

Article title	Fertilizer deep placement increases nitrogen use efficiency and rice productivity
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Abstract	<p>Increasing nitrogen fertilizer application has increased crop productivity and met the food demands of growing populations, but its use efficiency is very low. More than 50% of applied nitrogen is not utilized by crops, posing huge economical costs and environmental concerns. Therefore, fertilizer management should consider optimum time, rates, source and methods of application (the “4Rs” of nutrient stewardship) to increase use efficiency, crop yield, soil health and farm profits and to reduce negative environmental effects. Fertilizer deep placement (FDP) is one of the best currently applicable management techniques to achieve these multiple benefits. Experiments were conducted at different locations of Bangladesh to determine the effects of urea deep placement (UDP) and multi-nutrient fertilizer briquette (NPK) deep placement vs broadcast prilled urea (PU) on rice yields, nitrogen use efficiency and nitrogen losses including floodwater ammonium, ammonia volatilization and nitrous oxide emissions. Deep placement of both urea and NPK briquettes in dry (Boro) season increased grain yields. Across the years, the average observed yield increase was 30% compared to broadcast PU. Deep placement significantly reduced nitrogen losses compared to broadcast PU. Broadcast PU resulted in higher amounts of ammonium in floodwater and ammonia volatilization, both of which were negligible in deep placed treatments. Moreover, UDP reduced nitrous oxide emissions by 70% as compared to broadcast PU. In Bangladesh, fertilizer briquettes are produced by micro-enterprises and applied manually in fields. This approach is effective in small scale farming where household labour is sufficient for cultivation but requires modifications to work in larger scale farming systems where labour availability is an issue. Due to the increasing trend of labour outmigration, availability of labour has become one of the major issues of FDP adoption. Another issue relates to the non-availability of fertilizer briquettes throughout the country. Therefore, for large scale dissemination in other countries such as China and India, where greater N use efficiency gains can be realized, government and/or private sector actors must work together to promote wide-scale adoption by farmers through industrial-level briquette production and mechanized on-farm application.</p>
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