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Synthesis of Plant Growth Promoter (Natural Liquid Fertilizers) from Medicinal Plant By Fermentation Method

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ABSTRACT

A chemical based plant growth promoter normally affect particular organ or function of plant, whereas a fermented product show effect on the total plant system helping it to achieve better results as compared to a chemical plant growth promoter and reduce the side effects on the soil or the overall plant growth system. Plant growth promoters could be harmful for human health if not applied in adequate doses and convenient time on plants. In present investigation leaves of various medicinal plant e.g. Ricinus communis (Caster), Annona squamosa (Custard apple), Tinospora cordifolia (Gulvel), Azadirachta indica (Neem Tree), Nicotiana tobacum (Tobacco) taken in equal proportion and fermented for one month in cow urine (Gomutra). Filtered it and filtrate was taken as end product. Different concentrations (5, 10, 30 and 50 µl/ml) of fermented product were applied to Mung (Vigna radiata) seed germination. Growth of seeding was compared with control. Result showing that lower concentration increase seed germination and higher concentration decrease seed germination than control (Without treatment). We can conclude that this product can be use as growth promoter at low concentration at germination level.

Key words: Growth promoter, Vigna radiata, seed germination

I. INTRODUCTION

In recent years, use of continuous chemicals and intensive cultivation has been reduced soil organic materials and micronutrients. It is approved that continuance of these conditions lead to loss of biological diversity, agro-ecosystem disorder and destruction of soil structures. Plant active principles are chemical compounds present in the entire plant or in specific parts of the plant that confers them therapeutic activity or beneficial effects (Martins *et al.*, 2000) . Hence use of this plant property to produce herbal growth promoter is eco-friendly and cost effective. In recent years, Thai farmers mostly used fermented plant extracts (FPEs) as natural liquid fertilizers because it can easily produced from agricultural products or agricultural waste. These FPEs can promote plant growth and act as bio-control agents depending on the type of plants being used (Kantachote and Charernjiratrakul, 2008). Since FPEs are useful to reduce problems associated with the use of chemical fertilizers and pesticides, they are now being widely applied in organic agriculture, natural farming and IP farming.

However, there is very little scientific information to support the use of FPEs. FPEs are product of lactic acid fermentation and most of the available scientific information is concerned with the production and use of them as beverages (Kantachote and Charernjiratrakul, 2008; Prachyakij et al. 2008).

Habitats and some physiological properties of Lactic acid bacteria (LAB) and yeasts are confirmed that normally found in fermented plant products (Oboh, 2006; Okada et al. 2006; Olstorpe et al. 2008). We therefore thought of the possibility that an FPE from leaves of medicinal plant might be useful as a potential liquid fertilizer and could assist farmers because it would be easy and cheap to prepare and make use of what is at present a common but non utilized resource. Hence, the aims of this study were to investigate effect of fermented pant extract on seed germination

AIMS AND OBJECTIVES

To observe effect of fermented plant extract as Growth promoter/ liquid fertilizer

II. MATERIAL AND METHODES

- Synthesis of plant Growth Promoter (Natural Liquid Fertilizers):

Leaves of various medicinal plant e.g. *Ricinus communis* (Caster), *Annona squamosa* (Custard apple), *Tinospora cordifolia* (Gulvel), *Azadirachta indica* (Neem Tree), *Nicotiana tobacum* (Tobacco) taken in equal proportion (250gm) and fermented for one month in cow urine (Gomutra). Filtered it and filtrate was taken as end product.

- Effect of plant Growth Promoter (Natural Liquid Fertilizers)on seed germination:

Phytotoxicity can assess by a seed germination assay, it is one of the most common techniques (Kapanen and Itavaara, 2001). The graded concentrations (5,10,30 and 50 µl/ml) of fermented plant extracts (FPEs) were added aseptically to sterilized petriplates lined with Whatman no. 1 filter paper. Surface sterilized seeds of Mung were germinated (20 seed per plate) in each concentration of PEFs. Similar experiment without PEF was conducted as control. Distilled water was used as a control set for the testing of seed germination (Hoekstra et al. 2002; Fuentes et al. 2004). After 10 days of treatment, seedlings were harvested and shoot and roots of seedling were separated. Seedling growth in terms of root length, shoot length, fresh weight and dry weight were recorded and results were compared to see effect of PEFs on seed germination and early seedling growth.

III. RESULTS AND DISCUSSION

Results pertaining to seed germination and early seedling growth clearly indicate that PEFs at lower concentration promoted seed germination and seedling growth, but at higher concentration reduced seed germination and seedling growth. Lower concentrations of PEFS (5,10 µl/ml) showed significant enhancement in shoot and root lengths, however higher concentrations (50 µl/ml) of PEFs showed decreased root length, shoot length and total seedlings height. There was no major difference in root shoot ratio in all treatments however an decreasing trend was seen from lower to higher concentrations. Similar trend as in seedling height was seen in case of fresh and dry weight of the seedlings after PEFs treatments (Table. 1).

Table 1. Effect of Fermented product on seedling growth in Mung

Concentration(µl/ml)	Shoot Length (cm)	Root length (cm)	Total seedlings Height (cm)	Root-Shoot Ratio	Fresh Wt. (mg)	Dry Wt. (mg)
00	3.05	1.76	4.81	0.58	529.12	73.38
05	4.86	2.48	7.36	0.51	676.28	90.44
10	6.45	2.88	9.33	0.45	768.92	112.38
30	5.85	2.40	8.25	0.41	698.08	101.12
50	230	0.93	2.66	0.40	356.26	41.42

Fruits and vegetables are a rich source of B (Bellaloui and Brown, 1998). Fermentation process has provided a relatively high amount of plant nutrients particularly B, therefore after an appropriate dilution the PFEs may be a suitable liquid fertilizer. It has long been recognized that GAs play an important role in the stimulation of seed germination (Chen et al. 2001), thereby the FPEs may also induce seed germination. Other plant nutrients particularly P, Mg, Mn and B may also be present at appropriate concentrations to stimulate seed growth (Bellaloui and Brown, 1998). The numbers of lactic acid bacteria (LAB) and yeasts that were present during a wild forest noni (Morinda coreia Ham) fermentation, the changes in its physicochemical properties and levels of plant nutrients were investigated (Duangporn K e*t al.*2009) .Higher concentration decreases growth there may be increased concentration of citric acid. Results indicate that plant nutrients present in the FPE were at an appropriate level for potential use as a liquid fertilizer, particularly for the micronutrients such as B, Mn and Zn.

IV. CONCLUSION

From this project, we can be concluded that fermented plant extract can increase seed germination at lower concentration can use as herbal growth promoter or liquid fertilizer and at higher concentration decrease growth of seedlings can used as herbicide. Based on these results and because of high chemical herbicide and growth regulator costs for farmers, herbal growth promoter and herbicide can be replaced by them. In addition to, they had not any environmental pollution and risks for human being

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