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Effect of Potassium Humate (Humic Acid) On Seed Germination and Seedling Growth of Cotton (Gossypium Sp.)

Dr Rajesh Babarao Patil

Assistant Professor in Botany.
Dept of Botany,
Indira Gandhi (Sr) College, Cidco, New Nanded.
newsletterscm777@gmail.com

ABSTRACT:

A experiment was conducted in laboratory to study the effect of potassium humate (Humic acid) on seed germination and Seedling growth of cotton (Gossypium sp.). Potassium humate is the salt of humic acid. In order to study the ten different concentrations (from 0.1 to 1.0%) of potassium humate, seeds of cotton were treated with potassium humate and water as control. The seeds were sown on moist blotter papers to record percent seed germination, root length and shoot length of cotton. At the end of tenth day, potassium humate (from 0.1 to 1.0%) treated seeds showed stimulating effect on percent seed germination with root length and shoot length of cotton against water (control).

Key words: Humic acid, Potassium humate and seed germination.

1. INTRODUCTION:

Soil organic matter includes the remains of all plants and animals bodies that fell on earth surface. Humus is the final residue obtained from microbial decomposition of organic matter. Process of formation of humus is called as humification. Humic substances are component of humus and are widely distributed over earth surface. Humic substances are classified into humic acid, fulvic acid and humin (Solange and Rezende, 2008). Potassium humate is the salt of humic acid with dark colored, water soluble but alkali insoluble.

Previous published reports showed that, application of humic acid extracts to wheat and soybean crops increased water absorption, respiration and seed germination rate (Smidova (1962), Ishwaran and Chonkar (1971)). Humic acids to sand culture of soybean increases shoot length, root length and nodule dry weight in response to treatment up to 400 to 800 mg/kg soil (Tan and Tantiwiramannond 1983). Foliar spray of humic acid stimulates shoot growth of various plants (Chen and Aviad, 1990).

The various functional groups of humic acid such as acidic (e.g. carboxylic acid and phenol), alkaline (e.g. amine, imines) or neutral groups (e.g.alcohol, aldehyde, ketone, ether, ester and amide) stimulated enzymatic activities in several metabolic pathways (Jackson, 1993). Humic acids extracted from peat

and leonardite stimulated plant growth (Adani *et al*, 1998). Humic acid treatment enhanced overall Biochemical activities of crop plants (Sladky 1959 in Tomato, Kui Zeng 2002 in Wheat).
Application of humic acid to growth media supplemented with 50 mg Nacl kg before seed sowing. The humic acid applied seedling had at least 1.65 cm longer shoots then the non applied ones. Arbuscular mychorhizal fungus and humic acid stimulates on the seedling development of Pepper grown under saline soil conditions (O.Turkmen *et.al* 2005).
Humic acid increased numbers and lengths of tobacco roots and dry matter yield of corn and oat seedling respectively (Albuzio *et.al* 1994). Humic acid increased the root and shoot ratio as well as the production of thin lateral roots of tomato plants and yields of wheat of hybrid (*Triticum sp*) (F.Adani *et.al*.1998 and H.Ulkan 2008).Seeds of cotton treated with different humic acid positive response on plant height (Sema Bas Bag 2008).
In present paper study is done to discuss the importance of various concentration (0.1% to 1.0%) of potassium humate (humic acid) on seedling growth (shoot length and root length) of cotton (Gossypium sp.).

2. MATERIALS AND METHODS:

Moist Blotter Paper Method:

The effects of ten different concentrations (0.1 to 1.0 %) of Potassium humate against control (water) in three replications were tested for seed germination and seedling growth (root length and shoot length) of cotton. Seeds of cotton were collected from field. A two kg seed of crop plant in small gunny bags at 27±was stored in laboratory for experiments. The seed were tested in moist blotter papers following ISTA procedure (ISTA1966). The observation recorded after ten day included percent seed germination (%), Root length (cm) and Shoot length (cm).

Potassium Humate Formulation (Stock Solution):

The stock solution of potassium humate of various concentrations like 0.1%, 0.2%,0.3%,0.4%,0.5%,0.6%, 0.7%, 0.8%, 0.9% and 1.0 % were prepared by dissolving 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8,0.9 and 1.0 gm of potassium humate in 100 ml of water.

Table1: **Effect of Various Concentrations (0.1 % To 1.0 %) of Potassium humate (Humic acid) on Seed Germination (cm), Root Length (cm) , Shoot Length (cm) and Total Length of Seedling (cm) of Cotton (Gossypium Sp.).**

Potassium Humate % (Humic acid)	Germination (%)	Root Length (cm)	Shoot Length (cm)	Total Seedling Length (cm)
0.1	66.66	06.00	5.67	11.67
0.2	70.00	06.22	5.94	12.16
0.3	73.33	08.71	6.87	15.58
0.4	70.66	09.21	7.11	16.32
0.5	76.33	09.33	7.32	16.65
0.6	76.66	10.51	8.54	19.05
0.7	80.00	10.42	9.33	19.75
0.8	83.33	11.01	9.78	20.79
0.9	83.66	12.01	10.76	22.77
1.0	90.00	12.89`	11.83	24.72
Control	60.00	5.97	5.09	11.06

Values are mean of three Replications.

3. RESULTS AND DISCUSSION:

Result presented in Table-1 show that there was an increase in seed germination in seeds of cotton treated with potassium humate (1.0%) over control (water). Potassium humate showed 90.00% seed germination against 60.00% in water (control). As regarding the seedling growth root length and shoot length, it was found that there was increase in root length (12.89 cm) and shoot length (11.83cm) against root length 5.97 cm) and shoot length 5.09 cm in control (water). Overall total seedling growth of cotton is found more in potassium humate (1.0%) treated seeds as compared to control (water).

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