Analysis of Farmers' Willingness to Conserve Traditional Rice Varieties in the Western Ghats of South India

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Abstract

Conservation of crop genetic resources is a major preoccupation of the Indian government in particular and the international community at large. Drawing on a random sample of 228 farm households from two regions in the Western Ghats of Southern India, this study reports the main factors influencing farmers' willingness to conserve traditional rice varieties of different levels of survival ability (survivability). Estimated results of a logit model indicate that factors influencing decisions to conserve the varieties on-farm depend mainly on farmers' socio-economic characteristics, and vary between the two regions and among incentive or policy scenarios assumed. The factors do not however vary so much from the perspective of the survivability of the traditional rice varieties. Therefore, the study concludes that on-farm conservation in the two study areas requires a mix of different conservation strategies and policy incentives which may not be dependent on the levels of survivability of the traditional rice varieties.

Keywords: in-situ conservation; traditional rice varieties; willingness to conserve, India; logit

1. Introduction

In-situ conservation of traditional crop varieties (TVs) landraces has received growing focus of attention by the international community, particularly after Rio 1992. However, factors influencing farmers' choice of crop varieties and cultivation in developing countries has not yet been fully understood (Smale et al., 2001). In India, from where we gathered data for this study, the government in recent years has introduced programs and policy initiatives aiming at promoting conservation and sustainable use of crop genetic resources. These include a) ratification of WTO's

Agreement on Agriculture and adoption of the structural adjustment policies, including phasing out of subsidies that favor cultivation of high yielding varieties, b) enactment of the Plant Variety Protection and Farmers' Right (PVP & FR) Act 2001 in order to uphold the "rights" of farmers and communities who conserve agro-biodiversity and to lay down a mechanism for sharing of benefits with the farmers from the use of ago-biodiversity indirectly through a "gene-fund", c) The enactment of the Biological Diversity Act (BDA) 2000[1] which regulates access, transfer and Intellectual Property Rights (IPRs) of Ago-biodiversity, and decides fees and royalties, d) the formulation of the National Biodiversity Strategy and Action Plan (NBSAP)[2] which focuses mainly on *in situ* conservation and the creation of market and other infrastructure for conservation of agro-biodiversity in India, and e) the enactment of Administered Prices and Procurement (APP) Act whereby the government of India protects the interests of producers and consumers by using a system of government-administered prices of agricultural commodities, through a state trading corporation or a food corporation (see also Prakash and Virchow, 2003).

All these policies and programs for on-farm management of TVs will provide a legal and institutional framework for in-situ conservation of agro-biodiversity in India. However, factors influencing in-situ conservation of crop genetic resources by the smallholder farmers, and especially those under rain-fed agriculture, still remain less well understood. As stated by Woods et al., (1997), farmers' preferences, constraints and priorities are crucial to ascertain conservation and sustainable use of agro-biodiversity. In view of this, the main aim of this study is to investigate the major factors shaping farmers' choice and willingness to undertake in-situ conservation of traditional rice varieties conditional on certain policy scenarios. The analysis conducted here is based on a survey data elicited from randomly sampled farm households. This data includes

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[1] The BDA 2000 came in to existence recently in India. For implementation purposes, the BDA 2000 provides for a National Biodiversity Authority and a State Biodiversity Board which consist of both government and non-government members.

[2] The NBSAP is an initiative of the government of India undertaken with the financial assistance from UNDP and GEF.

farmers' propensity to conserve different traditional rice varieties; namely, some with high probability of survival and others with low probability of survival in the Western Ghats regions (Upper and Lower Western Ghats) of South India.

The rest of the paper is organized as follows: Section 2 describes the methodology applied in the paper and the data sources. In Section 3 estimated results are presented and discussed. Finally, in Section 4, the paper summarizes the results and draws some policy implications.

