subsequently, the schematisation of a general plant-fruit class derivation pattern.

Furthermore, cognitive approaches to grammar posit a strong correlation between frequency and semantic specificity. This principle, often referred to as the frequency-meaning correlation, dictates that the more frequent a linguistic unit is, the more schematic or less specialised its meaning becomes, allowing it to be used in a wider variety of contexts (Croft & Cruse, 2004; Pustet, 2004, as cited in Jensen, 2007). Conversely, less frequent units are more specific semantically and pragmatically. This is highly relevant to the current study. For example, the general noun class derivation pattern (e.g., plant names in class 3/4 vs. their fruits in 5/6) is highly frequent and schematic, applying to a vast array of plants. In contrast, the use of secondary noun classes for diminutives (12/13) or augmentatives (5/6) involves less frequent, more semantically specific operations, allowing speakers to encode nuanced evaluations of size, maturity, desirability, or quality.

This framework also directly addresses the long-standing debate in Bantu linguistics on whether noun class prefixes are inflectional or derivational (Mufwene, 1980; Kahigi, 2005; Kosch, 2011). From a cognitive linguistic perspective,

both functions are integrated. The systematic shift between classes (e.g., 3/4 for plants and 5/6 for fruits) using the same stem is a derivational process, creating a new lexical item with a related but distinct meaning (Marten, 2021; Mziray & Lusekelo, 2023). Conversely, the shift between singular and plural forms within the same class (e.g., *m-takataka* to *mi-takataka*) is an inflectional process marking number. The cognitive approach provides a unified view, demonstrating that both are aspects of the same symbolic system where meaning and form are intrinsically linked through patterns of use. This dual functionality is a key feature of the Bantu noun class system (Demuth, 2000; Moloi & Thetso, 2014).

Figure 1: Cognitive Process of Entrenchment and Schematisation in Chasu Plant-Product Derivation



This figure illustrates the relationship between frequency of use, entrenchment, and schematisation in the context of Chasu plant-product derivation. Repeated usage of specific tokens, such as parachichi *for 'avocado', leads to their entrenchment as types. Over time, these entrenched tokens contribute to the schematisation of a general pattern, such as the derivation of plant names in Class 3/4 from fruit names in Class 5/6. This process allows speakers to recognise and produce new plant-product name pairs based on the abstracted schema (adapted from Croft & Cruse, 2004; Langacker, 2008).*

Therefore, by employing this usage-based framework, this study moves beyond merely describing the morphological structures of plant names in Chasu. It offers an explanatory account for why these patterns exist and how they are maintained, arguing that the systematic interclass derivational relationships found are a direct outcome of the entrenched, conventionalised linguistic behaviour of the Chasu speech community, shaped by their long-standing interaction with their rich ecological environment.

3.0 Methodology

3.1 Research Design

This study employed a descriptive qualitative research design, which is particularly suited for investigating the systematic morphological relationships between plant names and plant product names in Chasu. Qualitative approaches are widely recognised as appropriate for documenting and analysing indigenous knowledge systems, as they allow for in-depth exploration of linguistic structures as embedded within their natural cultural and ecological contexts (Creswell, 2014; Silverman, 2017). The study was grounded in the cognitive linguistic framework, specifically the usage-based approach, which emphasises that linguistic knowledge emerges from patterns of language use in communicative contexts (Croft & Cruse, 2004; Evans & Green, 2006). This design enabled the researcher to capture not only the formal morphological structures of plant names but also the cognitive and cultural motivations underlying noun class assignment and interclass derivation.

3.2 Study Area

The study was conducted on the slopes of the Pare Mountains in Kilimanjaro Region, Tanzania, covering three rural wards: Vuje and Vumari in Same District, and Kighare in Mwanga District (see Table 1). The Pare Mountains constitute a significant portion of the Eastern Arc Mountain range, which is globally recognised for its exceptional species diversity and high levels of endemism (Lovett *et al.,* 2006; Ruffo *et al.,* 2002). The region is characterised by diverse vegetation types, including montane forest, woodland, and bushland, which support a rich variety of plant species with cultural and economic significance to the Chasu-speaking community (Yohana, 2009).

Table 1: Study Locations and Wards

District	Ward	Villages Visited	Ecological Zone
Same	Vuje	Vuje, Mwembe	Montane forest
Same	Vumari	Vumari, Mwanga	Woodland/bushland
Mwanga	Kighare	Kighare, Mwambe, Marangu	Montane forest

Table 1presents the districts, wards, and villages where fieldwork was conducted, indicating the ecological zones represented in each location.

The selection of these areas was motivated by several factors. First, the Pareland is home to approximately 530,341 Chasu speakers, making it the most predominant language in the region (Languages of Tanzania Project [LOT], 2009). Second, the area is part of the Afro-Montane region found in the Eastern Arc Mountains and is very rich in species diversity and endemism, hence suitable for study on plant naming (Ruffo *et al.,* 2002; Lovett *et al.,* 2006). Third, according to Yohana (2009), Pareland has various sacred forests (*mishitu ya ngathu*) which different clans use in youth initiation ceremonies and rituals, indicating a deep cultural relationship between the Chasu people and their plant environment. Additionally, native speakers of Chasu used to worship big trees, for example *mvumo* (*Ficus thonningii*) 'strangler fig' and *mdaria* (*Vangueria volkelnsii*) 'mild melder' (Yohana, 2009). These factors make Chasu an ideal case for investigating how speakers name and conceptualise plant names and plant product names.

Bushland and forested areas in nine villages were traversed on foot during fieldwork to document plant and plant product names in their natural contexts. The fieldwork was conducted during the rainy season (March to May 2023) and the dry season (August to October 2023) to capture a comprehensive range of plant species and their products across different phenological stages.

3.3 Participants and Sampling

First-hand ethnolinguistic data were obtained from nine adult native speakers of Chasu (six males and three females), aged between 45 and 78 years. In accordance with Berlin et al. (1992) and Leyew (2011), participants were selected based on sustained occupational exposure to plants and included traditional healers (*waganga*), farmers (*walimi*), and hunters (*wasaki*). Table 2 presents the demographic characteristics of the participants.

Table 2: Participant Demographics

Participant Code	Sex	Age	Occupation	Village	Years of Experience
CH-01	Male	72	Traditional healer	Vuje	45
CH-02	Male	65	Farmer	Mwembe	50
CH-03	Female	58	Traditional healer	Vumari	30
CH-04	Male	78	Hunter	Kighare	60
CH-05	Male	55	Farmer	Mwambe	40
CH-06	Female	62	Farmer	Marangu	45
CH-07	Male	49	Traditional healer	Vuje	25
CH-08	Male	68	Hunter	Kighare	50
CH-09	Female	45	Farmer	Vumari	28

Table provides demographic information for the nine participants who contributed data to this study, including their sex, age, occupation, village of residence, and years of experience with plant-related activities.

Participants were purposively selected based on several criteria. First, they were required to be native speakers of Chasu who had lived in the study area for at least 30 years, ensuring deep knowledge of the local flora and linguistic conventions. Second, participants had to possess extensive knowledge of medicinal plants, food sources, animal habitats, and environmental indicators, as verified through community recommendations (Berlin *et al.,* 1992; Leyew, 2011). Traditional healers were identified through consultation with village leaders and health committees, while farmers and hunters were identified through snowball sampling, where initial participants recommended other knowledgeable individuals (Bernard, 2018).

