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Research Article
Response of African Eggplant (*Solanum macrocarpon* L.) to Foliar Application of 6-benzylaminopurine and Gibberellic Acid

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Abstract

Background and Objective: Production of African eggplant falls short of market demands as a result of its slow growth. The influence of foliar application of benzylaminopurine (BAP) and gibberellic acid (GA_3) alone and in combination on quantitative and qualitative yields of *Solanum macrocarpon* L. cv. Igbagba was investigated to increase production of the vegetable. **Materials and Methods:** Treatments consisted of foliar application of 0.0, 20.0, 30.0 and 40.0 mg L^{-1} of BAP and GA_3 alone or in combination. Randomized complete block design with three replicates was used. **Results:** Foliar application of BAP or GA_3 alone increased growth, re-growth, proximate and mineral contents of eggplant. However, combination of 40 mg L^{-1} BAP and 30 mg L^{-1} GA_3 was the best as it enhanced the optimal growth, re-growth, proximate and mineral contents of the vegetable. **Conclusion:** Foliar application of BAP and GA_3 in combination was recommended for enhancement of quantitative and qualitative yields of the African eggplant.

Key words: African eggplant, foliar application, leaf vegetable, gibberellic acid, plant growth regulators, *Solanum macrocarpon*, benzyl aminopurine

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

African egg plant is an important indigenous vegetable[1,2]. It is cultivated in West Africa, Central and East Africa, Caribbean, south America and southeast Asia[1]. *Solanum macrocarpon* can grow to a height of 1-1.5 m. The shapes of the leaves are oval and lobed with a wavy margin. The vegetable is raised from seeds and transplanted in to the field when they are 4-6 weeks old at a spacing[1] of 50×50 cm. The importance of *Smacrocarpon* as a vegetable is mainly derived from its high nutritive and food values of its leaves, which make it a popular soup condiment in west Africa[1-3].

Fresh leaves and young stems of *S. macrocarpon* are widely consumed in West Africa and Central Africa. Leaves can be harvested over a number of seasons and sometimes for more than a year when not interrupted by a dry season. Medicinal properties of the vegetable are being exploited to cure many human and animal diseases in Africa and Asia. For example, in Sierra Leone, mature leaves of the vegetable are heated and chewed to ease throat pain. In Kenya, decoctions made from the roots is used to treat hookworms[1]. Furthermore, the root of *S. macrocarpon* is part of the herbal mix for curing bronchitis, body aches, asthma and speed up the process of healing wounds. During the screening of the leaf cuticular waxes from two cultivars of *S. macrocarpon*, an unusual profile with elevated sterols and low hydrocarbon contents was detected, suggesting that the plant is producing phytosterols[3]. Despite its nutritional and medicinal importance, production of the vegetable falls short of demand throughout the year[4]. This is attributed to slow growth and regeneration caused by limited axillary bud formation by the vegetable[5].

External application of plant growth regulators, to augment internally secreted ones, is a viable method of increasing yield, re-growth and quality of *S. macrocarpon*[6]. Studies have established that cytokinin-and gibberellins-driven diversion of assimilates and mineral nutrients towards shoot meristems, rather than to roots, resulted in an increase in aerial biomass in a wide number of species[7]. As a result, 6-benzylaminopurine (a cytokinin) and GA_3 (a gibberellic acid) have been externally applied to promote the growth, development and quality of crop species including vegetables. For example, exogenous benzylaminopurine supplied to pot-grown rooted-cuttings of *Epipremnum aureum* (an ornamental plant) resulted in promotion of shoot development, leaf area growth and fresh and dry weights accumulation[8]. A single foliar application of 50 ppm gibberellic acid increased plant height, number of leaves, number of fruits, fruit weight, ascorbic acid and total soluble solids of tomato[9]. Foliar application of GA_3 substantially boosted stem elongation, number of leaves per plant, number of pods per plant, number of seeds per pod, seed weight and seed yield in okra[10]. The response of *S. macrocarpon* to external application of 6-benzylaminopurine and gibberellic acid is not known. The objective of this study was to determine the influence of foliar application of BAP and GA_3 applied alone and in combination on growth, physiological parameters, proximate content and mineral composition of pot-grown *S. macrocarpon*.

