



BIOTECHNOLOGY SOCIETY OF NIGERIA (BSN)



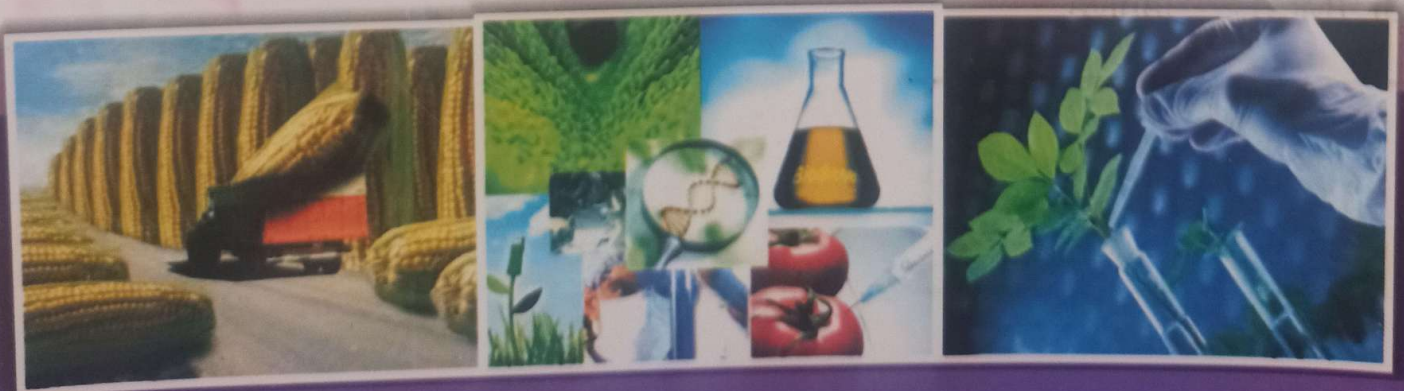
30TH ANNUAL INTERNATIONAL CONFERENCE

FEDERAL UNIVERSITY OF TECHNOLOGY
Minna, Niger State, Nigeria.

Book of **PROCEEDINGS**

Theme:

**BIOTECHNOLOGY AS A CHANGE AGENT
FOR NATIONAL DEVELOPMENT**



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30TH INTERNATIONAL ANNUAL CONFERENCE OF BIOTECHNOLOGY SOCIETY OF NIGERIA (BSN) (MINNA, NIGERIA 2017)

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YOUNG TISSUES MORE PRONE TO DNA DAMAGE BY RADIATIONS FROM GSM MAST

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ABSTRACT

The effects of electromagnetic radiations from GSM antennae on DNA of Roselle were investigated. The experiment was set-up by raising seedlings of Roselle in pots at distances to GSM antenna while control seedlings were raised in location without GSM signal. The results showed that seedlings of *H. sabdariffa* L., between the ages 2 - 8 weeks old had 91.66 % of the the sampled DNA damaged while only 8.34 % of the samples had their DNA intact. However, seedlings at 8- 24 weeks had further DNA damage on 50 % of their samples. These results proved that young tissues are more prone to DNA damages by radiations from GSM masts than older tissues. These observations corroborate those obtained from animal tissues. It thus showed the potentials of GSM radiations to be hazardous to living tissues especially the young / juveniles, hence the need to protect living tissues, especially the juveniles from such environmental hazards.

Keywords: DNA, damage, GSM antenna, young, tissues.

INTRODUCTION

Mobile telephony system has contributed immensely to the growth of economies and human development all over the world. Its positive impact have touched every sphere of human endeavours: from mere communications, education, business, information transfer etc, the life of man has improved. However, these gains have necessitated an increase in the number of telecommunication masts in our neighborhood to facilitate access to this technology.

Over the years, there have been conflicting reports on the possible effects of the emissions from GSM mast on living organisms generally. Some of these reports have been scaringly negative (Oluwajobi *et al.*, 2016; Daniel, 2017; Goldsworthy, 2016; Panagopoulos *et al.*,

2007, Haggerty, 2010; Roux *et al.*, 2008 a & b) while some are positive (Oluwajobi *et al.*, 2015;).

Damages to DNA occur every day and by a variety of factors (Clancy, 2008; Conrad, 2008). However, studies have shown that young, actively growing tissues are liable to absorb more microwave radiations than the adults or old ones, hence more prone to damages (Gandhi *et al.*, 1996; Kuster, 2009; Christ *et al.*, 2010 and LloydMorgan *et al.*, 2014). If these observations are true in juvenile animal tissues, those of plants will not be an exception.

Hibiscus sabdariffa (L), often called Roselle is a widely cultivated vegetable crop whose leaves and calyces have been used for food and medicines by man.

According to Qi *et al.*, (2005); Husain *et al.*, (2010) and Daudu *et al.*, (2016).

Roselles have been of considerable importance in industries, pharmaceuticals and in economic values. This study therefore examines the impact of radiations from GSM antennae on the DNA of *Hibiscus sabdarriffa* with emphasis on the age of the tissues sampled.

