

PDF - EVALUATION OF THE EFFECT OF DUMPSITE LEACHATE ON THE GROWTH, YIELD AND MITOTIC CHROMOSOME OF WATER MELON CITRULLUS LANATUS - researchcub.info ABSTRACT

Experiment was carried out in Calabar which was aimed at investigating into the direct and indirect effect of solid wastes dumpsite leachate on growth attributes, yield and yield components and cytology of Watermelon (*Citrullus lanatus*) in 2018. The leachate used for the study was obtained from the dumpsite in Calabar and made into four concentrations of 25 ml/L soil; 50 ml/L; 75 ml/L and 100 ml/L using 0 ml/L as control plot and these were used to treat 1 kg loamy soil in polybag for each plot. The seeds of water melon were sown directly in the polybags containing the treated soil. The experiment was laid out in completely randomized design (CRD) in the field and laboratory with three replications. The growth characteristic evaluated included vine length (cm), number of leaves per vine, number of branches per vine, leaf length (cm), leaf width (cm) and leaf area (cm<sup>2</sup>). Yield and yield component evaluation in the study included number of flowers per vine, number of fruits per vine, weight of fruit (kg), circumference of fruits (cm), and number of seeds per fruit. Cytological aberrations and effects studied included mitotic index, mitotic inhibition, number of clump cells, total number of aberrant cells and percentage aberration in the plant cells. The data gathered from the field and laboratory experiments were collated and subjected to statistical analysis using the ANOVA procedures and separated significant means using the Fisher's least significant difference (LSD) test at 5% probability level. The findings revealed that all the attributes evaluated for growth, yield and cytogenetics all showed an inverse relationship with increasing concentration of leachate in growth medium. The study revealed that there was absolute adverse effect of leachate on the growth, yield and cytological attributes of watermelon, *Citrullus lanatus* in Calabar. The solid wastes dumpsite leachate directly and adversely affected the vine length which ranged from 17.55 to 88.50 cm. Number of leaves per vine varies from 4 to 26, number of branches per vine was from 2 to 6, leaf length ranged from 5.22 cm to 15.97 cm, leaf width shows 2.00 cm to 10.30 cm while leaf areas varies from 62.44 cm<sup>2</sup> to 164.13 cm<sup>2</sup> all from control plot to the 100 ml/kg soil treated plot. Increasing concentration of leachate also adversely affected the number of water melon fruits per plant from 11 to 1.00, number of fruits per vine from 5 to 0, number of aborted flowers from 8.66 to 26.33, weight of fruits reduces from 4.60 to 0.00 kg, circumference of fruits reduced from 33.33 to 0.00 cm, the number of seeds per fruits decreases from 23 to 0.00 with increasing leachate in growth medium. It was also gathered from the study that solid waste dumpsite leachate contains heavy metals which are injurious to plant cells and cytological attributes like 100 % mitotic index at 100 ml/kg soil concentration of leachate, 150% mitotic inhibition, high number of clump cells, 10 aberrant cells and a 100 % cellular aberration. Consequently distorting plant cell cycle and other biochemical and physiological processes which are generally controlled by cellular functions. Hence this study is thus advocating for the proper disposal and management of solid wastes and dumpsite to prevent leachate from leaching into agricultural lands.

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## CHAPTER ONE

### INTRODUCTION

*Citrullus Lanatus* belongs to the family cucurbitaceae, a species of *Citrullus* which refers to a fruit plant of a vine – like herb (both climbers and trailer) and the most common type of melon of the members of the cucurbits family (Schippers, 2000). Its center of origin has been traced to both the Kalahari and Sahara deserts in Africa (Jairet, et al; 1996) these areas have regarded as point of diversification to other parts of the world (Schippers, 2000).

Leachate is a widely used term in the environmental sciences as a hazardous liquid that has dissolved or entrained harmful substances (heavy metals or degradable waste) from a dumpsite causing a negative impact to plant.

Water melons are available in a wide range of sizes and shapes, and are common in fruit platters or as a refreshing desert at a picnic (Thulaja, 2005).

Watermelon is one of the world's most important vegetables, as the crop is reared both for its fruit and the vegetative parts which are highly nutritious (Schippers, 2011) some works indicate that watermelon does not have a large fertilizer requirement and that of the crop on fertile land (Schippers, 2011).

Watermelon is thought to have originated from South Africa because it was found growing wild throughout the area and reaches maximum diversity. It is indigenous to tropical Africa and as all its genetic diversities present there from the sweet ones to the bitter ones and tasteless forms (Oguntala, 2006).

Watermelons are warm season annuals and less tolerant to cold than other cucurbits like cucumber and cantaloupe. According to Collins, 2007 watermelons are associated with various health benefits as stated below.

Watermelon contain vitamin B which is helpful in producing instant energy in the body.

Watermelon are such in water and as such, are helpful in preventing dehydration. Also, the low calories content of the fruits make it the best choice for diet – conscious people.

It is an excellent source of vitamin C and vitamin A, it also provide minerals such as potassium (K), magnesium (Mg), Iron (Fe), Phosphorus (P), Sodium (Na), and Zinc (Zn) (Collins, 2007).

## 1.2 Justification

This study is undertaken in order to examine the effect of Dumpsite leachate on the mitotic chromosome of watermelon (*Citrullus Lanatus*) or how leachate affects the mitotic chromosome of watermelon.

The pollution of underground water by leachate from dumpsite or sewage has tremendous impact on living organisms. For animals, it has a direct impact on health causing serious diseases associated with heavy metals from leachate in plants, the use of polluted underground water by plant through root sorption provides water and dissolves mineral for photosynthesis. However, the uptake of leachate polluted water by plants has been associated with various plant abnormalities and growth deficiency which has not been properly researched into. The leachate which contains heavy metals has been deleterious to plant cytogenetic system causing various abnormalities in plant.

It is based on this background that this research is undertaken to evaluate the effect of the leachate on watermelon.

## 1.3 Aim and Objectives

The study is aim at evaluating the effect dumpsite waste. Leachate on the mitotic chromosome of watermelon (*Citrullus Lanatus*).

Especially however, the study was designed to achieve the following objectives:

To determine the effect of different concentration of Leachate on the mitotic index of chromosome of watermelon.

To determine the effect of different concentration of leachate on the chromosome aberration.

To determine the effect of leachate on the chromosome numbers of watermelon.

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