MATERIALS AND METHODS

Seedling preparations and conditions of growth: The study was conducted between May, 2016 and April, 2017 at Central Greenhouse, Faculty of Agriculture, Obafemi Awolowo University, Ile-Ife, Nigeria. Plants of *Solanum macrocarpon* cv. Igbagba were raised from sterilized seeds in pot at an average temperature of 26±2°C under 65±5% relative humidity and 7-9 h of daylight. To check reproducibility of the results the study was repeated.

Treatments and experimental design: Plants were treated with foliar application of benzylaminopurine (BAP: 10, 20, 30 or 40 mg L^{-1} and gibberellic acid (GA_3; 10, 20, 30 or 40 mg L^{-}) alone and in combinations at 2 and 4 weeks after transplanting with an atomiser at sun set. The surface tension of GA_3 solution was reduced by addition of 0.5% Tween-20. Treatments were arranged in a randomized complete block design with 3 replicates. Fifteen plants were used per treatment. Data were recorded at 12 weeks after transplanting on survival, number of leaves per plant, leaf area, shoot height, fresh shoot weight and dry weights.

Measurement of photosynthetic pigments: Pigments were extracted from fresh leaves (1 g) with 80% acetone following homogenization. The homogenized mix was separated by centrifugation at 5000×g for 10 min. Absorbances of the supernatant were read at wavelengths of 645, 653, 662 and 664 nm for chlorophyll a and b and 470 nm for carotenoids, with a spectrophotometer[11]. Measurements were performed in triplicate.

Phenolic content: Total phenolics content was determined from 0.5 g of fresh leaves homogenized in 80% acetone (10 mL) following the method of Julkunen-Tiitto[12].

Soluble proteins: Total soluble proteins were determined from 0.25 g of fresh leaves dissolved in 10 mL of 50 mM potassium phosphate buffer (pH 7.8) as outlined by Bradford *et al.*[13].

Soluble sugars: Total soluble sugars was determined from 0.1 g of fresh leaves according to Yemm and Willis[14].

Determination of proximate contents: Moisture, ash, crude fat, crude fat and crude fibre were determined in accordance with the official methods of the association of official analytical chemists[15], while nitrogen was determined by the Micro-Kjeldahl method[16].

Determination of mineral element: To analyze for leaf mineral composition 5 g of dry milled samples were ashed in a furnace at 550°C for 12 h. The ash was cooled in desiccators and weighed. About 2 mL of concentrated hydrochloric acid were added to dissolve the ash, along with a few drops of nitric acid[17]. The solution was evaporated to almost dryness in a boiling water bath. The content was transferred to 100 mL volumetric flash and diluted to mark with deionized water. A PU9000 atomic adsorption spectrophotometer (Pye Unicam Ltd, Cambridge, UK) with acetylene flame was used to determine presence of phosphorus, calcium, magnesium, zinc and iron[17]. Sodium and potassium were determined with an AIM 049000 flame photometer (Aimil Ltd, New Delhi, India).

Statistical analysis: Data were subjected to one-way analysis of variance using PROC GLM in SAS (ver. 6, SAS Inc., Cary, NC). Means were separated using Duncan multiple range test at 5% level of probability.

RESULTS

Effect of external BAP and GA_3 on growth parameters: Compare with control, foliar application of either BAP or GA alone enhanced leaf production, leaf area development, shoot height, fresh shoot weight and dry shoot weight (Table 1). However, application of BAP and GA_3 in combination promoted these parameters better than either BAP or GA alone (Table 1). An outstanding result was obtained when a combination of 40 mg L^{-1} BAP and 30 mg L^{-1} GA was applied on number of leaves, leaf area and re-growth while application of 40 mg L^{-1} BAP combined with 10-40 mg L^{-1} GA_3 recorded highest fresh shoot weight and dry weight (Table 1). However, application of GA alone highly promoted shoot height (Table 1).

Effect of external BAP and GA_3 on some physiological parameters: In the same vein as growth traits, either BAP or GA_3 applied alone enhanced chlorophyll a and b, carotenoids, phenolics, soluble proteins and soluble sugars when compare with control treatment (Table 2). But combination of BAP and GA_3 promoted the physiological traits better than either BAP or GA_3 applied alone. In the case of the photosynthetic pigments (chl. a, chl. b. and carotenoids) and soluble proteins. The highest phenolics were observed when 40 mg L^{-1} BAP and 10-40 mg L^{-1} GA_3 were applied while combination of 40 mg L^{-1} BAP and 20-40 mg L^{-1} GA_3 gave the best results (Table 2).