Their extensive knowledge of medicinal plants, food sources, animal habitats, and environmental indicators was essential for capturing both the structural and semantic patterns of Chasu plant, fruit, and other non-typical plant product names in relation to interclass derivation. The selection of participants with varied but complementary expertise ensured comprehensive coverage of the ethnobotanical domain, as traditional healers contributed knowledge of medicinal plants, farmers provided insights into cultivated species, and hunters offered expertise on wild plants and their ecological contexts (Leyew, 2011; Lusekelo, 2023).

3.4 Data Collection Methods

Data collection employed multiple techniques to ensure comprehensive documentation of plant nomenclature and its morphological patterns. The triangulation of methods allowed for cross-validation of findings and enhanced the reliability of the data (Creswell, 2014; Silverman, 2017).

3.4.1 Free Listing

Free listing was used to elicit plant names, plant part names, fruit names, and other non-typical fruit plant product names. This preliminary method allowed the identification of key lexical items and their frequency of occurrence, consistent with the cognitive grammar emphasis on token frequency as a determinant of mental representation (Croft & Cruse, 2004). Participants were asked to list all the plants they knew in their local environment, including their various parts and products. The lists were then used to identify the most commonly named plants and to guide subsequent interviews and field walks. Free listing was conducted in participants' homes or community gathering places, with responses recorded using audio recorders and field notes.

3.4.2 Walk-in-the-Wood Interviews

Field-based interviews, also referred to as walk-in-the-wood interviews (Leyew, 2011), jungle-walk-and-identify (Charwi *et al.,* 2023; Lusekelo, 2023), or field walks (Charwi *et al.,* 2023), were conducted. During these walks, researchers and informants traversed gardens, farms, bushlands, and forests to collect plant names and observe noun-class assignment to

plant names and plant products. These walks were essential for connecting linguistic data with actual plant specimens in their natural habitats. Each walk lasted between three and six hours, depending on the terrain and the number of plant species encountered. The researcher and participants would stop at each plant species encountered, and participants would provide the Chasu name, indicate the plant's uses, and name its various parts and products.

Table 3: Data Collection Techniques and Sources

Technique	Purpose	Duration	Data Recorded
Free listing	Elicit plant names, part names, and product names	2-3 hours per participant	Lexical items, frequency counts
Walk-in-the-wood interviews	Observe plants in natural habitats, collect names and uses	3-6 hours per walk	Plant names, plant part names, product names, uses, noun classes
Written text analysis	Identify additional plant names and confirm patterns	Ongoing	Plant names from documentary sources

Table summarises the three data collection techniques employed in this study, their respective purposes, duration, and the types of data recorded through each method.

During these walks, the researcher would take photographs of each plant and its parts, collect small samples for later identification (with participants' permission), and record participants' explanations of the plant's uses, cultural significance, and any naming motivations. The naturalistic setting of these walks allowed participants to spontaneously produce plant names and discuss their relationships with plant products in a contextually authentic manner (Leyew, 2011; Lusekelo, 2023).

3.4.3 Written Text Analysis

Plant names were also obtained from written texts, including the Chasu dictionary, educational materials, and previous documentation efforts. This method was particularly useful for confirming the orthography and morphological structure of plant names identified during fieldwork and for identifying additional plant names not encountered during field walks. The written texts consulted included the Chasu language dictionary and local language educational materials.

3.4.4 Supplementary Ethnobotanical Documentation

In addition to linguistic data collection, supplementary ethnobotanical information was documented, including plant uses, cultural significance, and local classification systems. This information provided crucial context for understanding the semantic motivations underlying noun class assignment and interclass derivation. Participants were asked to explain why certain plants were named in particular ways, how they distinguished between plants and their products, and what cultural practices were associated with specific plant species.

3.5 Data Analysis

Data analysis followed a systematic, multi-stage process aligned with the cognitive linguistic framework and the descriptive qualitative research design.

3.5.1 Morphological Analysis

Plant names were broken down into their morphological constituents, including noun class prefixes and stems/roots. Each name was then classified according to its noun class based on the morphological form of its prefix and its agreement patterns with associated grammatical elements (Maho, 1999; Van de Velde, 2019). This allowed for the identification of recurring patterns in noun-class assignment and the systematic relationships between plant names and plant product names.

Table 4: Morphological Analysis Framework for Chasu Plant Names

Analysis Level	Description	Example
Root/stem identification	Identify the lexical root/stem	*-takataka*
Prefix identification	Identify the noun class prefix	*i-* (class 5), *m-* (class 3)
Noun class classification	Classify based on prefix form and agreement	Class 5/6 (fruit), Class 3/4 (plant)
Number marking	Identify singular and plural forms	*i-takataka* (sg.), *ma-takataka* (pl.)
Derivational relationship	Identify relationships between noun classes	5/6 ↔ 3/4 (fruit ↔ plant)

Table outlines the morphological analysis framework employed in this study, describing each level of analysis with illustrative examples from Chasu plant nomenclature.

3.5.2 Semantic Analysis

The semantic analysis focused on identifying the cognitive and cultural motivations underlying noun class assignment and interclass derivation. This involved examining participants' explanations of plant naming practices, the functional and cultural significance of different plants, and the evaluative meanings encoded through secondary noun classes. Patterns of semantic categorisation were identified and interpreted within the cognitive linguistic framework, focusing on how token frequency and usage patterns shape the entrenchment of morphological patterns (Croft & Cruse, 2004; Evans & Green, 2006).

3.5.3 Thematic Analysis

Audio recordings, transcripts, and field notes were repeatedly reviewed to identify recurring patterns in noun-class assignment, derivational relationships between plants and their corresponding products, and the semantic and cultural motivations underlying the assignment of such noun classes. Thematic analysis was employed to identify, analyse, and report patterns within the data (Braun & Clarke, 2006). Initial codes were generated from the data and subsequently grouped into themes corresponding to the research questions, including (i) interclass derivational relationships between plants and fruits, (ii) interclass derivational relationships between plants and non-typical fruit products, (iii) identical noun class assignment for plants and products, and (iv) the use of secondary noun classes for diminutive and augmentative functions.

3.5.4 Plant Identification

Scientific identification of plant species was conducted using reference materials including Ruffo *et al.* (2002), Beentje (1994), and the plant specimens collected during fieldwork. Where possible, plant identification was confirmed through consultation with botanists at Sokoine University of Agriculture (SUA). The scientific names of plants were provided alongside their Chasu names and English glosses to ensure clarity and enable cross-linguistic comparison.

3.6 Ethical Considerations

Ethical approval for this study was obtained from the Sokoine University of Agriculture Research Ethics Committee. Prior to data collection, the researcher obtained informed consent from all participants, explaining the purpose of the study, the procedures involved, and the participants' rights to withdraw at any time without consequences. Participants were assured of the confidentiality of their responses and were informed that their personal information would be anonymised in any publications resulting from the study. Given the culturally sensitive nature of ethnobotanical knowledge, participants' rights over their traditional knowledge were acknowledged and respected (Leyew, 2011; Charwi *et al.,* 2023).

