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Community Perception on Honeybee and Beekeeping Practices and Constraints in Tripoli

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Abstract

Objectives: To answer research questions onhow educational background affect knowledge and training in beekeeping; how age relates with knowledge, how gender relates with beekeeping constraint, and general constraints of beekeeping. **Methods/Statistical Analysis**: Quantitative method was used in the study by considering 300 respondents, and the farmers from the community were given an organized questionnaire. The associations between perception, beekeeping practices and constraints associated with beekeeping were explored by means of t-test, ANOVA and descriptive statistics. Data were analyzed using the statistical software SPSS 20.0. **Findings:** The dominant participants were male between the ages of 21 to 30 years old with college degree which result shows that there is statistically a significant difference between how educational background affect knowledge and they have basic skills and knowledge about beekeeping, honeybee colony management, processing, handling and storage and market information and networking. There is no significant ($p = 0.171 > 0.005$) relationship between factors that determine knowledge and necessary skill training about beekeeping. There is a significant ($p = .000 > 0.05$) relationship between methods used by the community and the constraints of beekeeping. The constraints faced by the Tripoli community are absconding of colonies, lack of bee colonies, droughts, pesticide poisoning, lack of training and lack of initial capital to start up beekeeping. **Application/Improvements:** The study suggests that farmers should have modern training for beekeeping and invest in propolis and wax production, well-organized honey market is recommended to increase the current flow of honey.

Keywords: Beekeeping, Beekeeping Practices, Constraints, Honeybee, Perception

1. Introduction

The relation between human beings and bees is endemic in Africa where modern beekeeping has taken various forms, starting from wild honey harvesting from hollow nests of bees in hollow trees and clefts. Historically, hunting has been practiced in many countries. However, honey is much less known in the Mediterranean region. Honey hunting charts can be seen in many parts of Africa. In their paintings, bears, hunters and their primitive tools[1], such as the honey pots needed to make such stairs, torches and raids, have been found in rocks in Libya and in many other countries.[2] The bee guardian of the King of Libya, Idris El-Senussi, reported that the Libyan beekeepers in Cyrenaica were collecting flocks to put in large, long and wide shallow wooden boxes that could hold 15 carts.The effective acquaintance of present-day hives in the East of Libya happened after the attacks of the World War II and was upheld by Olive Britten in 1952[3]. Beekeeping all through the world, swarming is a difficult issue that requires beekeepers in Libya to visit their apiaries every 7-10 days amid solid nectar stream, to control hives for

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swarm minimization. The decrease in forested territories through land misuse has a more prominent effect. In fact, beekeepers move their honey bee states to these regions during drought and deforestation could influence them radically. Because Libya was historically so isolated, its local bees had no outside contact with other bees. The native bees have been described as predominantly of the Taillan race, *A. mellifera intermissa*[4].

Temporary beekeeping is regularly practiced for honey generation[5], the essential honey plants in Libya including; *Eucalyptus* spp., *Acacia* spp., *Citrus* spp., *Pinus* spp., *Cupressus* spp., *Thymus vulgaris, Lantana camara, Hisbiscusrosa-sinensis, Medicago sativa* and numerous wild plants[5-10]. Eucalyptus honey, from Eucalyptus spp., is one of the major honeys conveyed and consumed in Libya especially in the north where there are wide scopes of trees which sprout in November and December. Because of the back to back blooming of the unmistakable Eucalyptus species, it is seen as the most crucial wellspring of nectar to areas in dry season periods[8,9]. The existing constraints on the production of the country's beekeeping sub-sector will vary depending on the agricultural ecology of the districts where the activities are conducted[11]. Production restrictions also apply to varieties, socio-economic conditions, cultural practices, climate (season of the year) and bee behavior. The lower bounds are the unpleasant behavior of the bears (aggressiveness, entanglement and disguised behavior) according to HBRC, lack of qualified staff and educational institutions; the low-tech level used; high price of advanced beekeeping technologies; destruction of drought and natural vegetation; management and marketing restrictions of postharvest products; the random use of pesticides; honey bee, harmful and predator diseases; poor extension services[11,12]. Failure to increase the bee's welfare level may be, due to the inadequacy of protective equipment such as suits. These are the most important tools for beekeeping as they provide the necessary confidence in the management of honey. Instead of focusing only on the socio-economic conditions of farmers for beekeeping. This study aim at determining beekeeping methods used in the community, identifying the community knowledge and skills in beekeeping, knowing the commonly used Bee hives in the community and honey production season thereby answering the following research questions.

