



BACTERIOLOGICAL ANALYSIS OF DATE PALM FRUITS SOLD IN KATSINA METROPOLIS

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Abstract

Date palm is widely cultivated, distributed and consumed by various individuals. Most of the date palm fruits sold in Nigeria are either damaged or has insufficient quality for human consumption. This study was carried out to determine the bacterial load of date fruits in Katsina metropolis. Enumeration of bacteria was determined using pour plate technique. Serial dilution was carried out, where 10g of date fruits was homogenized in 90ml of diluents and used as stock solution. The bacterial counts were determined using colony forming unit per gram of the date fruit samples (cfu/g). The results obtained revealed high bacterial load in all the samples analyzed, which indicates the fruits contamination with bacteria. This may be due to unhygienic handling of the fruits from the local sellers and the nutritional contents of the fruit that may serve as good source of nutrients to bacteria. Date fruits should be packed and processed in a very hygienic condition for public health importance.

Key words: Date palm fruits, Bacteria, Microbial enumeration, Serial dilution.

Introduction

Dates, fruits of the date palm (*Phoenix dactylifera*) are main sources of staple food in arid and semi-arid regions of North Africa, Middle East and South-Asian countries. Dates have always played an important role in the economic and social lives of people. Date fruit is highly nutritious food product, rich in calories and many vitamins and minerals. Some dates varieties ripen early in the season, while others are not mature until the end of the season (Hasnaoui *et al.*, 2010).

Chemical composition of date palm fruit has been reported by various researchers (Al-Shahib and Marshall, 2002; Ismail *et al.*, 2008; Elleuch *et al.*, 2008; Biglari *et al.*, 2009) formed

vital component of diet in Arabian Peninsula, especially Saudi Arabia and are well being consumed in many countries of the world, Nigeria is not an exceptional (Redmond, 2009).

Microbial contaminants isolated from date fruits include yeasts, molds, lactic acid bacteria and some potential pathogens like *Staphylococcus aureus*, *E. coli*, and *A. flavus* (Aido *et al.*, 1996; Kader, 2007; Hamad, 2008).

It was observed that the date palm fruits are mostly loaded with mixture of microbes; bacteria, molds and yeast (Atia, 2011) but people consume the fruits after clearing the inner environment, while some eat it whole irrespective of the state of the internal environment of the fruits (Atia, 2011). The Agricultural industries sustained huge crop losses as a result of fungal diseases of fruits and plants (Christensen *et al.*, 2007).

Temperature, oxygen and moisture content are the most important factors that influence the type of microbial growth and spoilage of foods. High sugar tolerant microorganisms, temperature of storage and water content are the major factors which affect the shelf life of dates (Rygg, 1956). Enumeration of microorganisms causing spoilage of fresh dates could lead to storage process that prevents date deterioration. This study was aimed at identifying the bacterial load of the date fruit samples sold around Katsina central Mosque.

Methodology

Date palm fruits from 5 different locations were collected in clean sterile polythene bag around Katsina central mosque and labeled accordingly. The labeled samples were transported to the microbiology laboratory, Umaru Musa Yar'adua University. A total of 150g of the date fruits were collected from five different places, 30g from each vendor.

Samples (10g) were weighed and 90 ml sterile peptone water was added and homogenized for 2 minutes, then serial dilution was prepared. 1ml of the stock solution was transferred into a test tube containing nine milliliter (9.0ml) sterile distilled water and the tube was shaken and labeled 1: 10. From the tube containing one milliliter (1.0ml) was then transferred into another tube containing 9.0 ml of sterile distilled water and labeled as 1: 100. This was also agitated and the procedure was repeated up to 1: 10⁵ using sterile syringes. Then results were reported as colony forming units (cfu) per gram (APHA, 1992).

One Milliliter (1.0ml) from the dilution factors of each labeled sample was transferred into appropriately labeled triplicate sterile petri dishes. This was followed by pouring a cooled molten prepared nutrient agar, SS agar and MaCconkey agar each into appropriately labeled separate triplicate petridishes. The dishes were gently rocked, plates showing less than 300 colonies were counted. Dilution factor of 10⁻⁵ were selected for total aerobic bacterial count and 10⁻² were also selected for SS count and total coliform count respectively. The results were finally expressed in colony forming unit per ml (cfu/ml) of the sample (FAO, 2007).

Result and discussion

The total aerobic bacterial counts of date's palm fruit analyzed were presented in Table 1. The aerobic mesophilic bacterial count ranged within 7.9x10² to 9.4x10⁴cfu/g (table 1).The total

coliform counts was found to have 2.5×10^2 to 2.0×10^4 cfu/g (table 2) while enumeration of Salmonella-Shigella bacteria was recorded as 4.5×10^3 to 1.0×10^4 cfu/g (table 3). Furthermore, the results indicated that the bacterial load was the highest in sampling location A (table 1). Sampling location D recorded higher for total coliform counts and enumeration of Salmonella-Shigella bacteria (table 2 and 3). This could be due to nutritional (sugar) content of the analyzed date palm fruits which may serve as good source of carbon to bacteria present and poor hygienic practices of the local sellers. This observation is has agreed with the one reported by Hamad *et al.*, (2008), Mohammed and Hossein (2005) in Saudi Arabia and Omogbal *et al.*, (2007) in Nigeria.

Table 1: Mean total aerobic bacterial counts obtained in all the samples analyzed

S/N	Samples	Colony counts
1.	SSA	9.6×10^4 cfu/g
2.	SSB	7.9×10^2 cfu/g
3.	SSC	1.5×10^3 cfu/g
4.	SSD	1.4×10^4 cfu/g
5.	SSE	Nil

KEY: SSA to E; Represents sampling stations A to E

Table 2: Mean total coliform counts obtained in all the samples analyzed

S/N	Samples	Colony Count
1.	SSA	3.0×10^2 cfu/g
2.	SSB	5.0×10^2 cfu/g
3.	SSC	3.0×10^3 cfu/g
4.	SSD	2.0×10^4 cfu/g
5.	SSE	2.5×10^2 cfu/g

KEY: SSA to E; Represents sampling stations A to E

Table 3: Mean bacterial enumeration for Salmonella-Shigella

S/N	Samples	Colony Count
1.	SSD	1.0×10^4 cfu/g
2.	SSE	4.5×10^3 cfu/g

KEY: SSA to E; Represents sampling stations A to E

Conclusion

The bacteriological analysis of date palm fruits analysed indicated high bacterial contamination. This may be as a result of the fruits processing such as washing, sorting and exposure to environmental contaminants. Contamination may also occur during pitting, mincing and pressing processes of the date fruits. Thus, date palm fruits sold around Katsina central mosque need more hygienic processing for human consumption.

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