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Standard Operating Protocol (SOP) for Utilisation of Methanotrophs Formulation in Rice Systems to Mitigate Methane Emissions

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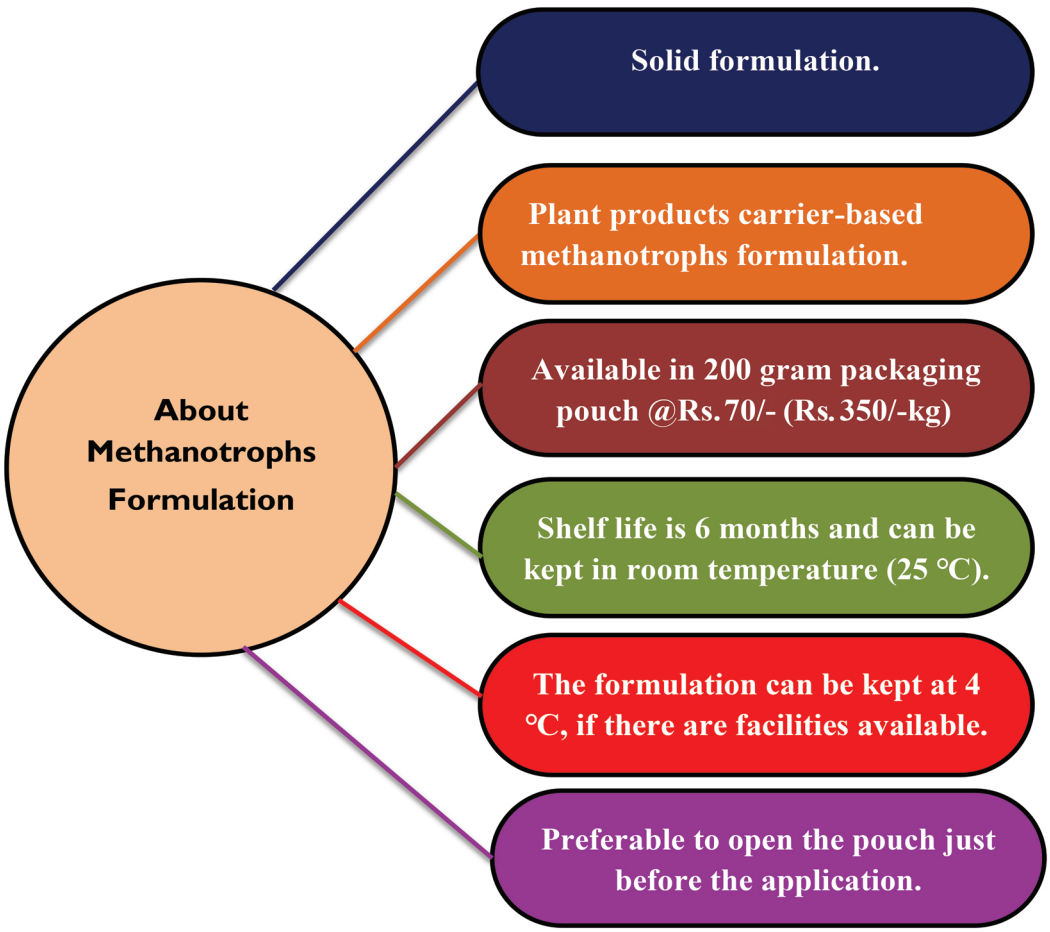
Introduction

Rice is a major contributor to India's total food grain production, cultivated across 44.6 million hectares. Irrigated rice fields in India are responsible for approximately 3.97 teragrams (Tg) of methane emissions annually, accounting for about 25-30% of the total methane emissions in India. To achieve the net-zero emissions target in agriculture by 2070, it is crucial to reduce methane emissions as part of the climate change mitigation approach. In this context, methanotrophs formulation offers an environment-friendly and sustainable technology that can be easily adopted by farmers and scaled up in Indian rice cultivation. The Plant products carrier-based methanotrophs formulation, developed by ICAR-NRRI in Cuttack, and the bacterial strain registered with NCBI (Accession number: MZ683316). The solid formulation product is currently awaiting patent approval (Application No. 202211063833). Following extensive laboratory and multi-location field trials, the formulation is now ready for commercialization and large-scale adoption at the state and national levels. Details about the formulation and the Standard Operating Protocol (SOP) for its application in rice fields are provided in this bulletin.



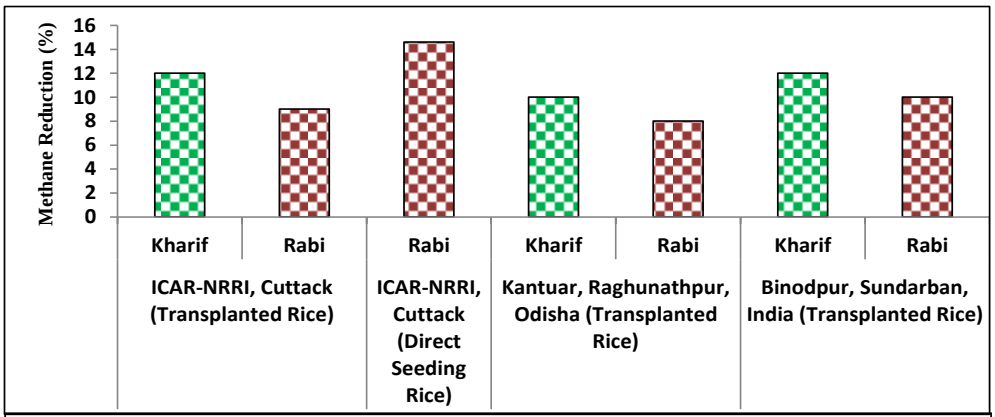
Application Protocol of Methanotrophs Formulation

Formulation Type	Solid
Composition of the formulation	Plant products carrier-based methanotrophs formulation
Doses of the formulation	1 Kg per acre in both *kharif* and *rabi*
Rate of application	7^{th} & 21^{st} days after transplanting of rice in both *kharif* and *rabi* seasons
	28^{th} & 45^{th} days after direct seeding of rice in both *kharif* and *rabi* seasons
Ponding water depth in field during application	Should be less than 2 cm
Mode of application	Broadcasting by mixing with inert material like dry sand (9-11 Kg) per acre
Irrigation after application	2-3 days after the application of formulation
Preferable field condition	Works best in weed free field
Precaution	Not to use during rain

Field Application and Validation

The field trial was done in both *kharif* and *rabi* seasons in different locations of Odisha and West Bengal and was found to reduce 10-12% of the CH_4 emissions as compared to control (RDF: without methanotrophs formulation) from rice-rice cropping systems.

1. ICAR-NRRI, Cuttack- Low land rice ecology Variety Used: Swarna Sub-1, CR Dhan-210
2. Kantuar, Raghunathpur, Odisha-Low-land rice ecology: Variety Used: Swarna Sub-I
3. Binodpur, Sundarban, WB- Low-land rice ecology: Variety used: Sonachur



Application of Plant products carrier based methanotrophs formulation in rice cropping systems at various locations

Acknowledgment

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Plant products carrier-based methanotrophs formulation

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