Effect of some Oxa-aza Heterocycles on Seed Germination of Bengal gram (*Cicer arietinum*) and Lady's finger (*Hibiscus esculentus*).

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ABSTRACT *Present investigation deals with bioassaying of synthesized Triazolobenzisoxazole compounds namely 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole and 3-hydroxy-1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. The compounds were used to find out their plant regulatory activity in the confined environment of laboratory. Experiment was undertaken to investigate their effect on germination of seeds of two plants viz. Bengal gram (Cicer arietinum) Lady's finger (Hibiscus esculentus).*

Keywords: *Oxa-aza Heterocycles, 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole, 3-hydroxy-1,2,4-triazolo-(3,4-b)1,2 benzisoxazole, plant regulatory activity, seed germination.*

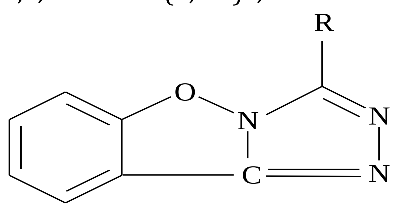
Introduction

In the biological process physiology of the plant, growth & development are related to the chemical reaction taking place in the plant bodies. From the earlier reports it is found that some of the fused triazole systems are very active as plant protective agents and as plant growth stimulants. Allen[1] reported wide applications of 3-amino 1,2,4-triazole. Amizol and some of its derivatives have been found to be useful as defoliants. The defoliating effect of this compound appears to be due to the destruction of chlorophyll[2]. Much work was carried out on the chemical nature of auxins[3,4,5]. Some derivatives of the following type Indole-3-acetaldehyde, Indole-3-pyruvic acid, Indole-3-acetonitrile, Indole-3-ethanol, indicated their close relationship to the parent structure Indoleaceticacid. The effect of Benzothiazolyl hydrazones and naphthathiazolyl hydrazones on seed germination was studied for the seeds of Wheat, Kakadi and Devdanger[6].

The synthesized compounds were evaluated for various types of bioassay screening. Studies were undertaken to observe the effect of the synthesized compounds on seed germination. For this purpose the seeds of Bengal gram and Lady's finger were selected. The choice of legume plant selected was based on the fact that gram is cultivated in 1 million acres in the State of Maharashtra and stands in 2nd in importance to the Tur (Phaseolus vulgare), these being very important sources of vegetable proteins. Lady's finger is selected as a typical vegetable commonly used in this part.

Experimental Procedure

Triazolobenzisoxazoles namely 1,2,4-Triazolo-(3,4-b)1,2-benzisoxazole[7] analogue of 1,2,4-triazolo(3,4-b)1,2-benzothiazole[8] and 3-Hydroxy-1,2,4-triazolo-(3,4-b)1,2-benzisoxazole were prepared[7] (Fig 1).



i. R= H: 1,2,4-Triazolo-(3,4-b)1,2-benzisoxazole
ii. R= OH: 3-Hydroxy-1,2,4-triazolo-(3,4-b)1,2-benzisoxazole

Fig 1. Structure of Triazolobenzisoxazoles

Ten seeds of each plant were soaked in 50 ml of 5 ppm solutions of the compounds for 4 hrs. The seeds were then spread on wet filter paper in petridishs. The Petri dishes and filter paper were sterilized before use. The filterpapers were moistened with solutions of the compounds. The experiment was conducted for seven days and percentage germination, shoot length, fresh weight and dry weight were measured. Carbohydrate content was estimated by anthrone method (Yemm and Willis, 1954) at the end of fourth day. A set of control and standard (Indole acetic acid 5 ppm, Cytokinin 5 ppm and Gibberellic acid 5 ppm) was also kept for comparison. The results obtained are presented in tables 1and 2.

Results and Discussion

i. Effect of some triazolobenzisoxazole on the germination of Bengal gram (*Cicer arietinum*).