RQ1: Does educational background affect knowledge and necessary skills training in beekeeping?

RQ2: Does the community have knowledge and the necessary skills in beekeeping?

RQ3: Does age have any relationship with knowledge and the necessary skill training in beekeeping?

RQ4: Is there a relationship between gender and constraint associated with beekeeping?

RQ5: Do the methods used in the community associate with the constraints of beekeeping?

RQ6: What is the general perception, constraints and season of production in beekeeping of the community?

2. Research Methods

This study mainly aimed at getting the community farmers' perceptions on their constraints and beekeeping practices in Tripoli, Libya. This study is based on field research carried out in Tripoli, Libya in 2017. For the reliability of this study, the research questionnaire was adopted from[13] as a quantitative method and by also getting information from focus group discussion, articles, textbooks, and studies on the subject and internet source.

2.1 Participants and Sample

The study was carried out in Tripoli. It is a cross-sectional study among 300 farmers in the community of Tripoli, Libya. This study concentrated on the adult population. The criteria for eligibility in this study included (i) The community farmer above 18 years (ii) The respondent's willingness to oblige to the study protocols and complete the study. The farmers from the community were given an organized questionnaire obtained from[13]. The questionnaire focused on gender, age, education, local people's awareness of the cause and consequences of forest degradation and attitude towards forest resource conservation practice, source of information towards forest degradation and conservation, source of information for the local people's attitude towards forest degradation and conservation practices, perception of the actual and potential socio-economic and environmental benefits from the surrounding forest, benefits from forest resource, and factors that determine local people's attitude towards forest degradation and conservation.

For demographic results of the farmers in the study area the gender indicate 47 (15.7%), 122 (40.7%), 59 (19.7%), 55 (18.3%) and 17 (5.2%) of the farmers to be less than 20 years, between 21-30 years, 31-40 years and 41– 50 and 51-60 years respectively (**Figure 1**), gender

shows that 166 (55.3%) of the famers were male while 134 (44.7%) were female (Figure 2) while the educational background of the farmers indicate 104 (34.7 %), 151 (50.3%), and 16 (5.3 %) of the farmers to have attended high school, college and tertiary respectively (**Figure 3**) while only 17 (5.7%) of them were illiterate.

2.3 Data Analysis

The associations between perception, beekeeping practices and constraints associated with beekeeping were explored by means of t-test, ANOVA and descriptive statistics. Data were analyzed using the statistical software SPSS 20.0. No laboratory or medical tests were conducted.

2.4 Research Ethics

For the research to be reliable, valid and scientific process research ethics were considered, the people that participated in the studies were given direct questions. Throughout the study, the researcher exhibited an objective attitude that displayed a good work behavior that did not affect the study.

2.5 Reliability of the Study

Table 1 shows the summary of the test of the four constructs using Cronbach's Alpha reliability. The construct reliability should exceed 0.7 to fall within acceptable level[14]. The reliability of the construct of this study ranges from 0.951 to 0.963 which indicates a good internal consistency.

3. Result and Discussion

3.1 Materials for Traditional Hive Construction

Table 2 indicates that the materials for traditional beehive construction which in item 19: with frequency of 241 (80.3) respondents said "YES" to the use of bamboo while 59 (19.7%) said "NO". Item 20 shows that 22 (7.3%) respondents said "YES" to using tree branch and tendril as material for construction of traditional hives while 278 (92.7%) said "NO", item 21: 58 (19.3%) said "YES" that they used clay as material for traditional hives while 242 (80.7%) said "NO" and item 22: 92 (30.7%) said "YES" to using animal dung as material for traditional hive while 208 (69.3%) said "NO". Therefore, they make use of bamboo as material for traditional hive construction.

