Proceedings of the

2nd International Conference of Agriculture and Agricultural Technology

ICAAT 2022

Theme:

Climate-Smart Agriculture in the Post COVID Era:

A Gate Way to Food Security in Africa

Held at
Caverton Hall
Federal University of Technology Minna, Nigeria

Published by
School of Agriculture and Agricultural technology
Federal University of Technology
P. O. M. 65, Minna, Nigeria
Email: icaat@futminna.edu.ng
Tel: 08028573305

Edited by

- Dr. (Mrs) Adeniran, O.A.
- Dr. Muhammad, H.U.
- Dr Rajan Sharma
- Prof. Alabi, O.J.
- Dr. (Mrs) Akande, K.E.
- Dr. Otu, B.O.
- Dr. Mrs Carolyne Cherotich
- Mr. Ibrahim, A.
- Mr Adesina, O.A





Contents

45

FREE RADICAL SCAVENGING ACTIVITY OF SELIM POD (Xylopia aethiopica)

Aliyu, M.[1], Akande, K.E.[1] and Egwim, E.C.[2]

[1]Department of Animal Production, School of Agriculture and Agricultural Technology, Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria.
[2]Department of Biochemistry, School of Life Sciences, Federal University of Technology, P.M.B. 65, Minna, Niger State, Nigeria

*Corresponding Author's Email: mijindadialiyu@gmail.com

ABSTRACT

This study was carried out to determine the antioxidant activity of the selim pod (Xylopia aethiopica). Extracts of Xylopia aethiopica pods were investigated for their free radical scavenging activities in the presence of 2, 2-diphenyl-1-picrylhydrazyl (DPPH), using ascorbic acid as the standard antioxidant. The result revealed that with an increase in the concentrations of the selim pod extract from 0.2 to 1.0 mg/ml, the free radical scavenging activity of the selim pod extracts also increased from 16.04 to 48.17%. The DPPH free radical scavenging activity of the selim pod is observed to be dose-dependent. The antioxidant activity of the extract of Xylopia aethiopica was examined and the results were compared to that of ascorbic acid which served as the standard. The percentage inhibition of ascorbic acid (vitamin C) at the concentration of 1mg/ml was 97.05% meanwhile that of selim pod at the same concentration, the inhibition recorded was 48.17%. Although the free radical scavenging activity is lower than that of ascorbic acid, notwithstanding, the result suggests that Xylopia aethiopica has potential antioxidant properties which could be exploited as a natural antioxidant for use in animal nutrition and the food industry.

KEYWORDS: Scavenging activity; *Xylopia aethiopica*; phytochemicals; antioxidants

INTRODUCTION

Selim pod *(Xylopia aethiopica)* is a medicinal plant growing in various parts of Africa (Yin *et al.*, 2019) It is sometimes referred to as Negro pepper and Guinea pepper, and is one of the most valuable spices with numerous health benefits (Yin *et al.*, 2019). *Xylopia aethiopica* is a spice that is used in flavouring local dishes and the pods are sold as condiments. It is a medicinal plant that has been utilized traditionally in the treatment of several diseases and ailments (Yin *et al.*, 2019).

Xylopia aethiopica is a rich source of phytochemicals and possesses free radical scavenging abilities, it could, therefore, be utilized in the management of free radical-related degenerative diseases by exploiting them as natural antioxidants in food systems (Okechukwu-Ezike and Oly-Alawuba, 2020). John-Dewole *et al.* (2012) from their in vitro studies with the extracts of selim,

reported that it exhibited some anti-microbial and pharmacological properties which might be due to the presence of phytochemicals in the plant.

According to Melo *et al.* (2021), *Xylopia aethiopica* contains phenolics and essential oils which might be linked with the remarkable antioxidant, antimicrobial, and moderate anti-SARS-CoV-1 and SAR-CoV-2 activities. *Xylopia aethiopica* has been reported to have antimicrobial and free radical scavenging activity and this could be associated with the presence of polyphenols in the plant (Apenteng *et al.*, 2016). Literature is scarce on the antioxidant potential of Nigerian *Xylopia aethiopica* to the best of the authors' knowledge.

This research study was therefore conducted to evaluate the antioxidant activity of selim pod (*Xylopia aethiopica*) to determine its potential for possible application in animal nutrition.

