

INFLUENCE OF FOLIAR SPRAY BY GA₃ AND IAA ON THE GROWTH ATTRIBUTES OF *ANDROGRAPHIS PANICULATA* (L.)

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An experiment was conducted to study the effect of GA₃ and IAA as foliar spray to a medicinal plant, *Andrographis paniculata* (L.). The vegetative characters such as shoot length, root length, number of leaves, number of branches, number of roots, fresh weight and dry weight were studied. All the growth attributes were sufficiently improved due to gibberellic acid spray.

Keywords : *Andrographis paniculata*; Foliar spray; Growth; GA₃; IAA.

Introduction

The growth of the plant is very much regulated by certain chemical substances which are synthesized by the plant in very small quantities, which produce specific effects on growth and development. These chemical substances are commonly known as plant hormones, while the synthetic ones are called growth regulators. The growth and development of the plant body is the sum total of different growth regulators.

A study was conducted to find out the influence of foliar spray using growth regulators such as GA₃ and IAA on the growth attributes of *Andrographis paniculata* (L.). This plant belongs to the family Acanthaceae. It is an important medicinal plant which is found throughout the country.

Material and Methods

The seeds of *Andrographis paniculata*, soaked in ordinary tap water were germinated in plastic trays filled with potting mixture. The sample consisted of 200 seeds. The tray was watered twice a day. Thirty days after sowing (DAS) the seedlings were uprooted and transplanted into polythene bags containing potting mixture (Red soil : Sand : FYM @ 2:1:1). Three replications were maintained for each treatment. The experiment was set up in completely randomised design.

The plants were given foliar spray with 50, 100 and 150 ppm of IAA and GA₃ on 10th day after transplantation (40 DAS), 30 days after transplantation (60 DAS) and

45 days after transplantation (75 DAS). The treatment details were :

T₁ - Tap water; T₂ - 50 ppm of Indole - 3 acetic acid; T₃ - 100 ppm of Indole - 3 acetic acid; T₄ - 150 ppm of Indole - 3 acetic acid; T₅ - 50 ppm of Gibberellic acid; T₆ - 100 ppm of Gibberellic acid; T₇ - 150 ppm of Gibberellic acid.

The following biometric parameters were observed on 60, 75 and 90 days after sowing.

1. Shoot length of plant (cm);
2. Root length of plant (cm);
3. Number of leaves;
4. Number of branches;
5. Number of roots;
6. Fresh weight of the plant (g);
7. Dry weight of the plant (g).

The length from the collar to the tip of the shoot was measured and expressed in cm as shoot length. The length from the collars to the tip of primary root was measured and expressed in cm as root length.

The number of leaves was counted and expressed as whole number. The number of branches was counted and expressed as whole number. The number of roots was counted and expressed as whole number.

Seedlings were washed with water to remove the adhering soil particles from the root and surface dried. Then fresh weight was taken in a top pan balance and expressed in g. The same seedlings used for fresh weight were dried in an oven maintained at 60°C for 24 hours. Then, dry weight was taken and expressed in g.

Table 1. Effect of GA₃ and IAA foliar spray on growth parameters of *Andrographis paniculata*.

Treatment	Shoot length of plant (cm)			Root length of plant (cm)			Number of leaves			Number of primary branches			Number of secondary root			Fresh weight of plant (g)			Dry weight of plant (g)		
	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
Control	33.33	39.67	49.83	16.67	20.00	22.83	33.33	42.00	64.33	7.83	11.67	12.83	8.50	8.17	12.83	6.63	7.37	11.28	1.03	1.28	1.43
IAA-50 ppm	36.67	41.67	53.83	20.00	22.50	25.00	34.67	43.00	69.00	8.00	11.33	15.00	8.83	9.83	15.00	7.13	8.45	12.73	1.21	1.42	1.83
IAA-100 ppm	36.83	40.50	55.50	18.83	22.00	24.50	37.6	45.00	71.33	11.33	12.33	15.50	8.67	9.67	15.33	7.32	8.65	13.13	1.23	1.44	1.87
IAA-150 ppm	40.67	46.67	58.83	20.33	23.50	25.83	38.33	50.33	74.67	9.67	15.00	15.83	10.50	14.33	15.50	8.30	9.53	14.33	1.45	1.64	2.13
GA ₃ -50 ppm	40.00	45.50	59.17	19.17	22.67	26.00	39.67	53.00	76.33	11.67	18.00	16.00	8.83	13.17	16.00	8.55	9.75	15.27	1.45	1.70	2.49
GA ₃ -100 ppm	45.00	50.83	63.50	23.00	24.33	27.00	45.67	55.67	83.67	13.67	16.00	16.33	12.17	14.83	16.50	9.62	11.42	16.00	1.61	1.75	2.59
GA ₃ -150 ppm	44.16	48.50	64.67	21.50	24.06	24.67	65.33	56.83	83.63	16.00	17.33	18.00	12.67	15.67	17.00	9.68	11.82	16.70	1.63	1.78	2.71
SEd	1.09	1.18	1.05	0.86	0.85	0.92	1.45	1.41	1.29	0.96	1.07	0.86	0.86	0.86	0.84	0.09	0.13	0.17	0.16	0.02	0.05
CD (P=0.05)	2.22	2.40	2.13	1.75	1.72	1.86	2.95	2.87	2.61	1.94	2.16	1.75	1.75	1.74	1.69	0.18	0.27	0.35	0.03	0.04	0.11

