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## INSIGHTS IN “*KHEMISS-TWEIRA*” AS A FAMINE PEARL MILLET COPING STRATEGY IN DARFUR STATE, SUDAN

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### ABSTRACT

In an effort to intervene in the relentless food shortages during famine periods in Darfur and elsewhere in the country, the Sudanese Government has vested interest in exploiting indigenous food resources that are often given less development attention. The objective of this study was to gain insights in the value and other perceptions associated with, *Khemiss-tweira*, together with pearl millet (*Pennisetum glaucum*) as a famine coping food security crop in Darfur, Sudan. The study was conducted in the displacement camps in El-Fasher in North Darfur, with a particular focus on Naivasha markets. The data were collected using a semi-structured questionnaire, on a sample size of 140 respondents. The study found that food was mostly scarce during summer times. The majority of respondents (27.9%) used *Khemiss-tweira* during the famine time. A large proportion of respondents in El-Fasher (92.1%) were familiar with *Khemiss-tweira*. The predominate method of preparation *Khemiss-tweira* was in the sequence of germination-fermentation- baking-drying-adding sugar and salt. The only difference was in the last additions where only peanuts, dates or sesame were the ingredients. The crop could be stored for more than a year without reported deterioration in food value and quality. *Khemiss-tweira* was commended for high acceptability by majority of the respondents (91.4%).

*Key Words:* Famine, *Khemiss-tweira*, pearl millet, Sesame

### RÉSUMÉ

Dans un effort pour intervenir dans les pénuries alimentaires incessantes pendant les périodes de famine au Darfour et ailleurs dans le pays, le gouvernement soudanais a tout intérêt à exploiter les ressources alimentaires indigènes qui reçoivent souvent moins d'attention en matière de développement. L'objectif de cette étude était de mieux comprendre la valeur et d'autres perceptions associées au *Khemiss-tweira*, ainsi qu'au millet perlé (*Pennisetum glaucum*) en tant que culture de

sécurité alimentaire faisant face à la famine au Darfour, au Soudan. L'étude a été menée dans les camps de déplacés d'El-Fasher au Nord-Darfour, avec un accent particulier sur les marchés de Naivasha. Les données ont été recueillies à l'aide d'un questionnaire semi-structuré, sur un échantillon de 140 répondants. L'étude a révélé que la nourriture était la plupart du temps rare pendant les périodes estivales. La majorité des répondants (27,9%) ont utilisé *Khemiss-tweira* pendant la période de famine. Une grande partie des personnes interrogées à El-Fasher (92,1%) connaissaient *Khemiss-tweira*. La méthode prédominante de préparation *Khemiss-tweira* était dans la séquence de germination-fermentation-cuisson-séchage-ajout de sucre et de sel. La seule différence était dans les derniers ajouts où seuls les cacahuètes, les dattes ou le sésame étaient les ingrédients. La récolte pourrait être stockée pendant plus d'un an sans que l'on signale une détérioration de la valeur et de la qualité des aliments. *Khemiss-tweira* a été félicité pour sa grande acceptabilité par la majorité des répondants (91,4%).

*Mots Clés* : Famine, *Khemiss-tweira*, millet perlé, Sésame

## INTRODUCTION

Darfur is renowned for frequent famines, which involves mass starvation and causes extensive morbidity within a specific period of time (De Waal, 2018). This phenomenon is usually accompanied by malnutrition, famine, epidemic and increased mortality (Kelly, 1992). As such, Darfur is one of the most food insecure regions in Sudan. Major contributors to occurrence of famine in Darfur are the weak rural security policies in general, and the short-term concept of relief policies rather than food security policies (Masci, 2002).

As an ameliorative strategy, the Sudanese Government has embarked on leveraging and investing in developing indigenous food mechanisms in order to avert the associated food crises. *Khemiss-tweira* is one of the indigenous fermented millet foods popularly used during famines in Darfur. *Khemiss-Tweira* is a food product confined to the region of Darfur, but with scanty scientific documentation to support effective decision making. Nutritionally, *Khemiss-Tweira* reportedly provides a balanced meal, containing the necessary carbohydrates, proteins, oil, minerals and vitamins (Dirar, 1994). Hence, its name which connotes "five birds", probably refers to the five ingredients: millet flour, millet malt flour, sesame, sugar and salt. This food is consumed after the

addition of pure water to the level of attaining the consistence desired by the consumer.

The usefulness and attractiveness of this food acts as an incentive to justify its widespread production in the country (Dirar, 1993). It is widely eaten in Western Sudan by travelers, boarding school pupils, soldiers and rural workers. There is little information on socio-economic aspects of using *Khemiss-tweira* during famine and non-famine times, acceptability by Darfur's people and its role as food is little investigated. The objective of this study was to gain insights in the value and other perceptions associated with, *Khemiss-tweira*, together with pearl millet (*Pennisetum glaucum*) as a famine coping food security crop in Darfur, Sudan.

