

# Biological Mitigation of N<sub>2</sub>O Emission through Application of Plant Based Nitrification Inhibitors in Wheat Field

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**Abstract**—Two year field experiments were done to assess the efficacy of three different plant residues, fresh neem (*Azadirachta indica*) leaves (NL), green manure (*Sesbania aculeata*) (SA) and used tea leaves (TL) along with Calcium carbide (CC) and NPK on N<sub>2</sub>O emission from wheat field. Their possible nitrification inhibiting properties were compared with known nitrification inhibitor calcium carbide (CC). Several soil and plant attributes like soil organic carbon, plant photosynthesis and grain productivity were also studied. The plant residues were applied along with recommended dose of NPK in soil. Application of used TL at the rate of 5 t ha<sup>-1</sup> in combination with NPK resulted in substantial reduction in N<sub>2</sub>O emission and improved agronomic yield over control (NPK) application alone. In comparison to corresponding control (NPK), the seasonal cumulative N<sub>2</sub>O emission decreased by 13% and 10% in NL and 14% and 26% in TL during 2012-13 and 2013-14 respectively. Highest grain yield was recorded at SA (1.81 t ha<sup>-1</sup>) with efficient increase in grain bearing productive tillers per unit area over control (NPK). Addition of plant residues in combination with conventional fertilizer (NPK) revealed that plant based materials can help in reducing N<sub>2</sub>O emission from wheat agriculture without affecting the agronomic productivity of the crop.