MATERIAL AND METHODS

Sample extract preparation

Accurately 1g of the grounded selim pod was weighed into a conical flask. Then 100ml of ethanol was then added to the weighed samples. The samples were extracted using a digital 4 holes water bath (Model: E-Track England) at 70 degrees for 40 minutes, then later cooled at room temperature and transferred into a 100ml volumetric flask. The samples were filtered using a Whatman filter paper No. 1.

Assay of DPPH Free Radical Scavenging Activity

The DPPH radical scavenging activity of the selim pod extracts was examined in line with the procedure described by Mukherjee *et al.* (2011) with slight modifications. The concentration of 100 μM of DPPH was dissolved in methanol to a final concentration of 0.03mM. Serial dilutions were made to check the IC50. The values of IC50 signify the concentration of the sample, which is required to scavenge 50% of DPPH free radicals. The IC50 values were calculated by linear regression of plots. The contents were mixed and incubated for 30 minutes at 37°C. To determine the absorbance at 517 nm, a UV spectrophotometer was used. Vitamin C (ascorbic acid) was used as the standard control antioxidant. All readings were taken in triplicate and the mean values were then recorded. The decrease in absorbance indicated increased radical scavenging activity. The percentage inhibition of the samples at the different doses was calculated using the formula;

$$\% \text{ Inhibition} = \frac{Ao - As}{Ao} \times 100$$

Where Ao is the absorbance of the control and As is the absorbance of the test sample (selim pod)

RESULTS AND DISCUSSION

The results revealed that with an increase in the concentrations of the selim pod extract from 0.2 to 1.0 mg/ml, the free radical scavenging activity of *Xylopia aethiopica* extracts also increased from 16.04 to 48.17% (Figure 1)

The DPPH free radical scavenging activity of the selim pod is observed to be dose-dependent. The antioxidant activity of the extract of *Xylopia aethiopica* was examined and the results were compared to that of ascorbic acid which served as the standard. The percentage inhibition of ascorbic acid (vitamin C) the antioxidant used as standard, at the concentration of 1mg/ml was 97.05% meanwhile that of the selim pod at the same concentration the inhibition recorded was 48.17% (Figure 1).

The IC50 value recorded for *Xylopia aethiopica* was 0.94mg/ml against the IC50 value of 0.44mg/ml of ascorbic acid. However, contrary to the result obtained in this study for the IC50 for *Xylopia aethiopica*, Ngwoke *et al.* (2015) reported a lower value of 0.62.mg/ml for acetone extracted *Xylopia aethiopica* and a much lower value of 0.28mg/ml for aqueous extracted *Xylopia aethiopica*. This variation may be due to differences in the method of extraction used for the test sample while other likely factors contributing to the disparity in result may be; cultivar type, climatic and soil conditions, storage and handling, etc.

