

Research

Application of combined GA₃ and NAA treatments to improve yield and quality of Okra (*Abelmoschus esculentus* L.)

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Abstract

In Bangladesh, okra is an important popular summer vegetable. However, traditional farming practices often lead to suboptimal yields. Thus, the study was designed to determine the ideal GA₃ and NAA doses for accelerating okra growth, yield, and quality characteristics. A three-replication, randomized complete block design was adopted. Foliar sprays with three concentrations of GA₃ (0 ppm, 150 ppm, and 250 ppm) and NAA (0 ppm, 150 ppm, and 250 ppm) were applied in 2022 and 2023. In comparison to the control, the combined application of GA₃ @ 150 ppm and NAA @ 150 ppm improved plant height, leaf number, leaf area, branch number, internode length, bud number, pod number, pod length, pod diameter, and 1000 seed weight average over the two years. Furthermore, GA₃ @ 150 ppm with NAA 150 ppm increased yield by 35.08% and 27.01% in 2022 and 2023 respectively, above the control. Combining NAA @ 150 ppm with GA₃ resulted in higher levels of vitamin C, TSS, magnesium, and zinc by 19.31%, 81.2%, 22.73% and 21.43% in 2022 and 22.83%, 50.57%, 18.07%, 33.33% in 2023 respectively, compared to the control. In contrast, GA₃ and NAA decreased potassium and calcium in both year when compared to the control. Overall, the results of this experiment indicated that using GA₃ @ 150 ppm with NAA @ 150 ppm could enhance okra growth, yield, and quality. These findings provide insightful information for improving okra cultivation techniques and improving Bangladesh's productivity in agriculture and food security.

Keywords Okra · Plant growth regulators · Vitamin C · Minerals · Yield

1 Introduction

An important summer vegetables named Okra (*Abelmoschus esculentus* L.) belongs to the Malvaceae family that is grown all over Bangladesh. According to the USDA [1], okra pods are highly healthy and nutritious since they include P, K, Zn, Cu, Ca, Mg, and Mn, dietary fiber, protein as well as reasonable amounts of vitamins including ascorbic acid, thiamine, riboflavin, and niacin. 100 g of fresh fruit includes 89.6% water, 90 mg calcium, 103 mg potassium, 56 mg phosphorus, 43 mg magnesium, and 18 mg vitamin C [2]. Vegetables are highly produced in winter, but the availability decreases with the start of summer [3]. So, cultivating okra can largely compensate the shortage of vegetables during summer. The total okra production was about 85,000 metric tons [4], which is much lower than any other developed country [5]. Farmers in Bangladesh usually follow traditional practices, and they don't have standard production techniques. As a result, they don't get satisfactory yields. Plant growth regulators (PGR) may be help to enhance fruit and vegetable yields while reducing those obstacles [6]. PGRs are crucial appliances for modifying and regulating various development as well

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