

# Rotational rice and fish farming as an alternative to rice mono-culture system in the mekong delta, Vietnam: Economic and environmental considerations



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## Introduction

- Intensification of rice farming causes rice soil degradation, pest and disease outbreaks. Furthermore, the 3<sup>rd</sup> rice crop in the flood-prone areas is adversely affected by flooding (Fig. 1).
- A hypothesis is that 2 rice crops rotated with a fish crop (2R-F) could replace the commonly practiced 2 or 3 rice mono-culture (RM) systems.

Cropping pattern	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
2 rice crops	1 <sup>st</sup> crop			2 <sup>nd</sup> crop			Flooding season					
3 rice crops	1 <sup>st</sup> crop			2 <sup>nd</sup> crop			3 <sup>rd</sup> crop					
2 rice crops - 1 fish crop	1 <sup>st</sup> crop			2 <sup>nd</sup> crop			Fish crop					

Fig. 1: Rice and fish cropping calendar in the flood-prone areas in the Mekong Delta, Vietnam

## Results & Discussion

- Rice and fish production
  - Fish yielded 1.1 tons ha<sup>-1</sup> in 2R-F while the 3<sup>rd</sup> rice crop gave 3.8 tons ha<sup>-1</sup> in 3RM system.
  - Fish culture (Fig. 3) did not affect rice production.
- Economic returns
  - Fish farming had a higher economic return than the 3<sup>rd</sup> rice crop, due to lower production costs.
  - 2R-F was more profitable than 2RM and 3RM systems (Fig. 4).
  - Production costs were higher in 3RM than those in 2RM system while profitable was equal, suggesting that the 3<sup>rd</sup> rice crop is not economically viable in the flood-prone region.
- Environmental effect
  - Quantities of chemical fertilizers applied for rice were lower in 2R-F than that in 3RM system (Fig. 5).
  - Quantities of fungicides applied for rice were lower in 2R-F than that in 2RM and 3RM systems.

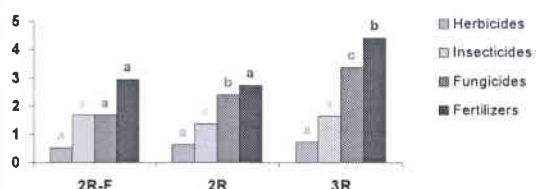


Fig. 5: Quantities of herbicides, insecticides and fungicides (kg a.i. ha<sup>-1</sup> year<sup>-1</sup>), and fertilizer (10<sup>2</sup> kg N-P-K. ha<sup>-1</sup> year<sup>-1</sup>) applied for rice by farming system<sup>(1)</sup>

<sup>(1)</sup> For each parameter, different superscript letters (a, b and c) denote significant difference ( $p < 0.05$ ) among farming systems.

## Materials and Methods

- Household surveys, conducted in Can Tho city in 2006, involved 51 farms of 2R-F, 37 farms of 2RM and 24 farms of 3RM (Fig. 2). Collected data were inputs and outputs of rice and fish production.
- A one-way ANOVA and Duncan test were applied to analyse data.

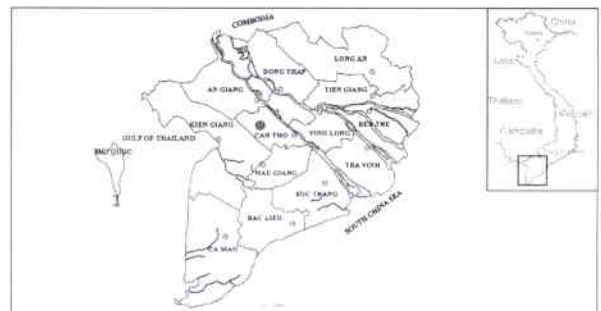


Fig. 2: Mekong Delta with study site (●)



Fig. 3: A 2R-F field: during flooding season with ratoon rice, fish care and harvesting

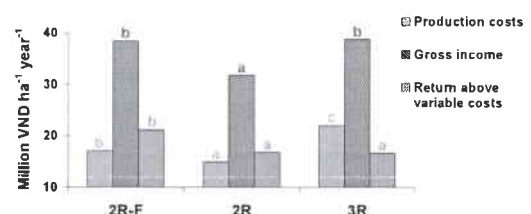


Fig. 4: Production costs and income by farming system<sup>(1)</sup>

## Conclusion

In the flood-prone region of the Mekong Delta 2R-F should replace the commonly practiced 2RM or 3RM systems from both economical and environmental points of view.

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