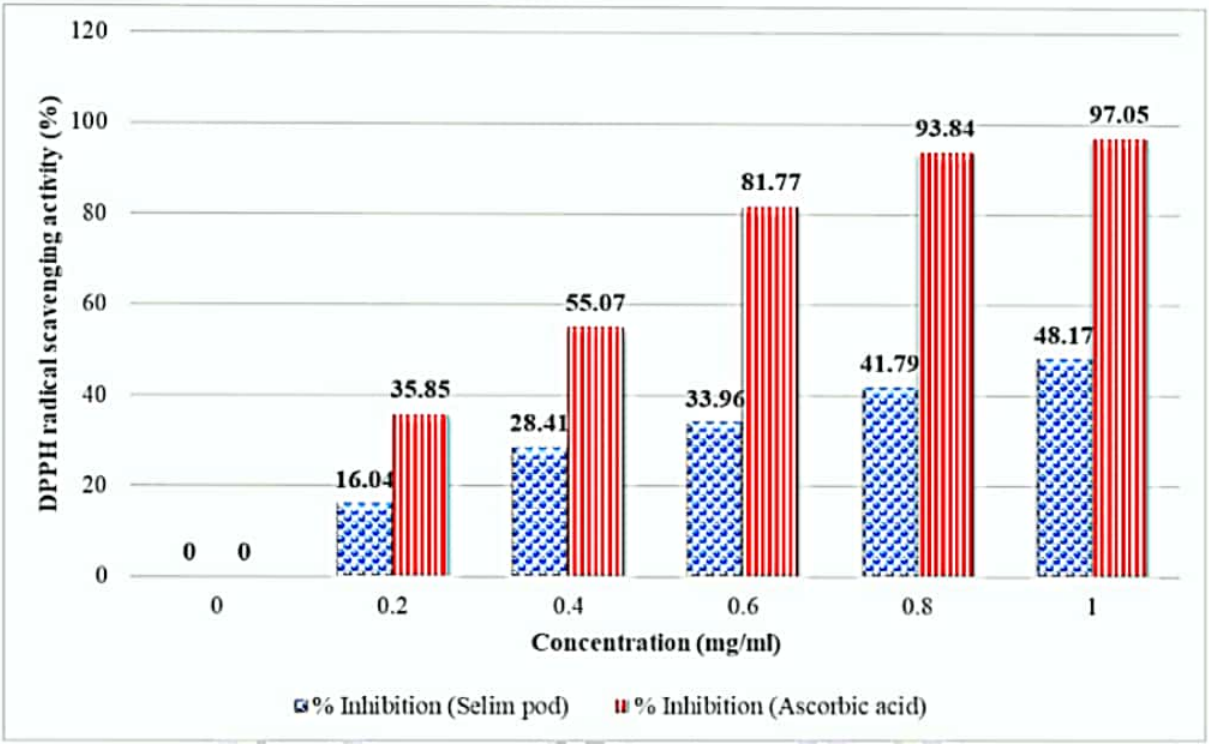

*Figure 4: Antioxidant activity of selim pod (*Xylopia aethiopica*)*

CONCLUSION

The findings of this study revealed that *Xylopia aethiopica* has antioxidant properties. Selim pod, therefore, has promising potential for use as an antioxidant agent in livestock feeds, food products, and the pharmaceutical industry.

REFERENCES

Apenteng, J. A., Ogundeyi, M., Oppong, E. E., Osei-Asare, C., & Brookman-Amissah, M. G. (2016). In vitro Anti-infective and Antioxidant activity of *Xylopia aethiopica* [Dun.] A. Rich: A comparison of the fruits and leaves extracts. *Journal of Medicinal Plants Studies*, 4, 24-29.

John-Dewole, O. O., Agunbiade, S. O., Alao, O. O., & Arojojoye, O. A. (2012). Phytochemical and antimicrobial studies of extract of the fruit of *Xylopia aethiopica* for medicinal importance. *Journal of Biotechnology and Pharmaceutical Research*, 3(6), 118-122.

Melo, C., Perdomo, R., Yerima, F., Mahoney, O., Cornejal, N., Alsaidi, S., Coron, S., Bonnaire, T., Zhang, S., Zydowsky, T.M., Priano, C., Fernández Romero, J.A., Rodolfo Juliani, H., & Koroch, A. (2021). Antioxidant, antibacterial, and anti-SARS-CoV Activity of commercial products of Xylopia (*Xylopia aethiopica*). *Journal of Medicinally Active Plants*, 10(1), 11-23.

Mukherjee, S., Pawar, N., Kulkarni, O., Nagarkar, B., Thopte, S., Bhujbal, A., & Pawar, P. (2011). Evaluation of free-radical quenching properties of standard Ayurvedic formulation Vayasthapana Rasayana. *BMC Complementary and Alternative Medicine*, 11,38.https://bmccomplementmedtherapies.biomedcentral.com/articles/10.1186/1472-6882-11-38

Ngwoke, K.G., Ikeanyi, A.U., Eze, P.M., Ezemokwe, I.C., Abba, C.C. and Ugwu, M.C. (2015). Phytochemical and Antioxidant Properties of Extracts of *Xylopia aethiopica* Fruits.

Chemical Science Review and Letters 4(13), 267-270.
Okechukwu-Ezike, N.C. and Oly-Alawuba, N. M. (2020). Assessment of the Phytochemical Contents and Antioxidant Activities of Some Herbs and Spices in South-Eastern Nigeria. *Research Journal of Food and Nutrition,* 4(3) pp. 1-5.
Yin, X., Chávez León, M.A.S.C., Osae, R., Linus, L.O., Qi, L.W., Alolga, R.N. (2019). *Xylopia aethiopica* Seeds from Two Countries in West Africa Exhibit Differences in Their Proteomes, Mineral Content and Bioactive Phytochemical Composition. *Molecules*, 23, 24(10):1979. DOI: 10.3390/molecules24101979. PMID: 31126018; PMCID: PMC6572195.