On the methods of beekeeping (**Table 3**) in the community for item 23 282 (94.0%) of the respondents said "YES" that they to the use of traditional method as beekeeping method while 18 (6.0%) said "NO". In item 24,104 (35.7%) said "YES" to the use of modern method, while 196 (65.3%) said "NO". This indicates that the community of Tripoli use traditional methods in beekeeping.

In Tripoli the honey production period was assessed as seen in **Table 4**. Item 19 shows that 12 (4.0%) of the respondents said that January-February was the period for honey production, 10 (3.3%) said May-June while 278 (92.7) said October-November. Therefore, the period of honey production in Tripoli is October-November.

R1: Does educational background affect knowledge and necessary skills training in beekeeping?

T-test was employed to examine the effect of educational background affect knowledge and necessary skills training in beekeeping at $p = 0.05$. The results are displayed in **Table 5**. The t-test results, however, showed that there was a statistically significant difference ($t(299) = .58.61$, $p = .000 > 0.05$) between the effect of educational background affect knowledge and necessary skills training in beekeeping. The indication here is that educational background affect knowledge and necessary skills training in beekeeping training.

RQ2: Does the community have knowledge and the necessary skills in beekeeping?

As indicated in **Table 6** the majority of the people agreed with items 1 to item 8: That is, item 1: Colony split with

Table 1. Reliability - Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
MI22	2.8596	.210	.951	.951
CB22	2.8241	.262	.958	.954
KB22	3.0345	.227	.928	.963

192 (65.7%) "YES" and 103 (34.3%) "NO", item 2: 199 (66.3%) respondents said "YES" on honeybee colony management while 101 (33.7%) said "NO", item 3: 286 (95.3%) said "YES" that they have skill in processing, handling & storage while 14 (4.7%) said "NO" and item 4: 198 (66.0%) have knowledge and the necessary skill in market information & networking, but 102 (34.0%) do not. Item 5: 282 (94.0%) said "YES" about their skill in input utilization, while 18 (6.0%) said "NO", item 6: 197 (65.7%) said "YES" that they have Bee forage management knowledge and skills in beekeeping while 103 (34.3%) said "NO" that they do not have that knowledge and skill asked. In item 7: 198 (66.0%) said "YES" that they have all types of training in knowledge and skills required for beekeeping while 102 (34.0%) said "NO" that they do not have that training skills in beekeeping and to item 8, 64 (21.3%) of respondents said "YES" while 236 (78.7%) said "NO" contradicting their previous answer which stated that they have all types of training which in this case maybe because most of the training they had is individual based training and development on beekeeping, but not an organized training from the government of community leaders or farmers association in the community.

Table 2. Materials for traditional hive construction

No	Items	Yes	No
19	Bamboo	241 (80.3%)	59 (19.7%)
20	Tree branch and tendril	22 (7.3%)	278 (92.7%)
21	Clay	58 (19.3%)	242 (80.7%)
22	Animal dung	92 (30.7%)	208 (69.3)

Table 3. Are you aware of the types of beekeeping methods?

No	**Items**	**Yes**	**No**
23	Traditional	282 (94.0%)	18 (6.0%)
24	Modern	104 (35.7%)	196 (65.3%)

Table 4. Honey production period

No	**Items**	**Tick**
19	January-February	12 (4.0%)
	May-June	10 (3.3%)
	October-November	278 (92.7%)

RQ3: Does age have any relationship with knowledge and the necessary skill training in beekeeping?
Pearson Correlation was employed to assess whether there was a relationship between age and knowledge and the necessary skill training in beekeeping. In **Table 7**, there is no correlation between the two variables. Therefore, there is no significant ($p = .171 > 0.005$) relationship between factors that determine knowledge and the necessary skill training in beekeeping.

RQ4: Is there a relationship between gender and constraint associated with beekeeping?
The Levene's independent sample t-test was employed to examine the effect of gender on constraint associated with beekeeping at $p = 0.05$. The results are displayed in Table 8. The t-test results, however, showed that there was no statistically significant difference ($t(298) = .103$, $p = .918 > 0.05$) between a male and female and constraints associated with beekeeping. Therefore, genders do not have any relationship with constraints associated with beekeeping from the community.