3.7 Trustworthiness and Rigour

To ensure the trustworthiness and rigour of the findings, several strategies were employed (Lincoln & Guba, 1985). First, triangulation of data sources (participants with different expertise) and methods (free listing, field walks, written texts) enhanced the credibility of the findings. Second, member checking was conducted by sharing preliminary findings with participants and seeking their confirmation of the accuracy of the recorded plant names and their meanings. Third, prolonged engagement with the community through repeated fieldwork visits allowed the researcher to build trust and gain deeper understanding of the plant naming practices. Fourth, thick description of the study context, participants, and data collection procedures enables readers to assess the transferability of the findings to other contexts (Lincoln & Guba, 1985; Creswell, 2014).

4. Results and Discussion

This section presents the findings of the study, organized according to the research questions and structured around the three systematic interclass derivational relationships identified in Chasu plant nomenclature. The results are presented with illustrative examples from the data, followed by discussion that interprets the findings within the cognitive linguistic framework. The discussion integrates the findings with previous research on Bantu noun class systems and ethnobotanical classification, highlighting both convergences and divergences.

4.1 Interclass Derivational Relationship between Noun Classes 3/4 (Plant Names) and 5/6 (Fruit Names)

The study found a pervasive interclass derivational relationship between plants designated in noun classes 3/4 and their corresponding fruits designated in noun classes 5/6. This pattern reflects a systematic morphological relationship whereby the same lexical stem appears with different class prefixes: class 3/4 prefixes (*m-/mi-*) for the plant and class 5/6 prefixes (*i-/ma-*) for the fruit. Table 5 illustrates this productive pattern.

The data presented in Table 5 demonstrate a systematic and productive relationship between noun classes 5/6 and 3/4, where the same stems with class 5/6 prefixes (*i-/ma-*) are used to designate fruits, and the same stems with class 3/4 prefixes (*m-/mi-*) are used to designate plants. As noted by Denny and Creider (1976) and Contini-Morava (2000), fruits are prototypically assigned to noun classes 5/6 in many Bantu languages, while plants and trees are typically assigned to classes 3/4. This pattern holds consistently in Chasu, suggesting a deep-seated cognitive categorization where the morphological distinction between plant and fruit is encoded through systematic class alternation.

From a cognitive linguistic perspective, this pattern reflects the entrenchment of a productive derivational schema through high token frequency (Croft & Cruse, 2004; Langacker, 2008). The repeated use of numerous lexical items following this pattern (as evidenced by the 15 examples in Table 5) reinforces the mental representation of the plant-fruit derivational relationship, enabling speakers to productively extend the pattern to new lexical items. This is consistent with Bybee's (1995) observation that high type frequency promotes the entrenchment of morphological schemas.

Table 5: Interclass Derivational Relationship between Classes 3/4 (Plants) and 5/6 (Fruits)

Noun Classes 5/6 (Fruit Names)	Noun Classes 3/4 (Plant Names)	Botanical Name	Gloss
i-takataka	*m-takataka*	*Azanza garckeana*	Snot apple / Snot apple tree
i-tungululu	*m-tungululu*	*Aframomum angustifolium*	Wild cardamom / Wild cardamom plant
i-tunguja	*m-tunguja*	*Solanum bataceum*	Tomato / Tomato tree
i-kongwa	*m-kongwa*	*Peruvian groundcherry*	Goose berry / Goose berry plant
i-ng'ong'o	*m-ng'ong'o*	*Sclerocarya birrea*	Marula / Marula tree
i-papayu	*m-papayu*	*Carica papaya*	Papaya / Papaya plant
i-chungwa	*m-chungwa*	*Citrus sinensis*	Orange / Orange tree
i-thuva	*m-thuva*	*Flacourtia indica*	Governor's plum / Governor's plum tree
i-yembe	*m-wembe*	*Mangifera indica*	Mango / Mango tree
i-kungu	*m-kungu*	*Passiflora incarnata*	Passion fruit / Passion plant
i-limawe	*m-limawe*	*Citrus limon*	Lemon / Lemon tree
i-parachichi	*m-parachichi*	*Persea americana*	Avocado / Avocado tree
i-funethi	*m-funethi*	*Artocarpus heterophyllus*	Jackfruit / Jackfruit tree
i-pera	*m-pera*	*Psidium guajava*	Guava / Guava tree
i-topetope	*m-topetope*	*Annona muricata*	Soursop / Soursop tree

Table 5: This table presents the systematic interclass derivational relationship between fruit names in noun classes 5/6 and plant names in noun classes 3/4. The same lexical stem appears with different class prefixes to distinguish between the fruit product and the plant source, reflecting a productive derivational pattern in Chasu plant nomenclature.

The directionality of derivation is an important theoretical consideration. Leyew (2011) argued that indigenous peoples initially named entities that were most useful to them, following the utility criterion. In the Chasu context, the finding that fruit names appear to be primary is significant, the plant name is derived from the fruit name, as in *m-parachichi* 'avocado tree' from *i-parachichi* 'avocado fruit'. This supports the utility criterion, as fruits generally have more immediate food value and are therefore named first (Denny & Creider, 1976; Leyew, 2011; Lusekelo & Amir, 2022). However, it is important to note that this claim about directionality would benefit from historical linguistic evidence; what is clear from the synchronic data is the systematic paradigmatic relationship between the forms.

plausibly motivated by phonological factors, as noun classes 9/10 are the default class for nouns with a zero-prefix or nasal-initial stems (Maho, 1999; Van de Velde, 2019). Table 6 presents illustrative examples of such classifications.

Table 6 shows that some fruit names in Chasu are assigned to noun classes 9/10 instead of the default class 5/6. This pattern has been observed in other Bantu languages and is typically motivated by phonological constraints, where stems beginning with certain consonants take the nasal prefix characteristic of class 9/10 (Maho, 1999; Katamba, 2002; Van de Velde, 2019). For instance, *ndaria* is derived from the stem *-daria* with the prefix *n-* (which undergoes assimilation to *nd-*), while *ntundutwa* shows the same

Table 6: Fruit Names in Noun Classes 9/10

Noun Class 9/10 (Fruit Names)	Noun Class 3/4 (Plant Names)	Botanical Name	Gloss
ntelia	*m-telia*	*Fragaria ananassa*	Strawberry / Strawberry plant
ndaria	*m-daria*	*Vangueria infausta*	African medlar / African medlar tree
ntundutwa	*m-tundutwa*	*Ximenia Americana*	Hog plum / Hog plum plant
dhammbarau	*m-dhambarau*	*Syzygium cumini*	Java plum / Java plum tree
thambia	*m-thambia*	*Pachystela msolo*	Pachystela msolo / Pachystela msolo tree
dhabibu	*m-dhabibu*	*Vitis vinifera*	Grape / Common grape plant
mpunguu	*m-punguu*	*Antidesma membranaceum*	Antidesma / Antidesma plant

Table 6: This table presents fruit names that are designated in noun classes 9/10 rather than the prototypical classes 5/6. These fruit names nevertheless share the same lexical stems as their corresponding plant names in classes 3/4, demonstrating the same derivational relationship across a different noun class pair.