2. Data and methodology

2.1 Background to data analysis

Farmers maintain their agro-biodiverse production systems only in as far as their private marginal benefit is higher than their private marginal costs. This practice of in-situ conservation reflects the economic principle of efficient resource allocation. Put in another way, conservation takes place where diversity is high and opportunity costs are low (Bellon, 2004; Virchow, 1999). Thus, the survival ability of a traditional crop variety in a particular agro-ecological niche depends, to a great extent, on the decision of farmers to cultivate that variety. The farmer's decision to conserve crop genetic resources is influenced by a portfolio of preferences which include not only marketable values but also non-marketed uses, stability services and the benefits from qualitative attributes associated with it (Smale et al., 2001). These preferences influence the ability of the traditional varieties to survive in the farms. Using an ordinal ranking technique, Prakash et al. (2004) identified three different degrees of survivability (survival ability) of traditional rice varieties and classified 29 local Indian rice varieties into poor survivability (ten varieties), medium survivability (ten varieties) and high survivability (nine varieties). Four of the varieties identified during this ranking are used in the econometric analysis of this paper (see Appendix 1). Conditional on four alternate policy scenarios, respondents of the present study were asked to report their willingness to cultivate two traditional varieties with contrasting levels of survival probability in each region; one endangered (or with poor survival ability) and another safe. The main policy scenarios to which this study is

based on are derived from the aforementioned agro-biodiversity policies and programs' initiatives of the Indian government. These can be briefly outlined as follows:

Dissemination of information (Scenario I): this policy scenario underscores the need for extending necessary information services regarding the benefits of TVs and motivating farmers to enhance the cultivation of the TVs. NBSAP and BDA essentially contain the necessary policy initiatives to this effect.

Compensation of yield loss (Scenario II): farmers may experience a yield loss as they switch over from HYV to the TVs. Hence policy should compensate this loss to the farmers growing LVs to enable them remain in the same production possibility frontier. The compensation system may be visualized as per the benefit sharing mechanism under PVP and BD Act.

Withdrawal of subsidies to HYVs (Scenario III): this entails lifting of subsidies and other related privileges that have been given to users of HYVs. In other words, a real 'level playing' ground is prepared for the farmers' competition for HYVs and TVs. This is consistent with government's commitment for WTO's Agreement on Agriculture (AOA).

Provision of support price (Scenario IV): it is envisaged in this policy scenario that a price support system for farmers cultivating TVs will be instituted. The justification for such a policy scenario emanates again from the recommendations of the NBSAP.

2.2 Analytical tools

A logistic regression was employed to assess the probability that a farmer chooses to cultivate a traditional rice variety of a certain level of survivability given four different policy scenarios mentioned in Section 2.1. The farmer's response was coded as 1 if he/she was willing to cultivate a given variety and as 0 otherwise. Following Aldrich and Nelson (1984), the probability (P_i) that the ith farmer is willing to cultivate the traditional variety can be specified using a logit model as follows:

$$P_i = \frac{1}{1+e^{-Z_i}} \quad (1)$$

Where, P_i is the probability that the ith farmer is willing to cultivate the traditional rice variety; Z_i is an index that is linearly related to an array of socioeconomic, demographic and technical variables influencing farmers' willingness to cultivate the traditional rice variety. More specifically, the relationship between these variables and Z_i may be specified as below:

$$Z_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \therefore . + \beta_n X_{in} \quad (2)$$

Where, $\beta's$ are parameters of the logit model to be estimated; and $X's$ as the hypothesized explanatory variables influencing the farmers' willingness to cultivate traditional varieties of rice. Eight explanatory variables were hypothesized to influence farmers' willingness to cultivate traditional rice varieties in Western Ghats Region of South India. These include age of the farmer (in years), education of the farmer (number of schooling years)**,** family size (number of family members), % area under paddy, milked animals (in number), previous experience of growing the traditional paddy varieties (1 = yes, 0 = no), growing of a local cash crop, arecanut (1 = yes, 0 = no) and awareness of the tested traditional paddy varieties (1 = yes, 0 = no). The model was estimated using the Maximum Likelihood Estimation procedure. The adequacy of the model was estimated through Chi-square maximum likelihood values.

