Environment Friendly Slow Release Nano Fertilizer

Samina Ahmed[1], Farah Nigar[1], Md. Humayun Kabir[1], Ganga Chakrabarti[1], Husna P Nur[1] and S. M. Imamul Huq[2]

[1] Bangladesh Council of Scientific and Industrial Research (BCSIR)
[2] Department of Soil, Water and Environment, University of Dhaka

Our Focused Key Points.....

What is Nanotechnology:

Nanotechnology is the engineering of functional systems at the molecular scale. It is the creation and use of materials or devices at extremely smaller scale.

In more technical terms the word "Nano" means 10^{-9} or one billionth of something.

Application of Nanotechnology:

Nanotechnology (NT) is an emerging field in "Agricultural Research"

It has potential to revolutionize agriculture and food systems!

Our motivation: Development of "Slow Release Nano Fertilizer"

❶ The emerging nano strategies indicate that due to the high surface area to volume ratio, **nano fertilizers** would be a revolution in the field of agriculture

Our motivation: Development of "Nano Fertilizer"

❷ Excessive use of chemical fertilizers causes serious environmental hazards as only a fraction is really absorbed by the plants. About **40–70% of nitrogen** and **80–90% of phosphorous** of the applied normal fertilizers are lost to the environment and could not be absorbed by crops, which not only causes large economic and resource losses but also very serious environmental pollution.

Our motivation: Development of "Nano Fertilizer"

❸ A great deal of research has already been shown that use of **slow or controlled release nano fertilizers** could effectively check these problems, avoiding or decreasing the loss of normal fertilizers and the environmental pollution.

So.....

Considering the above facts, in **BCSIR** we have focused on to developing slow release **nano fertilizers**, (incorporating into porous ceramic materials, *e.g.* zeolite and hydroxyapatite etc.) which would be a significant step in the context of fertilizer consumption efficiency in Bangladesh.

Our Methodology

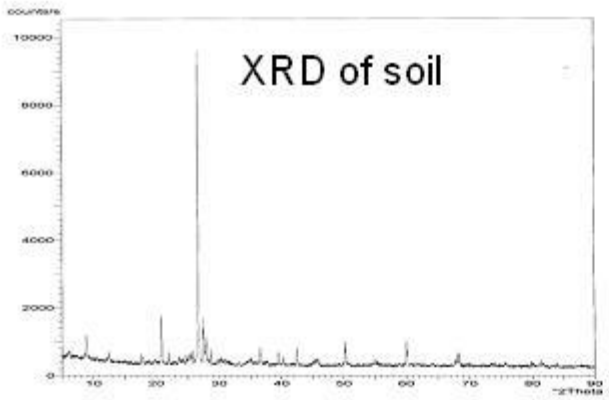
1. **Urea** and **K_2SO_4** were incorporated into the pores of commercially available **zeolite**

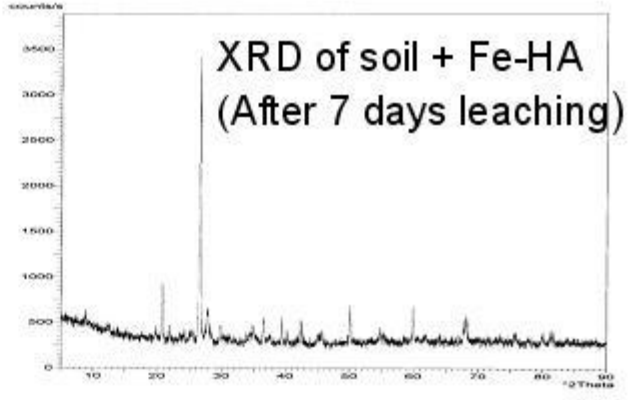
2. **Ca-hydroxyapatite (HA)** was synthesized from egg shell incorporating **urea and macro/micro nutrients (Fe, K and Zn)**

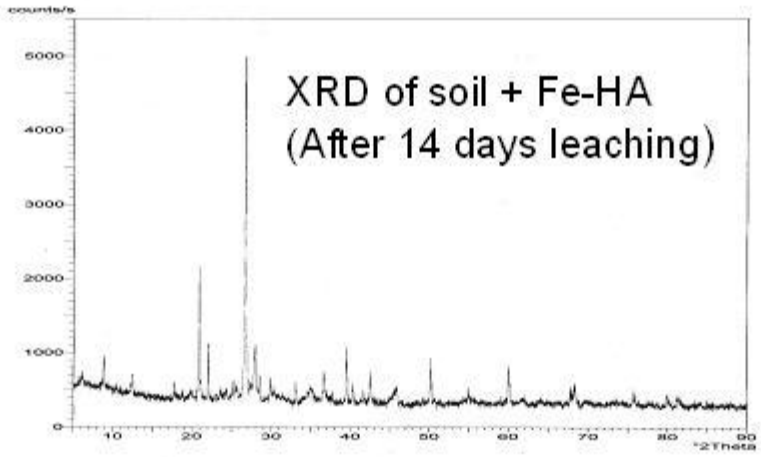
Soil Experiment

- The nano-materials were incubated into potted soils for 7 and 14 days
- The soils were kept moist at Field capacity over the incubation period
- At the end of each incubation period, samples were analyzed for Fe and P
- Soil samples before and after incubation were subjected to analysis

