

Morphological and Developmental Responses of Macro Cuttings of *Vernonia Amygdalina* Del. to Synthetic Growth Hormones

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ABSTRACT

The morphological and developmental responses of *Vernonia amygdalina* macro shoot cutting to plant growth hormonal solution of 6-benzyl amino purine (BAP) and naphthalene acetic acid (NAA) were investigated in the laboratory. The concentration levels of 2.5, 5.0, 7.5 and 10.0mg/l were used alongside a control treatment (0mg/l). The growth parameters examined were shoot length, root length and leaf number. The protein and carbohydrate contents of the plants were also assessed. The result of this study showed that the root length and leaf number of the species were significantly ($P=0.05$) increased with increase in the concentration of plant growth regulators. Similarly, the carbohydrate and protein contents in treatment with plant growth regulators were comparatively higher than those of the control. This study suggests that plants growth regulators can be utilized to enhance growth and development activities in *Vernonia amygdalina* Del. and that plant growth regulators such as benzyl amino purine and naphthalene acetic acid aided to maintain an appropriate shoot to root ratio and could be used to induce rooting in stem cuttings.

Keywords: *Vernonia amygdalina*, macro cuttings, benzyl amino purine and naphthalene acetic acid

INTRODUCTION

Bitter leaf (*Vernonia amygdalina*) is a green shrub with petiole leaf of about 6 mm diameter. The leaf has a characteristic odour and bitter taste. *Vernonia amygdalina* grows under a range of ecological zones in Africa being drought tolerant and produces large fodder biomass for both human and animal nutrition [4]; [3]; and [5]. *Vernonia amygdalina* plant commonly found around homes in Southern Nigeria as a green vegetable or spice especially in the popular “bitter-leaf soup” [8] also widely used for both therapeutic and nutritional purposes.

The growth regulators influence plant growth and development at very low concentrations while they inhibit at high concentrations [11]. Monthly foliar spraying of geranium (*Pelargonium graveolens*) resulted in increased plant height and herb production [13]. Spraying of datura plant, *Datura innoxia* planted in different salinity concentrations with chlormequat,

ethephon or kinetin was found to enhance plant growth, alkaloidal and soluble sugar contents of leaves and reduce the harmful effect of salinity on the plant [1]. Application of gibberellic acid, 4-chloroindole and 6-benzyl amino purine on to the standard petal and calyx of *Vicia faba* var. was found to significantly enhance pod set [15].

In view of the physiological and morphological effects of plant growth regulators on plant, this study was carried out to examine the effects of naphthalene acetic acid (NAA) and 6-benzyl amino purine (BAP) on the growth and development of *Vernonia amygdalina*.

MATERIALS AND METHODS

Plant growth regulators used for this study were sourced from a phytochemical laboratory in India. Stem cuttings of *Vernonia amygdalina* were sourced from Agricultural Development Programme, Rumuodomaya, Rivers State. Appropriate quantities of plant growth regulators Benzyl amino purine (BAP) and Naphthalene acetic acid. (NAA) were dissolved in 1000 cl distilled water. The concentration levels of 0, 2.5, 5.0, 7.5 and 10mg/l of hormonal solutions were prepared through series of dilutions. Cuttings (basal region) of *Vernonia amygdalina* were pre-soaked in hormonal solutions on each treatment 0, 2.5, 5.0, 7.5, and 10mg/l for ten minutes. The stem cuttings (3 pieces) were transferred to perforated poly bags containing 2kg of sandy loam soil. The following growth and biochemical parameters were analyzed: shoot length (cm), root length (cm), Leaf number, carbohydrate and protein content.

The shoot lengths were measured with a metre tape in centimetres from the soil surface to the plant apex. Leaf carbohydrate content were analysed by extracting 1.0g of dry leaf sample and digested with Perchloric acid and the sugar was determined colorimetrically by the Anthrone method. The protein content was analysed by weighing 1 gram of each sample and 3 grams of digestion catalyst and 20ml sulphuric acid were added. The solution put through the process of digestion which involved the heating of the sample on a regulated heat source until the sample was melted and turned green. The solution was allowed to cool and made up to 100ml with distilled water. This was titrated and weighed with the calorimeter.

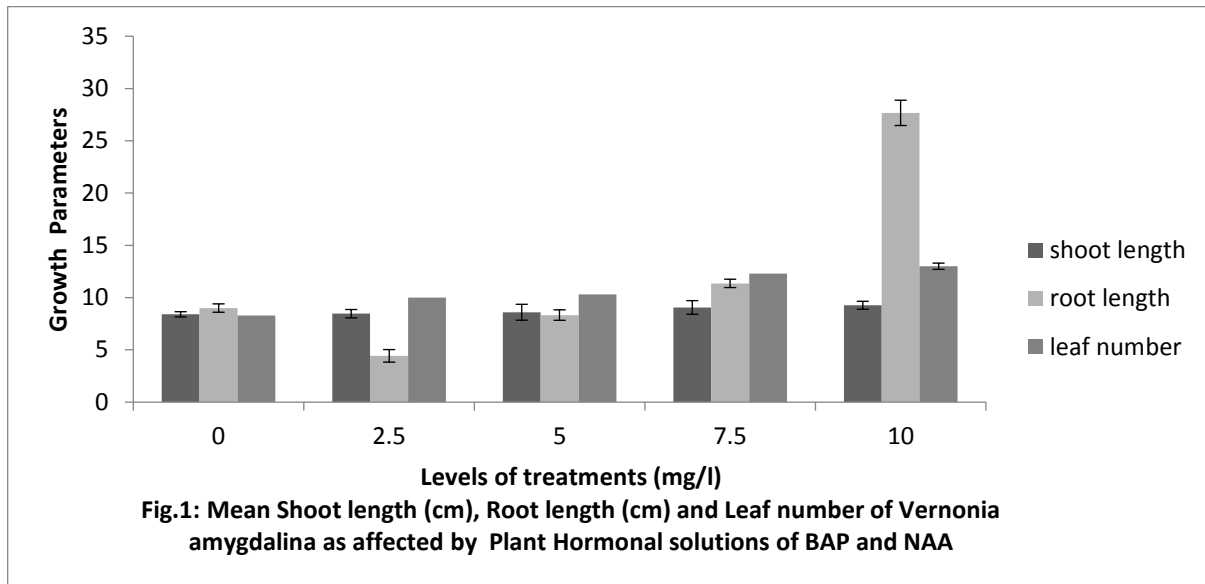
All data collected were subjected to statistical analysis such as Analysis of variance (ANOVA) and standard error means. New Duncan Multiple range test (NDMRT) was employed to separate means at 5% level of significance.

