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VALUE OF CORAPE PLANT AS FAMINE FOOD IN DARFUR STATE, SUDAN

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ABSTRACT

Darfur state of Sudan faces famine at different times, thus necessitating a search for improved coping strategies. The objective of this study was to assess the value of Corape (*Dactyloctenium aegyptiacum*) plant as a food crop during famine periods in Darfur state in Sudan. A total of 132 respondents purposely selected from Alfashir, the capital of north Darfur were interviewed using a semi-structured questionnaire. Also, key informants and focus group discussions with local leaders of the area were engaged in data collection. A total of 82.6% attested the existence of the Corape plant in Darfur; while 49.2% confirmed its significance as a famine crop in Darfur. Corape seed is used to prepare different types of meals and its seed stores for 15 - 20 years. Corape vegetation is also used as animal fodder, which according to 28% of the respondents can be stored for 6 to 12 months without significant deterioration in quality. This study concluded that the Corape plant has a good potential as food and fodder plant and can contribute significantly to household food security and livelihoods of local communities, if the problems of storage and pests were tackled.

Key Words: Crop seeds, *Dactyloctenium aegyptiacum*, famine food, storage

RÉSUMÉ

L'État du Darfour au Soudan est confronté à la famine à différents moments, ce qui nécessite la recherche de stratégies d'adaptation améliorées. L'objectif de cette étude était d'évaluer la valeur de la plante *chiendent* patte-poule (*Dactyloctenium aegyptiacum*) en tant que culture vivrière pendant les périodes de famine dans l'État du Darfour au Soudan. Au total, 132 répondants sélectionnés à dessein à Alfashir, la capitale du nord du Darfour ont été interrogés à l'aide d'un questionnaire semi-structuré. En outre, des informateurs clés et des discussions de groupe avec des dirigeants locaux de la région ont été engagés dans la collecte de données. Au total, 82,6% ont attesté l'existence de la plante de *chiendent* patte-poule au Darfour ; tandis que 49,2% ont confirmé son importance en tant

que culture de famine au Darfour. La graine de *chiendent* patte-poule est utilisée pour préparer différents types de repas et ses réserves de graines pendant 15 à 20 ans. La végétation de *chiendent* patte-poule est également utilisée comme fourrage pour animaux et 28% des répondants ont confirmé que la végétation de *chiendent* patte-poule peut être stockée pendant 6 à 12 mois sans détérioration significative de la qualité. Cette étude a conclu que la plante de *chiendent* patte-poule a un bon potentiel en tant que plante vivrière et fourragère et peut contribuer de manière significative à la sécurité alimentaire des ménages et aux moyens de subsistance des communautés locales, si les problèmes de stockage et de ravageurs étaient résolus.

Mots Clés : semences de la plante, *Dactyloctenium aegyptiacum*, nourriture de famine, stockage

INTRODUCTION

Darfur state suffers intense famine more frequently than elsewhere in Sudan. Famine is largely due to desertification and drought both attributed to climate change and its variations. This has caused massive migration from north to south in search for food, fodder and water.

As a coping strategy, Darfur people strongly depend on a variety of wild food plants for survival. Among these, is Corape (*Dactyloctenium aegyptiacum* crowfoot), which is a grass belonging to the family Poaceae a common weed in cultivated land, gardens and roadsides usually where additional water collects (Salih, 1991). The plant is a traditional food plant used as famine food in Africa and as fodder and relished by all classes of ruminants. In semi-arid areas, it makes valuable annual pastures as well as excellent hay; yet it is also suitable for silage. The seeds can be fed to poultry or used to make alcoholic beverages and are eaten by humans in periods of food scarcity (Bartha, 1970).

In Darfur state, although Corape plant is naturally available and is used to feed people in times of famine, its significance as a famine food and its impact on communities is yet to be properly understood. The objective of this study was to assess Corape plant (*Dactyloctenium aegyptiacum*) as famine food as a basis for promoting its utilisation during famine periods in Darfur state in Sudan.

METHODOLOGY

This study was conducted in Alfashir, the capital city of north Darfur State, home for a multitude of Darfurian people including a large number of displaced people from different parts of Darfur. Further, due to insecurity in Darfur, it was not possible to reach other parts of the State. Alfashir is located in western Sudan at altitude 13° 37' 40.55" N and longitude 25° 20' 57.70" E and at about 700 meters above sea level. Alfashir is a market for agricultural crops and its economy depends on agricultural products marketed in the area.

A multi-method research approach was adopted using both quantitative and qualitative methods (Thomson, 2002). A survey of 132 respondents selected purposely using stratified sampling method (Table 1). The districts set criteria for sample selection included locations in different directions to cover most of the area as much as possible.

