
Guddiri People's Belief System in The Unusual Functions of Apple-Ring Tree (*Faidherbia Albida*) As A Measure of Their Scientific Literacy

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ABSTRACT: *This study aimed to investigate the Guddiri people's belief system in the unusual phenology, agroforestry function, medicinal value, environmental protection, and weird function of the Apple-Ring Tree (*Faidherbia albida*) as a measure of their scientific literacy. *Faidherbia albida* is a type of tree species that thrives very well, specifically in Sudan and the Sahel Savannah of Northern Nigeria. The design of the study was a descriptive survey. The population comprised all Guddiri people of Azare District, Katagum Local Government, Bauchi. The sample size consisted 384 (276 males and 168 females) adult respondents that were drawn through stratified random sampling technique based on the recommendation of Krejcie and Morgan (1970). Furthermore, the instrument for data collection was a 22-item structured questionnaire tagged "Questionnaire on People's Belief System in the Unusual Functions of *Faidherbia albida*". The instrument was divided into five-function dimensions of *Faidherbia albida*: unusual structure, agroforestry function, medicinal value, environmental protection, and weird function. Some experts in botany, geography, and traditional medicine validated the face and content aspects of the instrument. The reliability of 0.82 was determined through Cronbach Alpha Coefficient Index. The collected data were analyzed by using statistical mean, standard deviation, and Chi-Square. The decision rule for accepting a response be considered a strong belief in the unusual functions of *Faidherbia albida* was a mean value of 3.00 and above. Further, a statistical value of $p < 0.05$ is considered critically significant. The result indicated that Guddiri people had a very strong belief system in the unusual functions of *Faidherbia albida*. Though the males' belief system was stronger than that of their female counterparts. Furthermore, it presents existence of significant difference between Guddiri males' and females' belief system in the unusual functions of the tree. Based on the finding, it was recommended that scientific literacy should be widely disseminated through all kind of communication media among others.*

KEYWORDS: Guddiri people; belief system; unusual function; *Faidherbia albida*

INTRODUCTION

Africans misconceptions and misinterpretations of the working principles of natural phenomena seem to be impeding factors that are grossly affect the expansion of scientific literacy in the continent. Thus, apparently, debilitate the envisioned developments and sustainability that would have salvaged the region out of its wretched state (Asouzu, n. d.). This traditional situation according to Gyimah-Brempong (2011) is the by-product of penchant adherence to archaic socialization in the continent as a result poor level of education, specifically scientific literacy. Scientific literacy according to Dani (2009) is an education programme that aims to train and encourages citizens to investigate the operational principles of natural events and their processes, so that they will describe and explain each one adequately in social conversations.

Unfortunately, in most parts of Africa, today, the use of curiosity to inquire why things work as they do have been slayed and shrouded by regressive taboos (Miller, Kundie, Apusigah & Havarkorty, 2005). Worst still, the fear of consequences of what may follow investigation into operations of natural phenomena is vigorously unleashing severe effect on the development of scientific literacy in the region (Asouzu, n. d.). These indeed have contributed to Africans' disinclination and skepticism towards thinking and investigating what inspires them in their natural environment. Furthermore, the unfavorable situation has influenced Africans in making dogmatic belief in the occurrences in environment (Chukunonyelum, Chukuelobe & Ome, 2013), specifically those related to strange physical structures and functions in objects. Impliedly, objects with abnormal physical appearances and physiological processes are usually assumed to possess weird attributions capable of altering one's fortune. Such as in the case of Guddiri people's belief system in the unusual function of Apple-Ring tree (*Faidherbia albida*) to impact someone's prosperities.

Bauchi North, popularly known as Guddiri Land comprised majorly of Fulani, Kanuri and Kare-Kare tribes (Ibinola, 2009). These native clans were tightly knotted by marriage and of course by religion. The name Guddiri, was derived from an epithet 'Borno N'guddiri', meaning "little Borno" (Ibinola, 2009). Guddirawa is the popular folkloric name of the inhabitants. Their major occupations were farming, fishing, iron smelting and hunting (Ibinola 2009). The religion generally practiced is Islam. Even though a negligible percentage of the population combines Islam with animism. Specifically, they affiliate their belief in the capability of objects with abnormal structures and characterizations to inflict influence someone's destiny and wellbeing. In this vein, they often times believe in the power of some species of plant to alter pattern of life, than they do in animal species. These plants include but not limited to Sodom Apple (*Calotropis procera*), baobab tree (*Adonsonia digitata*), and Tamarind tree (*Tamarindus indica*). Others are *Euphorbia poissoni*, Senegal Coral tree (*Erythrina senegalensis*), and African violet tree (*Securidaca longepedunculata*). However, the most outstanding among them is the Apple-Ring tree (*Faidherbia albida* or *F. albida*).

