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## Effects of Growing Environments on the microflora of *Basella alba* and *Basella rubra*.

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### ABSTRACT

*Basella alba* and *Basella rubra* are leafy vegetables of the family Basellaceae which are consumed for their rich nutrient content so they are cultivated around residential areas for easy access during food preparation. Microbiological analysis was carried out on leave samples of the vegetables obtained from three different growing environments. The vegetable samples were cultured on Nutrient agar and incubated at 37°C for 24 hours; Potato dextrose agar and incubated at 25°C for 5-7 days. The fungi isolated from the vegetables were *Pullularia* spp, *Mucor* spp, *Rhizopus* spp, *Microsporium* spp, *Absidia* spp and *Aspergillus* spp; while the bacteria were *Klebsiella* spp, *Pseudomonas* spp and *Acinetobacter*. Irrespective of the growing environment, bacteria isolated from *Basella alba* and *Basella rubra* were similar while fungi varied based on the type of growing environment. It was concluded that growing environment had no effect on the bacteria found on the two species of *Basella* but growing environment had effect on the fungi growing on the two species of *Basella*. Vegetable growers were therefore advised to desist from growing vegetables around bathrooms and toilet facilities.

**Keywords:** Microflora, *Basella alba*, *Basella rubra*, growing environment.

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### INTRODUCTION

*Basella alba* and *Basella rubra* commonly called Ceylon or Malabar spinach is a tropical perennial vine widely used as leafy vegetable. *Basella alba* is the green variety while *Basella rubra* has red stalk and lightly coloured reddish purple on the undersides of its leaves. *Basella* species is commonly grown in the Southern part of Nigeria, usually at the back of bathroom or any water outlet or channel in the house.

Green leafy vegetables are grown for their foliage from ancient times and are considered to be excellent sources of essential nutrients. In the absence of meat, vegetables are cheap sources of protein and vitamins. *Basella* species are rich in vitamin C, provitamin A and minerals such as iron, calcium, phosphorus [1].

Fruits and vegetables are infected by micro-organisms while the produce is still immature and attached to the parent plant or during harvesting and subsequent handling and marketing operations. Microbial attack in vegetables may result into off colours, off odour and often tissue deterioration. *Erwinia carotovora* has been reported to cause soft rot diseases in some leafy vegetables [2]. Others include lesions formation, sliminess and leafy spot diseases. Microbial load on leafy vegetables has been attributed to a number of factors/sources including soil water, air and a

host of others. Solomon *et al.* [3] reported that edible portion of leafy greens can transmit pathogens by means of water to soil and soil to leafy greens.

*Basella alba* and *Basella rubra* are commonly grown at the back of the house where domestic effluents keep the soil moist and give the plant all year round survival. Since soil water is a source of microbial load on leafy vegetables, it is necessary to study the effect of different soil water on the micro-organisms of *Basella* species. This work is aimed at the determination of the effect of growing environment on the microflora of *Basella alba* and *Basella rubra*.

## MATERIALS AND METHODS

### Collection of Samples

The vegetables were aseptically picked from the parent plants, put into polyethylene bags and transported immediately to the laboratory for analysis. The vegetables were coded as follows:

FA and FR: *Basella alba* and *Basella rubra* respectively grown at the back of the bathroom in a flat or mono family type house.

MA and MR: *Basella alba* and *Basella rubra* respectively grown at the back of the bathroom in a general or multifamily type house.

GA and GR: *Basella alba* and *Basella rubra* respectively grown in a garden where rain water serve as source of water as control.

### Isolation of Micro organisms

#### Fungi

Ten grammes of each of the vegetables were separately crushed in a sterile mortar. A small portion of the macerate was picked using a sterile forcep and put on the surface of sterile potato dextrose agar. The plates were incubated at 25°C for 5–7 days [4].

#### Bacteria

One gramme of the vegetable macerate was suspended in 9mls of sterile distilled water and serial dilutions were made to  $10^{-5}$ . One ml of the  $10^{-5}$  dilution was dropped on a sterile Petri dish and 15ml of sterile molten Nutrient agar cooled to 45°C was poured over it. This was gently swirled to mix, the plates were incubated at 37°C for 24hours.

