

Antimicrobial Activity of *Crescentia cujete*

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ABSTRACT

The Philippines is known for being an agricultural country with different varieties of plants that have medicinal potential. This study focused on the antimicrobial potential of the fruit of *Crescentia cujete* or Calabash tree against common infections *Staphylococcus aureus*, a gram-positive bacteria, and *Escherichia coli* which is a gram-negative bacterium. Fruit extracts were obtained by maceration with ethanol for 24 hours at room temperature. The experimental research design was used through disc diffusion method. Findings of this study, however, revealed no antibacterial effect of the fruit extract against *Staphylococcus aureus* and *Escherichia coli*.

Keywords: *Crescentia cujete*, antimicrobial, *Staphylococcus aureus*, *Escherichia coli*

INTRODUCTION

The healing power of plants is a widely explored study. Plants have been traditionally used for the treatment of infection of different aetiology. More so now with the development of bacterial resistance of some microorganisms due mainly to the abuse of antibiotic use. The increasing prevalence of multidrug-resistant strains of bacteria and the recent appearance of strains with reduced susceptibility to antibiotic raises the spectre of untreatable bacterial infections and adds urgency to the search for new infection-fighting strategies (Sieradzki, Roberts, Haber & Tomasz, 1999) as

cited by Mahbub *et al.* (2011).

The Philippines, being a tropical country, is a treasure trove of different varieties of plants that have medicinal potential. One such plant is the *Crescentia cujete*, locally known as the Calabash tree or Miracle tree. According to Stuartxchange, the fruit, bark and leaves of the tree are used for their medicinal value. The plant principally contains tartaric acid, cianhidric acid, citric acid, crescentic acid, tannins, beta-sitosterol, alpha and beta amyryns, estearic acid, palmitic acid, flavonoids (quercetin and apigenin), naphthoquinones, iridoid glycosides, 3-hydroxyoctanol glycosides (Marc, 2008).

Calabash is a tropical evergreen tree about 4 to 5 meters in height with spreading branches and broad head. Leaves are alternate, often fascicled at the nodes, oblanceolate, 5 to 17 centimeters long, glossy at the upper surface, blunt at the tip and narrowed at the base. Flowers develop from the buds that grow from the main trunk, yellowish and sometimes veined with purple, with a slightly foetid odor, occurring singly or in pairs at the leaf axils, stalked and about 6 centimeters long, and open in the evening. It produces very large green smooth fruit often resembling the size of a large watermelon. Inside is a pulp that has medicinal applications with flat seeds that are small and embedded in the pulp. The fruit takes about six months to ripen. It is used in various parts of the world for their laxative, expectorant, anthelmintic, analgesic, anti-inflammatory and febrifuge properties.

Antimicrobial properties of the fruit, leaves and bark of the Calabash tree has also been explored in various studies (Binutu & Lajubutu, 1994; Bussman, Glenn & Sharon, 2010; Mahbub *et al.*, 2011; Das *et al.*, 2014; Parvin *et al.*, 2015, Agarwal & Chauhan, 2015) and has yielded promising results.

Of particular interest to this study is the fruit of *Crescentia cujete* or Calabash tree. Phytochemical study on the fruit yielded saponins, flavonoid, cardenolides, tannins, and phenol, as well as the presence of hydrogen cyanide (Stuartxchange). A study on the chemical constituents of the Calabash fruit was conducted by Ejeloru, Lasisi, Olaremu and Ejeloru in 2011 which yielded low mean concentrations for heavy metals, but high mean concentrations for manganese, iron, zinc and copper. The presences of phytochemicals, as well as the presence of hydrogen cyanide, were also observed in the fruit sample. The findings on the phytochemical constituents, mineral composition and proximate composition of the *Crescentia cujete* suggest that the fruit can make a useful contribution to both human and animal nutrition and possesses medicinal values.

In the context of the efforts to improve the management of diseases, natural products could be a good source of new drugs with high sensitivity to microbes.

Taxonomical Classification

Crescentia cujete belongs to the family Bignoniaceae. Its taxonomical classification reported in literature (ntbg.org/plants/plant_details.php?plantid=3503) is given below:

Kingdom:	Plantae
Division:	Magnoliophyta
Class:	Magnoliopsida
Order:	Lamiales
Family:	Bignoniaceae
Genus:	<i>Crescentia</i>
Specie:	<i>C. cujete</i>

OBJECTIVES OF THE STUDY

In light of the above information, the objective of the study is to investigate the antibacterial activity of the fruit concoction of *Crescentia cujete* or Calabash tree against *Staphylococcus aureus* and *Escherichia coli*.