Sr. No.	Treatment R	% Germi-nation	Fresh Wt. (gm)	Dry Wt. (gm)	Length of root (cm)	Length of shoot (cm)	pH	Conductance (mhos)	Protein (µg/ml)	Carbohydrate (µg/ml)
1.	-H	90	4.88	0.84	9.31	4.88	6.82	1.42	250	25.0
2	-OH	100	5.27	1.12	7.20	3.70	6.95	1.28	400	14.8
3.	Water	100	4.13	0.79	7.92	4.17	6.88	1.47	820	13.9
4.	Cytokinin	100	3.98	0.63	1.03	0.89	7.00	1.31	900	19.0
5.	Gibberellic acid	100	4.37	0.94	2.39	3.75	7.01	1.35	1000	23.0
6.	Indole acetic acid	90	3.08	0.58	1.12	1.07	6.95	1.20	450	35.0

Table: 1

The results of the experiment indicate percentage germination in treated compound is equal to cytokinin, Gibberellic acid treatments. The fresh weight is the highest in the seeds treated with 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole where as it is the lowest with Indoleacetic acid. The values with parent compounds are nearly equal to Gibberellic acid treatment. Protein contents is highest in Gibberellic acid treatment even in cytokinins, where as it is 50% with 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. Surprisingly with simple 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole protein content are least and it is nearly 25% of the values with Gibberellic acid. Carbohydrate quantity in parent compound is more than 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. The highest is standard Indoleacetic acid. No change in pH. The conductance is highest with the simple 1,2,4-triazolo-(3,4-b)1,2-benz- isoxazole least is with Indoleaceticacid and also with 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. Shoot lengths are also highest in seeds treated with 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. Least values are with Indoleacetic acid. Parent compound is much more superior in all respect except protein value.

ii. Effect of some triazolobenzisoxazole on the germination of Lady's finger (*Hibiscus esculentus*).

Sr. No.	Treatment R	% Germi-nation	Fresh Wt. (gm)	Dry Wt. (gm)	Length of root (cm)	Length of shoot (cm)	pH	Condu-ctance (mhos)	Protein (µg/ml)	Carbo hydrate (µg/ml)
1.	-H	70	1.92	0.307	2.95	7.14	6.90	1.37	210	21.0
2	-OH	70	1.65	0.324	2.77	4.45	7.10	1.25	300	18.0
3.	Water	80	1.42	0.298	2.10	6.85	6.95	1.28	315	25.2
4.	Cytokinin	60	1.32	0.310	0.73	3.68	6.98	1.25	450	27.3
5.	Gibberellic acid	60	1.50	0.326	1.30	6.03	6.78	1.39	500	24.2
6.	Indole acetic acid	70	1.29	0.285	1.67	4.35	6.80	1.42	300	18.0

Table: 2

The results show that the germination of seed for synthesized compounds is equal to Indoleacetic acid. Results are better than cytokinin and Gibberellic acid. Residual weights of the seeds are highest in 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole and Gibberellic acid the next is cytokinin and simple 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. Protein contents are highest with Gibberellic acid treatment where as Indoleaceticacid and 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole are equal but less than cytokinin and Gibberellic acid.

Carbohydrate contents are highest with cytokinin, next is control and Gibberellic acid, in 3-hydroxy compound and Indoleaceticacid treatment carbohydrate and protein values are same. But when compared with simple 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole and 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole, Protein is more where as in simple 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole it is less while carbohydrate content is less in 3-hydroxy1,2,4-triazolo-(3,4-b)1,2-benzisoxazole and more in simple triazolo-(3,4,-b)-benzisoxazole. In all the treatment pH is almost same. As far as conductance is concerned the high values are with Indoleacetic acid. Next to that is 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole. Gibberellic acid treatment and 3-hydroxy 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole they are equal to cytokinin treatment. In cytokinin treatment shoot length is the lowest even root length is also lowest as compared to all treatments.

4. Conclusion

The results from the tables indicate that the oxa-aza compounds are showing plant regulatory activity for both the seeds. The parent compound 1,2,4-triazolo-(3,4-b)1,2-benzisoxazole shows better results than its hydroxyl derivative except protein values. It can be concluded that the hydroxyl substitution is decreasing the activity of the parent compound.

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