## METHODOLOGY

The study was conducted at locality of El-Fasher (13.61667°N 25.35°E), in five units, namely El-fashir Large Market, Um Dafsu Market, Livestock Market, Naivasha Market and Zamzam Camp Market. Staff of the Association of Women Development Networks in El-Fasher, as well as the Ministry of Agriculture, and El-Fashir University were used as key informants

The data were collected with the aid of a semi-structured questionnaire through one-on-one interviews; using a sample of 140

individuals, including women, using official lists obtained from local authorities. The sample size was determined using random sampling, because the population frame was unknown. The data collected were analysed statistically using descriptive statistics. The Statistical Package for Social Scientists version 22, was used for all the analyses.

**RESULTS AND DISCUSSION**

**Seasonal availability of food.** Table 1 presents the profile of foods availability in Darfur based on rainy seasons. A total of 82.1% of respondents asserted that the rainy seasons were characterised by abundant food supply throughout the Sudan. This observations agrees with results from elsewhere that the rainy season is a period of plenty of food both in arid and semi-arid conditions (FAO, 2021). This result, however, appeared to contradict that of Salih *et al.* (2017) who reported that the rainy season was a period of difficulty for the internally displaced people (IDP) in Darfur to obtain food for their households. This contradiction could be due to the difficulties of aid reaching the IDP camps in autumn due to poor road conditions, rather than seasonal food scarcity.

Table 2 shows the distribution of respondents based on seasonal food scarcity in Darfur, Sudan. It is clear that the rainy season is the bounty period for food supply in

Darfur; while the summer season marks the climax for food scarcity in the region. Other seasonal periods are equally seldomly affected by food scarcity. Therefore, summer periods are the best target periods for investing in *Khemiss-tweira* in Darfur.

**Knowledge of *Khemiss-tweira*.** Most respondents in El fasher (92.1%) knew *Khemiss-tweira* as a vital crop for the dry period in Darfur region (Table 3). This conforms to Dirar’s (1993) observation that *Khemiss-Tweira* is a food product confined to the region of Darfur in Sudan. Whether this is a true reflection of the situation prevailing elsewhere in Sudan, needs further investigations. The modest lack of knowledge expressed by some respondents (7.9%) (Table 4) could be due to the cosmopolitan nature of urban residents, who are characterised by a diversity of cultures and feeding habits, owing to relatively better incomes than their rural counterparts. Food in urban areas is generally plentiful and available in a variety of forms ranging from fresh to prepared to packaged (Mahmoud, 2009; CSIS, 2020).

Table 5 shows the ranking of ease of preparation of *Khemiss-tweira* in Darfur, Sudan. Majority of the respondents (74.3%) agreed that *Khemiss-tweira* was easy to prepare, thus offering a good entry point for expansion use of this famine food. However, this observation appears to be mismatched

TABLE 1. Distribution of respondents according to food abundance periods in Darfur, Sudan

Time	Frequency	Percent
Winter	11	7.9
Rainy season	115	82.1
Summer	1	0.7
Winter/rainy season	8	5.7
Missing data	5	3.6
Total	140	100

TABLE 2. Seasonal distribution of food scarcity in Darfur, Sudan

Time	Frequency	Percent
Winter	5	3.6
Rainy season	6	4.3
Summer	117	83.6
Summer/rainy season	6	4.3
Summer/Winter	4	2.9
No answer	2	1.4
Total	140	100

TABLE 3. Respondents' distribution according to food types used during the famine in Darfur, Sudan

Type of food	Frequency	Percent
Stored millet	11	7.9
<i>Khemiss-tweira</i>	39	27.9
Dry porridge	7	5
Stored crops	31	22.1
Government wheat	1	0.7
Dried food	35	25
Corape and elmakhit	5	3.6
watermelon seeds	2	1.4
Lentil, rice and pasta (aid food)	6	4.3
Missing data	3	2.1
Total	140	100

TABLE 4. Respondents distribution according to the knowledge of *Khemiss-tweira* in Darfur, Sudan

Known	Frequency	Percent
Yes	129	92.1
No	11	7.9
Total	140	100.0

TABLE 5. Respondents distribution according to ease of preparation of *Khemiss-tweira* in Darfur, Sudan

	Frequency	Percent
Easily prepare by anyone	104	74.3
Only prepare by specific individual	24	17.1
I do not know	12	8.6
Total	140	100.0

with the method of preparation (Table 6), which was rather lengthy; comprising of at least five steps (germination/ fermentation / baking/ drying / adding sugar and salt). The respondents' favourable opinion about the ease of preparation might be because the process

was considered a routine that is executed without empirical assessment of the amount of labour required for the overall preparation process. This could be partly to blame for the negative response given by some respondents to the question about the ease of preparation

TABLE 6. Respondents distribution according to the method of preparation *Khemiss-tweira* in Darfur, Sudan

The method	Frequency	Percent
Germination/ fermentation / baking/ drying / adding sugar, salt and sesame	18	12.9
Germination/ fermentation / baking/ drying / adding sugar and salt / adding peanuts, dates or sesame	84	60.0
Germination/ fermentation / baking/ drying / adding sugar, salt and peanuts	20	14.3
I do not know	18	12.9
Total	140	100.0

question. It is, therefore, imperative that an assessment of the ease of food preparation from *Khemiss-tweira* is done in order to revisit and justify some steps technically and economically.

