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FULVIC FOLIAR FERTILIZER IMPACT ON GROWTH OF RICE AND RADISH AT FIRST STAGE

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ABSTRACT

The present investigation on "fulvic foliar fertilizer impact on rice and radish carried out at laboratory of soil microbiology, Cuu Long Delta Rice Research Institute, Can Tho city on September, 2010. One experiment was tested on rice including 6 treatments (including control, 1, 2, 4, 8 and 16 percent of fulvic foliar fertilizer) with two replications. Another was done on radish including four treatments (control, 1, 2 and 4 percent of fulvic foliar fertilizer) with three replications. Both experiments were in randomly complete design. The results showed that fulvic foliar fertilizer affected good on growth of rice and radish at the first stage. The application with deferent levels of fulvic foliar fertilizer at dose of 1, 2 and 4 percent on rice and radish were significant and higher plant height as compared to control. Among treatments, there were two treatments applied with fulvic foliar fertilizer as 2 and 4 percent, were the better plant height as compared to other treatments.

Key word: rice, radish, foliar fertilizer, fulvic foliar fertilizer.

INTRODUCTION

Fulvic acid is rapidly being recognized as one of the key elements in many outstanding health and scientific breakthroughs of the 21st century. Scientists and doctors throughout the world are beginning to discover fulvic acid and are starting to recognize its extraordinary potential (Nicola 2009). Fulvic acid chelates and binds scores of minerals into a bio-available form used by cells. These trace minerals serve as catalysts to vitamins within the cell. Additionally, fulvic acid is one of the most efficient transporters of vitamins into the cell (Williams 1977). Fulvic acid complexes have the ability to bio-react one with another, and also inter-react with cells to synthesize or transmute new mineral compounds (Schnitzer & Dodama 1977). Fulvic acid stimulates and balances cells, creating optimum growth and replication conditions (Poapst and Schnitzer 1971). It enhances the permeability of cell membranes (Prakash 1971; and Christman and Gjessing 1983). Fulvic acid intensifies the metabolism of proteins (Khristeva at al. 1967). The research on tomato plants revealed that plants treated with fulvic acid had significant beneficial effects on roots and stem weight, surpassing the benefits of those plants treated with humic acid (Sladky 1959). McCarly *et al.* (1985) reported that a foliar application of fulvic acid (50 mg/l) yielded a greater stem length, greater fresh weight, dry stem weight and root weight as compared with control. The study aims at transferring fulvic acid containing more macro and micronutrients uptake by plant to help biomass and productivity increase with high quality.

METERIAL AND METHODS

1. Fulvic Foliar Fertilizer: Fulvic acid was extracted from peat the following method of Stevenson (1982). Fulvic acid was yellow and it adjusted pH: 4-5. Fulvic acid was added some micro and micronutrients to make "*fulvic foliar fertilizer*". Progressing for producing fulvic foliar fertilizer made in laboratory of soil microbiology, Cuu Long Delta Rice Research Institute. This fulvic foliar fertilizer was testing on growth of rice and radish at their first stage as below:

2. Rice: The experiment carried out random complete design including six treatments with two replications at laboratory of soil microbiology, Cuu Long Delta Rice Research Institute, Can Tho city, on 15 September, 2010. Rice variety was used as OM8923. Each treatment was applited for experiment as below: T_1: control; T_2: 1% Fulvic foliar; T_3: 2% Fulvic foliar; T_4: 4% Fulvic foliar; T_5: 8% Fulvic foliar; and T_6: 16% Fulvic foliar.

Procedure: Rice seed germinated and they soaked into solution of fulvic foliar as above treatments within 30 minutes and removed out side these

solutions. After that they were grown in box plastic (Fig 2). Each box plastic sowed with 10 g of rice germination seeds. Water irrigated for rice plant every day. Measuring height plant of rice was recorded at 2, 5 and 8 days after sowing (DAS).

3. Radish: The experiment was carried out in randomly complete design with 4 treatments and 3 replications at laboratory of soil microbiology, Cuu Long Delta Rice Research Institute, Can Tho city on 22 September, 2010 and radish variety was produced by Trang Nong Company. Each treatment was applited for experiment as below: T_1: control; T_2: 1% fulvic foliar; T_3: 2% fulvic foliar; T_4: 4% fulvic foliar.