FRAMEWORK

The use of natural products like plants as an alternative for prevention and cure of various diseases has been increasing over time. In a country like the Philippines, the use of alternative medicine is supported by the Philippine Institute of Traditional and Alternative Health Care (PITAHC) under the Department of Health's arm, whose primary task is to provide the people with healthcare utilizing traditional and alternative source of medicine that is proven to be safe, affordable and effective. PITAHC is strengthened by Republic Act 8423, also known as Traditional and Alternative Medicine Act of 1997, creating a policy of the state to improve the quality and delivery of healthcare services to the Filipino people through the development of traditional and alternative healthcare and its integration into the national health care delivery system.

Thus, this research study was conducted to support the governments' program on discovering the utilization of plants as possible sources of antibiotics for the treatment and management of human diseases. Initially, the study identifies the antimicrobial properties of calabash fruit extract against common infections brought by *Staphylococcus aureus* and *Escherichia coli*.

METHODOLOGY

The study utilized the experimental research design in evaluating the antibacterial effect of the fruit concoction of *Crescentia cujete* or Calabash tree against the growth of gram-positive bacteria *Staphylococcus aureus* (BIOTECH Acc. No. 1582) and Gram-negative bacteria *Escherichia coli* (BIOTECH Acc. No. 1643). Cefazidime, a semisynthetic, broad-spectrum, beta-lactam antibiotic that has activity against Gram-negative and Gram-positive bacteria (www.drugs.com) was used as positive control while distilled water was used for negative control.

Crescentia cujete or Calabash tree was obtained from RER, Kauswagan, Cagayan de Oro City. Its leaves and bark were sent for species identification at Central Mindanao University in Musuan, Bukidnon and was confirmed to be *Crescentia cujete* or Calabash tree. The fruit of the Calabash tree was used to prepare the concoction for the antimicrobial testing. The method of extraction used was through maceration. This procedure was anchored from the studies of Bussman, Glenn and Sharon (2010) and Mahbub, Hoq, Ahmed and Sarker (2011). The pulp of the fruit of *Crescentia cujete* or Calabash tree was scooped out and placed in a beaker and mixed with ethanol. The solution was then left to immerse for 24 hours and was then filtered using Whatman filter paper. The extract was then sent to F.A.S.T Laboratory for antimicrobial testing through disc diffusion method.



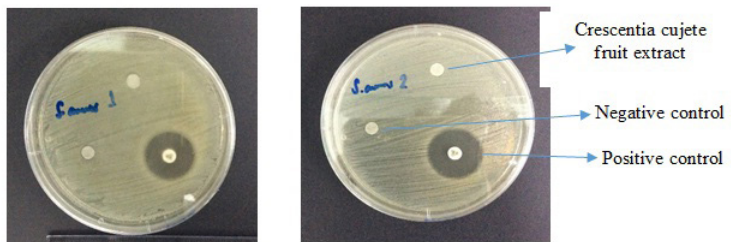
RESULTS AND DISCUSSION

The results of the present investigation showed the non-existence of antimicrobial compounds in the extracts of the assayed plants as evidenced by the presence of microbial growth surrounding the experimental disc.

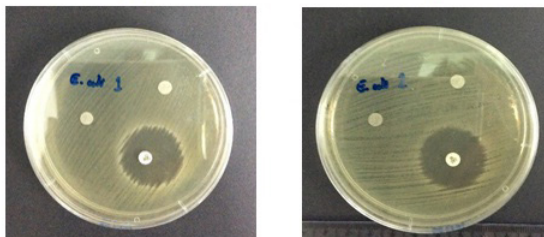
Table 1. Zones of inhibition based on the inhibitory effect of *Crescentia kujete*, Positive control and Negative control on *E. coli* and *S. aureus*

TEST SAMPLES	Zone of Inhibition	
	<i>E. coli</i> (average)	<i>S. aureus</i> (average)
Fruit extract of <i>Crescentia kujete</i>	0 mm	0 mm
Positive Control: CEFTAZIDIME	28 mm	22.5 mm
Negative Control: Distilled Water	0 mm	0 mm

***Staphylococcus aureus* plates 1 and 2**
(Positive control, Negative control and *Crescentia kujete* fruit extract)



***Escherichia coli* plates 1 and 2**
(Positive control, Negative control and *Crescentia kujete* fruit extract)



CONCLUSIONS

This study revealed that *Crescentia cujete* did not exhibit any antimicrobial activity when tested against *Staphylococcus aureus* and *Escherichia coli*. As illustrated in the table, no zone of inhibition was noted in the disc sensitivity testing. The results of the study were contrary to the investigations made by Bussmann, *et al.*, and Mahbub, *et al.*, where *Crescentia cujete* demonstrated an increased antimicrobial activity against *Escherichia coli* (9 mm) and *Staphylococcus aureus* (18.32) respectively. Further, the study of Parvin MS, *et al.*, also supported similar findings on the antimicrobial activity of Calabash extract. It can be concluded that further detailed study and deep investigation should be needed to exploit the differences with the findings of other previous researches.

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