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Select Theme	: Climate change and environmental sustainability
Endorsement email	:
Keyword 1	: Climate smart agriculture
Keyword 2	: Adaptation to climate change
Keyword 3	: Soil, water, and air pollution
Title of Entry	: Climate smart fertilizer management in rice cultivation under stress prone areas for food security and mitigating greenhouse gas emissions
Presenting author	: Yam Kanta Gaihre
Presenting author email	: ygaihre@ifdc.org
Co author 1	: Upendra Singh2, Mohammed Hasnain1
Co author 2	: Myint Aung3, Bandhu Raj Baral4,
Affiliation presenting author	: International Fertilizer Development Center (IFDC), Bangladesh
Affiliation 1	: 2-International Fertilizer Development Center (IFDC), Muscle Shoals
Affiliation 2	: 3- Fertilizer Sector Improvement Project, Myanmar and 4- Agriculture and Forestry University Chitwan,Nepal
Select only one type of presentation	: 15 minute oral presentation
Abstract	: More than 50% of applied nitrogen is not utilized by crops, posing huge economical costs and environmental concerns. Fertilizer management is more challenging for rice cultivation in stress-prone environments subject to drought, submergence, and salinity. Farmers in these areas have poor control over water and fertilizer application. For conventional broadcast application of nitrogen, farmers are often unable or unwilling to apply the follow-on splits. Fertilizer deep placement (FDP) could be a better alternative since it could be done before or at planting, ensures higher use efficiency due to reduction of losses (runoff and ammonia volatilization). FDP eliminates the need for additional split applications of urea and ensures higher yields. While FPD has proven its multiple benefits under favorable irrigated rice cultivation, but its effects under stress prone environments are still lacking. Multi-location experiments were conducted under drought, submergence and saline conditions in Bangladesh, Nepal and Myanmar to determine the effects FDP vs broadcast prilled urea (PU) on rice yields, nitrogen use efficiency and economic returns. Effects on nitrogen losses including floodwater ammonium, ammonia volatilization and nitrous oxide (N2O) emissions were measured in on-station trials in Bangladesh. Across the countries and stress environments, FDP increased grain yields and nitrogen use efficiency significantly compared to broadcast PU. Under drought condition, FDP increased grain yields by 12% (Bangladesh) to 21% (Nepal) compared to broadcast PU. Similarly, under saline condition, yield increment ranged from 10% (Bangladesh) to 40% (Myanmar) while saving urea fertilizer by up to 50%. Similar yield benefits and fertilizer saving were observed under submerged condition in Bangladesh and Myanmar. FDP 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 FDP treatments. Moreover, FDP reduced nitrous oxide emissions by 70% as compared to broadcast PU. These results confirm that FDP is equally effective if not more under stress environments than under favorable environment. FDP, in addition to saving N fertilizer and increasing crop productivity, reduces N losses as ammonia volatilization and greenhouse gas N2O emissions, could be considered a climate smart fertilizer management practice.

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