Radish seed germinated, they were soaked into solution of fulvic foliar as above treatments within 30 minutes and removed out side these solutions. After that, they were grown in box plastic (Fig 3). Each box plastic was sowed with 5 g of radish germination seeds. Ash husk was also used for making humidity, each box plastic was put one spoon of ash husk. Two days after sowing, solution of each treatment was irrigated 1 ml for each plastic box. In addition, water also irrigated for radish plant every day. Measuring height plant and plant weight of young radish was recorded at 8 days after sowing.

RESULTS AND DISCUSSION

The results in Table 1 and Fig 1 and 2 showed that application with fulvic foliar fertilizer in 1, 2, 4 and 8 % for germination of rice increased more height plant than control during the time of experiment. However, application with 8% of fulvic foliar fertilizer was reduced height plant of rice at 2 DAS and observation also recorded that some germination seeds had dead at this time. In addition, when application with 16% of fulvic foliar fertilizer had affected to germination of rice and there were almost germination seeds dead (see Fig 1 at 16% of box plastic). The results of studying could conclude that application fulvic foliar fertilizer from 2 to 4 % was the best growth of rice at the first stage and they were not significant as compared with 8% of fulvic solution.

Table 1. Effective of fulvic foliar fertilizer on height plant of rice at 2, 5 and 8 days after sowing.

Treatments	2 DAS		5 DAS		8 DAS	
	Plant height (cm)	% over control	Plant height (cm)	% over control	Plant height (cm)	% over control
Control (no application of Fulvic)	3.13	-	7.65	-	10.07	-
1% Fulvic	3.69	17.89	8.53	11.49	11.26	11.81
2% Fulvic	4.07	25.61	9.46	23.64	12.37	22.82
4% Fulvic	3.40	6.74	9.48	23.90	13.21	31.11
8% Fulvic	2.86	-7.93	9.30	21.48	13.70	36.02
16% Fulvic	1.67	-50.87	6.18	-19.26	9.93	-1.43
CV (%)	**2.40**	**-**	**5.20**	**-**	**5.00**	
LSD (5%)	**0.19**		**1.13**		**1.51**	

Fig 1. Different levels of fulvic foliar fertilizer on 8-day rice seedlings

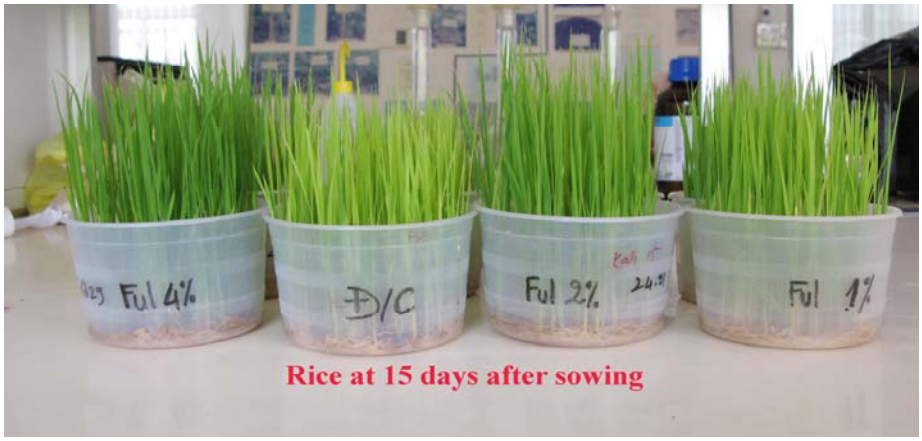

Fig 2. Different levels of fulvic foliar fertilizer on rice at 15 DAS

The results in Table 2 and Fig. 2 and 3 also showed that application with fulvic foliar fertilizer at 1, 2 and 4% on germination seeds of radish enhanced higher both of plant height and shoot weight than control at 8 DAS. The plant height in all treatments with fulvic foliar fertilizer increased from 11.63 to 17.34% as compared to control. Similarly, weight of 10 radish plants at 8 DAS was heavier 10.28% - 28.18% than control. This experiment showed that the application of fulvic foliar fertilizer at the levels of 1%, 2% and 4% were better in terms of development and growth of young radish.

