

# **RESEARCH ARTICLE**

#### ISOLATION AND IDENTIFICATION OF BACTERIOLOGICAL COMPOSITION OF SOME SELECTED VEGETABLES LEAVES SOLD IN MARKETS

Sunday A. Musa

Department of Physics, Kogi State College of Education, Ankpa, Kogi State, Nigeria.

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### Manuscript Info

#### Abstract

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..... Vegetables are an essential dietary source of nutrients and fiber for the health and wellbeing of human beings. The demand for vegetables has increased substantially in recent years. However, research has linked vegetable consumption with various pathogenic bacteria that are of public health concern. The present study was designed to isolate and identify the bacteriological composition of fluted pumpkin, bitter leaf. and scent leaf commonly sold at various markets in Kogi State. These bacteria were studied using standard microbiological methods. The serial dilution method was employed. The result shows that the three samples of vegetables collected from different vendors contain the microbial load. Bitter leaf has the higher bacteria load, followed by pumpkin leaf with a moderate bacteria load, while scent leaf has the lowest plate count. The bacteria isolated are pseudomonas species, Bacillus, Erwinia spp, streptococcus. The sample contains an unacceptable number of bacteria recommended by the world health organization. Therefore, to safeguard the health of the final consumer, there should be proper washing of vegetables with clean water and disinfect the bacteria with sodium chloride(salt).

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#### Introduction:-

Vegetables and fruit are essential dietary sources of nutrients (minerals and vitamins) and fiber for human health and wellbeing. Vegetables, mostly regarded as the fresh edible part of herbaceous plant roots, stems, leaves, or fruits(Damen et al., 2007), remain one of the essential portions of nutrition and balanced diet (Boeing et al., 2012; Denis et al., 2016; Knecht et al., 2015; Ogunleye et al., 2010; Okyay et al., 2004; Yafetto et al., 2019). Fruits and Vegetables are significant food products for the daily life of humans(Jana et al., 2020; Liu, 2013; Nti et al., 2011; Slavin & Lloyd, 2012), and their production has increased substantially in recent years(Hess & Sutcliffe, 2018). Adequate vegetable and fruit consumption are essential in health promotion and body weight management(Aughinbaugh, 2015; Dukhi & Taylor, 2018; Mytton et al., 2014; Rudra et al., 2019; Ziaei et al., 2020). Vegetables are precious for their ability to supply vitamins A and C, which are known to reduce the risk of several diseases (Deribe & Mintesnot, 2016; Hung et al., 2015; Pennington & Fisher, 2009; Septembre-Malaterre et al., 2018; Ülger et al., 2018)

Despite the relevance attached to the consumption of vegetables, it has been reported that vegetables are widely exposed to microbial contamination (Alemu et al., 2018; Balali et al., 2020; Machado-Moreira et al., 2019; Snyder & Worobo, 2018). Vegetables are commonly contaminated through contact with the soil, application of raw manure

of domestic animal origin as fertilizer, unclean water organic fertilizer, and improper handling at harvest or during postharvest processes(Amaechi et al., 2016; Hasibur et al., 2016; Rajwar et al., 2016; Tsado et al., 2015). The cultivation of vegetables through to consumption presents variety of opportunities for microbial contamination of the produce, especially with the increasing consumption of raw vegetables commonly motivated by the intention of retaining its nutrients. Vegetables are likely to house variedbacteria, including plant and human-related(Leff &Fierer, 2013).*Salmonella, E. coli, B. cereus, Campylobacter spp., Y. enterocolitica, L. monocytogenes*, and*C. botulinum* are pathogenic bacteria commonly found in vegetables (Al-Kharousi et al., 2016; Alam et al., 2015; Feroz & Noor, 2019; Heaton & Jones, 2008; Mogren et al., 2018; Warriner, 2005). Most of the pathogenic bacteria portion of the natural flora of fruits and vegetables or contaminants from handling, storage, and transportation.

In Nigeria, varieties of vegetables, including fluted pumpkin, bitter leaf, and scent leaf, are hugely available in the local markets and constitute a severe business for some people(Ibeawuchi et al., 2015). The intricacyassociated with the distribution of fresh horticultural produce in the local markets could significantly account for the contamination risk of vegetables. Harvesting, processing, and transportation of the products represent critical steps in the distribution of vegetables. Perhaps, the variations in these processes could lead to too many accidentally contaminated vegetables being sold in the market. Thus, this study aims to isolate and identify some selected vegetable leave (fluted pumpkin, bitter leaf, and scent leaf) sold in the local markets in Kogi State.

### Materials and Method:-

### **Collection of Sample**

Fresh leaves of fluted pumpkin, bitter leaf, and scent leaf were purchased from the open market, placed in separate sterile plastic bags, and conveyed to the laboratory for microbial analysis.

