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# Effect of various concentrations of potassium humate (0.1 to 1.0%) soaking periods (3 to 24 hours) on seedling vigour of Groundnut (*Arachis hypogaea L*).

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***Abstract:*** Pot experiment were conducted to study the effect of potassium humate (0.1 to 1.0%) soaking periods (3 to 24 hours) on seedling vigour of Groundnut (*Arachis hypogaea L.*). The seeds of Groundnut were treated with potassium humate at ten different concentrations (0.1 to 1.0%) and different soaking periods from 3 to 24 hours. Seeds without treatment of potassium humate served as control. Seeds were then sown two cm deep in soil in pot and at the end of tenth day seedling vigour was recorded. Results obtained showed that maximum seedling vigour was recorded in 1.0% potassium humate and after 15 hours soaking period in Groundnut against control (water).

***Key Words:*** Potassium humate, Soaking Period and Seedling vigour.

## 1. INTRODUCTION :

Seedling emergence is stimulated by humic substances. Soil is a living biological system containing billion of microorganism. These microorganisms feed on soil organic matter and break it down into humus. Humic substances are component of humus. Humic substances are widely distributed over earth surface. Humic substances classified into three categories like Humic acid, Fulvic acid and Humin [1]. Seed germination and seedling growth is stimulated by humic substances [2]. Potassium humate is the salt of humic acid. Humic acid (HA) and fulvic acid (FA) can be isolated from humus according to the acid or alkali solubility [3,4].

Humic and fulvic acids as plant bio stimulants are mainly produced by biodegradation of lignin containing plant organic matter. Fulvic acid as an organic fertilizerand non-toxic mineral chelating additive with water binder that maximizes uptake through leaves and stimulates plant productivity [5].

Seed germination is the first step towards the growth of plant. Poor seed germination adversely affect on seedling establishment, growth and development of crop plants and results into low yields of crop plants. The success of seedling vigour depends on formation of radicle and plumule. Seedling vigour in the form of root length and shoot length of crop plants are positively affected by humic acid application [6,7, 8].

Poor germination and seedling establishment adversely affect growth and development of crop plants and results into low yields of crop plants. The success of seedling vigour depends on formation of radicle and plumule. Seedling vigour in the form of root length and shoot length of crop plants are positively affected by humic acid application [9, 10].Fulvic acid shows positive effect on the growth and quality of Italian lettuce in hydroponic culture.[11]. Fulvic acid is benefit to the soil adsorption of Cu (II) and Zn (II) at high concentrations. Besides, Zn (II) adsorbed is harder to be desorbed by the neutral salt solution [12]. Development of roots regards to number, length and mass was increased when grown in sand or nutrient solution to which were added humic or fulvic acids extracted from oxidized lignite [13].

Foliar application with humic, fulvic acid and calcium as individual or in a combination improved growth parameter, yield and fruit quality of tomato and decreased the incidence of blossom end rot. The combination treatment with the three solutions was the most effective [14]. Humic acid treatment increases nutrient uptake and physiological

characteristic *Fragaria ananassa* var. Camarosa [15]. Fulvic acid was used to decrease the water stress or the stress imposed by hot, dry winds during ear development, grain yield increased by 7.3-18.0% [16].

Foliar application of 0.05% humic acid favourably increased the curcumin (4.58 % per cent), oleoresin content (9.47 per cent) essential oil content (4.94 per cent) and chlorophyll content (1.83 mg g-1) (15). Accumulation of curcumin in induced microrhizomes grown under controlled conditions in vitro [16]. Suitability of AM fungus for reinforcing turmeric growth, yield, essential oil, curcumin contents, and improvement of soil fertility and health in addition to saving of considerable chemical fertilizers cost [17].

In present paper an attempt is made to discuss the importance of various concentrations of potassium humate (0.1 to 1.0%) soaking periods (3 to 24 hours) on seedling vigour (root length and shoot length) of Groundnut (*Arachis hypogaea L.).*

## 2. MATERIALS AND METHODS:

The effects of ten different concentrations of potassium humate (0.1 to 1.0%) soaking periods (3 to 24 hours) against control (tap water) in three replications for each crop were tested for seedling vigour i.e. root length and shoot length at Botanical Garden of Yeshwant Mahavidyalaya, Nanded. Seeds of Groundnut (*Arachis hypogaea L.).* cv. Local were collected from field. A Four kg seeds of crop plant in small gunny bags at ± 27 was stored in laboratory for experiments.