Release of micro nutrient (Fe) in Soil: XRD observation







Release of micro nutrient (Fe) in Soil: AAS observation

Sample	P content (mg/kg)	Fe content (mg/kg)
Soil	06	251

Sample	P content (mg/kg)		Fe content (mg/kg)	
	7 days	14 days	7 days	14 days
Soil + Fe-HA (110°C)	12	16	311	1050
Soil + Fe-HA (300°C)	11	30	275	1125
Soil + Fe-HA (600°C)	**06**	**14**	**295**	**1010**
Soil + Fe-HA (900°C)	10	22	239	1010

Our Observation:

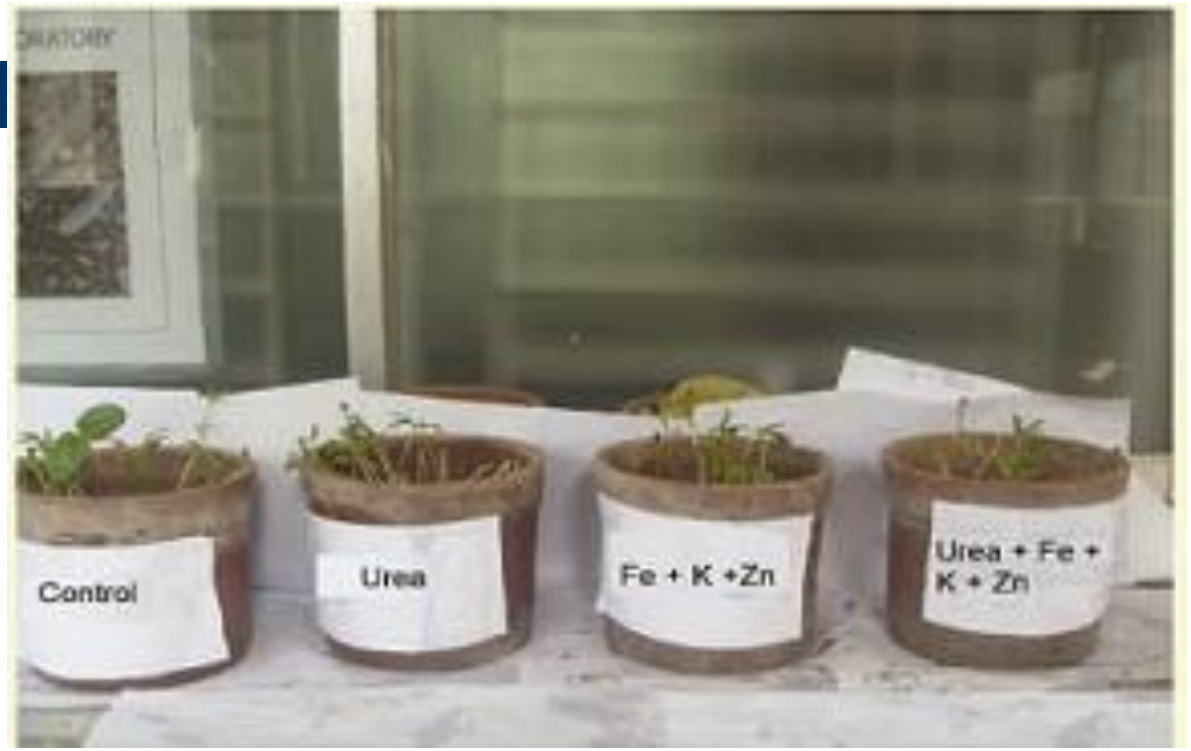
The results so far revealed that the present experimental protocol favors the slow release of micronutrients into the soil

The Result is encouraging

What's going on now?

1. Experiment with plant growth

2. Synthesis of biodegradable polymer coated nano fertilizers



Plant growth

Conclusion:

1. Development of slow release nano fertilizer will be a significant step in the context of Bangladesh and other developing countries

2. Slow release nano fertilizer will reduce fertilizer consumption as well as environmental pollution

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So……

Let's have a green environment !

THANK YOU All