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UNIVERSITÀ DEGLI STUDI DI SASSARI



# II CONVEGNO **AISSA #UNDER40**

» **Sassari, 1-2 luglio 2021** «

**BOOK OF ABSTRACT**

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**#P41 Life Cycle Assessment of alternative water managements for rice cultivation**

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Italian rice production is one of the most important Italian agri-food sectors. However, cultivation of rice is one of the cultivation systems with the highest environmental impact, due to the flooding cultivation. This condition involves the degradation of organic matter in anaerobic conditions and the emission of methane that is responsible for about 40-55% of the total impact in terms of climate change.

The aim of this study, that is included in BESTsomeRICE project – Development of a flooding management protocol to reduce greenhouse gas emissions in paddy fields, is to demonstrate how an alternative flooding management, characterized by an additional aeration period, can reduce methane emission and carbon footprint of Italian rice production for a greater environmental sustainability. To this purpose, a Life Cycle Assessment methodology was applied with a from cradle-to-farm gate perspective. The environmental impact of the production of two rice varieties (Carnaroli and Caravaggio) grown in 3 farms in Lomellina was analyzed. In detail, the environmental profile of two different water management systems were compared (traditional and alternative). The environmental profile was analysed in terms of 12 different impact categories: climate change (CC), ozone depletion (OD), particulate matter (PM), human toxicity – non cancer effects (HT-noc), human toxicity – cancer effects (HT-c), photochemical ozone formation (POF), terrestrial acidification (TA), terrestrial eutrophication (TE), freshwater eutrophication (FE), marine eutrophication (ME), freshwater ecotoxicity (FEX), and mineral and fossil resource depletion (MFRD).

Alternative flooding management decreases emissions of CH<sub>4</sub> in all scenarios evaluated (from 15% to 52%), resulting in a reduction in Climate Change of paddy production (from 12% to 32%). Furthermore, the alternative water management does not negatively affect grain production in terms of quantity and quality.



### ***Analisi del ciclo di vita di differenti gestioni della sommersione in risicoltura***

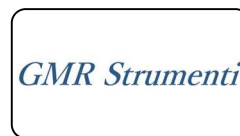
La risicoltura italiana rappresenta uno dei settori agroalimentari italiani d'ecceellenza. Tuttavia, il sistema risicolo è uno dei sistemi di coltivazione a maggiore impatto ambientale, a causa della coltivazione in sommersione che lo contraddistingue. Questa condizione, con la conseguente degradazione della sostanza organica in anaerobiosi, comporta l'emissione di quantità notevoli di metano, responsabili di circa il 40-55% dell'impatto totale in termini di riscaldamento globale.

Questo studio, inserito nel progetto "BESTsomRICE - Messa a punto di un protocollo di gestione della sommersione in risaia per la riduzione delle emissioni di gas ad effetto serra" ha lo scopo di dimostrare come una gestione irrigua alternativa, caratterizzata dall'aggiunta di un'asciutta, possa ridurre le emissioni di metano e, quindi, l'impronta di carbonio della produzione del riso italiano, al fine di garantire una maggiore sostenibilità ambientale. È stata applicata la metodologia *Life Cycle Assessment*, con un approccio *from cradle to-farm-gate*, per la valutazione dell'impatto ambientale della produzione di due varietà di riso (Carnaroli e Caravaggio) in tre diverse aziende della Lomellina, coltivate applicando sia la gestione idrica tradizionale, sia quella alternativa. Il profilo ambientale delle produzioni è stato analizzato considerando 12 categorie di impatto differenti: impronta di carbonio (CC), assottigliamento strato di ozono (OD), tossicità umana – effetti non cancerogeni (HT-noc), tossicità umana – effetti cancerogeni (HT-c), formazione di particolato (PM), formazione di smog (POF), acidificazione (A), eutrofizzazione terrestre (TE), eutrofizzazione acque dolci (FE), eutrofizzazione marina (ME), ecotossicità delle acque dolci (FEx), consumo di risorse abiotiche (MFRD).

L'analisi mostra che la gestione alternativa proposta riduce le emissioni di metano in tutti i casi analizzati (dal 15% al 52%) determinando una riduzione dell'impronta di carbonio della produzione di risone che varia dal 12% al 32%. Il sistema proposto non ha influenzato quantitativamente e qualitativamente la produzione, riducendo, in 2 casi su 4, anche tutti gli altri impatti ambientali valutati.

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