2.3. Data source and description of the study areas

The primary data for this study were collected from a random sample of 228 farmers residing in the Western Ghats region of South India. The sample is representative of two agro-ecologically distinct village clusters in the region, *Mittabagilu* and *Chokkodubylu* from which 140 and 88 sample farmers, respectively, were interviewed. The Western Ghats is a hilly evergreen tropical forestry region and is one of the mega biodiversity regions in the world.

The *Mittabagilu* village cluster is located at the Lower Western Ghats (LWG) region. The LWG is rich in lowland traditional paddy varieties. The region has an altitude of 400 feet above mean sea

level, annual temperature of 20^0C to 40^0C and mean annual rainfall of about 380 centimeters. For the analysis, two traditional varieties from this area which were locally identified as *Peetsala* (with very poor survival ability) and *Geersala* (high survival ability) were chosen. The varieties were chosen because all the farmers were familiar with them (see Appendix 1).

The *Chokkodubylu* village cluster is in the Upper Western Ghats (UWG) region. The UWG is rich in upland paddy varieties. It has an altitude of 2000 feet above mean sea level, receives an average annual rainfall of 300 centimeters and temperatures ranges from 9^0C to 28^0C. Similarly, two local varieties well know to farmers were identified. These were locally named as *Kamadhari*, an endangered variety with poor survivability, and *Karidadi* which had a safe survivability (see Appendix 1).

Data were collected on a wide range of topics including farmers' socio-economic profile, demographics, agricultural resource endowments, experiences in the cultivation of TVs. Further, farmers were asked to record their current willingness to cultivate TVs of rice, given the certain policy initiatives (scenarios in Section 2.1). Structured questionnaires were used to record farmers' responses. The questionnaire was pre-tested to improve on its content and coverage.

3. Results and discussion

3.1 Farmers' willingness to plant traditional rice varieties in the Lower Western Ghats region

This section reports the factors influencing farmers' willingness to cultivate two local rice varieties; namely, *Peetsala* (very poor survivable variety) and *Geersala* (high survivable variety), in the LWG. Estimated results of the logit model are shown in Table 1. They reveal several interesting results which are discussed here below.

Table 1: Logistic regression results of factors influencing farmers' willingness to plant traditional rice varieties in the Lower Western Ghats region, South India.