The study also included key informants (10) (*Umad*, *Sheikhs* and teachers) who are more informed about the culture in the area. The study also involved focus group discussions (FGDs), in groups of about 10 members.

Primary data were collected using a face-to-face interview, using a semi-structured questionnaire. The interviews focused on household heads and women. Additionally, key informants were involved with the help of a discussion guide.

The data collected were analysed using the Statistical Package for Social Scientist (SPSS) software adopting descriptive statistics to obtain the frequency distribution and percentages of respondents with regards to the different socio economic and cultural variables of the study.

RESULTS AND DISCUSSION

Knowledge of Corape plant. A total of 82.6% of the respondents attested to knowing the Corape plant; while 17.4% did not know the plant (Table 2). The reason for not knowing the plant was perhaps the new generations that predominates the Alfashir city had dismal knowledge of natural plants and traditional method of coping including traditional food types (Shava, 2000).

Recently, more attention has been given to indigenous wild food plants worldwide. According to Reddy *et al.* (2007), more than 3000 edible plant species are known to mankind, but less than 30 species of crop plants contribute to more than 90% of the

world calorie intake. The contribution of wild plant species to household food supply varies according to region and groups (Modi *et al.*, 2006; Mazhar, 2007; Reddy *et al.*, 2007; Misra., 2008; Tiwari *et al.*, 2010; Piya *et al.*, 2011).

Ecological niches of the Corape plant. Table 3 shows the typical ecologies of the Corape plant. Up to 70.5% attested to the plant being an inhabitant of farms and valleys; while 17.4% gave no answer.

Corape plant growth. Table 4 shows that most of the respondents (81.8%) agreed that the Corape plant grows naturally; while the rest (17.4%) did not give an answer.

Preparation of Corape food from seeds

Fermentation of seeds. The way to prepare the seeds for use is to perform fermentation of seeds. There were 28% of the respondents who did so; while 39.4% did not ferment the seeds and 32.6% did not give an answer.

TABLE 1. Distribution of respondents by districts in Alfashir city in Darfur of Sudan

Districts	Total numberof individuals	Percentage
Al Fasher	7	5.3
Shangel Tobay	83	62.9
UmDrisai	5	3.8
AbZeriga	27	20.5
Locality of Klemendo	10	7.6
Total	132	100

TABLE 2. Frequency distribution of respondents according to the knowledge of the Corape plant (N=132)

Knowing of the corape plant	Total number of individuals	Percentage%
Yes	109	82.6
No	17	12.9
Missing	6	4.5

TABLE 3. Frequency distribution of respondents according to places of growth of the Corape plant (N=132)

Places of growth of the Corape plant	Respondents	
	Total number of individuals	Percentage (%)
Valleys	15	11.4
Farms	1	0.8
Valleys/Farms	93	70.5
Missing	23	17.4

TABLE 4. Frequency distribution of respondents according to Corape plant growth (N=132)

Corape plant growth	Total number of individuals	Percentage (%)
Naturally	108	81.8
Planting /Naturally	1	0.8
Missing	23	17.4

A total of 28% of the respondents attested to seed fermentation as a precursor to preparing food stuffs from the Corape plant. This was attributed to its ability to induce a diversity of flavours desirable for human consumption. Fermentation and/or germination are viewed as desirable methods for grain processing because of its low cost, low energy requirements, with acceptable and diversified flavors for human consumption (Singh *et al.* 2015). In addition, research has shown that germination and fermentation cannot only improve nutritional quality and functional properties of the seeds, but also reduce the anti-nutritional factors in Corape food stuffs (Hübner and Arendt, 2013)

Time of fermentation. Up to 12.9% of the respondents who fermented the seeds mentioned that the fermentation period was from 1 -2 days; while 12.1% reported that the fermentation took 2-3 days, although 75% gave no answer.

Method of preparing a meal from Corape. In order to prepare a meal of Corape, the seeds

were dried, then ground them, before adding boiling water. A total of 57.6% of the respondents followed this method; while 42.4% did not know this form of preparation.

It was noticed that the fermentation process was carried out by some people and not by others. Table 5 shows the process of preparing Corape food *via* fermentation.

The level of consumption. The level of consumption of Corape seeds is currently low as mentioned by 37.1% of the respondents; while some respondents (8.3%) reported a moderate level use of Corape food (Table 6). According to Reddy *et al.* (2007) in order to reduce the dependency of Darfur community on the food aid, other food sources such as wild plants should be sought. The consumption of wild plants seems more common and widespread in food insecure areas where a wide range of species are consumed.