RQ5: Do the methods used in the community associate with the constraints of beekeeping?
Pearson Correlation was used to investigate the relationship between methods used in the community and the constraints of beekeeping. As seen in Table 9, there is a correlation between the two variables. Therefore, there is a significant ($p = .000 > 0.05$) relationship between the methods used in the community and the constraints of beekeeping.

RQ6: What is the general perception, constraints and season of production in beekeeping of the community?
Pearson Correlation was used to investigate the relationship between the general perception, constraints and season of production in beekeeping of the community. **Table 10** shows a correlation between the two variables. Therefore, there is a significant ($p = .000 > 0.05$) relationship between the general perception, constraints and season of production in beekeeping of the community.

3.2 Beekeeping Constraints in Tripoli

The constraints of beekeeping are shown in **Table 11**. In item 9, 167 (56.7%) faces a constraint of colony absconding while 133 (43.3%) said "NO". In item 10, 45 (15.0%) said "YES" that they lack enough space while 245 (85.0%)

Table 5. T-Test on educational level with perception items

		t-test value= 0					
		t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper	
perception	Education Level	58.61	299	.000	2.51333	2.4289	2.5977
	KB22	90.26	299	.000	1.32458	1.2957	1.3535

Table 6. Community knowledge and necessary skills in beekeeping

No	Items	Yes	No
1	Colony split	192 (65.7%)	103 (34.3%)
2	Honeybee colony management	199 (66.3%)	101 (33.7%)
3	Processing, handling & storage	286 (95.3%)	14 (4.7%)
4	Market information & networking	198 (66.0%)	102 (34.0%)
5	Input utilization	282 (94.0%)	18 (6.0%)
6	Bee forage management	197 (65.7%)	103 (34.3%)
7	All types of training	198 (66.0%)	102 (34.0%)
8	No training	64 (21.3%)	236 (78.7%)

Table 7. Correlations

		Age Group	KB22
Age Group	Pearson Correlation	1	-.079
	Sig. (2-tailed)		.171
	N	300	300
KB22	Pearson Correlation	-.079	1
	Sig. (2-tailed)	.171	
	N	300	300

Table 8. Independent Samples Test

F		Levene's Test for Equality of Variances		t-test for Equality of Means						
		Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference		
								Lower	Upper	
CB22	Equal variances assumed	.070	.791	.103	298	.918	.00256	.02489	-.04642	.05154
	Equal variances not assumed			.103	285.910	.918	.00256	.02486	-.04638	.05150

Table 9. Correlations

		CB22	methods
CB22	Pearson Correlation	1	.947**
	Sig. (2-tailed)		.000
	N	300	300
methods	Pearson Correlation	.947**	1
	Sig. (2-tailed)	.000	
	N	300	300

Table 12. Correlations for honeybee production against general perception constraints items

		CB22	Honey production period
CB22	Pearson Correlation	1	.345**
	Sig. (2-tailed)		.000
	N	300	300
Honey production period	Pearson Correlation	.345**	1
	Sig. (2-tailed)	.000	
	N	300	300

Table 11. Constraints associated with beekeeping

No	Items	Yes	No
9	Colony absconding	167 (56.7%)	133 (43.3%)
10	Lack of enough space	45 (15.0%)	245 (85.0%)
11	Droughts	283 (94.3%)	17 (5.7%)
12	Poor society awareness	211 (69.6%)	89 (30.4%)
13	Pesticides poisoning	280 (93.3%)	20 (6.7%)
14	Lack of training	198 (66.0%)	102 (34.0%)
15	Honeybee diseases	172 (57.3)	128 (43.7%)
16	Shortage of bee colonies	200 (66.7%)	100 (32.3%)
17	Lack of initial capital	252 (84.0%)	48 (16.0%)
18	Shortage of modern bee hives	92 (30.7%)	208 (69.3%)
19	Lack of experience sharing visit	47 (15.7%)	245 (84.3%)