a = 60 DAS after first spray taken on 40 DAS.

b = 75 DAS after second spray taken on 60 DAS.

c = 90 DAS after third spray taken on 75 DAS.

Statistical Analysis

The data obtained for the various growth observations were subjected to statistical analysis¹ and based on the results, inferences were drawn. Whenever the treatment differences were significant, critical differences were worked out at five per cent level.

Results and Discussion

Effects of foliar spray by IAA and GA₃ analysed on 60, 75 and 90 DAS are given in Table 1.

Shoot length : A significant increase in shoot length on 60 and 75 DAS were 45.0 cm and 50.83 cm due to GA₃ at 100 ppm. On 90 DAS GA₃ at 150 ppm recorded the highest shoot length (64.67 cm). It was least in control on 60, 75 and 90 DAS (33.33 cm, 39.67 cm and 49.83 cm). Similar increase is reported by Kamaraj *et al.*² in sunflower.

Root length : GA₃ @ 100 ppm treatment recorded longest root of *Andrographis paniculata* on 60 DAS (23.0 cm), 75 DAS (24.33 cm) and 90 DAS (27.00 cm) when compared to control (16.67 cm, 20.00 cm and 22.83 cm). This is in agreement with Singh *et al.*³ who reported an increase in root length of *Allium sepa* due to GA₃ application.

Number of leaves : The number of leaves were increased due to GA₃ treatment at 150 ppm on 60 DAS (65.33) and 75 DAS (56.83). GA₃ treatment at 100 ppm and 150 ppm resulted in highest number of leaves on 90 DAS (83.67 and 83.63 respectively). Control showed lowest number of leaves (33.33, 42.00 and 64.33) on 60, 75 and 90 DAS. Similar increase in number of leaves of *Allium sepa* is documented by Singh *et al.*³.

Number of branches : Maximum number of branches were recorded in GA₃ @ 150 ppm on 60 DAS (16.00) and 90 DAS (18.00). On 75 DAS (18.00) it was maximum in GA₃ @ 50 ppm treatment. The untreated plants showed least number of branches on 60 and

90 DAS (7.83 and 12.83 respectively). Similar observations are reported by Papanna *et al.*⁴ in sapota.

Number of roots : More number of roots were recorded in GA₃ @ 150 ppm on 60 DAS (12.67), 75 DAS (15.67) and 90 DAS (17.00) compared to control (8.50, 8.17 and 12.83). Gulnaz *et al.*⁵ also reported similar findings.

Fresh weight of the plant : GA₃ @ 150 ppm treatment recorded highest fresh weight of plants on 60 DAS (9.68 g), 75 DAS (11.82 g) and 90 DAS (16.70 g) compared to untreated plants (6.63 g, 7.37 g and 11.28g respectively).

Dry weight of the plant : GA₃ @ 150 ppm recorded highest dry weight on 60, 75 and 90 DAS (1.63 g, 1.78 g and 2.71 g) compared to control (1.10 g, 1.28 g and 1.43 g). A similar increase in fresh weight and dry weight were reported by Ghosh *et al.*⁶ in *Quercus serrata* with IAA and GA₃ treatments.

Growth regulators have attracted much attention in the recent years. The application of growth regulators has been extensively used for enhancing the growth and development of seedlings under nursery condition because of their major role in enhancing shoot and root growth and internal differentiation including the cambial activity, xylem differentiation and annual ring formation. Growth regulators can be utilized for enhancing the vegetative growth of plants.

References

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