Forms in which Corape seeds are consumed. Corape seeds are used in multiple ways as shown in Table 7. Some respondents (12.1%) eat them in the form of boiled grains

TABLE 5. Frequency distribution of respondents according to method of preparing the Corape seeds for food (N=132)

	Respondents	
	Total number of individuals	Percentage (%)
Fermentation of seeds	Fermented	37 28
	Not fermented	52 39.4
	Missing	43 32.6
Time of fermentation	1-2 Days	17 12.9
	2-3 Days	16 12.1
	Missing	99 75
Method of preparing a meal from Corape	Cutting, drying, grind and adding to boiling water	76 57.6
	I don't know	56 42.4

“*Balela*”, others (18.9%) make porridge from it; while some respondents (8.3%) make thin porridge “*Madida*”, some respondents (4.5%) consume it in a form of porridge and “*Madida*”, other (19.7%) consume it in a form of porridge and grain, some respondents (17.4%) use it in all the previous forms; while some (18.9%) gave no answer.

The grain is pounded or ground into flour, which is cooked into thin porridge or ugali to be eaten with vegetables or meat (Ruffo *et al.*, 2002).

Consumption of Corape seeds on age of respondents. According to the respondents (78%), Corape seeds are used by respondents of all age stages; while (20.5%) did not give an answer (Table 8).

Storage of Corape seeds

Seeds storage. Table 9 shows that 65.9% of the respondents asserted that the seeds of the Corape can be stored and contended; while 15.9% of the respondents answered that the seeds of the Corape cannot be stored, yet 18.2% did not give an answer.

Food grains are the most commonly stored durable food commodities in the tropics and subtropics for food and feed reserves, as well as seed for planting (Asif *et al.*, 2013).

Storage containers. Respondents stored Corape seeds in different containers. There were 13.6% of the respondents who stored seeds in mud jars; while 13.6% stored them in plastic containers. Some respondents (31.1%) used both types of pots for storage, yet 41.7% gave no answer.

Three techniques of storage involving different structures have been identified in Africa, namely: traditional/local grain storage at the farm and domestic level which includes local cribs and rhombus, platforms, open fields, roofs and fire places; improved/semi modern grain storage techniques at farm (Adesuyi *et al.*, 1980; Udoh *et al.*, 2000) and domestic level which are ventilated cribs,

TABLE 6. Frequency distribution of respondents according to the level of consumption of Corape seeds (N=132)

Level of consuming	Total number of individuals	Percentage (%)
High	5	3.8
Medium	11	8.3
Low	49	37.1
Missing	67	50.8

TABLE 7. Frequency distribution of respondents according to forms of using Corape seeds (N=132)

Forms of using Corape seeds	Total number of individuals	Percentage (%)
Boiled grain	16	12.1
Porridge	25	18.9
Madida	11	8.3
Porridge/Madida	6	4.5
Porridge/Grain	26	19.7
All of that	23	17.4
Missing	25	18.9

TABLE 8. Consumption of Corape seeds according to age stages of respondents (N=132)

The age stages	Total number of individuals	Percentage%
Children	1	0.8
Adults	1	0.8
All	103	78
Missing	27	20.5

improved rhombus and brick bins; and modern centralised storage at the commercial level involving silos and warehouses. Since farming is mostly done by subsistence farmers, the first two storage techniques predominate. Stored grains may suffer from serious attacks from pests (insects, fungi, rodents and birds), especially when not protected and in the presence of poor store hygiene.

Time of storage. A total of 25.8% respondents reported that the storage period ranged from 1-5 years; while 20.5% reported

that the storage period ranged from 5-10 years. Others (2.3%), reported that the storage period ranged from 10-15 years; while those 41.7% of the respondents did not give an answer.

It is evident from the above data that this plant can be stored for a long time. A similar observation was made by Juliano (1940).

Storage problems. A total of 40.2% respondents reported the existence of Corape storage pest problems; while 9.8% complained of storage capacity problems. Some respondents (15.2%) mentioned no storage

TABLE 9. Frequency distribution of respondents according to mode of storage of Corape seeds (N=132)

		Total number of individuals	Percentage (%)
Seeds storage	Yes	87	65.9
	No	21	15.9
	Missing	24	18.2
	Mud jars	18	13.6
	Plastic containers	18	13.6
Storage containers	Mud jars and plastic containers	41	31.1
	Missing	55	41.7
Time of storage	1-5 years	34	25.8
	5-10 years	27	20.5
	10-15 years	3	2.3
	15-20 years	13	9.8
	Missing	55	41.7
Storage problems	Pests	53	40.2
	Storage capacity	13	9.8
	Nothing	20	15.2
	Missing	46	34.8

problems; while the rest (34.8%) did not give an answer.