### 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 water.

### Potassium humate (0.1 to 1.0 %) soaking periods (3 to 24 hours)

To study the effect of ten different concentrations of potassium humate (0.1%, 02%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8, 0.9% and 1.0%) against different periods of seed soakings 3, 6, 9, 12, 15, 18, 21 and 24 hours. Pot experiments were conducted. In pot experiment, 100 seeds of each of crops were pre soaked in different concentrations of potassium humate (0.1 to 1.0 %) and
water as control. At the time of sowing, 3 hours pre soaked 10 seeds of each crop plants of each concentration of potassium humate (0.1 to 1.0 %) and water (control).Seeds were taken out and sown at 2 cm deep in soil in 12.5 cm diameter pot. Same procedure was followed for remaining concentrations (0.2 to 1.0 %) for different soaking periods like 6, 9, 12, 15, 18, 21 and 24 hours. The observation was recorded after ten days included seedling vigour in the form of root length (cm) and shoot length (cm).

**Table-1. Effect of various concentrations of potassium humate soaking periods (3 to 24 hrs) on seedling vigour of Groundnut (*Arachis hypogaea L.).* cv. Local (After 10 day)**

| Sr. No | Potassium Humate (%) | Seed Soaking Period in Hours | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 3 | | 6 | | 9 | | 12 | | 15 | | 18 | | 21 | | 24 | |
| | | RL | SL | RL | SL | RL | SL | RL | SL | RL | SL | RL | SL | RL | SL | RL | SL |
| 1 | 0.1 | 11.2 | 10.4 | 11.1 | 10.2 | 11.3 | 11.2 | 11.0 | 11.2 | 11.2 | 12.1 | 10.1 | 11.0 | 10.2 | 11.1 | 10.2 | 11.1 |
| 2 | 0.2 | 11.3 | 10.5 | 11.1 | 10.3 | 11.4 | 11.3 | 11.2 | 11.3 | 12.2 | 12.2 | 11.2 | 11.1 | 11.1 | 9.2 | 11. | 9.5 |

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| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 0.3 | 12.2 | 10.5 | 11.3 | 11.1 | 12.1 | 11.3 | 12.3 | 11.3 | 14.3 | 12.3 | 11.2 | 11.2 | 11.3 | 11.1 | 10.1 | 10.2 |
| 4 | 0.4 | 12.5 | 10.6 | 12.2 | 11.3 | 13.2 | 11.4 | 12.4 | 11.4 | 14.4 | 12.5 | 11.3 | 11.3 | 11.4 | 11.2 | 11.2 | 11.2 |
| 5 | 0.5 | 13.1 | 11.3 | 13.2 | 11.4 | 13.4 | 12.2 | 13.1 | 12.3 | 14.2 | 12.5 | 12.4 | 11.4 | 11.5 | 12.2 | 11.3 | 11.3 |
| 6 | 0.6 | 13.2 | 11.3 | 13.5 | 11.4 | 13.5 | 12.3 | 13.2 | 12.4 | 14.3 | 13.2 | 12.5 | 11.4 | 11.6 | 12.3 | 11.2 | 11.4 |
| 7 | 0.7 | 14.2 | 11.4 | 14.3 | 11.5 | 14.1 | 12.4 | 15.3 | 12.5 | 16.2 | 13.3 | 12.6 | 12.4 | 12.1 | 11.2 | 12.3 | 11.5 |
| 8 | 0.8 | 14.3 | 12.2 | 14.4 | 12.3 | 14.2 | 12.5 | 15.3 | 13.1 | 16.2 | 13.3 | 12.7 | 13.1 | 12.3 | 12.1 | 124 | 11.5 |
| 9 | 0.9 | 15.2 | 12.6 | 15.2 | 12.4 | 15.0 | 12.6 | 15.4 | 13.2 | 16.3 | 14.1 | 14.8 | 13.3 | 12.5 | 13.2 | 12.5 | 11.6 |
| 10 | 1.0 | 14.1 | 13.3 | 15.3 | 13.3 | 16.1 | 14.2 | 16.2 | 15.3 | 16.1 | 15.2 | 14.8 | 13.4 | 13.1 | 13.2 | 13.2 | 12.3 |
| 11 | Control (water) | 11.1 | 10.5 | 11.2 | 10.4 | 11.1 | 10.3 | 12.1 | 11.2 | 13.2 | 11.3 | 11.00 | 10.2 | 10.3 | 12.2 | 11.4 | 9.4 |

**Root length (cm) and Shoot length (cm)**

## 3. RESULTS AND DISCUSSION :

It is evident from the results presented in Table-1 that more seedling vigour as regards to root length and shoot length of Groundnut was noted in 1.0% solution of potassium humate and 15 hours soaking period. Maximum root length 16.1 cm and shoot length 15.2 cm was recorded in 1.0% potassium humate and after 15 hours soaking period. In control (water) root length was 13.2 cm and shoot length was 11.3 cm. Gradual decrease in seedling vigour was noted after 15 hours of soaking period.

