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Effects of Auxin on Germination of Barnyard Millet *Echinochloa crus-galli* Seed

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ABSTRACT

Barnayard millet is a highly variable species of genus of *Echinochloa*. In north Bihar it is called Kheri, Japanese millet, Water millet and specially known as cock spur millet, due to its fruiting body. It is an annual monocot C_4 operating millet species. It is fastest growing of all the millets and produced a crop in six weeks, effect of phytohormones like Auxin on seed germination, the physiological estimation of reducing and non reducing sugar of germinated seed pretreated with different concentration of Indole 3 Acetic Acid (IAA) for 48 hours of Barnyard millet (*Echinochloa crus-galli*) was recorded for 12 days old seedling using Thin Layer Chromatography (TLC) method. According to the table IIA, seed plates were kept under all ppm of IAA (1ppm, 2ppm, 3ppm, 4ppm and 5ppm), maximum seeds were germinated and percentage of seed germination varied. Mild traces of Glucose and Fructose present at all ppm of IAA (1ppm, 2ppm, 3ppm, 4ppm and 5ppm) along with control whereas less traces of Maltose, Lactose and Sucrose localized at different ppm of IAA but Galactose was not present either in control or at different ppm of IAA.

This paper highlights the use of Auxin to overcome the dormancy, healthy production of seedling and enrichment of primary metabolite to the standing crop.

Keywords: *Barnayard millet, Physiological estimation, Echinochloa crus-galli, Auxin, Germination.*

INTRODUCTION

Barnayard millet is a highly variable species of genus of *Echinochloa*. In north Bihar it is called Kheri, Japanese millet, Water millet and specially known as cock spur millet, due to its fruiting body. It is an annual monocot C_4 operating millet species. It is fastest growing of all the millets and produced a crop in six weeks, one of its advantages is its great adaptive abilities it is able to withstand and thrive in a wide variety of environments such as saline soils etc. Adaptation to different environment has morphological effects making it difficult to identify in many regions; a distinguishing trait is the lack of ligules, on the leaf stem interface, it grows best in warmer temperature was obtained from millets division Birsa Agriculture University, Ranchi and from local market also (Attrey, 2015 & 2016).

MATERIALS AND METHODS

Experiments were designed to see the different concentration of Auxin on seed germination, seedlings morphology as well as plant growth. Different concentrations of Auxin (1, 2, 3, 4 and 5 ppm) were prepared and were used as for carry further experiments. *Echinochloa crus-galli* Seeds were put for 24 hrs. in each concentration, thereafter, 30 seeds were implanted in each Petridish having presoaked filter-paper with respective Auxin solution. Percentage seeds germination, morphological observation of coleorhiza and plumule

were measured with the help of graph papers, seeds were dehusked and thoroughly wash with distilled water to avoid exogenic microbes. Thereafter Petriplate in triplicate was arranged, sterilized, filter paper cut into Petriplate size. Experiment was designed to see the effect of phytohormones like Auxin on seed germination. Effects of foliar spray of phytohormone pre soaked phytohormone/pouring of different concentration of Auxin on seed germination and seedling growth. Physiological estimation of sugars were done with the help of chromatography techniques and colorimetric technique prescribed by (Hens, 1958 and Henz, 1954).

Preparation of stock solution of Auxin:

The Auxin has been used for the conducting different experiment. For the experiment or least quantity of these phytohormones has been used to avoid to save time stock solution of Auxin has been prepared, stock solution is a concentrated solution of a desired chemical, is required a small amount of stock solution is added to media. This avoids having to way out frequent and small amount of plant growth regulator, either in tissue culture technique or direct deeding of explants. Stock solution is so made that 10 mg chemical can be found per 1 ml of stock solution. To make, a stock solution 100 mg (0.1g) plant growth regulator is weighed and dissolve in some form of solvent. Many plant growth regulators dissolve poorly in water. Enough water was added to make a fine stock of solution of 10 ml. For example 100 ml of IAA is dissolved in 2 ml of 0.5N NaOH. After the IAA is dissolved, 8 m/s of H_2O (water) are added (Bala., 2014). The stock solution was stored in the refrigerator until needed. Storage times vary, but they should never be longer then a month.

List of plant growth regulator and its solvent is mention below:

Auxins

Indole Acetic Acid (IAA)	–	0.5N NaOH
Indole Butyric Acid (IBA)	–	0.5N NaOH
Napthalanic Acetic Acid (NAA)	–	0.5N NaOH
2, 4 – Dichlorophenoxyacetic Acid (2, 4-D)	–	95% ethnol

RESULTS AND DISCUSSION

Each triplicate sets of petri dish implanted 30 seeds each along with control. For each experiment both of the selected seeds were implanted in triplicate and put under different temperature inside seed germination chamber, Effects of different concentration of Auxin, {Indole-3- Acetic Acid (IAA)} on seed germination and seed morphology of Barnyard millet (***Echinochloa crus-galli***) at presoaked condition for 48hrs. It was experimented for different concentrations *viz.* 1ppm, 2ppm, 3ppm, 4ppm and 5ppm was used along with control. Average Percentage of seed germination, plumule length and radical length was measured after twelve days of implantation and obtained results are recorded in table I. For seed germination 5 pair of petri dish in triplicate were used Double glass distilled water was used during the experiment, the highest percentage of seed germination was recorded 91.10 on 4ppm followed by 83.33 on 3ppm. Plumule length was also measured and length in centimeter is also presented in Table I.