The food preparation sequence was similar in all options, except at the tail end of the sequence in which majority of respondents added peanuts, dates or sesame. On the other hand, the minority (12.9%) added sesame only, and 14.3% added peanuts only. This result was in line with that of Ali (2000), who intimated that *Khemiss-tweira* could be prepared by adding either sesame or peanuts. The value of adding extra ingredients to *Khemiss-tweira* preparation needs further investigation since the action has potential for increasing the energy used and overall cost of production.

**Duration of fermentation.** Table 7 shows the distribution of respondents against time taken to ferment *Khemiss-tweira* during its food preparation in Darfur, Sudan. The majority of respondents (40.7%) intimated that fermentation period of *Khemiss-tweira* was in the range of 12-24 hours. Ali (2000) also noted that *Khemiss-tweira* fermented was done up to 24 hours. On the other hand, other respondents (25.7%) intimated fermentation periods of less than 12 hours. The latter observation is in line with that of Dirar (1993), who reported that *Khemiss-tweira* was fermented for up to 12 hours. Reasons for the differences in range of fermentation periods were not divulged in each case; hence it may be necessary to justify these time differences in terms of food nutritional quality of the product (Khetarpaul and Chauhan, 1989).

**Storage of *Khemiss-tweira*.** The majority of respondents (42.9%) indicated that *Khemiss-tweira* was stored for a duration of less than 3 months under Darfur conditions (Table 8). This result in line with the results of Dirar (1993), who did not recommend storage of the crop beyond three months owing to development of rancidity caused by oil which the crop contains. Nevertheless, 32.9% of

TABLE 7. Respondents distribution according to the duration of fermentation of *Khemiss-tweira* in Darfur, Sudan

Duration of fermentation (hrs.)	Frequency	Percent
Less than 12	36	25.7
12-24 hours	57	40.7
More than 24 hours	1	0.7
Missing data	46	32.9
Total	140	100

TABLE 8. Respondents distribution according to storage duration of *Khemiss-tweira* in Darfur, Sudan

Storage duration	Frequency	Percent
Less than 3 month	60	42.9
3 - 12 month	46	32.9
More than year	12	8.6
I do not know	22	15.7
Total	140	100.0

TABLE 9. Respondents distribution according to general acceptability of *Khemiss-tweira* in Darfur, Sudan

Acceptability	Frequency	Percent
Acceptable	128	91.4
Unacceptable	12	8.6
Total	140	100.0

respondents alluded to a storage period of 3-12 months. Issues related to storage conditions of *Khemiss-tweira* and its consequences on food quality have received non-traceable research attention thus far in Darfur. This knowledge blur could be a recipe for latent maladies attributed to invisible quality

deterioration arising from inappropriate storage conditions associated with this famine crop. Fermentation is necessary mainly for food preservation, flavour development and for enhancement of nutritional quality of raw products (Saleh *et al.* 2013). When pearl millet is turned into flour, the resulting powder is noted as having poor keeping quality, especially under conditions of moderately high moisture and oxygen exposure (Abdelrahman *et al.*, 1983; Chaudhary and Kapoor, 1984).

**Acceptability of *Khemiss-tweira*.** *Khemiss-tweira* was highly acceptable to the majority of respondents (91.4%) in Darfur (Table 9). This is rather surprising considering the cosmopolitan nature of urban areas and IDP camps. On the other hand, it underscores the importance of this crop as a food security crop in Darfur; and therefore justifies its targeted research and development attention to avert the frequent food crises in the region. Issues of acceptability are linked with crop species and probably storage and fermentation conditions of pearl millet. Hence, a more comprehensive study targeting sensory analysis may be necessary, in order to further entrench this as a food security crop of the Darfur region.

## CONCLUSION

*Khemiss-tweira*, made from fermentation of pearl millet, is a food source of growing significance during famine periods in Darfur of the Sudan. It is consumed by both city dwellers and IDP populations, with its acceptability rated high across both populations. Its preparations, which comprise of a sequence of elaborate steps may be a hindrance to its full exploitation; thus requiring further exploration. Furthermore, its storage and fermentation periods require optimisation studies to obviate extended energy and labour requirements as well as latent deterioration in food quality.

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