Faidherbia albida is of genus of leguminous plant containing only one species. It is a native of Africa and the Middle East (Usvat, 2015). Its leaves are bipinnate, typically *monosadae* and compound-type with leaflets borne along the pinnae (Woods, 1992; Usvat, 2015). The morphology of the flower also is very spectacular and attractive (Woods, 1992). The flowers are borne in dense axillary pannicles 3.5 to 16 cm long (Usvat, 2015). Besides, they are arranged in yellow spikes, a special appearance, which attracts pollinator insects to visit the plant in search for nectar.

The fruits are modeled into pods with shiny orange colour. When dry, the pods do not break to shed seeds freely, thus they are indehiscent. More so, they are considerably large, usually in the measurement of 25 cm long by 5 cm broad. The stem of the tree is covered by a corky bark, which is highly impregnated with active metabolites (Laike, 1988). Furthermore, its roots are deeply plunged into the sandy soil (Hargraves, 2010).

F. albida is a farmers' friend tree owing to its ability to expand agro-forestry production (Hargraves, 2010). Importantly, it operates two-fold function; increasing soil fertility viz-a-viz counteracting soil erosion and desertification. In Sub-Saharan Africa, *F. albida* is intercropped with annual crops such as millet and groundnut so as to enhance yearly harvests (Moklodi, *et al*, 2011). Furthermore, (Moklodi, *et al*, 2011) report that leaves deposit of *F. albida* when decayed in the soil is comparable to fertilization of almost 50-t-ha⁻¹/year⁻¹ of manure in dense stand of 50 large trees per ha. Moreover, the leaves and pods of *F. albida* serve as fodder to farm animals in the dry season, thus, serves as alternative food in stressed situation (Wood, 1992). In the view of Duke, (1983) the leaves and pods are palatable to animals, therefore, farm animals like them eagerly. In addition, animals like to take retreat under its shade in the severe month of March, April and May, that is when the crown of the tree is very thick and gorgeously luxuriant (Tropical Plants Database, 2020).

Medicinally, parts of *F. albida* such as the barks, leaves, pods, sections of root and of course, the woods are used in the treatment of so many tropical diseases (laike, 1988). In Guddiri Land, the solution of crushed bark of *F. albida* is used in the management of toothache, eczema, yaws, stomachache and many more

However, the tree prefers sandy soil for its growth and development, soil covering its circumference and even beyond is well compacted and strongly bound (Hargraves 2010). This peculiarity would not be unconnected to the decay of leaves and pods that deposited over periods. By this, the probability of the proximal soil to be worn away by either air or water erosion is truly very slim (Moklodi, *et al*, 2011). Thus, *F. albida* prevents soil erosion in addition to improving soil fertility.

Additionally, *F. albida* demonstrates inverted phenology. Inverted phenology in *F. albida* in the view of Gilani and Farooq, (2019); Rroupsand, Ferhi, Pallo., Depomme, Mallet, Joly and Dreyer (2002) is the characterization in *F. albida* to delay production of leaves, flowers and fruits in rainy

season until dry season. In other terms, the tree appears lifeless in rainy season, but only to become active in dry season. This uniqueness actually prompted an assumption that the tree also exhibits weird function. As such people postulate that the use of parts of the plant can alter someone's fortune and vice versa. For instance, some superstitious people in the study area burn ground parts of the plant on glowing charcoal and then chant weird praises. By doing so, they presume that the mysterious smoke waves coming up can invert one's destiny based on the appeal made.

