J. Phytol. Res. 7 (1) : 65-68, 1994

INFLUENCE OF GROWTH REGULATORS ON BIOMASS AND BIOCRUDE YIELD OF *EUPHORBIA ANTISYPHILITICA*

SHOBHA JOHARI AND ASHWANI KUMAR
Department of Botany, University of Rajasthan, Jaipur - 302 004, India.

Present study was aimed to increase latex yield in *Euphorbia antisyphilitica. It was observed that,* GA_3 promoted overall growth and biomass yield of the plant, while auxins (NAA and IAA) promoted hexane extractables. Sugars were best in NAA and chlorophylls were maximum in IAA followed by NAA.

Keywords: Biomass; *Euphorbia antisyphilitica;* Growth regulators; Latex.

Introduction

Growth regulators are commonly employed for rooting in the plants, vegetative propagation and for increasing the overall yield of the plant[1,2]. Increased biomass and hexane extractables were noted in Eup*horbia lathyris* with the application of IAA and NAA, respectively[3]. Such studies, however, are lacking on E.*antisyphilitica,* hence, present study has been made with an object to study the influence of exogenous growth regulators on biomass and biocrude yield in *E.antisyphilitica.*

Material and Methods

Growth regulators taken for present study included - IAA, NAA, CCC, GA_3 and 2,4,5-T. A 60 µm aqueous solution of all these growth regulators was prepared separately. A drop of Triton was added to each solution before spraying it on the plant to improve its retention on plant surface.

A glass sprayer was employed to spray ca 10.0 ml of growth regulator on each plant, of uniform size and age , in such a way that the entire plant became wet. Control plants were sprayed with equal amount of distilled water. Ten replicates were taken for each set of experiment. Plants were sprayed at fortnightly intervals upto a period of six months, i.e. total twelve sprays were given. Plants were harvested after fifteen days of last spray. They were cut into above-ground and underground parts and their lenght, fresh and dry weights were determined. Chlorophyll, sugar and hexane extractables were also estimated.

Results and Discussion

Maximum plant height of above ground parts was observed in GA_3 followed by CCC, NAA, 2,4,5-T and IAA. The root length was promoted generally to the same extent in 2,4,5-T, CCC, and GA_3 (Table 1). IAA and NAA exhibited poor growth (length) of underground parts. Spray of different growth regulators resulted in enhanced fresh and dry weight production in both aboveground and underground plant parts. GA3 favoured maximum production of aboveground biomass and underground percent dry weight (Table 1). NAA, 2,4,5-T, CCC and IAA favoured the increase in

fresh weight over the control. GA_3 promoted maximum growth but did not induce maximum biocrude production which was at the highest level in the plants treated with NAA and IAA. CCC and 2,4,5-T favoured biocrude production to same extent as compared to other growth regulators. The sugars were maximum in NAA treated plants followed by IAA, however, maximum chlorophyll contents were observed in IAA followed by NAA, GA_3, CCC and 2,4,5-T.

Hexane extractables increased in *E.antisyphilitica* plants treated with IAA and NAA. The auxins, especially 2,4-D were found to influence strongly the carbohydrate content in *Hevea* latex[4,5]. A rise in sucrose level of latex was recorded in auxin treated plants. Increase in invertase activity in the treated plants might be responsible for enhanced sucrose utilization in latex serum. And carbohydrates are presumed to be the main source of carbon for hydrocarbon and rubber formation. Thus, the influence of auxin on hydrocarbon formation may be indirect, through increasing invertase, to increase carbohydrate contents of latex, which in turn affect hydrocarbon and rubber formation.

Gibberellins supported maximum aboveground plant height and fresh weight (Table 1). Gibberellin treatment is reported to increase the fresh and dry weight of *Physalis peruviana* L. and *P. angulata* L[6]. The effect of GA_3 might be due to its direct action on cell permeability, extension and cell division, or mediated through ethylene production. GA_3 and IAA oppose the inhibitory action of ethylene when they act as a promoter. Hence, the effect may be direct or mediated through enhancement of auxin level and regulation of ethylene action. It has been suggested that the higher concentrations of gibberellins counter-act the effect of abscisic acid which causes growth inhibition. One important feature of regulatory system of hormones is that during the development of many tissues and organs of the plant, the content of physiologically active, i.e.free form of these hormones changes. Probably an interaction between endogenous and exogenous levels of hormones might also play an important role in growth of the plant.

Underground length and biomass were seen to increase with the treatment of CCC. Growth retarding as well as stimulatory effects of CCC have been reported on *Antirrhinum majus* L[7] and mustard[8].

It was concluded that the application of growth regulators on *E.antisyphilitica* is beneficial to obtain raw material, i.e., hydrocarbons from latex, and to utilise it at commercial scale.

Acknowledgement

Financial assistance from the Department of Non-Conventional Energy Sources is gratefully acknowledged.

Table 1.: Effect of different growth regulators on plant growth, hexane extractables, sugars and chlorophyll contents of *E.tuntisyphilitica*

Growth	Length(cm)		Fresh Wt.(g)		Dry Wt.(g)		Dry Wt.(%)		HE	Sugars	Chlorophylls		(mg/g)
regulator	AG	UG	AG	UG	AG	UG	AG	UG	(%)	(mg/g)	a	b	Total
Con.	37.21	45.07	41.26	13,91	4.16	2.23	10.08	16.03	7.20	53.0	0.373	0.135	0.508
2,4,5-T	45.45	58.24	65.77	21.85	7.90	4.14	12.01	18.95	9.12	45.5	0.263	0.232	0.495
CCC	47.31	58.6	60.03	21.92	5.78	3.80	9.63	17.34	9.45	60.0	0.495	0.242	0.737
NAA	46.85	41.24	68.14	22.30	6.84	4.01	10.04	17.98	10.50	201.0	0.557	0.209	0.766
IAA	44.0	49.10	55.95	21.90	5.86	4.46	10.47	20.37	10.55	161.0	0.519	0.365	0.884
GA3	63.6	58.20	75.22	21.70	9.28	5.15	12.34	23.73	9.87	61.0	0.498	0.252	0.750
SEm	±3.79	±6.80	±5.11	±2.15	±1.41	NS							
CD at 5%	7.91	14.19	10.66	4.49	2.95								
CD at 1%	10.79	19.36	NS	6.12	4.02								

NS = Non Significant; AG = Above ground; UG = Underground

References

1. Holm R E and Abeles F B 1968, *Planta* **78** 293
2. Puri S, Bhardwaj S D and Srivastava L J 1982, In : *Symp. Proc. Improve. Forest Biomass*, (Ed.) P.K.Khosla p. 255, ISTS, Solan.
3. Garg J and Kumar A 1987, In : Prog.Photosynth. Res., *Proc. Int. Congr. Photosynth.* Vol. 4 (Ed.) J. Eiggins. p.403. Nijhoff : Dordrecht, Netherlands.
4. Wort D J 1964, In : The *Physiology and Biochemistry of Herbicides* (Ed.) L.J. Audus, p.291. Academic Press, London.
5. Tupy J 1969, *Planta* **88** 144
6. Raghava R P and Murty Y S 1988, *J.Indian Bot. Soc.* **67** 322
7. Wunsche U 1969, *Planta* **85** 108
8. Saran B and Mehta A S 1985, *Geobios* **12** 24