Table 2. Effectiveness of deferent levels of fulvic foliar fertilizer on plant height and weight on radish at 8 days after sowing.

Treatments	Plant height (cm)	% over control	Wt. of 10 plants (g)	% over control
Control (no application of Fulvic)	9.51	-	1.62	-
1% Fulvic	10.62	11.63	1.78	10.28
2% Fulvic	10.71	12.64	2.00	23.86
4% Fulvic	11.16	17.34	2.07	28.18
CV (%)	**5.3**	**-**	**4.3**	**-**
LSD (5%)	**1.10**		**0.15**	

Fig 3. Different levels of fulvic foliar fertilizer on plant height of radish

Root growth in tomato plants has been shown to be increased by the application of humic and fulvic acids at low concentrations. Which organic acid, humic acid or fulvic acid, can speed up the germination of green mung beans (Elizabeth 2006). The research done in tomato plants revealed that plants treated with fulvic acid had significant beneficial effects on roots and stem weight, surpassing the benefits of those plants treated with humic acid (Sladky 1959). McCarly *at al.* (1985) reported that a foliar application of fulvic acid (50 mg/l) yielded a greater stem length, greater fresh weight, dry stem weight and root weight as compared with control. Similarly, the results of two experiments with dose of fulvic foliar fertilizer at 1, 2 and 4% on germination of rice and radish seeds also increased height plant at 8 DAS.

In Northern China, fulvic acid was sprayed on plants just before head development, and allowed to grow to maturity over time when hot, dry winds are prevalent. It was found that grain yield was increased by 7% to 18% over the untreated controls (Xudan 1986). Beside, when humic acid application significantly influenced total chlorophyll content, this effect was mainly on chlorophyll b content. Foliar 20 ml/l and soil 20 ml/l HA application resulted in the highest total chlorophyll content. Foliar and soil HA applications also led to significantly higher mean fruit weight, and early and total yield than for control (Karakurt at al. 2009).

CONCLUSSIONS

On rice: Plant height with fulvic foliar fertilizer treatment at the levels of 2% and 4% was better and increased over control from 6.25 to 25%, 23.64 - 23.9% and 22.82- 31.11% at 2, 5 and 8 DAS, respectively.

On radish: Both plant height and weight with fulvic foliar fertilizer at the level of 2% and 4% were better and increased over control from 12.64 to 17.34% and from 23.86 to 28.18% at 8 and 10 DAS, respectively.

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Đánh giá ảnh hưởng của phân hữu cơ bón lá fulvic trên sự tăng trưởng của cây lúa và cây cải củ ở giai đoạn đầu

Nghiên cứu đánh giá ảnh hưởng của phân hữu cơ bón lá fulvic trên sự tăng trưởng của cây lúa và cây cải củ đã được thực tại phòng thí nghiệm vi sinh vật đất, Viện Lúa đồng bằng sông Cửu Long, Tp. Cần Thơ trong tháng 9 năm 2010. Một thí nghiệm đã được đánh gía trên cây lúa với 6 nghiệm thức (bao gồm đối chứng, 1, 2, 4, 8 và 16% của phân hữu cơ bón lá fulvic) và được lập lại 2 lần. Thí nghiệm kia được sử dụng trên cây cải củ với 4 nghiệm thức (đó là đối chứng, 1, 2 và 4 % của phân hữu cơ bón lá fulvic). Cả 2 thí nghiệm được bố trí theo thể thức hòan tòan ngẫu nhiên. Kết quả nghiên cứu cho thấy phân hữu cơ bón lá fulvic đã có ảnh hưởng tốt trên sự phát triển của cây lúa và cải củ ở giai đọan đầu. Từ kết quả thí nghiệm đã cho thấy các nghiệm thức áp dụng phân hữu cơ bón lá fulvic ở nồng độ 1, 2 và 4% có chiều cao cây cao hơn và đã có sự khác biệt có ý nghĩa thống kê so với đối chứng ở trên cả cây lúa và cây cải củ. Trong số những nghiệm thức của các thí nghiệm có hai nghiệm thức được áp dụng phân hữu cơ bón lá fulvic ở nồng độ 2 và 4% được ghi nhận chiều cao cây tốt hơn so với các nghiệm thức khác .