Explanatory Variables	Policy scenarios							
	I. Information and Motivation		II. Compensating the Yield Loss		III. Withdrawal of Subsidies to HYVs		IV. Support Price for TV	
	TVI	TVII	TVI	TVII	TVI	TVII	TVI	TVII
Age of farmer (years)	-0.021	0.002	-0.020	0.003	-.006	-0.001	-0.003	0.01
	(0.016)	(0.017)	(0.016)	(0.014)	(0.016)	(0.016)	(0.014)	(0.015)
Education in years	0.103*	0.135**	0.203***	0.163**	0.105*	0.067	0.148***	0.111**
	(0.059)	(0.063)	(0.063)	(0.056)	(0.061)	(0.060)	(0.060)	(0.060)
Family size (number)	0.062	-0.029	0.106	0.017	0.028	-0.036	-0.07	-0.085
	(0.073)	(0.075)	(0.075)	(0.064)	(0.076)	(0.077)	(0.065)	(0.067)
Paddy area (ha)	0.018*	0.015	0.029*	--------	0.034**	0.03*	0.004	+ 0.025**
	(0.011)	(0.011)	(0.011)	--------	(0.013)	(0.012)	(0.010)	(0.011)
Milch animals (number)	-0.027	-0.029	0.014	-0.047	0.069	0.073	-0.138**	-0.178***
	(0.081)	0.084)	(0.077)	(0.061)	(0.080)	(0.079)	0.071)	(0.075)
Prior experience of growing TVs (dummy)	-0.885**	-0.173	-0.773*	-0.340	-0.615	-0.614	-1.00***	-0.529
	(0.477)	(0.460)	(0.456)	(0.404)	(0.478)	(0.485)	(0.426)	(0.418)
Growing arecanut (dummy)	-0.041	-0.111	0.028	-0.178	0.115	0.003	-0.369**	-0.53
	(0.173)	(0.186)	(0.165)	(0.134)	(0.176)	(0.201)	(0.166)	(0.180)
Awareness of the test variety (dummy)	0.819*	0.960*	0.075	0.454	0.145	0.111	0.363	0.669
	(0.501)	(0.524)	(0.450)	(0.412)	(0.476)	(0.468)	(0.434)	(0.409)
Constant	-2.239	-3.143	-2.946	-1.377	-3.989	-3.366	1.08	2.598
	(1.432)	(1.507)	(1.393)	(0.943)	(1.546)	(1.513)	(1.231)	(1.319)
No. of farmers willing to grow TV	*32*	*36*	*50*	*53*	*33*	*34*	*83*	*91*
(% to the sample)	*(23)*	*(26)*	*(36)*	*(38)*	*(24)*	*(24)*	*(59)*	*(65)*
-2 Log likelihood	144.28	136.63	151.56	173.74	139.66	138.26	168.77	164.19
Chi-square	*15.30***	*13.89**	*29.73****	*12.003**	*15.56***	*12.26**	*21.18***	*18.31**
% correct prediction	76	79	73	65.7	75.7	78.6	63.6	72

Dependent variable = farmers' willingness to plant the TV (Yes = 1, No= 0)

Note: figures in the parentheses are standard errors; TVI = a variety with poor survival probability; TVII = a variety with high survival probability variety.

*, ** and *** are denote statistical significance respectively at the 10 %, 5 % and 1 % probability levels

In LWG, education level of the household head, which is a proxy of human capital, is positive and statistically significant in all cases except for willingness to conserve the traditional variety with a high survivability when support to HYVs is withdrawn. In the latter case the variable has a positive coefficient but not significant. This indicates that education is an important factor which influences

the willingness to cultivate traditional rice varieties irrespective of the survival ability of the variety and policy measures taken to enhance on-farm conservation. This may be mainly because education facilitates access to and interpretation of information necessary to carry out conservation of crop-genetic resources in farmers' farms.

The area under paddy and prior experience in growing traditional varieties also influences, significantly, farmers' willingness to grow both types of TVs, irrespective of policy measures, but each in opposite direction. The effect of paddy area on farmers' willingness to cultivate TVI, in policy scenarios I-III, and TVII, in policy scenarios III and IV, is positive and statistically significant. Controlling for other differences, this means that the likelihood of cultivating the endangered traditional variety (TVI) increases with increasing size of paddy farm if there are better information services, yield compensation mechanisms and subsidies to HYVs are withdrawn. For the safe traditional rice variety (TVII), this would be the case if subsidies to HYVs are withdrawn and a support price is provided for it. It appears therefore that withdrawal of subsidies to HYVs is a key policy instrument that would favor on-farm conservation of both safe and endangered traditional rice varieties.

Unexpectedly, prior experience in growing TVs has a negative and significant effect on farmers' willingness to cultivate TVI under policy scenarios I, II, and IV. Notably, all the coefficients of this variable are negative for the two varieties and under all policy scenarios. This may be because farmers' demand for additional utility from the varieties may decline simply due to the fact that they already had them in their farms. This variable is closely related to the awareness about the existence of the test varieties which showed a positive and significant impact under policy scenario II for both types of varieties. The result confirms the importance of information service and previous knowledge about agro-biodiversity in enhancing farmers' willingness to conserve TVs (Virchow, 2003). Unlike prior experience, however, this factor has positive coefficients for all the policy scenarios since farmers cannot be in a position to conserve the varieties they are not aware of.