Effect of external BAP and GA_3 on proximate content of tomato fruits: Moisture content of tomato fruits was enhanced by combine application of BAP and GA_3 (Table 3). Compare with the control, BAP did not increase fruit moisture while GA_3 slightly decreased fruit moisture. The highest quantities of crude fibre and carbohydrates were obtained from application of GA_3 alone while combination of BAP and GA_3 favoured highest synthesis of crude protein and crude fat (Table 3).

Table 1: Influence of external application of BAP and GA_3 on growth parameters of *S. macrocarpon*

BAP (mg L^{-1})	GA3 (mg L^{-1})	Number of leaves	Shoot height (cm)	Leaf area (cm^2 $plant^{-1}$)	Fresh shoot weight (g $plant^{-1}$)	Dry weight (g $plant^{-1}$)	No. of re-growth
0	0	10.5±2.3^{d}	6.5±2.2^{d}	25.8±4.9^{d}	37.2±5.6^{e}	6.4±1.8^{d}	2.3±1.8^{e}
10	0	17.5±3.6^{c}	15.1±2.7^{c}	43.0±5.2^{c}	56.8±6.7^{c}	43.4±3.5^{b}	4.4±1.5^{d}
20	0	16.7±3.2^{c}	14.5±2.7^{c}	46.4±5.2^{c}	58.6±5.7^{c}	42.3±3.5^{b}	4.5±1.5^{d}
30	0	15.7±3.1^{c}	16.4±2.3^{c}	42.6±4.8^{c}	62.9±6.1^{b}	42.3±3.4^{b}	4.8±1.4^{d}
40	0	15.0±2.8^{c}	15.2±2.1^{c}	45.4±4.3^{c}	63.8±6.0^{b}	46.2±3.8^{b}	4.7±1.4^{d}
0	10	13.0±2.4^{c}	20.5±4.2^{b}	44.3±4.2^{c}	48.5±5.1^{d}	34.5±3.7^{c}	2.8±1.5^{e}
0	20	13.7±2.9^{c}	24.5±3.8^{a}	47.2±3.8^{c}	46.0±5.2^{d}	36.0±3.2^{c}	2.7±1.2^{e}
0	30	13.0±3.6^{c}	27.6±4.1^{a}	47.8±3.8^{c}	47.6±4.3^{d}	34.0±2.6^{c}	2.8±1.3^{e}
0	40	12.0±2.5^{c}	26.2±4.1^{a}	44.6±3.6^{c}	42.8±3.8^{d}	33.0±2.8^{c}	2.8±1.2^{e}
40	10	23.7±4.5^{b}	18.5±2.9^{b}	54.0±3.9^{b}	70.8±6.2^{a}	51.3±3.5^{a}	5.7±1.2^{c}
40	20	23.5±3.8^{b}	20.9±2.3^{b}	54.0±4.3^{b}	73.4±6.2^{a}	53.5±4.8^{a}	6.7±2.3^{b}
40	30	33.5±4.8^{a}	18.4±2.1^{b}	68.4±6.7^{a}	73.7±5.8^{a}	56.6±4.3^{a}	7.5±2.3^{a}
40	40	25.7±4.2^{b}	18.9±2.2^{b}	55.5±5.8^{b}	71.8±5.6^{a}	57.3±4.5^{a}	5.4±2.1^{c}

Values are Mean±standard error. Means followed by different letters in the same column are significantly different at 5% level of probability using Duncan multiple range test

Table 2: Influence of foliar application of BAP and GA_3 alone and their combinations on physiological parameters* of *Solanum macrocarpon*