In addition to fruit names assigned to noun classes 5/6, the findings further reveal that, in Chasu, certain fruit names are also classified under noun classes 9/10. This distribution is

nasal prefix with the stem *-tundutwa*. This finding aligns with Marten's (2021) observation that while class 5/6 is the semantic default for fruits in Bantu languages, phonological

factors can override semantic assignment and trigger placement in other classes.

Despite the different noun class assignment, the derivational relationship remains consistent: the same lexical stem is used for both the fruit (in classes 9/10) and the plant (in classes 3/4). This suggests that the derivational relationship is independent of the specific noun class pair involved and instead operates at the level of the lexical stem, with noun class prefixes serving as formal markers of the plant-product distinction. This is consistent with Contini-Morava's (2000) analysis of *Swahili*, where noun class alternation serves a derivational function regardless of the specific classes involved.

4.2 Interclass Derivational Relationship between Noun Classes 3/4 (Plant Names) and 9/10 (Non-typical Fruit Plant Products)

The second interclass derivational relationship concerns noun classes 9/10 and 3/4 in Chasu. Noun classes 3/4 are used to name plants, while noun classes 9/10 are used to name certain products derived from those plants that are not typical fruits. The findings show that the same lexical stems occur in both sets of classes: when the stem appears in classes 3/4, it refers to the plant itself; when the same stem appears in classes 9/10, it refers to a non-typical fruit plant product such as seeds, nuts, beans, or other edible parts. Table 7 illustrates this systematic relationship.

Table 7: Interclass Derivational Relationship between Classes 3/4 (Plants) and 9/10 (Non-typical Fruit Products)

Noun Class 9/10 (Non-typical Fruit Products)	Noun Class 3/4 (Plant Names)	Botanical Name	Gloss
ndangu	*m-dangu*	*Solanum incanum*	Bitter apple / Bitter apple plant
mbono	*m-bono*	*Ricinus communis*	Castor bean / Castor bean plant
korosho	*m-korosho*	*Anacardium accidentale*	Cashew nut / Cashew nut tree
kahawa	*m-kahawa*	*Coffea arabica*	Coffee bean / Coffee plant
mpirimpiri	*m-piripiri*	*Capsicum annuum*	Pepper / Pepper plant
nadhi	*m-nadhi*	*Cocos nucifera*	Coconut / Coconut tree
nyanya	*m-nyanya*	*Solanum lycopersicum*	Tomato / Tomato plant
mpojo	*m-pojo*	*Vicia faba*	Broad bean / Broad bean plant
mpaha	*m-paha*	*Tylosema esculentum*	Morama bean / Morama bean plant
shughu	*m-shughu*	*Cajanus cajan*	Pigeon pea / Pigeon pea plant
mpwa	*m-pwa*	*Solanum aethiopicum*	African eggplant / African eggplant plant

Table 7: This table presents the systematic interclass derivational relationship between non-typical fruit products designated in noun classes 9/10 and their corresponding plants designated in noun classes 3/4. These products include seeds, nuts, beans, and other edible plant parts that are not classified as typical fruits.

The data in Table 7 demonstrate a productive derivational pattern similar to that observed for fruits in Table 5, but involving non-typical fruit products in classes 9/10. Plant names such as *mbono* 'castor bean plant', *mpojo* 'broad bean plant', *mpwa* 'African eggplant', *mpirimpiri* 'pepper plant', and *mpaha* 'morama bean plant' are derived from the names of their products through the addition of class 3/4 prefixes to the same lexical stem.

A notable phonological phenomenon is evident in these examples: the plant names are formed by the attachment of the noun class 3 prefix (*m-*) to the stem, which in many cases results in gemination or modification of the initial consonant. For instance, *mbono* derives from *m-* + *-bono*, *mpojo* from *m-* + *-pojo*, and *mpwa* from *m-* + *-pwa*. The resulting form is phonologically identical to the product name in classes 9/10, as the nasal prefix in classes 9/10 also produces nasal-initial forms. This creates potential ambiguity between plant and product names, which is resolved through agreement patterns and context.

As Maho (1999) and Contini-Morava (2000) have noted, the distinction between identical or similar forms in different noun classes is maintained through syntactic agreement patterns rather than solely through the phonological form of the noun itself. In Chasu, the plural forms distinguish between plants and products: plant names take class 4 plural prefixes (*mi-*), resulting in forms such as *mipiripiri* (class 4 plural of *mpirimpiri* 'pepper plant'), while their product counterparts take class 10 plural prefixes and exhibit nasal-initial forms such as *mpirimpiri-mpirimpiri* (class 10 plural of *mpirimpiri* 'pepper'). This demonstrates that noun class membership is confirmed through agreement patterns rather than isolated noun forms, a key principle in Bantu noun class analysis (Denny & Creider, 1976; Van de Velde, 2019).

The derivation of plant names from non-typical fruit product names further supports the utility criterion posited by Leyew (2011) and earlier scholars. The fact that products such as coffee beans, castor beans, and cashew nuts are named first, due to their economic, medicinal, or food utility, and then

extended to name the plant itself reflects a cognitive priority on useful items. This pattern has been observed in other Bantu languages including Vidunda (Legère, 2009), Nyamwezi (Lusekelo & Amir, 2022), and Sukuma (Lusekelo & Amir, 2022).

4.3 Same Names for Plants and Plant Products (Noun Classes 3/4, 5/6, 7/8, and 9/10)

The study found another derivational relationship where the same noun class is used to name both the plant and its product, that is, the same name for both plant and product. The findings show that determination of whether the name is used to refer to a plant or to its product depends on the context. The products can either be fruits or any other non-typical fruit plant products. Table 8 presents examples from various noun classes where the same noun class is used to name both the plant and its product.

Table 8: Same Noun Class for Both Plant and Product

Product Name	Noun Class	Plant Name	Noun Class	Botanical Name	Gloss
i-yombo	5/6	*i-yombo*	5/6	*Xanthosoma sagittifolium*	Tannia cocoyam (plant and product)
i-dunguthi	5/6	*i-dunguthi*	5/6	*Opuntia ficus-indica*	Cactus (plant and fruit)
i-hemba	5/6	*i-hemba*	5/6	*Zea mays*	Maize (plant and grain)
i-gimbi	5/6	*i-gimbi*	5/6	*Colocasia esculenta*	Taro (plant and corm)
i-totwe	5/6	*i-totwe*	5/6	*Landolphia kirkii*	Wild peach (plant and fruit)
i-liki	5/6	*i-liki*	5/6	*Elettaria cardamomum*	Cardamom (plant and seed)
i-koko	5/6	*i-koko*	5/6	*Cucurbita pepo*	Pumpkin (plant and fruit)
i-ghobe	5/6	*i-ghobe*	5/6	*Phaseolus vulgaris*	Bean (plant and seed)
kyadhi	7/8	*kyadhi*	7/8	*Solanum tuberosum*	Irish potato (plant and tuber)
kilukwa	7/8	*kilukwa*	7/8	*Dioscorea alata*	Water yam (plant and tuber)
kyogwe	7/8	*kyogwe*	7/8	*Ipomoea batatas*	Sweet potato (plant and tuber)
njwijwi	9/10	*njwijwi*	9/10	*Solanum anguivii*	African eggplant (plant and fruit)
karanga	9/10	*karanga*	9/10	*Arachis hypogaea*	Groundnut (plant and seed)
mtama	3/4	*mtama*	3/4	*Pennisetum glaucum*	Millet (plant and grain)
mustafeli	3/4	*mustafeli*	3/4	*Eriobotrya japonica*	Loquat (plant and fruit)

Table 8: This table presents examples where the same noun class and the same lexical form are used to name both the plant and its product. The distinction between plant and product is determined by context rather than by morphological marking, reflecting a different pattern of derivational relationship from the class-alternation patterns observed in Tables 5-7.