says NO, item 11: 283 (94.3%) said "YES" that drought is one of the constraint faced in beekeeping, 17 (5.7%) said "NO". In item 12: 211 (69.6%) of the respondents says that poor society awareness is part of beekeeping constraints while 89 (30.4%) said "NO". In item 13, 280 (93.3%) said "YES" to pesticides poisoning, 20 (6.7%) said "NO". In item 14, 198 (66.0%) said "YES" to lack of training while 20 (6.7%) said "NO". In item 15, 172 (57.3) said "YES" to honeybee diseases while 128 (43.7%) said "NO". In item 16, 200 (66.7%) said "YES" to the shortage of bee colonies while 100 (32.3%) said "NO". In item 17, 252 (84.0%) said "YES" for lack of initial capital while 48 (16.0%) said "NO". In item 18: 92 (30.7) said "YES" that shortage of modern colonies is part of the constraints they face as beekeepers while 208 (69.3%) said "NO" and item 19 shows that 47 (15.7%) said "YES" that lack of experience sharing visit is a constraint to them in beekeeping while 245 (84.3%) said "NO". Therefore, the constraints faced by the Tripoli community are absconding of colonies, lack of bee colonies, droughts, poor societal awareness, pesticide poisoning, lack of training, honeybee diseases and lack of initial capital to start up beekeeping (Figure 4)[15-29].

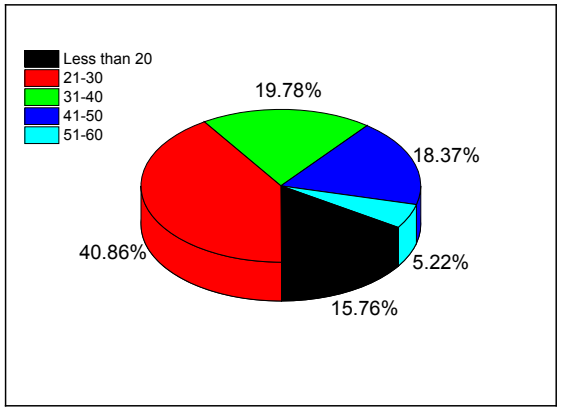

Figure 1. Age distribution.

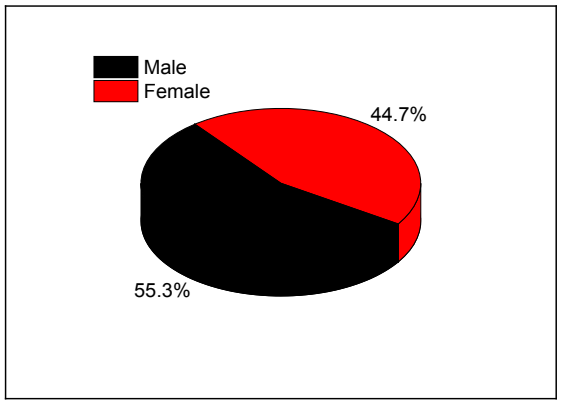

Figure 2. Gender distribution of the farmers.

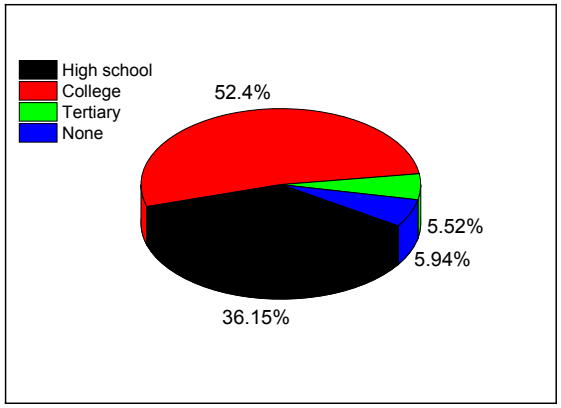

Figure 3. Educational level of the farmers.

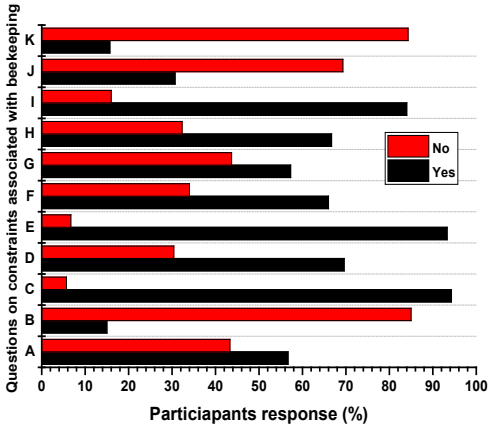

Figure 4. Constraints associated with beekeeping in Tripoli (where A-Colony absconding, B-Lack of enough space, C-Droughts, D-Poor society awareness, E-Pesticides poisoning, F-Lack of training, G-Honeybee diseases, H-Shortage of bee colonies, I-Lack of initial capital, J-Shortage of modern bee hives, K-Lack of experience sharing visit).