BAP (mg L^{-1})	GA_3 (mg L^{-1})	Chl.a	Chl.b	Carotenoids	Total phenolics	Total soluble sugars	Totals soluble protein
0	0	19.5±3.4^{f}	10.3±1.8^{c}	7.8±1.4^{e}	4.9±1.2^{e}	34.5±4.5^{e}	28.7±4.2^{f}
10	0	28.7±3.7^{e}	12.2±1.0^{b}	7.8±1.4^{e}	8.4±2.2^{c}	87.8±7.3^{c}	38.5±3.9^{d}
20	0	32.5±3.2^{d}	11.6±1.6^{b}	7.6±1.3^{e}	10.7±2.1^{b}	88.5±7.1^{c}	37.4±3.2^{d}
30	0	32.5±3.2^{d}	11.6±1.4^{b}	8.7±1.7^{d}	12.6±2.4^{b}	89.7±7.2^{c}	42.3±3.5^{c}
40	0	38.7±3.4^{c}	11.4±1.8^{b}	8.6±1.9^{d}	12.8±2.3^{b}	88.8±7.2^{c}	45.2±3.8^{c}
0	10	24.3±3.1^{e}	12.5±1.8^{b}	9.8±1.9^{c}	7.5±1.8^{d}	65.0±6.7^{d}	35.5±3.8^{d}
0	20	24.8±2.8^{e}	11.4±1.6^{b}	10.8±2.1^{c}	7.6±1.6^{d}	65.8±6.4^{d}	35.6±3.1^{d}
0	30	27.6±2.3^{e}	13.5±2.1^{b}	10.6±2.2^{c}	7.5±1.8^{d}	65.4±6.4^{d}	35.8±3.1^{d}
0	40	27.7±2.7^{e}	14.5±2.1^{b}	10.4±2.3^{c}	7.4±1.7^{d}	63.7±6.3^{d}	37.7±3.3^{d}
40	10	37.9±3.3^{c}	16.5±2.5^{b}	13.8±2.4^{b}	16.4±2.7^{a}	94.9±7.8^{b}	53.5±4.6^{b}
40	20	45.7±3.4^{b}	17.4±2.3^{b}	13.5±2.4^{b}	15.6±2.8^{a}	100.7±8.5^{a}	53.5±4.7^{b}
40	30	56.8±4.2^{a}	21.4±2.6^{a}	18.9±2.2^{a}	15.8±2.9^{a}	106.9±8.6^{a}	56.9±4.7^{b}
40	40	55.4±4.3^{a}	21.3±2.6^{a}	19.6±3.1^{a}	15.8±3.1^{a}	105.8±8.8^{a}	60.8±6.5^{a}

Values are Mean±standard error. Means followed by different letters in the same column are significantly different at 5% level of probability using Duncan multiple range test. Chl.a: Chlorophyll a, chl. b.: Chlorophyll b. *Measured as mg g^{-1} fresh weight

Table 3: Influence of foliar application of BAP and GA_3 on proximate content* of *Solanum macrocarpon*

BAP (mg L^{-1})	GA_3 (mg L^{-1})	Moisture	Crude protein	Crude fibre	Crude fat	Ash	Carbohydrate
0	0	76.3±8.3^{b}	4.5±1.6^{c}	1.5±0.4^{c}	0.8±0.2^{c}	1.4±0.6^{c}	5.5±1.6^{d}
10	0	78.7±7.8^{b}	4.9±1.8^{c}	1.7±0.4^{b}	2.2±0.4^{b}	1.6±0.7^{b}	10.9±2.8^{b}
20	0	78.4±7.2^{b}	5.4±1.3^{b}	1.8±0.5^{b}	2.2±0.8^{b}	1.7±0.6^{b}	10.6±2.3^{b}
30	0	78.4±7.5^{b}	5.4±1.5^{b}	1.8±0.6^{b}	2.5±0.8^{b}	1.8±0.8^{b}	10.1±3.2^{b}
40	0	78.7±7.1^{b}	5.6±1.5^{b}	1.8±0.3^{b}	2.4±0.4^{b}	2.0±0.4^{b}	9.5±1.9^{b}
0	10	64.2±6.4^{c}	4.4±1.5^{c}	2.0±0.5^{b}	0.6±0.1^{c}	1.7±0.5^{b}	27.1±3.5^{a}
0	20	64.4±6.7^{c}	4.6±1.7^{c}	2.5±0.4^{a}	0.8±0.1^{c}	1.7±0.6^{b}	25.9±4.3^{a}
0	30	65.4±5.8^{c}	4.5±1.6^{c}	2.6±0.6^{a}	0.8±0.3^{c}	1.8±0.8^{b}	24.9±5.3^{a}
0	40	65.5±5.6^{c}	5.1±1.9^{b}	2.6±0.8^{a}	0.9±0.2^{c}	1.8±0.8^{b}	24.5±5.2^{a}
40	10	82.5±5.4^{a}	5.5±1.9^{b}	1.8±0.7^{b}	2.9±0.3^{a}	2.4±0.7^{a}	4.9±1.5^{c}
40	20	83.5±5.2^{a}	5.5±1.7^{b}	1.8±0.8^{b}	2.8±0.4^{a}	2.4±0.7^{a}	4.0±1.6^{c}
40	30	83.6±6.4^{a}	6.2±1.3^{a}	1.8±0.8^{b}	2.8±0.4^{a}	2.6±0.6^{a}	3.0±1.3^{e}
40	40	84.8±6.4^{a}	6.2±1.8^{a}	1.8±0.5^{b}	2.8±0.5^{a}	2.6±0.5^{a}	1.8±0.4^{f}