TABLE – I

Effects of different concentrations of Auxin [Indole-3-Acetic Acid(IAA)]on seed germination of Barnyard millet (*Echinochloa crus-galli*) (Pre-soaked condition ,48 hrs.). Data's obtained after 12 days of seed implantation; Results showing :

(a) Percentage seed germination;

	CONTROL	1ppm	2ppm	3ppm	4ppm	5ppm
I	80.00	70.00	73.33	80.00	86.66	80.00
II	76.00	76.66	76.66	83.33	90.00	86.66
III	73.33	80.00	86.66	86.66	96.66	76.66
Total	229.99	226.66	236.65	249.99	273.32	243.32
Average	76.66	75.55	78.88	83.33	**91.10**	81.10

(b) Length of plumule;

	CONTROL	1ppm	2ppm	3ppm	4ppm	5ppm
I	6.22	5.23	5.43	6.72	6.12	5.83
II	6.00	5.44	5.81	6.83	6.13	5.80
III	5.33	5.62	5.61	6.82	6.11	5.72
Total	17.55	16.29	16.85	20.37	18.36	17.35
Average	5.85	5.43	5.95	**6.79**	6.12	5.78

(c) Length of radicle;

	CONTROL	1ppm	2ppm	3ppm	4ppm	5ppm
I	3.51	3.45	3.83	4.57	4.33	3.41
II	3.40	3.90	3.87	4.80	4.82	3.72
III	3.17	3.13	3.92	4.66	4.82	3.91
Total	10.08	10.48	11.62	14.03	13.97	11.04
Average	3.36	3.49	3.87	**4.67**	4.65	3.68

* Length in centimeter

** Average of 30 seeds per plate

*** Observation recorded after twelve days of implantation.

**** Experiments in Triplicate at Room temperature and pressure (NTP)

Length of plumule was recorded 6.79 which is highest on 3ppm followed by 6.12 on 4ppm. Length of radical was measured 4.67 on 3ppm followed by 4.65 on 4ppm.

Physiological estimation of Reducing and Non Reducing Sugar of germinated seeds at different concentration of Indole 3-Acetic -Acid (IAA) of Barnyard millet (*Echinochloa crus-galli*):

The physiological estimation of reducing and non reducing sugar of germinated seed pretreated with different concentration of Indole 3Acetic Acid (IAA) for 48 hours of Barnyard millet (*Echinochloa crus-galli*) was recorded for 12 days old seedling using Thin

Layer Chromatography (TLC) method. According to the table IIA, seed plates were kept under all ppm of IAA (1ppm, 2ppm, 3ppm, 4ppm and 5ppm), maximum seeds were germinated and percentage of seed germination varied. Mild traces of Glucose and Fructose present at all ppm of IAA (1ppm, 2ppm, 3ppm, 4ppm and 5ppm) along with control whereas less traces of Maltose, Lactose and Sucrose localized at different ppm of IAA but Galactose was not present either in control or at different ppm of IAA.

TABLE - IIA

Physiological estimation of Reducing and Non Reducing Sugars to germinated seeds of Barnyard Millet (*Echinochloa crus-galli*).Seeds were pretreated with different concentration of Auxin, [Indole 3-Acetic Acid(IAA)] for 48hours.Results recorded to twelve days old seedlings.

Reducing Sugar	Control	1ppm	2ppm	3ppm	4ppm	5ppm
Glucose	++	++	++	++	++	++
Fructose	++	++	++	++	++	++
Maltose	-	+	+	+	+	+
Lactose	++	+	+	+	+	+
Galactose	-	-	-	-	-	-
Sucrose	++	+	+	+	+	+

\+ = Less presence

++ = Mild presence

+++ = Heavy presence

Physiological estimation of Reducing and Non Reducing Sugar of germinated seeds at different concentration of(IAA) of Barnyard millet (*Echinochloa crus-galli*):

Physiological estimation of reducing and non reducing sugar to the germinated seedlings was conducted and obtained results are posted in the form of table IIB.

TABLE - IIB

Physiological estimation of Reducing and Non Reducing Sugars to germinated seeds of Barnyard Millet (*Echinochloa crus-galli*).Seeds were pretreated with different concentration of Auxin, [Indole 3-Acetic Acid(IAA)] for 48hours.Results recorded to twelve days old seedlings.

Reducing Sugar	Control	1ppm	2ppm	3ppm	4ppm	5ppm
Glucose	.0528	.0582	.0597	.0631	.0681	.0711
Fructose	.0722	.0584	.0592	.0441	.0683	.0701
Maltose	-	.0229	.0237	.0241	.0245	.0251
Lactose	.0542	.0230	.0234	.0245	.0249	.0252
Galactose	-	-	-	-	-	-
Sucrose	.0785	.0228	.0244	.0245	.0251	.0253

\+ = .0228 to .0258 µm/mg ++ = .0525 to .0750 µm/mg +++ = .0850 to .105 µn/mg

Observed data's showed that quantitative presence followed the contraction. Increased concentration increases the amount of sugars. Presence of glucose and fructose under all ppm ranging from 1ppm to 5ppm along with control represent satisfactorily and the present investigations corroborates with works of other workers as well. (Sampath *et al*., 2015; Channappagoudar *et al*., 1986; Atlop and Mennan, 2011; Kumar, 2013; Sampath *et al*., 2015 and Rawat *et al*., 2018).

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