4 .Conclusion

In this research the dominant participants were male between the ages of 21 to 30 years with college degree. According to Gichora[16] there should be advanced beekeeping knowledge about bee biology and behavior of bees for better colony management. Moreover, for illiterate people there is a need for intensive training. According to the result of this study the level of illiteracy is (9.7%) but high college educational level, though the illiteracy in the community, can limit the effectiveness of formal training programs and requires more emphasis to be placed on practical demonstration of essential concepts especially in improved beekeeping methods.

The communities in Tripoli of Libya majorly make use of bamboo as material for traditional hive construction by traditional method for beekeeping and the period of honey production in Tripoli is October-November, which also corresponds to the period of honey production in AsgedeTsimbla District, Kenya as reported.

Does educational background affect knowledge and necessary skills training in beekeeping?

There is a statistically significant difference between how educational background affect knowledge and necessary skills training in beekeeping. Therefore, educational background affects knowledge and necessary skills train-

ing in beekeeping. This study agrees with those of who found that 80% of the beekeepers in Nigeria had received post-secondary education. On the other hand, they were in disagreement who also found beekeepers to have low education levels.

Does the community have knowledge and necessary skills in beekeeping?

As indicated in the results the majority of the people have basic skills and knowledge in beekeeping in the area of Colony split, honeybee colony management, processing, handling and storage and they have knowledge and the necessary skill in market information and networking. The farmers are also skilled in input utilization, they have bee forage management knowledge and skills in beekeeping, they have all types of training about knowledge and skills required for beekeeping, the community have knowledge and necessary skills in beekeeping.

Does age have any relationship with knowledge and necessary skill training in beekeeping?

There is no significant ($p = .171 > 0.005$) relationship between factors that determine knowledge and necessary skill training in beekeeping.

Is there a relationship between gender and constraint associated with beekeeping?

The results showed that there was no statistically significant difference ($t(298) = .103$, $p = .918 > 0.05$) between a male and female constraints associated with beekeeping. Therefore, gender does not have any relationship with constraints associated with beekeeping from the community.

Does the methods used in the community associate with the constraints of beekeeping?

Pearson Correlation was used to investigate the relationship between methods used in the community and the constraints of beekeeping. As seen in Table 8, there is a correlation between the two variables. Therefore, there is a significant ($p = .000 > 0.05$) relationship between methods used in the community and the constraints of beekeeping.

What is the general perception, constraints and season of production in beekeeping of the community?

There is a significant ($p = .000 > 0.05$) relationship between the general perception, constraints and season of production in beekeeping of the community.

4.1 Beekeeping Constraints in Tripoli of Libya

The constraints faced by the Tripoli community are absconding of colonies, lack of bee colonies, droughts, poor societal awareness, pesticide poisoning, lack of training, honeybee diseases and lack of initial capital to start up beekeeping. This study corresponds with the study of Xie et al.[21] which states that increased use of pesticides, reduced extensive grazing and harvesting of alfalfa before blooming to maximize protein content significantly reduce bee forage available for pollen and nectar collection by bees. Other studies affirm that major ecological and biological constraints previously focused on were inadequate bee forage, limited land for expansion, pesticide poisoning, predators, pests, diseases and death of the colony[22-25]. In terms of lack of training as a constraint other studies shows that technical constraints were lack of knowledge on suitable management methods of tropical bee races and species, lack of skilled trainers and training opportunities, lack of dissemination of new research information especially that related to disease control and inadequate beekeeping equipment. Apart from the explanation above, diseases are also seen in this study to be a constraints and as previously stated in other studies of Meixner[26]; Shimanuki et al.[27] they were also a major concern in beekeeping and more so those affecting the brood because they quickly weaken the colony. Other environmental constraints are bee forage availability and weather conditions which affect the quantity of honey yield[26,28,29].

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