Although there exists scanty literature related to Corape storage pests, Hill (1975) listed 407 insect species of major and 788 of minor importance occurring in 48 major groups on stored products in the tropics. Fleurat-Lessard (1988) stated that all grain and seed insect species belong to two principal orders: Coleoptera and Lepidoptera, with some minor species belonging to the order Psocoptera. In addition to direct destruction of grains through feeding and reproduction, insects' presence has direct influence on grains causing an increase in grain temperature and moisture contents which leads to an increase in respiration and consequently loss in quantity and quality of the grain (Odogola, 1994).

Animals in the area. Data in Table 10 show different types of livestock in the area. Some respondents (2.3%) keep cows and others (1.5%) keep sheep. Other respondents

(16.7%) keep goats; while 1.5% keep camels. In addition, 2.3% of the respondents keep cows and sheep; yet others (2.3%) keep cows and goats; while some (2.3%) keep sheep and goats. Furthermore, 8.3% of the respondents had three types of animals (cows, sheep and goats), and others (2.3%) had cows, goats and camels. A total of 40.9% of the respondents keep all types of animals mentioned above; and 19.7% gave no answer.

Usage of Corape plant as fodder. Up to 81.1% of the respondents attested to using Corape as a feed for livestock production; while 18.9% did not give an answer (Table 11).

Dactyloctenium aegyptium is a traditional food plant used as a famine food in Africa; it has been used as a cereal substitute in times of famine in parts of Africa and India (Van Oudtshoorn, 1999). In Haryana, India, the grass is reported to provide fuel, fodder and stabilises soil in natural woodland and plantations (Jalota *et al.*, 2000).

TABLE 10. Frequency distribution of respondents according to livestock types in the area (N=132)

Livestock types in the area	Respondents	
	Total number of individuals	Percentage (%)
Cows	3	2.3
Lamb	2	1.5
Goat	22	16.7
Camels	2	1.5
Cows/Lamb	3	2.3
Cows/Goat	3	2.3
Lamb/Goat	3	2.3
Cows/Lamb/Goat	11	8.3
Cows/Goat/Camels	3	2.3
All	54	40.9
Missing	26	19.7

TABLE 11. Frequency distribution of respondents according to usage of Corape plant as fodder (N=132)

		Respondents	
		Total number of individuals	Percentage (%)
Usage of Corape plant as fodder	Yes	107	81.1
	Missing	25	18.9
The part of the plant used as fodder	Whole plant	103	78
	Missing	29	22
Method of packing the fodder	Bundle	90	68.2
	Missing	42	31.8
Storage	Yes	85	64.4
	No	6	4.5
	Missing	41	31.1
Period of storage	3-6 months	47	35.6
	6-12 months	37	28
	Missing	48	36.4
Storage containers	Mud jars	5	3.6
	Burlap sacks	9	6.8
	Shelters "Pergola"	63	47.7
	Mud jars+ Sacks	2	1.5
	Sacks+ Pergola	1	0.8
	Missing	52	39.4

TABLE 12. Frequency distribution of respondents according to the time of eating the Corape plant (N=132)

Time of eating the Corape plant	Total number of individuals	Percentage (%)
At any time	42	31.8
In famine	65	49.2
Missing	25	18.9

Table 11 shows that most of the households (78%) used the whole plant as animal fodder, while the rest did not answer. This implies the significance of this plant in animal production in Darfur; although the nutritional value offered by the plant needs proper investigation.

There were mixed views about Corape feed storage, ranging from 3 months to twelve months; though without proper explanation. This may be due to differences in storage conditions, including containers.

Some respondents (3.8%), for instance reported that the storage was done in mud jars; 6.8% in burlap sacks and 47.7%, mentioned that the storage took place under shelters. Overall, the comparative advantage of all these traditional storage felicitates still remains to be established.

Data in Table 12 show that most individuals (49.2%) ate the Corape plant only during the time of famine, since there were no other alternatives of grains. Some people (31.8%) took it at any time because they preferred this type of grain; while others (18.9%) gave no answer.

CONCLUSION

The Corape plant grows naturally in the Darfur region in the rainy season, and it grows in farms, valleys, and elsewhere. The people of the region prepare different meals from Corape seeds, and these meals are consumed by all age groups of females and males. Corape seeds are stored in traditional containers and are stored for long periods ranging from 3 to 12 months. There are storage problems due to pests and storage capacity.

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