



Environmental Impact Assessment of Rice Cultivation in Da Nang, Vietnam – Options for Sustainable Production Systems

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Problem and Objective

- Rice is the main staple food in Vietnam, which occupies the biggest share of the agricultural areas.
- This also applies to the environs of the city of Da Nang, located in the central region of Vietnam.
- The overuse of inputs, in terms of fertilizers, pesticides, and water in the rice production systems resulted in environmental issues and also health problems for the population.
- The main objective of this study was to assess the environmental impacts of the traditional rice-farming system in Da Nang, Vietnam.

Material and Methods

- The environmental impacts was analyzed following standards ISO 14040 and ISO 14044, Fig.1.
- Potential scenarios were modelled and evaluated based on the functional unit (FU) of 1 kg harvested rice.
- The environmental impacts of the scenarios were evaluated regarding the global warming potential (GWP), the primary energy demand (PED), the eutrophication potential (EP) and the water consumption (WC), Fig. 2.

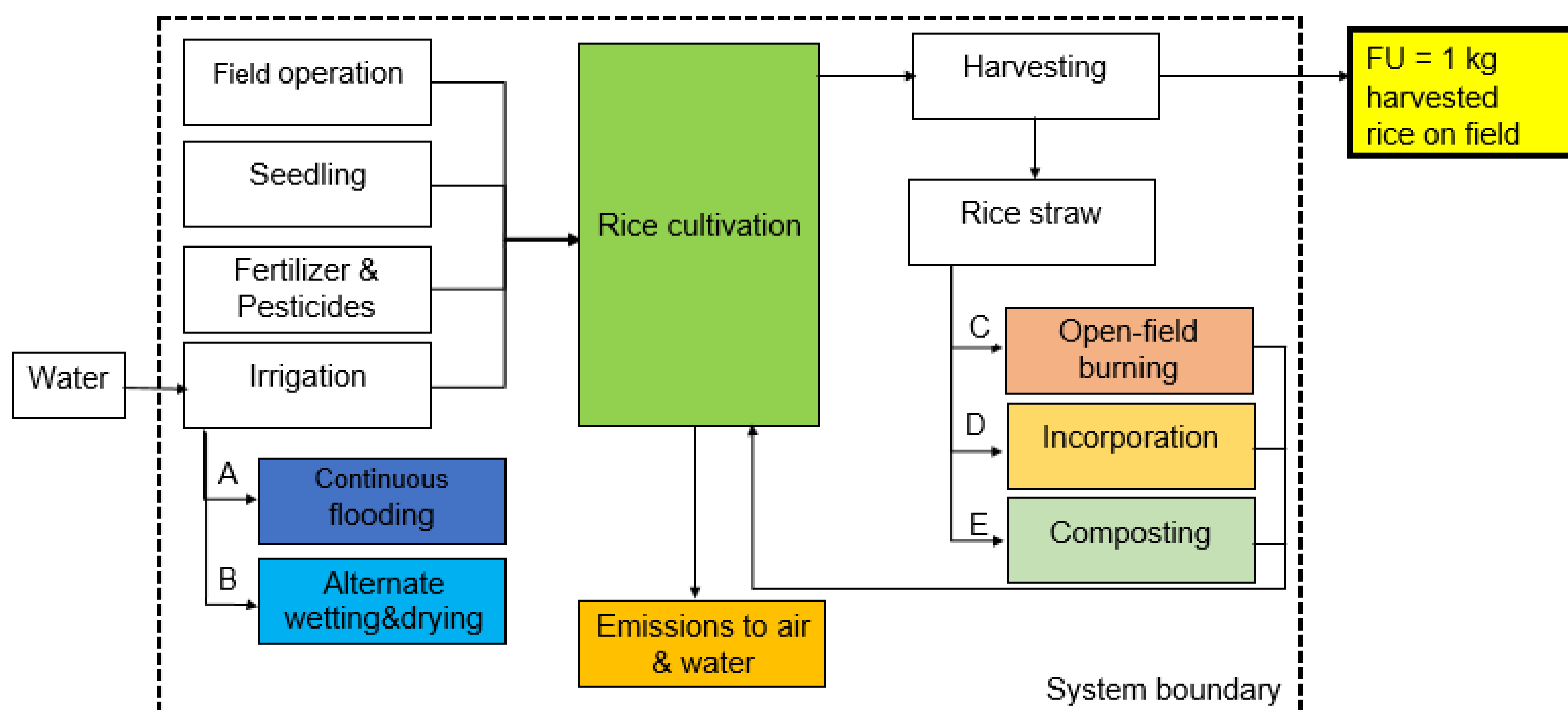


Fig. 1 System boundaries of the LCA model

Table. 1 Alternative rice farming scenario

Code	Scenario	Water and straw management
BA	Baseline	A
BA-I	Baseline with straw incorporation	A, D
AWD	AWD	B
AWD-I	AWD with incorporation	B, D
SB	Straw burning on field	A, C
SC	Straw composting	A, E

Results

- The GWP showed advantages when applying alternate wetting and drying. Incorporation of residues resulted in a higher GWP in the pairwise comparison with the baseline and the AWD scenarios. Burning (1.12 kg CO₂-eq FU⁻¹) and composting (1.76 kg CO₂-eq FU⁻¹) of rice straw resulted in the highest GWP, Fig 2.