Though significant number of Guddiri people are educated, yet some proportion appears scientifically illiterates, especially in conversations related to operation of natural events, such as discussion on the unusual function of *F. albida*. For this reason, elites and concerned people in the area passionately look for an answer to a question that intended to reveal the level of scientific literacy in Guddiri Land and hopefully proffer solutions to the misperception: "can the uncommon functions in *F. albida*'s with reference to belief system of Guddiri people be a measure of their scientific literacy?" It is on this background that this study sought to investigate the unusual functions in *F. albida* with reference to belief system of Guddiri people as measure of level of scientific literacy.

Research Questions:

The study was guided by the following questions:

1. What is the Guddiri people's belief in the unusual functions of *Faidherbia albida*?
2. What is the Guddiri males' belief in the unusual functions of *Faidherbia albida*?
3. What is the Guddiri females' belief in the unusual functions of *Faidherbia albida*?

Hypotheses

The following hypothesis guided the study:

1. There is no significant difference between male and female Guddiri people's belief in the unusual processes of *Faidherbia albida*.

METHODOLOGY

This study aimed to investigate the Guddiri people's belief system in the unusual phenology, agroforestry function, medicinal value, environmental protection, and weird function of the Apple-Ring Tree (*Faidherbia albida*) as a measure of their scientific literacy. The population comprises 165,545 people (Guddiri Tribe) of Azare District, Katagum Local Government, Bauchi State (National Population Commission, 2006). The sample size consisted 384 (276 males and 167 females) adult respondents that were drawn through a stratified random sampling technique based on the recommendation of Krejcie and Morgan (1970). Furthermore, the instrument for data collection was a 22-item structured questionnaire tagged "Questionnaire on People's Belief System in the Unusual Functions of *Faidherbia albida*". The instrument was divided into five-function dimension of *Faidherbia albida*: unusual structure, agroforestry function, medicinal

value, environmental protection, and weird function. Some experts in Botany, Geography, and traditional medicine validated the face and content aspects of the instrument. The experts in this way assessed the suitability and understanding of items on the participants. Further, they scrutinized the sequence of the items, the language. Furthermore, the experts assessed the interrelation between the questionnaire items and the main purpose of the study. The reliability of 0.82 was determined through Cronbach Alpha Coefficient Index. The collected data were analyzed by using statistical mean, standard deviation, and Chi-Square. The decision rule for accepting a response be considered a strong belief in the unusual functions of *Faidherbia albida* was a mean value of 3.00 and above. Further, a statistical value of $p < 0.05$ is considered critically significant.

ANALYSES AND RESULTS

Table 1: Guddiri People's Belief in the Unusual Phenology of *Faidherbia albida*

	Item	Mean	SD	Remark
1.	<i>F. albida</i> is the tallest thorn tree that I know.	4.86	0.36	Strong
2.	It produces unique leaves, flowers and fruits.	4.00	1.34	Strong
3.	It forms dense crown of leaves only in dry season.	3.57	1.29	Strong
4.	It sheds all leaves only in rainy season.	3.71	1.74	Strong
5.	Its stem is covered by thick corky bark.	3.90	1.45	Strong
6.	It develops deep root system.	3.95	1.36	Strong

Table1 presents Guddiri people's belief in the unusual function of *Faidherbia albida*. From the presentation, the fact that the tree is the tallest ever known thorn tree in the study area was the most trending manifestation in respect to value of the mean scores. In addition, the belief in the ability of the tree to produce unique leaves, flowers, and fruits is the successive score in the hierarchy of mean values. Additionally, the mean scores of the people's certainty in the ability of the tree to develop deep root system in the sandy soil of the savannah is indeed an indication of strong justification for its uniqueness. Subsequently, the belief in the corky nature of stem bark, ability to shed leaves only in the rainy season, and potentiality to develop dense crown of leaves in dry season were also indices of strong account in the unusual phenology of *F. albida*. The mean scores and standard deviations for all the items in the unusual phenology dimension of the tree range from 4.86; 0.36 to 3.57; 1.29 respectively.