Table 8 presents a pattern distinct from those observed in Tables 5-7. In these cases, the plant and product are morphologically identical, with no class alternation marking the distinction. The same noun class prefix and stem are used for both the plant and its product. This raises an important analytical question: should this be considered a derivational relationship (zero-derivation), or is the same lexical item being used for both referents?

From a derivational morphological perspective, this pattern reflects zero-derivation (or non-overt derivation), whereby a single nominal form is extended to encode both the source entity (the plant) and the derived entity (the product) without a change in noun class morphology (Maho, 1999; Marten, 2021). This is particularly common for cultivated plants whose products are culturally prominent, such as *ihemba* 'maize plant/maize', *kyogwe* 'sweet potato plant/sweet potato', and *kilukwa* 'water yam plant/water yam'. This suggests that, in Chasu, certain noun classes permit semantic expansion without formal reclassification when the plant-product relationship is conceptually salient and culturally entrenched (Legère, 2009; Lusekelo & Amir, 2022).

As noted earlier, indigenous peoples have long used various products from plants, including fruit products and other non-typical fruit products such as cereal grains, root tubers, legumes, and plant oils (Berlin *et al.,* 1992; Leyew, 2011). The findings show that plants which are particularly important for subsistence, such as maize, beans, sweet potatoes, and millet, are more likely to share identical names with their products. This can be explained through the cognitive linguistic concept of entrenchment: the high frequency of these items in daily use leads to the entrenchment of a single form encoding both plant and product, as distinguishing them through class alternation is not necessary for successful communication given the contextual salience of the distinction (Croft & Cruse, 2004; Langacker, 2008).

The zero-derivation pattern observed in Table 8 is consistent with findings from other Bantu languages. Legère (2009) documented similar patterns in Vidunda, where staple crops such as *mafamba* 'cassava' and *ŋoko* 'chicken (both bird and meat)' show identical forms for plant and product. Lusekelo (2023) also found this pattern in Hedzabe plant nomenclature, where culturally salient plants tend to have unified names. This suggests a cross-Bantu pattern where

cultural salience and frequency of use motivate the collapse of formal distinctions between plant and product.

4.4 Noun Classes and Plant Parts in Chasu (Ethnophytography) (*Plate 1, 2 & 3 Appendix*)

In the process of plant naming, multiple factors are taken into account, and plant parts play a central role in naming practices across ethnolinguistic groups. This section examines how plant parts are linguistically encoded in Chasu, focusing on the ways in which specific plant parts motivate plant names. Plant names may be derived from salient properties of plant parts, such as their shape, colour, size, or length.

Previous studies have shown that plant part terms are predominantly assigned to the noun class pair 5/6 in many Bantu languages (Denny & Creider, 1976; Contini-Morava, 2000; Marten, 2021). Consistent with these findings, the present study reveals that the majority of plant part–based names in Chasu also occur in noun classes 5/6. However, the analysis further indicates that other noun classes are involved in the naming of plant parts, notably classes 9/10, as well as a few plant parts in classes 3/4 and 7/8. Table 9 presents general plant part terms and their noun class assignments.

Table 9: General Plant Part Terms in Chasu

Plant Part Term	Noun Class	Gloss
itambi	5/6	Tree branch
ihungo	5/6	Leaf
irangare	5/6	Flower
ikonde la mti	5/6	Back of the tree
ishina la mti	5/6	Base of the tree
kikolo	7/8	Root
mbeu	9/10	Seeds
itunda	5/6	Fruit
mvwa	9/10	Thorn

Table 9: This table presents general plant part terms in Chasu and their noun class assignments. The majority of plant part terms are assigned to noun classes 5/6, consistent with the cross-Bantu pattern documented by Denny and Creider (1976) and Contini-Morava (2000).

The findings show that for plants that are particularly useful in the Chasu-speaking community, their parts are named extensively. For food plants such as *nkinda* 'banana plant', *ihemba* 'maize plant', *ighobe* 'bean plant', and *kyogwe* 'sweet potato', different parts are named in detail, reflecting the cultural and economic significance of these species (Ruffo *et al.,* 2002; Yohana, 2009). Table 10 presents the parts of the banana plant as an illustrative case.

Table 10: Banana Plant Parts and Their Noun Classes

Plant Part	Noun Class	Gloss
ijitu	5/6	Banana leaf
idio	5/6	Banana (fruit)
idafa	5/6	Dry stem skin (pseudostem)
ithagho	5/6	Dry banana leaf
ishambare	5/6	Petal
ihio	5/6	True stem
mbochwe	9/10	Flowers
ndoo	9/10	Banana bud
nkinda	9/10	Banana tree
nkamba	9/10	Bunch of bananas

Table 10: This table presents the names of banana plant parts in Chasu and their noun class assignments. The banana plant (nkinda) has extensively named parts, with most parts assigned to noun classes 5/6 and a few to classes 9/10.

The data in Table 10 demonstrate that the banana plant, which is central to Chasu subsistence and culture, has an elaborate terminological system for its parts. This aligns with Berlin *et al.'s* (1992) observation that culturally important plants tend to have more extensive terminological elaboration. The majority of banana parts are assigned to noun classes 5/6 (*i-/ma-*), consistent with the general pattern observed for plant parts (Denny & Creider, 1976; Contini-Morava, 2000). However, some parts such as *mbochwe* 'flowers' and *ndoo* 'banana bud' are assigned to classes 9/10, demonstrating that while class 5/6 is the default for plant parts, phonological and semantic factors can lead to alternative class assignments.

Similarly, the maize plant (*ihemba*), which is a common and useful plant in the Chasu community, has extensively named parts. Table 11 presents these parts.

Table 11: Maize Plant Parts and Their Noun Classes

Plant Part	Noun Class	Gloss
kireri	7/8	Tassel
ihungo	5/6	Leaf
ibuva	5/6	Stalk
ndoro	9/10	Husk
nyangio	9/10	Silk

Table 11: This table presents the names of maize plant parts in Chasu and their noun class assignments. The maize plant parts are assigned to noun classes 5/6, 7/8, and 9/10.

The naming of maize parts involves three different noun class pairs: 5/6 (*ihungo* 'leaf', *ibuva* 'stalk'), 7/8 (*kireri* 'tassel'), and 9/10 (*ndoro* 'husk', *nyangio* 'silk'). This distribution demonstrates that while class 5/6 is the most common for plant parts, the assignment is not categorical and may be influenced by phonological and semantic factors (Maho, 1999; Van de Velde, 2019).