Growing of arecanut (*Areca catechu*), a commercial plantation crop in the region, exhibits a negative sign for most for the policy scenarios and for both varieties (exceptions only in scenario II for TVI and scenario III for both varieties). Particularly under policy conditions that favor provision of a support price, the variable has a negative and significant effect on farmers' willingness to cultivate TVI. This would imply that this cash crop has more economic advantages than the rice varieties and therefore more favored regardless policy interventions.

The number of milch animals owned by the farmer exerts a significant and negative effect on farmers' willingness to cultivate both TVI and TVII under policy scenario that a support price for the TVs is provided. Though livestock and crop cultivation compete with each other for land, labor and capital, in a typical subsistence agrarian set up, they also have a mutually supportive and complimentary relationship. Rice production provides fodder for livestock, and livestock rearing in turn supports crop production, among others, by enriching the soil with manure. Noting that the two varieties considered from this region are among the best fodder producers per unit area (see Appendix 1) it is difficult to imagine why farmers should not be willingness to enhance their cultivation and particularly when a support price is provided. The negative effect may be because ownership of milch animals increases the opportunity cost of paddy farming since livestock production is very important in this densely populated region.

3.2 Farmers' willingness to plant traditional rice varieties in the Upper Western Ghats region

Just as in Section 3.1, factors influencing farmers' willingness to conserve traditional rice varieties in the UWG were investigated using a logistic regression (see Table 2). However, only three policy scenarios (provision of information, yield compensation and support price) are applied here since the number of farmers willing to plant traditional rice varieties under policy scenario III (withdrawal of subsidies to HYVs) was too few to allow for statistical investigation. From this region, a traditional variety locally named as *Kamadhari* is used to represent endangered variety or poor survivability; and a variety named *Karidadi* is used to represent a variety with safe

Table 2: Logistic regression results of factors influencing farmers' willingness to plant traditional rice varieties in the Upper Western Ghats region, South India

Explanatory variables	Policy scenarios#					
	I. Information and motivation		II. Compensating the Yield-loss		IV. Support price for TV	
	TVI	TVII	TVI	TVII	TVI	TVII
Age of farmer (years)	0.006	-0.008	-0.017	0.004	0.004	-0.030
	(0.029)	(0.029)	(0.029)	(0.029)	(0.025)	(0.028)
Education in years	-0.085	-0.022	-0.154**	-0.232**	-0.016	-0.192*
	(0.081)	(0.078)	(0.081)	(0.086)	(0.066)	(0.077)
Family size (number)	-0.072	-0.197	0.003	-0.063	0.087	0.043
	(0.132)	(0.230)	(0.062)	(0.110)	(0.102)	(0.066)
Paddy area (ha)	-0.055**	-0.010	0.009	0.028	0.017	0.039**
	(0.028)	(0.025)	(0.025)	(0.022)	(0.023)	(0.022)
Milch animals (number)	-0.043	0.065	0.026	0.281	-0.231*	0.252*
	(0.175)	(0.163)	(0.158)	(0.161)	(0.155)	(0.155)
Prior experience in growing TVs (dummy)	0.638	0.848*	-1.34***	-0.606	-0.118	0.341
	(0.599)	(0.583)	(0.581)	(0.562)	(0.499)	(0.519)
Growing arecanut (dummy)	-0.740	-0.429	0.676	-0.063	-0.355	0.295
	(0.545)	(0.550)	(0.598)	(0.326)	(0.422)	(0.297)
Constant	4.254	0.999	1.60	-1.281	-1.382	-1.491
	(3.240)	(3.144)	(2.910)	(2.704)	(2.655)	(2.584)
No. of farmers willing to grow the TVI/TVII (% to the sample)	*19*	*21*	*32*	*34*	*34*	*43*
	(22)	*(24)*	*(37)*	*(39)*	*(39)*	*(49)*
-2 Log likelihood	85.94	91.19	92.39	90.95	106.69	101.28
Chi-square	*5.39***	*4.98**	*22.06****	*25.48****	*9.73****	*19.32**
% correct prediction	79.3	76	73.6	69	65.5	73.6
Dependent variable = farmers' willingness to plant the TV (Yes = 1, No= 0)						

