

APPENDIX 2: THE RESPONSE OF PADDY PRODUCTION TO FERTILISER NUTRIENTS, ENVIRONMENTAL, ECONOMIC AND SOCIAL VARIABLES

Fertiliser response depends on soil quality and fertility, the quantity of fertiliser applied, crop variety, seed quality, water availability and husbandry practices (particularly water, weed and pest management). Not all of these (soil fertility, seed quality, husbandry) can be easily modelled. Other factors can also be theorised as being influential in eliciting a yield response:

- i) season. Historically HYVs have required a package of assured water and sunlight in order to maximise fertiliser response, conditions best guaranteed during the minor seasons;
- ii) village. 'Villages' as a variable are a complex of physical access characteristics, rural assets structure, environmental and labour force characteristics. In this instance, physical accessibility can be expected to affect fertiliser use.
- iii) social class is another such component, indicating scale of production, access, formal education and specialised knowledge, with all of which yields are expected to relate positively.

Thus a yield function for paddy was set up as follows:

$$P_n = C \{ F_t, P, I, S_1, S_2, V_1, V_2, Cl \}$$

where:

P_n : production per plot (kgs) (YIELD)

P : price (Rs/kg) (PRICE)

I : irrigation dummy (0= not irrigated ; 1= irrigated) (IRIG)

S_1 : samba season dummy (SEASON1)

S_2 : navarai season dummy (SEASON2)

V_1 : dummy for Nesal vilage (VILLAGE1)

V_2 : dummy for Vinayagapuram village (VILLAGE2)

Cl : dummy for agrarian class (0:poor; 1: elite) (CLUSTER)

C : constant

F_t : fertiliser.

Fertiliser in turn was modelled in four ways in separate exercises.

i) as total nutrients from all sources (NPKTOT)

ii) as two separate variables: total nutrients of fertiliser (NPKC) and of manure (NPKN)

iii) total Rs value (FERVALUE)

iv) all nutrients separately (NC,PC,KC; NN,PN,KN)

N: nitrogen; P: phosphoreus; K: potassium

C: chemical; N: organic nutrients

APPENDIX 2: FERTILISER - YIELD RESPONSE

Model 1: Stepwise Regression of Yield on Total Fertiliser (Total Physical Nutrients Content)

Dependent Variable = Yield

Variable	B	SE B	Sig T
Area	647.0	124.7	.0000
Price	108.8	163.0	.5060
Season 1	-212.8	258.2	.4118
Season 2	-30.8	248.9	.9016
Village 1	1066.0	397.7	.0086
Village 2	1010.8	391.7	.0113
Cluster	611.4	219.0	.0063
IRIG	25.5	229.9	.9116
NPKTOT	10.6	1.2	.0000
(Constant)	-1439.2	722.0	.0490
$r^2 = 0.29$			

Model 2: Stepwise Regression of Yield on Chemical (NPKC) and Organic

(NPKN) Fertilizer.

Variable	B	SE B	Sig T
Area	337.3	114.4	.0040
Price	59.6	136.6	.6632
Season 1	-120.5	216.4	.5789
Season 2	60.8	208.6	.7713
Village 1	450.1	345.5	.1957
Village 2	258.2	347.0	.4585
Cluster	348.1	187.5	.0663
IRIG	-221.5	195.9	.2609
NPKC	16.1	1.3	.0000
NPKN	1.7	1.7	.3195
(Constant)	-371.2	625.2	.5540

$r^2 = 0.84$

Model 3: Stepwise Regression of Yield on Total Rs Value of Fertilizer.

Variable	B	SE B	Sig T
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Area	290.4	133.3	.0318
Price	4.0	146.1	.9780
NMVLU	.7	.3	.0485
Fer Value	1.2	.1	.0000
Season 1	-238.5	229.9	.3021
Season 2	55.0	220.5	.8033
Village 1	823.5	358.1	.0236
Village 2	249.9	398.1	.5315
Cluster	159.4	208.6	.4466
IRIG	-230.9	205.6	.2641
(Constant)	-107.5	696.5	.8776
r ² = 0.82			

Model 4: Stepwise Regression on Individual Nutrients

Variable	B	SE B	Sig T
Area	350.5	114.3	.0028

Price	75.7	134.2	.5743
Season 1	-93.0	215.2	.663
Season 2	44.1	205.1	.8302
Village 1	492.3	341.1	.1522
Village 2	187.9	349.5	.5921
Cluster	357.4	184.2	.0553
IRIG	-242.9	192.6	.2103
KC	21.65	3.9	.0000
NC	16.02	3.4	.0000
PC	6.97	5.8	.2337
PN	11.53	20.7	.5799
(Constant)	-298.7	622.8	.6326

$r^2 = 0.84$

Model 5: Factors Conditioning Fertilizer Use

Dependent Variable: FERTAREA (area of land under chemical fertilizer)

Variable	B	SE B	Sig T
Village 1	-1.1	.28	.00
Village 2	-1.4	.28	.00
Season 1	.2	.23	.31
Season 2	.3	.22	.17
Price	.0	.14	.64
Cluster	-.07	.19	.70
IRIG	-.36	.22	.09
(Constant)	2.01	.59	.00

$r^2 = 0.50$

Model 6: Factors Effecting Nitrogen Use

Variable	B	SE B	Sig T
Village 1	52.8	14.7	.00
Village 2	23.1	14.8	.12

Season 1	20.1	12.2	.10
Season 2	16.4	11.5	.15
Price	6.2	7.6	.41
Farm Size	7.3	2.0	.00
Cluster	7.6	10.3	.46
IRIG	-14.7	11.6	.20
(Constant)	-28.4	31.5	.36

$r^2 = 0.32$