### Isolation and identification of bacteria

Pathogenic bacteria were isolated from the vegetables using a serial dilution agar plate using the method described by Ruangpan and Tendencia (2004).Biochemical tests such as catalase test, coagulate test, indole test, and sugar fermentation test was carried out to identify bacterial isolates using the methods described by Cheesbrough (2005).

<b>Result:-</b>	
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No of plates	Media	Bacteria count Bactria count Bacteria count in pumpkin leaf in bitter leaf in scent leaf		
1	Nutrient agar	8.0x10 <sup>4</sup>	$1.02 \times 10^5$	6.7x10 <sup>4</sup>
3	Nutrient agar	1.64x10 <sup>5</sup>	9.7x10 <sup>4</sup>	7.2x10 <sup>4</sup>
5	Nutrient agar	1.28x10 <sup>5</sup>	8.9x10 <sup>4</sup>	1.17x10 <sup>5</sup>
2	Cled agar	7.6x10 <sup>4</sup>	6.6x10 <sup>4</sup>	1.10x10 <sup>5</sup>
4	Cled agar	2.7x10 <sup>4</sup>	3.07x10 <sup>4</sup>	7.8x10 <sup>5</sup>
6	Cled agar	5.8x10 <sup>4</sup>	1.14x10 <sup>5</sup>	1.21x10 <sup>5</sup>

 Table 1:- Table showing the standard plate count of bacteria colonies isolated.

The table above shows the standard plate count of bacteria colonies isolated from the vegetables (fluted pumpkin, bitter leaf, and scent leaf).

**Table 2:-** Table showing the morphological characteristic of the Isolates, gram reactions, and presumptive organism.Morphological characteristicsGram-positivePresumptiveorganism

А	Creamy dull surface with	Gram-positive cocci	Bacillus spp	

	irregular shape Vellow flat round colonies	Gram-negative rod shane	Frwinia snn
	Greenish colonies on cled agar	Gram-negative rod shape	Pseudomonas spp
	Creamy colonies and smooth beta-hemolytic	Gram-positive cocci colonies arranged in chains	Streptococcus spp
В	Pale blue-colored colonies	Gram negative rod	Pseudomonas spp
	Creamy white raised with rough edges	Gram-positive bacillus	Bacillusspp
C	Yellow flat round colonies Greenish colonies on cled agar	Gram-negative rod shape Gram-negative rod shape	Erwinia spp Pseudomonasspp

KeyA – fluted pumpkin, B – Bitter leaf, C = Scent leaf

Table 3:- Shows the biochemical test of the isolates from	pumpkin, bitter leaf and scent leaf.
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Catalase	coagulation	Indole Glucose	Lactose F	ructose		
	test					
+	+	-	AG	А	А	Streptococcus
+	+	+	AG	А	AG	Bacillus
+	+	+	А	AG	AG	Erwirriaspp
+	-	-	-	А	А	Pseudomonas spp
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Key - = Negative, + = Positive, A = Acid, AG = Acid & Gas

### **Discussion:-**

The current study was conducted to isolate and identify the bacteriological composition of fluted pumpkin, bitter leaf, and scent leaf soldin the market. The samples (pumpkin, bitter leaf, scent leaf) were subjected to bacteria load and isolate identification. The result showed that the produces are influenced by several pathogenic microorganisms. Sample A (pumpkin) has a moderate bacterium count of  $2.6 \times 10^4$ , while sample B (bitter leaf) has the highest count of  $3.0 \times 10^4$ , and sample C (scent leaf) has the lowest count of  $2.5 \times 10^4$ . Consistent with previous studies(Muhammad et al., 2021; Akinyele et al., 2013; Bae et al., 2011; Mbilia & Shude, 2020; Odu & Okomuda, 2013; Shobha, 2014), the result reports higher bacteria count in commonly consumed vegetables. The predominant microorganisms identified were of the genus; Bacillus, Pseudomonas, streptococcus, Erwinia spp. However, Pseudomonas species occurred in all the vegetables while Bacillus were isolated from fluted pumpkin and bitter leaf, Erwinia were isolated from fluted pumpkin and scent leaf. Streptococcus was only found in fluted pumpkin. The isolated microorganism from the leaves of the vegetables have been previously implicated as health concerns (Moellering, 2002; Morella et al., 2019; Zeighami et al., 2020), hence, the importance of isolation and identification of the commonly consumed vegetables. Accordingly, the study agrees with previous research (e.g., Maia et al., 2013; Ogbonna et al., 2019; Shobha, 2014) that improper handling of the product from harvesting, storage, processing to distribution accounts for the bacteriological contamination of the vegetables.

## **Conclusion:-**

This study detected the profile of bacteria that caused pathogenicity of some vegetables. It also showed that bacteria were involved in the spoilage of many vegetables. Mechanical injuries such as bruises or cuts during harvesting or post-harvesting, grading, and packing could provide infection sites for spoilage pathogens. Thus, it is recommended that proper handling of the product is crucial in mitigating pathogenic bacterial contamination.

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