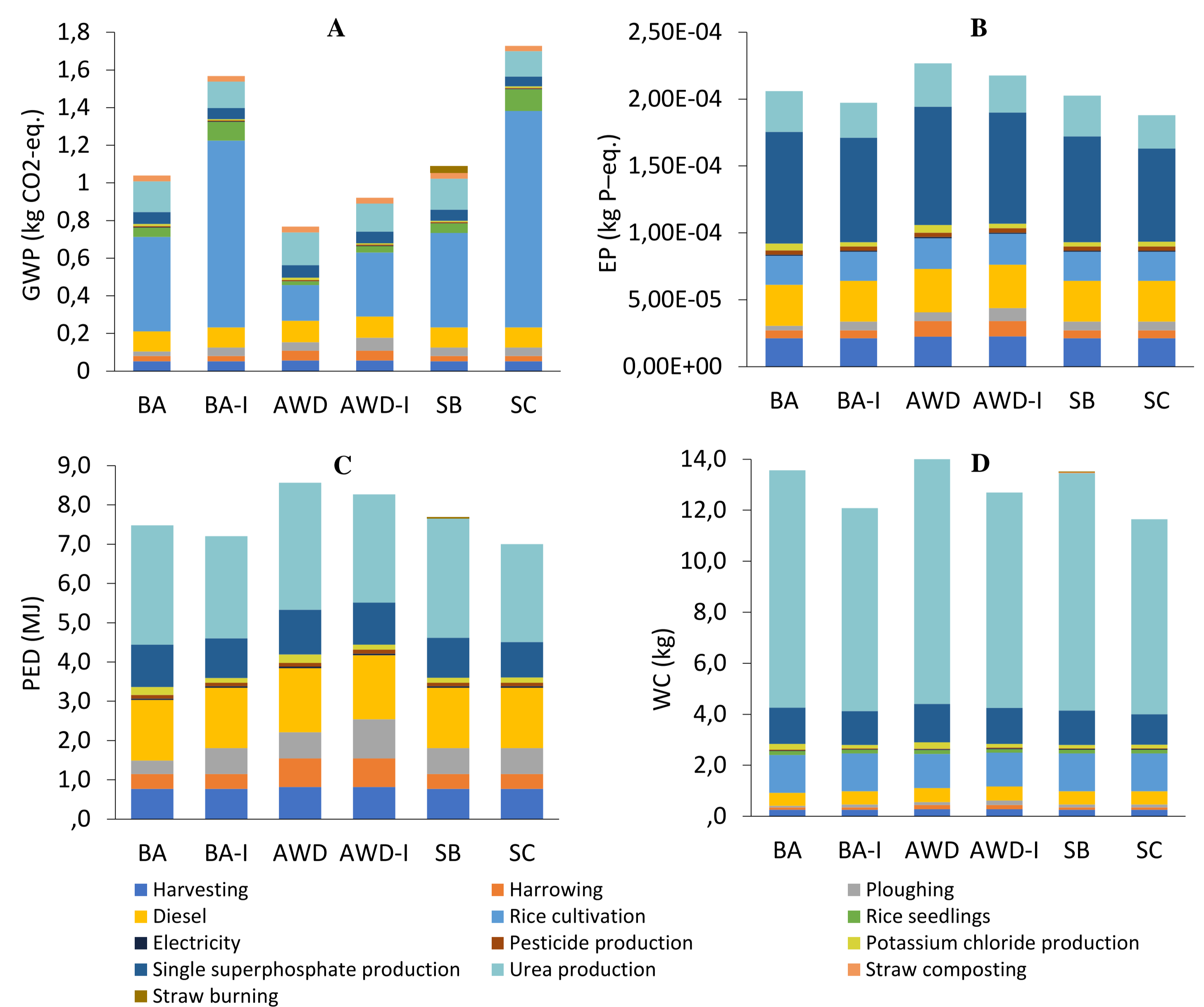


Fig. 2 LCA results of: (A) Global Warming Potential GWP, (B) Eutrophication Potential, (C) Primary Energy Demand PED and (D) Water Consumption

- The EP indicated that an incorporation of residues or application of composted straw have positive effects. This also applies for the PED and the WC.

Conclusions

- The results show complex interlinkages and tradeoffs in both, within and between the chosen impact categories.
- Applying alternative rice cultivation systems can result in a lower GWP, but causing a higher WC, PED or EP instead, highly dependent on the local conditions.