Note: figures in the parentheses are standard errors; TVI = a variety with poor survival probability; TVII = a variety with high survival probability variety. # =estimation for policy scenario III was not conducted due to small number of farmers.

*, ** and *** are denote statistical significance at the 10 %, 5 % and 1 % probability levels, respectively.

survivability. Thus, the endangered and safe traditional varieties of rice tested here are also different from those of LWG (discussed in Section 3.1.).

In contrast to the results discussed in Section 3.1, the effect of education on farmers' willingness to cultivate TVs in UWG was negative under all the policy scenarios even though some of these are statistically insignificant. Notably, this effect was negative and statistically significant with the cultivation of both varieties under policy scenario II and with the cultivation of the safe variety, TVII, under policy scenario IV. The possible reasons for this divergence concerning the effect of education on farmers' willingness to cultivate TVs between the two regions may be attributed to differences in food habits and consumption preferences. For instance, our field observations indicated that the local population in the LWG prefers to consume partially processed and parboiled rice called "*Kuchulakki*", a particular type of rice which is common in most parts of the coastal regions in South India. The distinctive attributes of the rice varieties used to make this recipe are found in the grains: they should be of a bigger size and reddish in color when compared with the HYVs. These attributes are possessed by the traditional varieties grown in LWG. On the contrary, in the UWG, TVs with such attributes are preferred by a small proportion of the local population comprising of daily-laborers and people in the lower socioeconomic strata, who migrated to this region from the LWG. The majority of the population with higher socio-economic status in the UWG prefer normal rice which is white and smaller in size. These are actually the attributes embodied in the HYVs.

The number of milch animals owned by the farmer has a negative and significant influence on the willingness to cultivate TVI, under policy scenario IV. On the contrary, its effect on the farmer's willingness to cultivate the safer variety, TVII, under the same policy scenario is positive and significant. As discussed in Section 3.1, the complimentarity between rearing of milch animals and rice production depends on the capacity of a particular crop variety to provide fodder and livestock's capacity to produce manure for crop production. In an earlier study it had been found

that *Kamadhari* (TVI) has lower fodder yield (16.29 quintals per acre) than *Karidadi (TVII)* (26.83 quintals per acre). Likewise, the fodder yield of TVI is less than that of HYVs in the same region by nearly 10% (see Appendix 1). Thus, under the conditions that a support price is provided for the traditional varieties' farmers with a large number of milch animals, growing of *Karidadi* (TVII) would be promoted while that of *Kamadhari* (TVI) would be affected negatively since the former provides more fodder per unit area.

The effect of the proportion of paddy area under traditional varieties is positive for both varieties under policy conditions where farmers are compensated for yield loss and provided with a support price. However, under policy conditions of information provision, the effect of this variable on the farmer's willingness to cultivate both varieties is negative. It seems therefore, from the perspective of this variable, yield compensation and support price provision are stronger policy measures that would favor the conservation of both traditional varieties, and particularly TVII whose coefficient is positive and significant under scenario IV. However, except in this latter case, prior experience of growing of traditional rice varieties has the opposite effect as the area under paddy. It would thus imply that if farmers who are already experienced in growing other traditional rice varieties are provided with information and motivations concerning the two test varieties their production is likely to increase. This would particularly favor the variety with a higher survivalbility since its coefficient is positive and significant. This is probably because farmers growing local varieties have already acquired the local knowledge that would favor in-situ conservation incentives (Bellon, 2004).