Values are Means±standard error. Means followed by different letter in the same column are significantly different at 5% level of probability using Duncan multiple range test. Weight, *measured as g/100 g dry weight

Table 4: Influence of BAP and GA_3 applied alone and in combination on mineral composition* of *Solanum macrocarpon* leaves

BAP (mg L^{-1})	GA_3 (mg L^{-1})	Sodium	Potassium	Phosphorus	Magnesium	Calcium	Zinc	Iron
0	0	25.3±4.5^{e}	38.7±3.1^{c}	4.6±1.3^{d}	6.4±2.1^{f}	45.6±4.5^{c}	9.4±2.3^{d}	3.8±1.2^{d}
10	0	32.6±4.1^{c}	45.9±4.2^{a}	6.7±1.2^{c}	8.4±2.2^{e}	51.5±4.8^{b}	13.4±2.6^{c}	4.8±1.2^{c}
20	0	38.5±4.2^{c}	45.8±4.1^{a}	9.3±2.3^{c}	12.5±1.8^{d}	54.6±4.9^{b}	16.8±2.3^{b}	7.5±1.2^{b}
30	0	45.3±4.2^{b}	45.7±4.2^{a}	10.6±2.3^{b}	13.7±2.4^{d}	59.8±5.1^{b}	18.6±2.2^{b}	9.5±1.1^{b}
40	0	46.8±4.3^{b}	46.8±a4.1	14.2±3.4^{b}	21.8±2.2^{b}	58.8±4.8^{b}	17.0±2.4^{b}	9.3±1.3^{b}
0	10	26.5±2.8^{d}	40.5±3.8^{b}	5.2±1.5^{c}	6.8±1.3^{e}	53.8±4.8^{b}	12.4±2.5^{c}	4.7±1.4^{c}
0	20	29.5±2.6^{d}	41.8±3.6^{b}	7.2±2.2^{c}	8.7±1.2^{e}	57.8±5.5^{b}	13.5±2.5^{c}	4.9±0.7^{c}
0	30	33.6±2.9^{c}	42.8±3.2^{b}	10.8±2.2^{b}	12.5±3.4^{d}	56.9±5.6^{b}	11.7±2.4^{c}	5.3±0.8^{c}
0	40	34.4±2.9^{c}	43.6±3.2^{b}	14.6±2.6^{b}	17.8±2.5^{c}	59.4±5.7^{b}	12.9±2.6^{c}	5.6±1.1^{c}
40	10	36.2±3.2^{c}	47.8±4.2^{a}	14.6±3.3^{b}	19.9±2.5^{c}	58.8±5.8^{b}	20.5±2.6^{a}	13.7±2.3^{a}
40	20	45.8±4.1^{b}	46.9±4.1^{a}	18.3±2.5^{a}	24.6±3.4^{b}	63.5±5.8^{a}	21.5±2.7^{a}	12.6±2.4^{a}
40	30	50.9±4.8^{a}	43.8±4.2^{b}	18.9±2.6^{a}	23.9±3.2^{b}	68.9±5.3^{a}	22.6±2.8^{a}	14.9±3.1^{a}
40	40	50.8±4.6^{a}	41.8±3.8^{b}	18.3±2.5^{a}	28.6±3.1^{a}	69.4±5.7^{a}	22.4±2.6^{a}	14.8±2.8^{a}

Values are Mean±standard error. Means followed by different letter in the same column are significantly different at 5% level of probability using Duncan multiple range test. *Measured as mg/100 g dry weight

Effect of external BAP and GA_3 on leaf mineral contents: Comparison with the control treatment showed that either BAP or GA_3 alone increased leaf mineral composition (Table 4). However, combined application of BAP and GA_3 increased mineral content better than application of either of the growth regulators (Table 4). Foliar application of 40 mg L^{-1} BAP and 20-40 mg L^{-1} GA_3 gave the highest content of leaf Na, P, Ca, Zn and Fe while combination of 40 mg L^{-1} BAP and 10 mg L^{-1} GA_3 had highest leaf potassium and Mg (Table 4).