RESULTS AND DISCUSSION

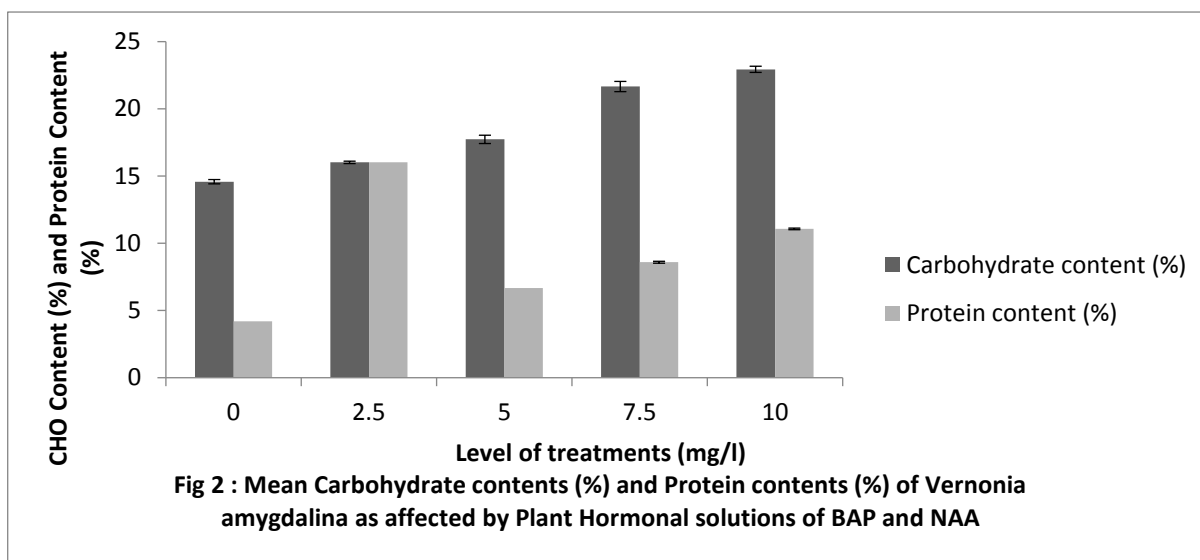
The shoot length of *Vernonia amygdalina* increased from 8.46cm at 2.5mg/l to 9.27cm at 10.0mg/l treatment. These values did not show any statistical ($P=0.05$) Significant difference. The root lengths of the plant increased from 4.43cm at 2.5mg/l to 27.66cm at 10.0mg/l treatment. These values were comparatively higher than the control (9.00cm). (Figure1).

Leaf number of *Vernonia amygdalina* increased from 10.00cm at 25.0mg/l to 13.00cm at 10.0mg/l treatment these values showed statistical ($P=0.05$) significance (Figure 1). There were marked differences in the shoot length, root length and leaf number of *Vernonia amygdalina* in treatment with stem cuttings presoaked in hormonal solutions of NAA and BAP than those in the control (without plant growth hormones). This result agrees with the work of [10] that auxins are morphogenic substances which stimulate cell division, elongation, and

differentiation, lateral root development and mediate tropic response. Similarly, this enhanced growth performance can be attributed to the positive roles played by cytokinin in stimulating cell division, morphogenesis, lateral bud formation, lateral shoot formation and nutrient movement in plant [12][13].



The carbohydrate contents of *Vernonia amygdalina* significantly ($P=0.05$) from 16.02% at 2.5mg/l to 22.94% at 10.00mg/l. These values were comparatively higher than that of the control (14.58%). (Figure 2). The protein contents of *Vernonia amygdalina* increased significantly ($P=0.05$) from 3.30% at 2.5mg/l to 11.09% at 10.00mg/l treatment. (Figure 2). The carbohydrate and protein contents of *Vernonia amygdalina* were positively affected in treatments with plant growth hormonal solutions than those in the control (without plant growth hormones). In general, plant growth hormones have been identified as substances that enhance plant growth and developmental processes [12]. Similarly, complex molecules such as carbohydrate and protein are critical substances in the physiology of plants [7].



CONCLUSION

Vernonia amygdalina is one of the important leafy vegetables mostly used in preparation of dishes by the local population. Therefore, the use of plant growth regulator to manipulate the growth and development process will increase the nutrient status as well as enhance the vegetative growth of the species for the teaming population.

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