Although the coefficient of the arecanut is not statistically significant, it is negative in most of the cases just as in the LWG. This confirms the results that growing of this cash crop may not favor on-farm conservation of traditional rice varieties irrespective of the policy incentives and survival ability.

4. Summary and Conclusions

Summary

This study has investigated factors influencing farmers' willingness to cultivate traditional rice varieties of different levels of survivability in the Lower Western Ghats and the Upper Western Ghats regions of Southern India under different policy scenarios. Estimated results of the logit model indicate that the factors influencing farmers' willingness to cultivate the traditional land races of rice vary between the two regions and also among the policy scenarios considered, but not so much among the pair of varieties of different survivability. In the LWG region, willingness to cultivate the *Peetsala* cultivar (an endangered local rice variety in the region), is positively determined by size of paddy area, awareness about the variety and farmers' level of education. On the contrary, number of milch animals, experience in growing other traditional rice varieties and cultivation of arecanut (a commercial crop) negatively affected farmers' willingness to cultivate *Peetsala*. The signs of the effects of the aforementioned factors on farmers' willingness to cultivate *Geersala* (variety with high survivability) are similar to those of *Peetsala* even though their statistical significances vary from one policy scenario to the other.

In the UWG region, the impact of education on the farmers' willingness to cultivate *Kamadhari* (an endangered local rice variety in the region) as well as *Karidadi* (a variety with high survival probability) is negative even if compensation is promised for yield losses upon its conservation. The other important factor in this region is the area under paddy. The results indicated that paddy area owned by the farmers positively affects farmers' willingness to plant *both varieties* only if they are provided with yield compensation and a support price (i.e. not in all the assumed policy scenarios). The results also have shown that experience in growing traditional rice varieties is positively associated with farmers' willingness to cultivate *both varieties* only under conditions that the government provides them with the necessary information and motivation (i.e. not in all the assumed policy scenarios). Unlike in the LWG, the number of milch animals owned by the farmers

in the UWG have, in most of the policy scenarios, a positive influence on the cultivations of *both varieties* (exception were only with TVI in scenarios I and IV).

Conclusions

The analysis of factors influencing on-farm conservation of traditional rice varieties of different levels of survivability in this paper indicates two important inferences: first, to enhance on-farm conservation different policy interventions or incentives will be required for each of the research regions, and second, a particular policy measure is likely to have a similar influence on the cultivation of different traditional rice varieties, regardless of their levels of survivability. This is because the effects of different factors on the willingness of farmers to cultivate the traditional rice varieties differ according to the regions when different policy scenarios are assumed. However, this is not the case when the influence of the factors is considered from the perspective of the levels of survivability of the traditional varieties. In most cases the signs of the effects of a certain factor on the conservation of variety pairs of different survivability were in the same direction in a particular policy scenario though there were differences in some cases in terms of significance. It is therefore possible to enhance on-farm conservation of traditional rice varieties, irrespective of their levels of survivability, by using a certain policy incentive. As the results have shown this may be due to the fact that the socio-economic characteristics of farmers in each region play a more important role in influencing on-farm conservation of the test varieties than the policy incentives. Thus the willingness to maintain traditional rice varieties on-farm in the two regions is dependent of different factors and a specific set of policy incentives would be required to enhance conservation in each region, without much regard of the different levels of survivability of the landraces.

