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Abstract:	Use efficiency of P applied through water soluble fertilizers hardly exceeds 20% under well managed agriculture. Use of these water soluble fertilizers results in a massive wastage of applied P which causes a huge economic loss to the farmers and also pollutes the aquatic environment. Hence, there is an urgent need to develop an efficient P delivery system to reduce the loss of applied P by fixation in soil components to a great extent. In the present investigation, super absorbent P loaded nano-clay polymer composite (NCPC), nano-clay bio polymer composite and self-polymerizing natural oil coated DAP (OC-DAP) were prepared. Bentonite clay was used for the preparation of the products. Acrylic acid was replaced by starch @ 10 (NCBPC1), 20% (NCBPC2), 30% (NCBPC3), 40% (NCBPC4) and 50% (NCBPC5) by wheat flour in NCBPC to reduce the cost of clay polymer composites. X-ray diffraction analysis confirmed that the clay polymer composites synthesized were of exfoliated type. As high as 11.8% P could be loaded in NCBPC1 which was at par with NCBPC2 (11.6%). Synthesis of NCBPC4 and NCBPC5 took a lot more time as compared to other NCBPCs. The prepared products became very hard after drying. Very less amount of P could be loaded in these products (7.8 and 7.2%, respectively). Thus, these two products were not included in release study. The NCPC, NCBPC1, NCBPC2 and NCBPC3 were compared with standard DAP fertilizer in terms of release behaviour of P in acid (pH 4.4, available P 5.52 kg ha-1) and alkaline (pH 8.2, available 11.4 kg ha-1) soils. Phosphorus was added @ 100 mg kg-1 through the selected NCBPCs, all OC-DAPs and DAP. Minimum cumulative release of P (CRP) was recorded with NCPC, followed by NCBPC1 and NCBPC2 in both the soils. The NCBPC2 was selected for evaluation in greenhouse pot experiment as it is cheaper than NCPC and NCBPC1. The CRP from OC-DAPs was in the range of 7.60 to 15.0% in acid soil and 11.2 to 19.7% in alkaline soils. As the release of P from OC-DAPs was very low, the OC-DAP2 was selected for further evaluation because it produced the highest CRP among others. In a greenhouse pot experiment, the performance of P loaded NCBPC2, OC-DAP2 and DAP fertilizer was evaluated using wheat as test crop. Results indicate that, NCBPC2 and OC- DAP2 were able to provide higher P as compared to DAP fertilizer which was reflected in biomass yield of crop. Biomass yield at 100% recommended dose of P (RDP) applied 58 through DAP fertilizer was at par with 75% RDP applied through NCBPC2 and OC-DAP2 in acid soils (6.83 and 7.17 g pot-1 , respectively). Whereas, in alkaline soil, 50% RDP applied through NCBPC2, 75% RDP applied through OC-DAP2 and 100% RDP applied through DAP fertilizer were statistically at par in enhancing the biomass yield of wheat over control. Thus, 25-50% of rate of application could be curtailed using P loaded NCBPC. Hence, use of slow release P fertilizer products i.e. P loaded NCBPC and OC- DAP opened up a frontier area of research on enhancing use efficiency of applied P which needs further evaluation under field condition
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