## 4. CONCLUSION :

Thus optimum concentration of potassium humate as regards to seedling vigour of Groundnut was found to be 1.0% and 15 hours soaking period. Concentrations above 1.0% were found to be inhibitory.

## REFERENCES:

1. Solange L M and Rezende M O (2008): A powerful tool to characterize humic acid (HA). J. Brazil Chemical Society.9:24-28.
2. Amal D A: M.Sc. (Ag) Thesis (2001): Effect of humic acid treatments on growth and development of groundnut under different fertilizer levels. Tamil Nadu Agricultural University, Coimbatore.
3. Wen QX (1984): Research method of soil organic substance. Beijing: Agriculture Publishing House. 1984, 234-2473.
4. Li GL and Wei SQ (2003): The characteristics of adsorption and desorption of humic acids on copper. Ecology and Environment. 12(1):4-7.
5. Malan, C. (2015) Review: Humic and fulvic acids. A Practical Approach. In Sustainable soil management symposium. Stellenbosch, 5-6 November 2015, Agrilibrium Publisher.
6. Irfan, A., Shahzad, M. and Iqbal, A. (2005). The effects of seed soaking with plant growth regulators on seedling vigour of wheat under salinity stress. J. Stress Physiology and Biochemistry., 1(1):6-14.
7. S Ahmad;M Anwar and H Ullah (1998): J. Agron. *Crop Sci.Biol*, 18, 125-127.
8. Ulukan, H. (2008). Effect of soil applied humic acid at different sowing times on some yield component in wheat (*Triticum sp.*) hybrids. International Journal of Botany., 4(2) : 164-175.

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[ Impact Factor: 6.834 ]
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9. Turkmen O, Semra D, Suat S and Altilla D (2005): Effect of Arbuscular mycorhizal fungus and humic acid on the seedling development and nutrient content of Pepper grown under saline soil conditions. J. Biological sciences. 5(5):568- 574.
10. Ulukan H (2008). Effect of soil applied humic acid at different sowing times on some yield component in wheat (Triticum sp.) hybrids. International Journal of Botany. 4(21. 164-175.
11. Chen, Z.J. and J.Z. Ji, (2019): Effects of fulvic acid on the growth and quality of Italian lettuce in hydroponic culture. Hunan Agric. Sci., 10: 33-35.
12. ZhantaiWang ,Minxia Cao Wenchang, Cai and Heping Zeng (2017):The effect of humic acid and fulvic acid on adsorption-desorption behavior of copper and zinc in the yellow soil. Conference Proceedings 1820, 040027.
13. Reynold A, Wardle D, Drought B and Canlwell R. (1995):Gro-mate soil amendment improves growth of green house-grown Chardonnay' grapevines. J, Horti. Science. 30:539-542.
14. M.E.Husein , S. Abou El Hassan , M.M. Shahein (2015): Effect of humic, fulvic acid and calcium foliar application on growth and yield of tomato plants. ISSN: 2220-6655 (Print), 2222-5234 (Online) Vol. 7, No. 1, p. 132-140.
15. Ameri A, Tehranifar A. (2012): Effect of humic acid on nutrient uptake and physiological characteristic Fragaria ananassa var. Camarosa. J Biol. Environ. Sci. 6, 77-79.
16. Payman MORADI, Babak PASARI and Farzad FAYYAZ (2017): The effects of fulvic acid application on seed and oil yield of safflower cultivars European Agriculture18(3), p.584-597.
17. Kamal Prasad, AgamKhare and Prateek Rawat (2021): Quality and Yield Performance of Turmeric (Curcuma longa linn.) in Response to Glycoprotein Producing Arbuscular Mycorrhizal Fungal Biostimulant and Traditional Fertilizers Utilization. CurrInves Agri Curr Res 9(5) ISSN: 2637-4676.