InnoVationInfo

Sch J Appl Sci Res 2018

Volume 1: 4

Scholar Journal of Applied Sciences and Research

Effect of IBA and 2, 4-D on Morphology and Biochemical Characteristics of Radish (*Raphanus sativus*)

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Abstract

A study was carried out to investigate the effect of plant growth regulators (PGR) on certain morphological and biochemical parameters of *Raphanus sativus.* The plant growth regulator (IBA and 2,4-D) were applied individually in following concentrations IBA (2 ppm and 4 ppm) and 2,4-D (2 ppm and 4ppm). Experimental design was randomized complete block design with 3 replications. Maximum root length was observed in 2, 4-D application with both concentrations (2ppm, 4ppm). TSS was maximum in control and 2 ppm of 2, 4-D and these two are at par with each other. Maximum acidity was observed by the application of IBA @ 2 and 4 ppm concentrations. However less acidity was observed in control as compared to others. The recorded data was statistically analyzed using Statistics software at 5% probability level under RCBD. Least Significant Difference (LSD) test was applied for comparing the differences among treatment means.

Introduction

Radish (*Raphanus sativus* L), which originated from Europe or Asia, is presently cultivated all over the world. Long and red/spring radishes that are mainly used for salad and decorative purposes have high demand for hotel industry. In addition, radish is used for pickling and other processing industries. Radish is widely cultivated in the districts of Faisalabad, Lahore, Sahiwal, Bahawalpur and Jhang etc. radish is a cool season vegetable that can produce many crops each season due to its rapid days to maturity. Radishes can be planted in both spring and fall but the growing should be suspended in the warmer months. Plant growth regulators are the chemical which enhance the plant growth when applied in very minute quantity [1]. Several reports on regulatory effects of growth regulators on plant growth and development show that some of them can be used to enhance crop yield [2-4]. The role of endogenous gibberellins in the regulation of stem elongation and flower formation in radish has not been studied, although Murakami [5] was unable to detect gibberellin-like activity in mature dry seeds of a Japanese radish cultivar. The cytotoxic and mutagenic effects of 2,4-D synthetic auxin were observed both in animals (on hamster fibroblasts, for example) and in root apical meristems [5]. Many investigations showed that pre- sowing treatment of growth regulators could lead to increase in tissue hydration, redistribution of nutrient reserves, higher respiratory activities and enhancement of seedling growth, dry matter production, early flowering and yield [6-8].

Article Information

Article Type: : Research
Article Number: SJASR 137
Received Date: 18 May, 2018
Accepted Date: 27 June, 2018
Published Date: 05 July, 2018

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Citation: Ashraf MI, Sajad S, Iqbal R, (2018) Effect of IBA and 2, 4-D on Morphology and Biochemical Characteristics of Radish (*Raphanus sativus*). Sch J Appl Sci Res. Vol: 1, Issu: 4 (25 - 27).

Material and Method

The field experiment was carried out at vegetable area, Institute of Horticultural Sciences, UAF, to study the effect of foliar application of different concentration of Indole-3-Butyric acid and 2,4- D on morphological and biochemical parameters of *Raphanus sativus.* Seeds of *Raphanus sativus* cultivar "Laal moli" were sown on 1st November 2013. Sowing was done on ridges of 2.5 ft wide and plant to plant distance was maintained 6 inches. This experiment includes four treatments with one control. Foliar application of 2,4-D (2&4 ppm) and IBA (2&4 ppm) were done at 2 leaf stage of radish. Experimental design was randomized complete block design with 3 replications. Morphological data was collected after one-week interval (leaf length, leaf width, plant height, number of leaves). After 70 days from sowing, crop was harvested and remaining morphological parameters were recorded as plant height, number of leaves per plant, leaf length and width, fresh and dry weight of root, root length, root width. Biochemical parameters that were recorded include TSS, Vitamin C, and titratable acidity. The recorded data was analyzed statistically using Statistics software at 5% probability level under RCBD. Least Significant Difference (LSD) test was applied for comparing the differences among treatment means [9].