### Identification of Isolates

Fungi were identified using morphological and cultural characteristics. A piece of each fungal colony was teased out on sterile slide, and stained with Lactophenol in cotton blue and observed under the microscope. The features were compared using keys.

Bacteria were identified on the basis of cultural characteristics and result of biochemical analysis. The bacteria were then identified using the Bergeys manual of systemic bacteriology [5].

## RESULT AND DISCUSSION

The fungi and Bacteria isolated from *Basella alba* and *Basella rubra* harvested from three different growing environments are shown in Tables 1 and 2 respectively. The microflora of the two vegetables showed a preponderance of bacteria species over fungi. Most of the bacteria and moulds were common to the two vegetables. Among these are *Klebsiella edwardsii*, *Pseudomonas aeruginosa* and *Acinetobacter calcoaceticus*; and *Microsporium gypseum*, *Rhizopus oryzae* and *Rhizopus stolonifer*. Ogunbusola [6] reported *Scopulariopsis*, *Aspergillus*, *Rhizopus*, *Klebsiella*, *Pseudomonas*, *Erwinia*, *Acromonas* and *Proteus* species to be bacteria and fungi isolated from garden grown *Basella alba* and *Basella rubra* treated with or without benomyl. Wills *et al.* [7] reported *Erwinia* and *Pseudomonas* to be major cause of bacteria soft rot in fruits and vegetables. Jay [8] also showed that bacteria soft rot caused by *Erwinia* and *Pseudomonas* is commonly encountered in vegetables such as spinach, lettuce, tomatoes and broccoli. Fungi spoilage in Nigerian fruits and vegetables is reported to be due to species such as *Aspergillus*, *Rhizopus*, *Alternaria*, *Mucor*, *Cladosporium*, *Penicilium*, *Geotrichum*, Yeast and *Cephalosporium* [8&9].

There is no difference in the specie of bacteria isolated from garden grown *Basella* species and those grown where domestic effluent serve as source of water for the vegetable irrespective of the number of families producing the effluent. However, fungi isolated from garden grown *Basella alba* and *Basella rubra* differed from those isolated from vegetable grown at the back of monofamily (FA and FR) and multifamily (MA and MR) bathroom. No fungus was isolated from *Basella alba* grown at the back of the bathroom of a monofamily or flat type house.

**Table 1: Bacteria and fungi isolated from *Basella alba* under different environments.**

Samples	Bacteria	Fungi
GA	<i>Klebsiella Edwards</i>	<i>Pullularia pullulans</i>
	<i>Pseudomonas aeruginosa</i>	<i>Mucor mucedo</i>
FA	<i>Acinetobacter calcoaceticus</i>	ND
	<i>Klebsiella edwardsii</i>	
MA	<i>Pseudomonas aeruginosa</i>	
	<i>Klebsiella edwardsii</i>	<i>Rhizopus oryzae</i>
	<i>Pseudomonas aeruginosa</i>	<i>Microsporium gypseum.</i>
ND Not detected		

**Table 2: Bacteria and fungi isolated from *Basella rubra* grown under different environments.**

Samples	Bacteria	Fungi
GR	<i>Klebsiella edwardsii</i>	<i>Absidia species</i> <i>Microsporium gypsium</i>
	<i>Pseudomonas aeruginosa</i>	
FR	<i>klebsiella edwardsii</i>	<i>Rhizopus stolonifer</i> <i>Aspergillus fumigates</i>
	<i>Acinetobacter calcoaceticus</i> <i>Pseudomonas aeruginosa</i>	
MR	<i>Klebsiella edwardsii</i>	<i>Rhizopus stolonifer</i>
	<i>Pseudomonas aeruginosa</i> <i>Acinetobacter calcoaceticus</i>	

## CONCLUSION

Bacteria isolated from *Basella alba* and *Basella rubra* are similar irrespective of the growing environment. The type of growing environment however, influenced the type of fungi isolated from *Basella alba* and *Basella rubra*. The populace is hereby advised to desist from growing vegetables around bathrooms or questionable water channels around the home.

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