The naming of tree parts presents another illustrative pattern. Table 12 presents selected tree part terms in Chasu.

Table 12: Tree Parts and Their Noun Classes

Plant Part	Noun Class	Gloss
itambi	5/6	Tree branch
ishina la mti	5/6	Base of the tree
ikonde la mti	5/6	Back of the tree
ihungo	5/6	Leaf

Table 12: This table presents tree part names in Chasu and their noun class assignments. All tree parts identified in this study are assigned to noun classes 5/6.

The constructions such as *ikonde la mti* 'back of the tree' and *ishina la mti* 'base of the tree' are phrasal compounds (adnominal constructions) but they are used as names for these parts of the tree. The consistent assignment of tree parts to class 5/6 is significant. It suggests that class 5/6 serves not only for fruits but also for other "parts of wholes" or "items with extended shape" (Denny & Creider, 1976; Contini-Morava, 2000). This aligns with Denny and Creider's (1976) proposal that class 5/6 in Proto-Bantu was associated with parts of a whole, including fruits, leaves, branches, and other body parts.

4.5 Secondary Noun Classes and Their Semantic Functions in Chasu Plant Naming

Noun classes can be categorized as secondary classification, which may include augmentatives, diminutives, and locatives. Secondary classification may change the meaning of target nouns by adding augmentative, diminutive, and locative senses (Maho, 1999; Kahigi, 2005). This process indicates that plant naming is not only referential but also expressive, as such morphological operations allow speakers to encode evaluations of size, desirability, maturity, and quality. In Chasu plant nomenclature, secondary noun classes are productively used for both diminutive (classes 12/13) and augmentative (classes 5/6) functions.

4.5.1 Plant Naming and Diminutiveness

Noun classes 12/13 are regarded as secondary classes which reflect diminutiveness. The findings of the present study show that the majority of plant names in Chasu can be allocated to noun classes 12/13 to show diminutiveness. The study found that such noun classes can be substituted with the primary classes (regular diminutiveness) or can be stacked together with the primary classes (doubling/stacking noun classes).

4.5.1.1 Regular Diminutiveness

The first strategy involves regular replacement of the primary noun class prefix (typically 5/6 and 7/8) with the diminutive class 12/13 prefix. This results in a modified form that refers to a younger version of the plant, a smaller or less developed specimen, or a plant viewed with affection, tenderness, or aesthetic value. Table 13 illustrates this point.

The examples in Table 13 demonstrate that noun classes 5/6 and 7/8 permit regular replacement with noun classes 12/13 to show diminutiveness. For instance, *idunguthi* (5/6) becomes *kadunguthi* (12/13), and *kimbara* (7/8) becomes *kambara* (12/13). This pattern is similar to other Bantu languages which also allow regular substitution of primary noun classes with diminutive noun classes in plant names (Pakia, 2005; Legère, 2009; Legère, 2020). The regular substitution pattern is productive and applies to a wide range of plant names in classes 5/6 and 7/8.

Table 13: Regular Substitution of Noun Classes for Diminutiveness

Plant Name	Singular (Class 12)	Plural (Class 13)	Botanical Name	Gloss
ibaambono (5/6)	*kabaambono*	*vubaambono*	*Macaranga capensis*	Small David's heart
idunguthi (5/6)	*kadunguthi*	*vudunguthi*	*Opuntia ficus-indica*	Small cactus
ikararato (5/6)	*kakararato*	*vukararato*	*Alstonia macrophylla*	Small devil tree
iririko (5/6)	*kaririko*	*vuririko*	*Veronica amygdalina*	Small bitter leaf
kimbara (7/8)	*kambara*	*vumbara*	*Bidens pilosa*	Small beggar's tick
kilukwa (7/8)	*kalukwa*	*vulukwa*	*Dioscorea alata*	Small water yam
kirumbi (7/8)	*karumbi*	*vurumbi*	*Euphorbia heterochroma*	Small euphorbia

Table 13: This table presents examples of regular substitution of primary noun classes (5/6 and 7/8) with diminutive classes 12/13. The resulting forms refer to smaller, younger, or more aesthetically valued specimens of the plant.

The diminutive forms serve various pragmatic functions. They can indicate a young or small plant, as in *kakimbara* 'small beggar's tick' versus *kimbara* 'beggar's tick (standard size)'. They can also express affection, as in *kadunguthi* 'small/sweet cactus' referring to a young cactus that is viewed with tenderness. This expressive function aligns with Contini-Morava's (2000) observation that diminutives in Bantu often encode affective meanings beyond mere size reference.

4.5.1.2 Doubling of Noun Classes for Diminutives

In the case of other noun classes used in plant naming, specifically classes 3/4, 9/10, and 11/6, the findings indicate that Chasu permits the stacking or doubling of noun classes as a strategy to express diminutiveness. This process allows speakers to encode subtle distinctions in size, familiarity, or affective value within the noun itself. Table 14 presents illustrative examples.

Table 14: Stacking/Doubling of Noun Classes for Diminutiveness

Plant Name	Singular (Class 12)	Plural (Class 13)	Botanical Name	Gloss
mkunguma (3/4)	*kamkunguma*	*vumkunguma*	*Sorindeia madagascariensis*	Small "mti kiza"
mwangwi (3/4)	*kamwangwi*	*vumwangwi*	*Myrica salicifolia*	Small Chinese bayberry
mchofwe (3/4)	*kamchofwe*	*vumchofwe*	*Carissa edulis*	Small climbing num-num
mfune (3/4)	*kamfune*	*vumfune*	*Sterculia appendiculata*	Small Panama tree
nkambu (9/10)	*kankambu*	*vunkambu*	*Rumex usambarensis*	Small dammer
nyanje (9/10)	*kanyanje*	*vunyanje*	*Indigofera suffruticosa*	Small-leaved indigo
njitwe (9/10)	*kanjitwe*	*vunjitwe*	-	-
lukoka (11/6)	*kalukoka*	*vulukoka*	*Salaella ramosa*	Small azuma zasa
lufuriani (11/6)	*kalufuriani*	*vulufuriani*	*Branchiaria reptans*	Small creeping panic grass

Table 14: This table presents examples of stacking or doubling of noun classes for diminutive meaning. The diminutive prefixes (ka-/vu-) are added before the existing noun class prefixes, resulting in stacked or doubled class marking.

The examples in Table 14 demonstrate that Chasu permits the stacking of diminutive classes 12/13 with primary classes 3/4, 9/10, and 11/6. For instance, *mkunguma* (class 3/4) becomes *kamkunguma* (class 12 + class 3/4), and *nyanje* (class 9/10) becomes *kanyanje* (class 12 + class 9/10). This stacking strategy results in complex morphological structures where both the original noun class prefix and the diminutive prefix are present.

This stacking strategy is different from the pattern observed in other Bantu languages, which allow regular substitution of the diminutive noun classes with the primary noun classes in plant names (Pakia, 2005; Legère, 2009; Legère, 2020). However, Maho (1999) noted that some Bantu languages allow the doubling of noun classes for expressive purposes. The stacking pattern in Chasu represents a productive morphological strategy for encoding diminutive meaning while retaining the original class marking, allowing speakers to signal both the basic category (plant type) and the evaluative meaning (smallness) simultaneously. This creates richer expressive possibilities and reflects the cognitive entrenchment of multiple morphological patterns (Croft & Cruse, 2004; Langacker, 2008).

