

Supplementary Material

Boosting nitrogen fertilization by a slow releasing nitrate intercalated biocompatible layered double hydroxide-hydrogel composite loaded with *Azospirillum brasilense*

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In our work, the release of nitrate is shown in relative proportion rather than in absolute manner. The % nitrate released was determined with respect to the original nitrate content intercalated in the ZLDH and C-3 samples. It is mentioned that the ZLDH sample contains 11.83 % (w/w) nitrate content. During nitrate release studies, 350 mg of the sample was taken. Thus, this amount of ZLDH sample contains 41.405 mg intercalated nitrate. Likewise, the C-3 composite sample contains 5.39 % (w/w) nitrate content. 350 mg of the sample was used during experiment, so this amount of sample contains 18.86 mg of intercalated nitrate. To these initial quantities of nitrate intercalated, the amount of nitrate released from the test sample was compared at different time intervals to obtain % nitrate release values.

From the release studies, in neutral medium, it was observed that in milli Q water, 35.638 mg (86.00474%) of the nitrate content was released whereas 5.767 mg (13.995%) of nitrate was retained on the 30th day. In distilled water and carbonated water, the retained nitrate content was observed to be 3.407 mg (8.227%) and 0.504 mg (1.218%) respectively. Thus, this clearly indicates that ZLDH retained least intercalated nitrate content in carbonated water because of greater displacement of nitrate by abundant carbonate ions present. The retention amount raised in milli Q and distilled water because of displacement of nitrate due to the presence of atmospheric CO₂. While comparing the nitrate released from ZLDH and C-3 samples in neutral and acidic media, it was found that ZLDH retained 3.466 mg (8.227%) of the nitrate in neutral medium and

0 % of the nitrate content in acidic medium. The composite C-3 sample, however, exhibiting better performance, retained 2.744 mg (14.545%) in neutral medium and 1.798 mg (9.53%) of the total nitrate content on the 30th day of observation.

The nitrate release from the samples in respective media is expressed in terms of absolute value in the following figure.

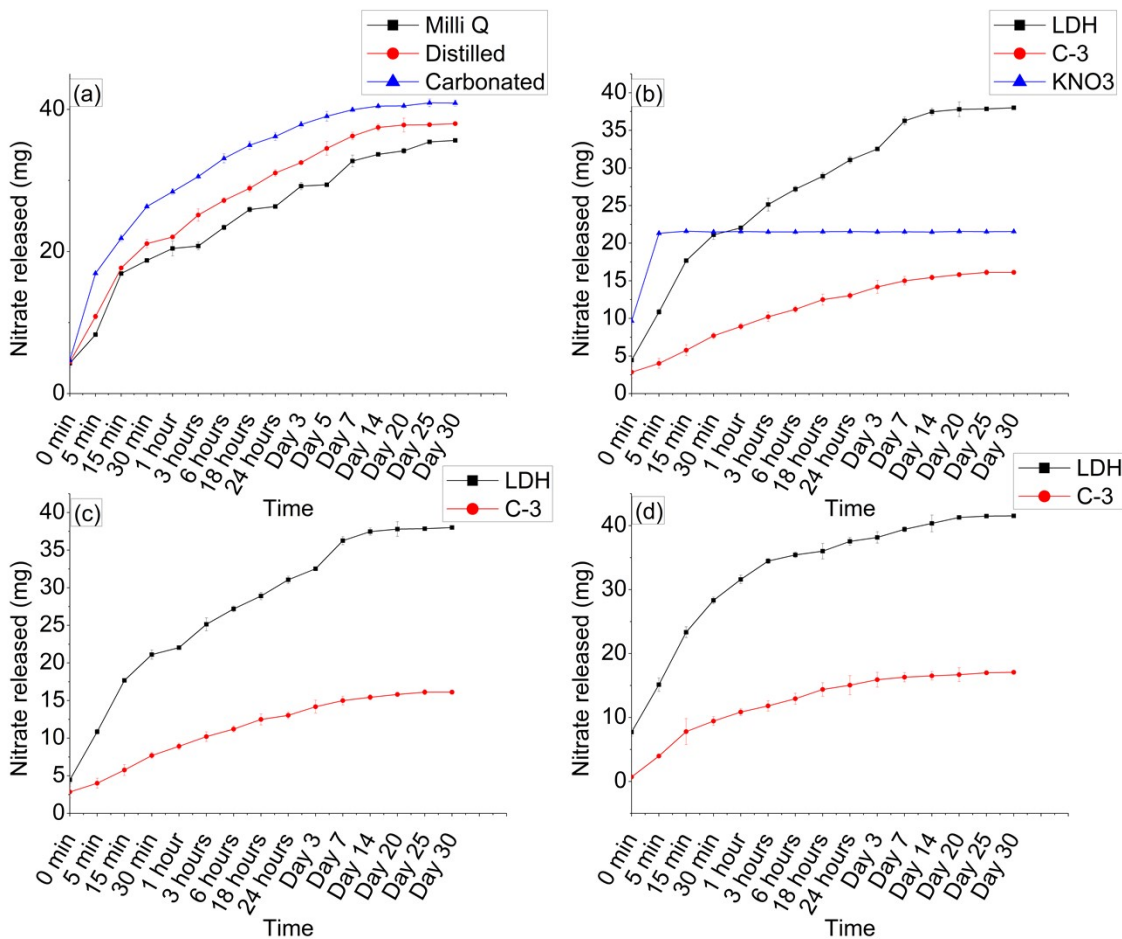


Fig. S1. Nitrate release profile (in absolute values) for (a) ZLDH in milli Q water, distilled water and carbonated water, (b) ZLDH, composite C-3 and KNO₃ solution in distilled water at pH-7, (c) and (d) ZLDH material and C-3 composite in neutral and acidic medium, respectively.

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