Table 2: Guddiri Peoples' Belief in the Agroforestry Function of *Faidherbia albida*

S/N	Item	Mean	SD	Remark
1.	It is raised on farmlands in combination with other crops.	4.90	1.30	Strong
2.	It does not interfere with development of other crops in rainy season.	3.90	1.51	Strong
3.	When its leaves fall, they improve the soil fertility.	3.86	1.39	Strong
4.	Its leaves are palatable and nutritious to farm Animals	3.90	1.58	Strong
5.	Its thick shade serves as a retreat for farm animals.	4.04	1.32	Strong

The agroforestry function of the tree is presented in Table 2. From the mean scores and standard deviations for all dimensions, it is obvious that the tree is raised in farmlands together with other crops in the rainy season. The tree is also regarded as a retreat for farm animals, especially during the harsh climate of the dry season. The exclusive feature of the tree to shed leaves in rainy season, thus, not interfering with the development of proximal crops was among the popular conviction instilled in the tree. Still, the belief in the nutritive value of its leaves to farm animals was expressing favourable justification about the tree. Furthermore, the Guddiri people believe in the power of the *F. albida* leaves to improve soil fertility is accordingly a significant validation on the unusual disposition of the tree.

Table 3: Guddiri Peoples' Belief in the Medicinal Value of *Faidherbia albida*

S/N	Item	Mean	SD	Remark
1.	Its corky bark is used in the treatment of several diseases.	4.39	1.23	Strong
2.	Crushed fruits are given to farm animals to stimulate milk production.	4.24	1.22	Strong
3.	Its leaves extract is used as anti-worm on farm animals.	3.80	1.57	Strong
4.	Its root extract is used as a sex enhancer.	4.00	1.41	Strong

From Table 3, it is evident that *F. albida* was considered very valuable and promising tree in the treatment and management of common diseases of man and livestock in the study area. Most often, herdsmen experience loss of calves, lambs and kids as a result inadequate milk production. In bid to ameliorate the tragedy, Guddiri farmers gather the fruits of the tree; crush and mix with cereal offal to stimulate sufficient milk production in farm animals. This has been a best practice yielding positive result over time. The people's opinion on the efficacy of the root extract of the tree in enhancing sexual performance in men was also favourably significant. Additionally, the power of the leaves extracts to act on gastrointestinal worms in ruminants is enormously positive. It is also observed that the mean scores and standard deviations for the items in agroforestry function of *F. albida* range from 4.29; 1.23 to 3.86; 1.57 correspondingly.

Table 4: Guddiri People's Belief in the Environmental Protection of *Faidherbia albida*

S/N	Item	Mean	SD	Remark
1.	It checkmates soil erosion.	3.86	1.23	Strong
2.	It checkmates desertification.	4.09	1.41	Strong
3.	It provides shelter and protection to birds and honeybees.	4.00	1.45	Strong

Table 4 shows the people's trust in the environmental protection capability of *F. albida*. From the mean scores, *F. albida*'s potentiality to counteract desert encroachment was the most observed popular people's opinion accordingly. In addition, the confidence instilled in the tree to secure small birds against the attack of predators as well as enabling honeybees to establish hives were also significant judgments. Moreover, there was a strong credence in the capacity of *F. albida* to neutralize soil erosion especially in farmlands. Similarly, Table 4 depicts the mean values and standard deviations for the items on the medicinal values of *F. albida* as 3.86; 1.23, 4.09; 1.41 and 4.00; 1.45 respectively.

Table 5: Guddiri People's Belief in the Weird Function of *Faidherbia albida*

S/N	Item	Mean	SD	Remark
1.	It has a super natural power to invert one's comfort to misery as a reflection of its appearance in the rainy season.	3.05	1.56	Strong
2.	It has a super natural power to invert one's misery to comfort as a reflection of its appearance in the dry season.	3.00	1.58	Strong
3.	When some invocations are chanted before it, it can exude calamity waves capable of killing an enemy.	3.48	1.54	Strong
4.	Its extract in mixture of some invocation-laden saliva is capable of prolonging one's life.	3.43	1.43	Strong

The belief in the power of tree to destroy enemies when some appeals are pronounced before the tree was the most distinct inclination in relation to its weird function. More so, Guddiri people expressed strong confidence in the tree's ability to elongate one's life span. The table also reveals the people certainty in the notable inversion power of the tree. In other words, the table portrays Guddiri people relative belief in the weird power of the tree to invert one's destiny. The mean values and standard deviations for all the items in the unusual medicinal function of *F. albida* are arranged as 3.05; 1.56, 3.00; 1.58, 3.48; 1.54, and 3.43; 1.43 respectively.