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Appendix 1: Agro-economic features and survivability of traditional rice varieties in South India, 2003/04

S. No	Variety	Duration (Days)	Plant.ht) (cams)	Fodder (Qtls/. Acer)	Grain (Qtls/. Acer)	Costs** Rs/ Acer	Grain Size And colour	Survivability Score*	Survivability Range
	I. Lower Western Ghats Region, Mittabhagilu Village								
1	Adenkelthe	135	104.00	16.72	14.90	9304	S & LW	0.83	High
2	Ajippa	130	78.00	19.26	5.94	8952	M & LR	-1.54	Very Poor
3	Allyande	150	112.80	19.68	14.52	9387	M & VR	-0.75	Poor
4	Bilinellu	125	110.60	15.01	9.31	8466	B & LW	-0.45	Medium
5	Gandhasale	185	120.00	29.93	13.18	9628	S & W	0.56	High
6	Giddabatha	120	67.20	14.45	15.09	8735	B & W	-0.75	Poor
7	Gulvadisanna	115	86.60	12.89	11.14	8724	S & W	0.04	Medium
8	Hallinga	125	127.20	16.81	9.86	8939	M & LR	1.09	Very High
9	***Jeerasaala***	***170***	***124.20***	***29.93***	***12.60***	***9500***	***S & W***	***1.09***	***Very High***
10	Jeerigesanna	120	109.00	13.50	12.60	8726	S & W	0.30	Medium
11	Kalame	120	91.00	17.70	13.05	8726	M & LR	1.09	Very High
12	Kariadadi	125	114.00	22.64	6.43	8941	B & W	-0.23	Medium
13	Kavalakannu	120	118.80	16.52	15.98	8727	M & LR	-0.04	Medium
14	Kayame	115	112.40	16.41	17.24	8702	B & LR	-0.23	Medium
15	Kolakedodra	120	127.20	20.45	9.92	8727	B & LR	0.30	Medium
16	Mascatti	115	115.00	16.92	15.90	8703	M & LW	2.14	Very High
17	Massury	175	94.20	16.55	13.62	9567	M & LW	-1.81	Very Poor
18	Meesebattha	115	113.60	20.45	14.47	8702	M & LW	1.35	Very High
19	Moradda	130	101.80	16.48	9.45	8706	B & LR	-0.23	Poor
20	Mysoorumallige	115	68.20	15.77	16.67	8705	M & W	-1.02	Very Poor
21	***Peetasaale***	***170***	***118.33***	***29.93***	***13.18***	***9504***	***B & VR***	***-1.02***	***Very Poor***
22	Rajakayame	180	113.20	17.64	10.10	9611	M & LW	-0.75	Poor
						9007			
I	Average LVs	135	105.79	18.89	12.55		M & MC	-0.03	Medium
II	Average – HYVs	130	68.67	13.63	16.79	10,024	M & W		Very high
	CV of TVs	16.57	17.06	24.37	25.89	4.05	35.56		
	I. Upper Westren Ghats Region: *Chokkodubylu* Village								
1	Joliga	176	105.4	18.56	13.76	12557	B & LR	-0.02	Medium
2	***Kamadhari***	***162***	***100***	***16.29***	***10.13***	***11474***	***M & W***	***-0.82***	***Poor***
3	***Karidhadi***	***170***	***113.4***	***26.83***	***19.12***	***13321***	***B & W***	***-0.15***	***Medioum***
4	Kichdisamba	183	93	29.95	20.68	12947	M & W	1.91	Very High
5	Padhmarekha	180	116.6	29.95	16.80	13299	M & W	0.58	High
6	Rathna Chudi	184	64.8	10.34	8.20	15403	S & VW	-0.42	Medium
7	Sannawalya	180	97.6	14.37	11.71	13673	S & LR	-1.02	Very Poor
I	Average LVs	176	98.69	20.90	14.34	13239	M & W	0.01	Medium
II	Average – HYVs	154	82.40	18.13	23.80	14101	S & W		Very High
	CV of TVs	4.50	17.38	38.07	32.68	9.02	34.99		

Note: * = Standard Normal Variates for survivability; ** = Cost includes all paid out costs plus family labor cost as well non paid out costs like land rent. Highlighted & italic are the varieties considered for willingness assessment; TVs = traditional varieties; HYVs = high yielding varieties, CV- Coefficient of variation

Source: Prakash et al., 200