4.5.2 Plant Naming and Augmentatives

Apart from diminutive meanings with noun classes 12/13, Chasu employs noun classes 5/6 to form augmentative meanings. This stacking or doubling of noun classes allows speakers to encode not only increased size or prominence but also social or cultural attitudes toward the referent, such as disapproval, undesirability, or exaggeration. The findings show that noun classes 5/6 can be substituted with the primary classes (regular augmentative) or can be stacked with the primary classes (doubling/stacking noun classes for augmentative).

4.5.2.1 Regular Replacement for Augmentatives

In this strategy, there is regular replacement of the original/primary noun class (classes 7/8) with the augmentative classes 5/6. This results in a modified form that can express largeness, excessiveness, coarseness, or undesirability. The findings further indicate that augmentatives often bear a derogative or negative evaluative meaning, which corresponds to Contini-Morava's (2000) observation that augmentatives in Bantu often express 'too big', 'rough', or negatively marked entities. Table 15 presents examples of augmentatives with regular replacement.

Table 15: Augmentative with Regular Replacement

Plant Name	Singular (Class 5)	Plural (Class 6)	Botanical Name	Gloss
kithapa kijiru (7/8)	*ithapa ijiru*	*mathapa majjivu*	*Agave fourcroydes*	Big Cuban sisal
kidongadwa (7/8)	*idongadwa*	*madongadwa*	*Rapanea melanophloeos*	Big cape beech
kikula (7/8)	*ikula*	*makula*	*Linderia insularies*	Big spicebush
kitavakwe (7/8)	*itavakwe*	*matavakwe*	*Mimosa pudica*	Big touch-me-not
kyogwe (7/8)	*iogwe*	*mayogwe*	*Ipomoea batatas*	Big sweet potato
kihindihindi (7/8)	*ihindihindi*	*mahindihindi*	*Cissus quadrangularis*	Big veldt grape
kimbara (7/8)	*imbara*	*mambara*	*Bidens pilosa*	Big beggar's tick

Table 15: This table presents examples of regular replacement of primary noun classes (7/8) with augmentative classes 5/6. The resulting forms encode largeness, excessiveness, coarseness, or undesirability.

The data in Table 15 illustrate that Chasu employs a strategy of regular replacement, where the original noun class (typically class 7/8) is systematically replaced by the augmentative classes 5/6. For example, *kithapa kijiru* (class 7/8) becomes *ithapa ijiru* (class 5/6), and *kimbara* (class 7/8) becomes *imbara* (class 5/6). This morphological modification produces forms that convey not only largeness or prominence but also additional evaluative meanings, such as excessiveness, coarseness, or undesirability.

The pejorative connotation of augmentatives is particularly evident in examples such as *imbara* 'big beggar's tick'

(from *kimbara* 'beggar's tick'). The augmentative form is often used to express disapproval or annoyance, such as when a farmer encounters an unusually large specimen of a weed. This aligns with Contini-Morava's (2000) observation that augmentatives in Bantu languages often carry negative or pejorative connotations, marking entities that are 'too big', 'rough', or otherwise socially or culturally undesirable. In the Chasu context, the augmentative can convey that the plant is excessively large and therefore difficult to manage or remove.

4.5.2.2 Doubling of Noun Classes for Augmentatives

In the case of other noun classes used in plant naming (e.g., noun classes 3/4, 9/10, and 11/6), the findings indicate that Chasu allows the stacking or doubling of noun classes as a strategy to convey an augmentative sense. This morphological pattern enables speakers to encode not only increased size or prominence but also evaluative or expressive nuances, such as largeness, excessiveness, coarseness, or undesirability, or a derogatory connotation. Table 16 presents illustrative examples.

Table 16: Doubling of Noun Classes for Augmentative Sense

Plant Name	Singular (Class 5)	Plural (Class 6)	Meaning
mpera (3/4)	*impera*	*mamipera*	Big guava tree (s)
mkisha (3/4)	*imkisha*	*mamikisha*	Big sausage tree (s)
nkambu (9/10)	*inkambu*	*mankambu*	Big red rumex (es)
mpatha (9/10)	*impatha*	*mampatha*	Big bitter leaf
lukoka (11/6)	*ilukoka*	*malukoka*	Big azuma zasa

Table 16: This table presents examples of doubling or stacking of noun classes for augmentative meaning. The augmentative prefixes (i-/ma-) are added before the existing noun class prefixes, resulting in stacked or doubled class marking that encodes increased size or prominence.

The data in Table 16 demonstrate that Chasu employs the doubling or stacking of noun classes, particularly classes 3/4, 9/10, and 11/6, as a morphological strategy to express augmentative meaning. In these examples, the singular and plural forms of plant names are marked not only by the conventional class 5/6 prefixes but also interact with noun-class prefixes from other classes, resulting in a layered or stacked morphological structure. For instance, *mpera* (class 3/4) becomes *impera* (class 5 + class 3/4), and *nkambu* (class 9/10) becomes *inkambu* (class 5 + class 9/10). This pattern allows speakers to encode additional semantic information beyond size, including emphasis, exaggeration, or evaluative meaning, such as a sense of impressiveness or even mild derogation.

The stacking strategy for augmentatives parallels the stacking pattern for diminutives (Table 14), demonstrating that Chasu uses similar morphological mechanisms for both expressive functions. This consistent pattern of class stacking for expressive purposes reflects the cognitive entrenchment of these morphological operations through repeated use (Croft & Cruse, 2004; Langacker, 2008). The ability to simultaneously encode both basic categorical information (plant type) and evaluative meaning (size, attitude) through stacked morphology represents a sophisticated expressive resource in Chasu plant naming.

4.6 Theoretical Implications

The findings presented in this section demonstrate three systematic interclass derivational relationships in Chasu plant nomenclature. Table 17 summarizes these relationships.

The findings make several contributions to the understanding of Bantu noun class systems and their role in encoding ethnobotanical knowledge. First, they confirm the systematic nature of interclass derivation in plant nomenclature, demonstrating that class alternation (Tables 5-7), zero-derivation (Table 8), and expressive class manipulation (Tables 13-16) are all productive mechanisms in Chasu.

Second, the findings support the utility criterion proposed by Leyew (2011) and earlier scholars (Berlin *et al.,* 1992), as products (fruits and non-typical products) appear to be the source forms from which plant names are derived. This suggests that cultural and economic utility plays a role in motivating the directionality of derivational relationships.

Third, the findings extend cognitive linguistic theory by demonstrating how entrenchment through high token frequency (Croft & Cruse, 2004; Langacker, 2008) explains both the regular class-alternation patterns and the use of zero-derivation for culturally salient plants. The high frequency of use for staple crops such as maize, beans, and sweet potatoes leads to the entrenchment of single forms for both plant and product, while less frequent but still familiar plants show systematic class alternation.