Results and Discussion

Two concentrations (2ppm, 4ppm) of IBA and Two concentrations (2ppm, 4ppm) of 2,4-D were used to observe their effects on various morphological and biochemical parameters. In case of Height, 2,4-D at 2 ppm ppm shows maximum height and its results were at par with other applications of 2,4-D and IBA including control. However, less height was shown by 2 ppm IBA. Maximum number of leaves was observed in control and significantly different from all other applications. IBA 2 ppm shows minimum number of leaves whereas 2,4-D at 2 ppm and at 4 ppm shows non-significant results with each other. It means 2, 4- D concentrations did not affect the number of leaves. Leaf length in control was significantly higher from others while leaf width was maximum in 2ppm of 2,4-D. 2,4-D at 2ppm and at 4 ppm shows results at par with each other but significantly different from all other treatments. Maximum root length was observed in 2,4- D application with both concentrations (2ppm, 4ppm). In root width 2ppm of 2,4-D and 4 ppm of IBA as well as 2,4-D shows non-significant results among each other's. Root width was reduced in control. All treatments including control shows non-significant results with each other in dry weight. In biochemical parameters, maximum Tss was observed in control and 2 ppm of 2,4-D and these two are at par with each other. Control shows significantly higher value of vitamin C and minimum value were observed in 2 ppm of 2,4-D. in case of acidity four applications of 2,4-D, IBA and control shows significant difference with each other. Maximum acidity was observed by the application of IBA @ 2and 4 ppm concentrations. However less acidity was observed in control as compared to others (Figure 1 and Table 1).

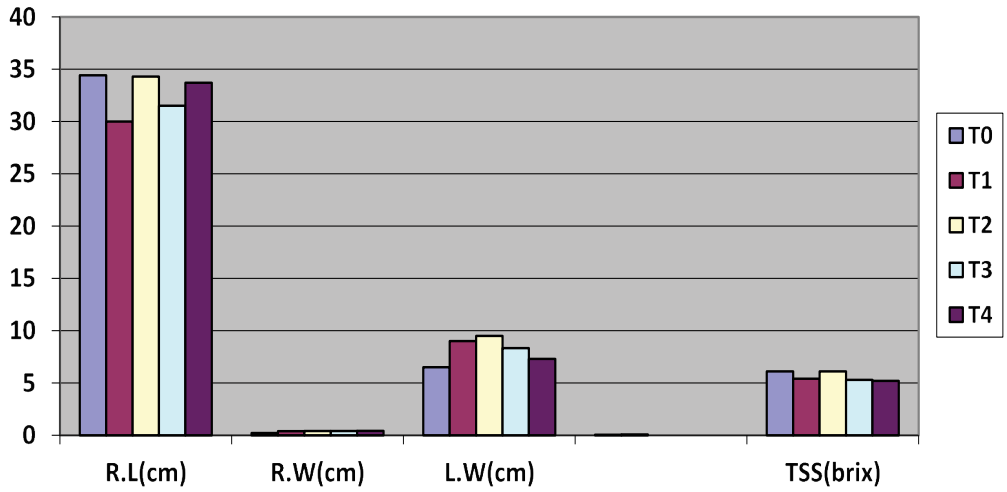

Figure 1: Experimental analysis of biochemical parameters.

Table 1: Experimental Factor for plant growth regulator.

T	Height (cm)	N.L	L.W (cm)	L.L (cm)	R.L (cm)	R.W (cm)	F.Wt (g)	Dry Wt.	TSS brix	Vit. C	Acidity
T1	19a	18d	9ab	26.6d	30d	0.39a	212.7a	23.4a	5.4b	52c	0.077a
T2	22a	25b	9.5a	27.8b	34.3a	0.4a	192.2a	21.3a	6.1a	43d	0.07b
T3	21ab	22c	8.33b	27.23c	31.5c	0.4a	203.2a	21.7a	5.3b	52c	0.077a
T4	20ab	25b	7.3c	26.7d	33.7ab	0.42a	225a	24.3a	5.2b	67b	0.064c

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