Table 6: Guddiri Males' Belief in *Faidherbia albida*

S/N	Item	Mean	Standard Deviation	Remark
1.	Unusual Phenology	4.20	1.04	Strong
2.	Agroforestry Function	4.25	1.02	Strong
3.	Medicinal Value	4.08	0.94	Strong
4.	Environmental Protection	4.17	1.07	Strong
5.	Weird Function	3.43	1.46	Strong

Table 6 presents the mean scores and standard deviations of the items in dimensions of males' belief in the unusual functions of *Faidherbia albida*. From the score for each dimension, it is noticeable that the values (4.25) for the agroforestry utility of the tree spearheads amongst others. The score (4.20) for phenology aspect of the tree was the successive score in the hierarchy of values. However, the mean scores (4.17) for the environmental and medicinal (4.08) dimensions are within the same range, the score of the former is more influential than the latter. Thus, indicating momentous belief in the capacity of the tree to contain environmental degradations. The mean score for the weird function (3.43) on the other hand, appears the least in the hierarchy of mean values, though, seems significant in reflection to the decision rule.

Table 7: Guddiri Females' Belief in the *Faidherbia albida*

S/N	Item	Mean	Standard Deviation	Remark
1.	Unusual Phenology	4.00	1.25	Strong
2.	Agroforestry Function	3.69	1.42	Strong
3.	Medicinal Value	4.08	1.36	Strong
4.	Environmental Protection	3.98	1.37	Strong
5.	Weird Function	3.24	1.53	Strong

Table 7 expresses the mean scores and standard deviation of females' belief in the unusual phenology and other unusual functions of *Faidherbia albida*. From the expression, the belief in medicinal value of tree in treatment of common diseases affecting people of the study area appears utmost going by its respective mean value. The female respondents also believed strongly in the tree to exhibits inverted foliation, flowering, and indeed fruiting process with a conspicuous mean value. Furthermore, their belief in the environmental protection attribute of the tree was also significant in reflection to its mean value. The belief in the benefit of the tree to improve soil fertility was also glaring. In addition, the females justified that the tree possesses special power to influence misery, comfort, destroy enemy, and of course extending one's life span. Moreover, the table shows the mean scores and standard deviations for all the dimensions of Guddiri females' belief in the ability of the tree to exhibit some unusual functions. The values are 4.00; 1.25, 3.69; 1.42, 4.08; 1.36, 3.98; 1.37 and 3.24; 1.53 for unusual phenology, agroforestry function, medicinal function, environmental protection and weird function respectively.

13: H₀ 1: There is no Significant Difference between Male and Female Guddiris Belief in the Unusual Processes of *Faidherbia albida*

S/N	Dimension	X ²	P- Value
1.	Unusual Phenology		
2.	Agroforestry Function	10.57	0.01
3.	Medicinal Value		
4.	Environmental Protection		
5.	Weird Function		

$P < 0.05$

Table 13 presents the X^2 – value and P -value for the difference between Guddiri males' and females' belief in the inverted processes of *F. albida*. The P -value 0.01 determined from the X^2 – value 10.57 is obviously indicating glaring difference between males' and females' belief in *F. albida*. This interpretation is apparently supporting H_0 1 and thus accentuating existence of significant difference between males' and females' belief in the phenology, agroforestry, medicinal, environmental and weird functions of *F. albida*.

DISCUSSION

Generally, Guddiri people belief in the unusual phenology of *Faidherbia albida* was very strong. This is evident from the value of mean scores for each dimension. However, there is a spectrum of species of thorn trees in the area such as *Zizyphus spina-christi* (Christ Thorn), *Acacia nilotica* (Gum Arabic) etc., non-among the tree of same genus can compare with the *Faidherbia albida* in terms of height. This is indeed supporting the view of Gilani and Farooq (2009) who designate it as the longest thorn tree in savanna forest, particularly in areas where there are no much human activities. Further, the leaves, flowers and fruits of the tree are unique in the sense that they emerge in the tree when almost all the trees in the study area have shed their leaves. In addition, farm animals prefer its leaves mostly than those of other tree species. This is a strong affirmation of the report of Tropical Plants Data Base (2020) which indicates that the leaves and fruits contain significant proportion of proteins and other microelements capable of boosting growth and development in farm animals.

