

EFFECTS OF THE FERTILIZER SUBSIDY ON YIELD AND ORGANIC MANURE USE IN PADDY CULTIVATION: EVIDENCE FROM MINOR IRRIGATION SYSTEMS

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Introduction

Successive governments in Sri Lanka since independence have provided various incentives to increase paddy production. These include investment in irrigation, agricultural credit, promotion of high yielding varieties, guaranteed output prices and subsidies on fertilizers. Out of this, fertilizer subsidy intervention appears to be the most controversial and were introduced and withdrawn several times during the last four decades. Stagnation of rice productivity and decreasing profitability had made farmers to move away from paddy cultivation (Thiruchelvam, 2005).

The present fertilizer subsidy programme that provides all three major fertilizers was introduced in 2005. This caused a financial burden of more than 40 billion rupees annually and the escalation of fertilizer prices has further increased (FAO, 2008). A recent study in Minipe irrigation scheme found that compared to the situation without subsidy in 2005 has increased fertilizer use, total extent cultivated and production by 36, 10 and 17% respectively. This however, had a negative impact on organic manure use (Wijethunga and Thiruchelvam, 2008). According to Central Bank report, Sri Lanka achieved

remarkable level in paddy production (3.87 mil mt) in 2008 attributed to the increase of extent cultivated due to high farm gate price.

There is lack information on the impact of fertilizer subsidy on minor irrigation systems that consists of an important target group of the fertilizer subsidy scheme. These systems occupies the larger share (40%) of the total paddy extent, but contribute only (20%) to the national paddy production. In view of these facts, this study tries to investigate the effects of the fertilizer subsidy on yield and organic manure use in paddy cultivation in two minor irrigation tank areas in Moneragala district.

Methodology

Primary data were collected during February 2009 using a pre-tested questionnaire from a stratified random sample of 60 farmers from two tanks namely Thambalawinnaara and Meepanara in Moneragala district. The study hypothesized that fertilizer subsidy had no effect on yield and organic manure use in paddy cultivation. Paddy yield (Y, kg) was regressed with land area (A, ha), labour (L, man days), organic manure (O, scale dummy), fertilizer (F, kg), F and O joint use (FO, scale

dummy). A log-log production model was employed.

$$\ln Y_i = \beta_0 + \beta_1 \ln A_i + \beta_2 \ln L_i + \beta_3 \ln F_i + \beta_4 \ln O_i + \beta_5 \ln FO_i + \varepsilon_i$$

Chi-square test was used to find the association between different levels of organic manure use with yield levels. Five point Lickert scale was used to determine the level of awareness and attitudes of farmer on organic manure use and soil fertility management. Figure 1 provides the conceptual framework and the basis of the analysis.

Results and Discussion

Among the farmers interviewed, 58% were full time farmers. The average age of the household head was 52 years. Majority had more than 20 years of farming experience. About 63% farmers had secondary education. Average family size was 4.5 with dependency ratio of 0.47. Average land holding size was 0.4 ha lowland and 0.9 ha highland. The average yield of paddy had increased by 8.63% from 4.15 mt/ha in 2004 *Maha* to 4.5 mt/ha in 2008 *Maha*. The average fertilizer use had increased by 30.55% from 315.59 kg/ha in 2004 *Maha* to 412 kg/ha in 2008 *Maha*. Farmers who traditionally practiced organic manure application had reduced from 42 to 33%, while 42 and 25% of the farmers had applied straw only as a condition to obtain the subsidy and others applied only fertilizer obtained from subsidy respectively. The results of the regression analysis of the estimated equation is as follows.

$$\ln Y = -8.64 + 0.105 \ln A - 0.507 \ln L + 0.084 \ln O^* + 0.164 \ln F^* + 0.216 \ln FO^*$$

* Significant at 0.05 level.

R² (adj) 0.435.

The results show that the organic manure, fertilizer and combination of both fertilizer and organic manure use were significant (P<0.05) and positively related to the productivity. Insignificant coefficients of land and labour suggest that the productivity has no relationship with land size and labour used. Fertilizer subsidy had reduced the total cost of production (Rs.60,600 /ha) to about 40% of the previous level. This was not significantly different among the different levels of yield. The share of labour and fertilizer in the total cost of production were 56 and 4% respectively. Organic manure use increased labour cost by 4%. The synergic effect of fertilizer and organic manure combined on paddy yield increase was reflected in chi square analysis (Table 1).

Further investigation evidenced a significant association between collective action of farmer organization and effective fertilizer use. All the respondents had the mentality of dependence on fertilizer subsidy and blamed inadequate irrigation for low productivity.

Conclusions

Fertilizer subsidy to paddy had reduced the cost of production significantly (40%) but had not significantly (8.6%) increased the yield. Poor organic manure use had limited the expected outcome from the fertilizer subsidy in minor tank

areas. There is a need to study the beneficial effects of combined use of organic and mineral nutrients on paddy yield.

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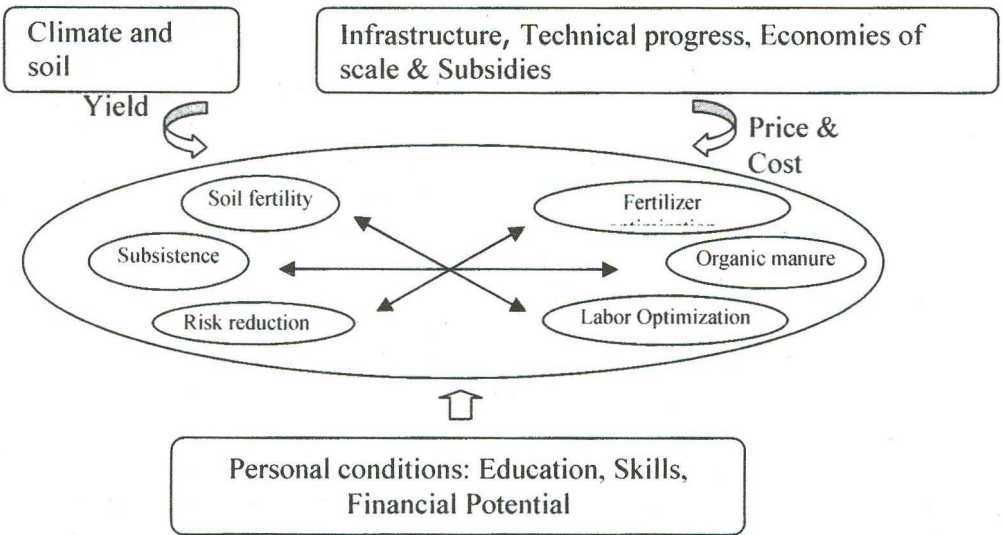


Figure1. Links between variables in agricultural production and fertilizer subsidy

Table 1. Relationships between organic manure uses with fertilizer in paddy cultivation

Organic Manure use levels with Fertilizer	Low Yield ≤ 4,100 kg/ha	Medium Yield < 4,150 Y ≤ 5000	Higher Yd. > 5,000	Total
Only Fertilizer	05 (33.3)	05 (33.3)	05 (33.3)	15 (100)
Straw & Fertilizer	05 (20)	09 (36)	11 (44)	25 (100)
Straw & other manure	05 (25)	07 (35)	08 (40)	20 (100)
Total	15 (25)	21 (35)	24 (40)	60 (100)

$\chi^2 = 1.778$, P-Value = 0.041, Figures in parenthesis are % of horizontal summations.