MATERIALS AND METHODS

Seedlings of *Hibiscus sabdarriffa* (L) were raised in pots from seeds. The pots were placed at distances of 100m, 200m, 300m and 400m away from GSM antennae, without any obstructions from structures. Control plants were raised in locations without GSM signals. Fresh, young leaf samples were harvested at 2 weeks, 8 weeks and at 24 weeks after sowing. The leaf samples were subjected to molecular (RAPD- PCR) analyses. Results obtained

were processed by Unweighted Pair Group Method using Average.

RESULTS

The results obtained showed that between 2 - 8 weeks (juvenile growth stage of the plant) 91.66% of the seedlings exposed to radiations from the GSM antenna got their DNA damaged, while only the remaining 8.34% of the samples had their DNA intact (Figure 1, Table 1).

At ages 8 to 24 weeks, only 50% of the exposed samples had their DNA further distorted by the radiations while the remaining 50% had no such influence (Table 1).

These results showed that as the tissue age increases, occurrence of DNA damage reduces, so, more damages was observed in juvenile seedlings than in older plant tissue.

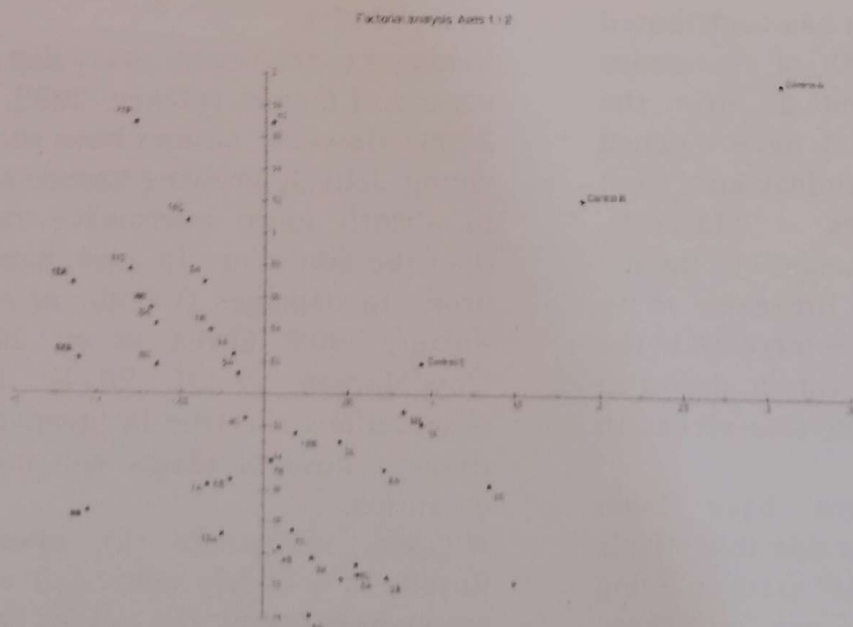


Figure 1: Factorial analyses of DNA extracts from *H. sabdarriffa* seedlings exposed to radiations from GSM antennae (curled from Oluwajobi *et al.*, 2016)

Table 1: Estimated age-dependent damages (%) on DNA of *H. sabdariffa* seedlings exposed to radiations GSM antenna

	AGES (WEEKS)	
	2 - 8	8 - 24
% DAMAGE	91.66	50.00
% INTACT	8.34	50.00

DISCUSSIONS

All organisms are made up of cells, which perform all their functions biochemically. The biomolecules are electrically charged ions and any wrong charges can lead to undesirable cellular responses. This condition made a cell to always ensure stability in its environment.

Electromagnetic fields are external stimuli recognized by cells as disturbance or stress which may or may not be deleterious. Hybrid (2003) stated that even through the intensity of emissions from base-stations is far too low to entail any heating effect, the amount of energy absorbed (which is proportional to intensity) can still be sufficient to effect subtle (confrontational) changes in molecular architecture, particularly if the frequency of the radiation matches or is close to that of an organized (collective) electrical vibrations of molecules, thus leading to alterations to biochemistry (such as enzyme activities) of any kind that could be incompatible with health.

The results obtained from this study showed that young / juvenile (2-8 weeks old) seedlings of *Hibiscus sabdariffa* had 91.66 % of the sampled DNA damaged when exposed to the radiations from GSM antenna while the seedlings at 8-24 weeks old showed only 50% of the

sampled leaf tissues had further DNA damage.

This observation should be expected because young, actively growing tissues are very tender. Wiart (2008) had reported that in humans, children are more liable to absorb microwave radiation than adults. This same view was reported by Christ *et al.*, (2010) who investigated an Age-dependent tissue specific exposure of cell phone users. Lloyd Morgan *et al.*, (2004) reported from their study that the foetus is in more danger of damage by microwave radiation exposure than children. Also, Hyland (1998) had earlier reported that the pulsed microwave radiation that characterized the GSM signals is a feature that can greatly enhance its impact on the biochemistry of the body (with pulsed signaling systems) and facilitate its discernment by the body.

In the light of the above, it is very important to keep the juveniles (animals and plant alike) away from exposure to radiation from GSM antennae. For humans, GSM masts should not be allowed in the vicinity of schools and hospitals while in Agricultures this may lead to food insecurity. Efforts should be geared towards making the radiations from GSM less hazardous while we still

continue to enjoy the benefits of GSM telephony technology.

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