Biogeosciences Discuss., 12, C2965–C2969, 2015
www.biogeosciences-discuss.net/12/C2965/2015/

Biogeosciences
Discussions
Open Access

Interactive comment on "Phosphorus release capacity of soluble P fertilizers and insoluble rock phosphate in response to phosphate solubilizing bacteria and poultry manure and their effect on plant growth promotion and P utilization efficiency of chilli (*Capsicum annuum* L.)" *by* M. K. Abbasi et al.

M. K. Abbasi et al.

kaleemabbasi@yahoo.com

Received and published: 19 June 2015

Reply to the Anonymous Referee #2 Overview: The study examined the effect of poultry manure (PM) and PSB on efficiency of rock phosphate (RP), soluble P fertilizers (SSP and di-ammonium phosphate, DAP) on the capacity of a soil to release P, growth, yield, P-uptake and P utilization efficiency (PUE) of chilli (Capsicum annuum L.) grown

under greenhouse conditions. Given the importance of find ways to improve the PUE in agricultural systems to increase yields and to reduce the P footprint in the environment, this type of studies are of high relevance.

General comments: 1) The title could be more concise, for example: Effect of phosphate solubilizing bacteria and poultry manure on plant growth and P utilization efficiency of Chilli (Capsicum annuum L.). Reply: The title is changed. However, the emphasis on P mineralization in this study cannot be neglected/ignored. Our major emphasis in this study is to know the effect of PSB and PM on changes in P release capacity (mineralization) of added P sources especially the RP. That is an important aspect how to utilize a cheap and easily available source of P i.e. RP for the benefits of Agriculture? Therefore, I feel that the amended title is now appropriate. 2) The soil used for the study showed initial pH values of 7.57 (lightly alkaline). There is evidence that in this type of pH, the phosphate could be in a complex form with Calcium. Therefore, some data is desired on Calcium and Magnesium contents. Please include this aspect on the discussion section. Reply: The concentration of Ca, Mg and CaCO3 in the soil used in the study have been included in Table 1. The possible effect of Ca on P availability has been included and discussed on Page 11 Lines 302-305. 3) RP works best in acidic soils, then what the purpose of evaluate RP in the selected (slightly alkaline) soil? Reply: Yes! Under acidic soils, RP works best and can be applied directly to the soil. On the other hand because of low or negligible efficiency of RP in neutral or alkaline soils, application of RP with different amendments have been successfully tried in the past to improve the efficacy of low grade phosphate rocks. Therefore, in this study RP along with PSB and organic manures was tried on the basis of the facts that both PSB and organic manures may release low molecular weight organic acids and generated the acidic environment in the rhizosphere which may affect P release capacity of the soil. The detailed explanation is give in the introduction section Page 03Lines 66-78. Two important papers are cited here (included in the Reference section) for Reference. 1: Toor, G.S.: Enhancing phosphorus availability in low-phosphorus soils by using poultry manure and commercial fertilizer, Soil Sci., 174, 358–364, 2009. (pH

of the soil used in the study was 7.9). 2: Begum, M., Narayanasamy, G., and Biswas, D. R.: Phosphorus supplying capacity of phosphate rocks as influenced by compaction with water-soluble P fertilizers, Nutr. Cycl. Agroecosyst., 68, 73–84, 2004. (pH of the soil used in the study was 8.5). 4) What was the logic behind the mixtures of treatments of 50%:50%? Reply: The logic behind the Combinations of 50:50 is to make comparison with full dose treatments to examine the efficiency of either RP or PSB or PM if these added amendments or combinations may give results equivalent to full dose. These combinations give very important findings presented in Table 5, Figures 1 and 3.

5) Did you measured the basal level of PSB of the evaluated soil? It would be important to determine the effect of the basal PSB present in the soil in the capacity to release phosphorous. Consequently, autoclaved soil would be an option in order to differentiate the PSB treatment as the soil used could have had a native PSB activity. Hence, fungi and mycorrhizae play a role in P mobilization affecting the P use efficiency. Reply: The basal level of PSB of the evaluated soil was not measured because we do not have this facility in our Lab. However, the most probable number of the soil used in the study was measured those were 8.0 x 106 CFU g-1 soil. The study presented here covers all aspects of the title and objectives of the work, therefore my request is to ignore this point. The study presented here is the work conducted by an MPhil student who after completing here degree had left this University. Further, additional study will not be possible. 6) As the value of organic matter is low in the soil used for the study, could this be a reason for the low solubilization of phosphorus that is retained in the soil? Please discuss. Reply: Yes! Organic matter plays an important role in P solubilization through the acidifying and chelation mechanisms. The low organic matter in our soil may be an important factor for low P solubilization/availability. This point has been added and discussed in Discussion section on Page 12 Lines 307-309. 7) What do you think is the reason behind the high levels of phosphorus in the day 0 of the incubation study. In fact for some treatments this time point show the highest P levels when compared to the other time points. Please discuss. Reply: This is a common

trend for all phosphatic fertilizers applied to soil. Please see the paper Begum et al. (2004). The reason behind the lower level of P with incubation timings is the possibility of P fixation and retention in soil with incubation periods. The discussion has already been made on Page 11 Lines 300 to 303.

8) What were the criteria to select Chilli to perform the study? Reply: Chilli was used as a test crop because of its popularity among the farming community of the region and its daily use in every kitchen. Specific Comments: 1) Page 1840, line 9: Correct soil type named as sandy loam, according to Table 1 is loam. Reply: The soil type is loam according to the data presented in Table 1. Correction has been made as suggested on Page 1 Line 11. 2) Please correct the pH value in Table 1 according to Table 2. Reply: The pH value has been corrected as mentioned in Table 2. 3) Please correct the phosphorus value of Table 1 with the data of Table o 3 of the soil incubation test. Reply: Corrected as suggested 4) Page 1844 Materials and Methods section 2.1 line 10, having discussion on complexation with iron and aluminum and this binding occurs more in acidic soils, that is not the case of soil in this study. Reply: From the discussion section sub-section “P release capacity of added amendments” the explanation of iron and aluminum and this binding effects under acidic soils have been deleted as suggested. However, in the introduction section, the reasons for Low P availability has been discussed where under both acid and alkaline conditions have been discussed which is fine. Page 5) Please name treatments T0. . . T11 in the tables as named in figure 1. Reply: In Figures T0, T1 –T11 is written so these symbols have been explained while in the Tables Treatments names have been fully written. Therefore, there is no need to further explanation in the Tables.

In addition to above amendments, the manuscript has fully been reviewed and the English language of the draft has been improved by a native English scientists cited in the Reference section i.e. G. S. Toor, Soil and Water Quality Laboratory, Gulf Coast Research and Education Center, University of Florida–Insititute of Food and Agricultural Sciences, 14625 C.R. 672, Wimauma, FL, USA. Hopefully the manuscript will now be

accepted for publication

Regards

Prof. M. Kaleem Abbasi

Please also note the supplement to this comment:
http://www.biogeosciences-discuss.net/12/C2965/2015/bgd-12-C2965-2015-supplement.pdf

---

Interactive comment on Biogeosciences Discuss., 12, 1839, 2015.