DISCUSSION

In this study, foliar application of either BA or GA alone and in combinations increased the growth and re-growth of African eggplant. These results agreed with previous reports that justified the use of the two growth regulators in enhancing vegetable and crop production. For example, reports have shown that a single 50 mg L^{-1} spray of BAP spray of some leaf vegetables during the first days after emergence increased total leaf area, fresh weight and dry weights of lettuce, celery and spinach[18,19]. Similarly, exogenous application of GA_3 improved vegetative and reproductive phases of growth of tomato, okra and cabbage[5,10,20,21]. The enhanced growth by exogenous BAP has been traced to stimulation of rapid cell division, differentiation and enlargement of meristematic cells by BAP which resulted in early formation of shoot buds and shoot proliferation[20,21]. Also, it has been established that gibberellic acids stimulate cell elongation and expansion and stem and inter-node elongation during plant growth and development[5,10,22,23]. In the current study, outstanding growth response was observed from combination of BAP and GA_3 as foliar spray. It was possible that combination of BAP and GA_3 as foliar spray resulted in massive cell division, differentiation and shoot bud growth. Also, high contents of chlorophylls a and b and carotenoids could responsible for high number of leaves, leaf area, fresh shoot weight, dry weight, total phenolics, soluble sugars and proteins when BAP and GA_3 were applied in combination. This is because chlorophylls a and b and carotenoids are photosynthesis pigments responsible for light harvesting for assimilate production that is used for development of leaves, leaf area, fresh shoot weight and dry weight and synthesis of phenolics, soluble sugars and proteins.

In this study, foliar application of BAP na GA promoted synthesis of chlorophyll a and b, carotenoids, phenolics, soluble proteins and soluble sugars. The results agree with findings of Pal *et al.*[20], who observed an increase in quantity of chlorophylls from foliar sprays of GA_3 alone or in combination of K in cucumber. Furthermore, high rate of growth from large number of leaves, shoot height, leaf area, fresh shoot weight and dry weight of BAP and GA_3-treated plants could have made adequate assimilates and mineral elements available for biosynthesis of chlorophylls and carotenoids. In addition, enhanced nitrogen metabolism could be responsible for soluble proteins in GA_3-treated plants detected in this study as exogenous GA_3 at grain filling significantly increases glutamine synthetase, soluble proteins, free amino acids, endogenous GA_3 and nitrogen metabolism in wheat[24,25]. Recently, data were presented to establish improvement in total soluble sugars and antioxidant activity (including phenolics) in cucumber following foliar spray of GA_3 alone or with K[20].

In this study, foliar application of BAP and GA_3 favoured high leaf mineral content. Higher content of mineral elements in BAP or GA_3-treated plants compared with untreated plants could be due to their fast growth rate which promoted rapid acquisition of the essential mineral elements for growth from the soil to support various plant's metabolism. Foliar application of GA_3 alone and in combination with K improves leaf N and P by 30% in cucumber[20]. Also, Saddon and Al-Zubaidy[21] reported improvement in N, P, K content of maize grain after foliar application of GA_3. Exogenous BAP has been reported to stimulate mobilization of photo assimilates, mineral nutrients and increase chloroplast activity[7,26].

CONCLUSION

Foliar application of BAP and GA_3 alone and in combinations enhanced growth, physiological activities, proximate and mineral element contents of *S. macrocarpon*. To boost the quantitative and qualitative yields of the vegetable, results suggested combine foliar application of 40 mg L^{-1} BAP and 30 mg L^{-1} GA_3 twice after seedling transplanting.

SIGNIFICANCE STATEMENT

The study discovered that external application of the two growth regulators alone and in combination increased leaf yield of the vegetable via enhancement of physiological and biochemical activities. The foliar application of 40 mg L^{-1} BAP and 30 mg L^{-1} GA_3 enhanced growth, re-growth, physiology and leaf mineral content that can be beneficial for improving the quantity and quality of leaf yield of the African eggplant. This study will help researchers to uncover the critical areas of boosting vegetable production that many researchers were not able to explore. Thus a new theory on increasing vegetable production may be arrived at with the use of growth regulators.

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