Fourth, the findings on secondary noun classes demonstrate that plant naming is not only referential but also expressive. The productive use of diminutives (classes 12/13) and augmentatives (classes 5/6) allows speakers to encode evaluations of size, desirability, maturity, and quality. This extends theoretical understanding of noun class derivation beyond grammatical agreement to expressive morphology, as noted by Maho (1999), Kahigi (2005), and Marten (2021). The finding that Chasu allows both regular substitution and stacking for expressive purposes is particularly significant, as it demonstrates the productivity and flexibility of the noun class system in encoding evaluative meaning.

Table 17: Summary of Interclass Derivational Relationships in Chasu Plant Nomenclature

Relationship Type	Noun Classes	Direction	Examples	Derivational Mechanism
Type 1: Fruits to Plants	5/6 --- 3/4	Product --- Plant	*i-takataka* --- *m-takataka*	Class alternation
Type 2: Non-typical products to Plants	9/10 --- 3/4	Product --- Plant	*ndangu* --- *m-dangu*	Class alternation
Type 3: Same name for plant and product	Various (3/4, 5/6, 7/8, 9/10)	Same form	*i-hemba* (plant/grain)	Zero-derivation
Type 4: Secondary classes	12/13 (diminutive), 5/6 (augmentative)	Expressive	*kambara* (small), *imbara* (big)	Replacement or stacking

Table 17: This table summarizes the four types of interclass relationships identified in Chasu plant nomenclature, including the noun classes involved, directionality, illustrative examples, and derivational mechanisms.

Finally, the findings on plant part terminology (Tables 9-12) contribute to the understanding of how the noun class system organizes not only plants and their products but also the internal structure of plants. The consistent assignment of plant parts to class 5/6 supports Denny and Creider's (1976) proposal that class 5/6 was historically associated with "parts of wholes," including fruits, leaves, branches, and other body parts. The fact that this pattern remains productive in Chasu today suggests the historical stability of this semantic association, consistent with Contini-Morava's (2000) analysis of Swahili noun classes.

5.0 Conclusions and Recommendations

This study has demonstrated that plant naming in Chasu is deeply intertwined with the language's noun class system, revealing three systematic interclass derivational relationships: plant names (classes 3/4) derived from fruit names (classes 5/6), plant names derived from non-typical fruit products (classes 9/10), and identical noun class assignment for both plant and product (classes 3/4, 5/6, 7/8, 9/10). The productive use of secondary noun classes for diminutive (12/13) and augmentative (5/6) functions further demonstrates that plant naming is not merely referential but also expressive, enabling speakers to encode evaluations of size, desirability, maturity, and quality. From a cognitive linguistic perspective, these patterns reflect the entrenchment of morphological schemas through sustained language use, while zero-derivation for culturally prominent staple crops indicates that high token frequency can motivate the collapse of formal distinctions between plant and product. The consistent assignment of plant parts to class 5/6 affirms the historical association of this class with "parts of wholes," corroborating cross-Bantu semantic categorisation principles. These findings make significant empirical contributions to Bantu linguistics and ethnobotanical documentation while advancing theoretical understanding of how usage-based processes shape morphological systems.

The study carries important policy implications for biodiversity conservation and cultural heritage preservation in Tanzania's Eastern Arc Mountains. Documenting indigenous ethnobotanical knowledge provides linguistically-grounded frameworks for community-based conservation, culturally responsive environmental education, and language revitalisation initiatives. Future research should pursue cross-Bantu comparative studies to establish the extent of these patterns across the language family, investigate morphophonological factors influencing noun class shifts, and employ psycholinguistic methods to test the cognitive reality of entrenchment and schematisation processes. Interdisciplinary collaboration between linguists, ethnobotanists, ecologists, and conservation practitioners is essential for translating these linguistic findings into actionable strategies that sustain both biological and cultural diversity in rapidly changing African landscapes.

Declaration of Conflict of Interest

The author declares that there are no known competing financial interests or personal relationships that could have influenced the research and findings presented in this paper.

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Plate 1: Parts of a Banana Plant

The photos in Figure 1 illustrate different names of the banana plant parts and they show that most of such parts are named using noun classes 5/6 and few of them are in classes 9/10. Table 5 presents the names of banana plant parts and their noun classes.

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Plate 2: Parts of Maize Plant

Figure 4.5 presents maize plant parts in Chasu where classes 5/6, 7/8 and 9/10 are used in naming those parts. The parts include ***kireri*** *'tassel' (7/8),* ***ihungo*** *'leave' (5/6)* ***ibuva*** *'stalk' (5/6),* ***ndoro*** *'husk' (9/10) and* ***nyangio*** *'silk' (9/10).*

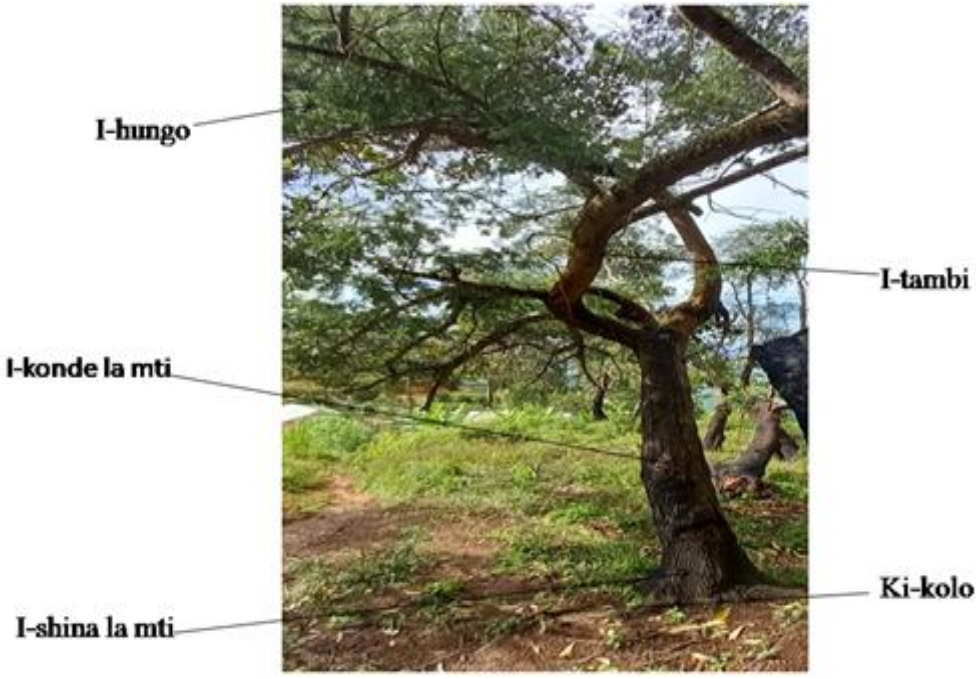

Plate 3*: A Photo Showing Parts of a Tree*

A photo in Figure 3 shows the names of various parts of the tree in Chasu. The parts of the tree include, ***itambi*** *'tree branch' (5/6),* ***ishina la mti*** *'base of the tree' (5/6),* ***ikonde la mti*** *'backs of the tree' (5/6) and* ***ihungo*** *'leaf' (5/6). The constructions such as* ***ikonde la mti*** *'back of the tree' (5/6) and* ***ishina la mti*** *'base of the tree' (5/6) are phrasal compounds (adnominal constructions) but they are used as names of such parts of the tree.*