The presumption that the tree improves soil fertility has been supported by the general view of the people of the study area. They believed that the crops cultivated around the circumference of *Faidherbia albida* perform better in terms of viability and yield than those nurtured elsewhere in a farm. In view of this, Moklodi *et al* (2011) confirmed that the millet grown around the tree produces 2.5 and 3.4-fold increase in grains and proteins respectively. Besides, during the month March and April, when the environmental condition become intense and other species of tree have shed their leaves, farm animals have no any alternative than to retreat under the dense crown of *Faidherbia albida* (Gilani and Farooq, 2019).

Furthermore, the belief in medicinal importance of the tree from the mean scores was very significant. The tree was considered as a salvation species because of its efficacy in the management of bundle of common diseases. For example, the corky bark, after scrapped off is washed and then boiled with red saltpetre. When become warm, a victim of toothache rinses his mouth with the solution. The result of the impact as revealed by the locals is an outright relief within shortest possible period. This indeed concurs with resolution of Laike (1988) who reports that the *Faidherbia albida* extract is used in the management of toothache. Still, the bark extract is very effective in expelling worms in farm animals (Tropical Plants Database, 2020). The locals

also believe in the nutritional value of the tree. The locals say “a cow fed on *Faidherbia albida* leaves is hailed and fatter than others fed on other tree species.

The locals have also revealed their confidence in the advantage of the tree in counteracting the menace of desertification. Perhaps, because of its well established root system, the tree is not easily uprooted by perennial wind storm that ravages the study area especially at the beginning of rainy season. In the view of Hargraves (2010), the roots of *Faidherbia albida* go deep down to a length that could be compared to the dimension from first section of the trunk up to tree top. Also, they believed that water flow (erosion) does not wash the soil within circumference of *F. albida*. This truly justifies that the leaves and fruit fall when decayed, improve the strength and fertility of soil. In a development, honeybees like the dense crown nature of the tree. This was certainly connected to the rich nature of flowers produced by the tree. In the process, they pollinate the flowers, which eventually leads to seed production (Moklodi, *et al*, 2011). Additionally, the people expressed trust in the clemency of the tree in giving asylum to small birds in the event of hawk and eagle attack. The tree was regarded a revered species because of bundles of assumption attached to it. As such, it is well protected against human destruction. In some parts of Africa, such as Ethiopia, locals believe in the growing of *F. albida* in graveyards (Laiké, 1988). Perhaps, the fact behind this was the trust develop in the weird power of the tree to pacify eternal irritations. If this might be a case, then, it may not be odd to interpret the unusual phenology of the tree to life processes such as fortunes, life spans, and proclivities, particularly in the study area. After all, locals presumably, use spiritual power of the tree to reverse one’s fortunes to poverties and vice versa for decades.

CONCLUSION

From the data analysis, it is inferred that the Guddiri people have a strong belief in the ability *F. albida* to discharge unusual phenology, agroforestry function and in the management of common diseases. It also exhibits environmental protection capability against seasonal winds. Additionally, they believe in the potentiality of the tree to discharge some weird functions. Furthermore, the belief of Guddiri males and females respectively was corroborating their general belief in the unusual function of the tree. Additionally, the analysis reveals the presence of significant difference between the Guddiri males and females’ belief system in power of the tree to discharge some special functions.

Recommendations

Based on the data analysis, the following recommendations are therefore given;

1. People should adequately be informed on the operation of common natural phenomena, such as cyclical process of day and night, rainbow, eclipse etc. through social media and relevant public orientation agencies.
2. Religious leaders should consistently discuss and clearly interpret natural occurrences to their followers and strongly emphasize their non-influence on someone’s life.

3. A course “scientific literacy” should be introduced as part of national curriculum in primary and secondary schools in Nigeria. The purpose of the course is to satisfactorily inform and prepare students to be ready in facing challenges that they may encounter in their future undertakings.
4. Universities should be organizing conferences, seminars and workshops on weird capabilities of unusual.
5. Scientists should be encouraged to undertake further studies on the knowledge gathered from sort of academic conventions cited in no. 4 above.

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