CONTRIBUTIONS FROM ECONOMICS TOWARDS THE IMPROVEMENT OF AN UNDER-UTILIZED PULSE IN NEPAL AND INDIA

DOREEN BUERGELT*, MATTHIAS VON OPPEN*, ROLF R.A. MUELLER*

ABSTRACT

Crop breeding has contributed much towards assuring the supply of high quality food for a rapidly growing world population. Crop breeding has, however, been focused on only a relatively small number of species and many more have been neglected. In this paper we report on our contributions to a multidisciplinary research project that aims at improving ricebean (*Vigna umbellata)* – a neglected pulse crop in India and Nepal – and at introducing improved ricebean into local and regional markets.

Keywords: hedonic analysis, supply chain, India, Nepal

1 INTRODUCTION

There are many less well-known or neglected plants, like ricebean (*vigna umbellata*), which continue to be grown, managed or collected, particularly in rural areas of developing economies, and are thus contributing to the livelihood of the poor. They are locally plentiful but nationally and therefore also globally rare, scientific information and knowledge about them is little, and their current use is limited related to their economic potential. A Ricebean variety with all quality characteristics demanded by consumers will increase the market value, improve their marketability and generate income for the local producers. Therefore our contribution to improve ricebean is twofold: (i) We estimate hedonic price functions for ricebean quality characteristics in order to be able to provide crop breeders reliable indicators of consumers' willingness to pay for specific ricebean quality attributes and (ii) we study local and regional pulse supply networks in order to be able to successfully introduce improved ricebean into local and regional markets.

* Department of Agricultural Economics, Christian-Albrechts-University, Kiel, Germany

2 HEDONIC PRICE ANALYSIS

Lancaster introduced his view of consumer theory 1966. He stated that single properties or characteristics of goods, like food, are creating utility for consumers. Therefore consumption is a process with goods, single or in combination as inputs and the assembling of characteristics as output (LANCASTER, 1966).

As conclusion goods are consumed for their utility-bearing characteristics. "Observed product prices and the specific amounts of characteristics associated with each good define a set of implicit or 'hedonic' prices." (ROSEN, S. 1974, 34)

Product heterogeneity through different amounts of characteristics in the same product results in different prices (LADD, 1976). By using regression it is possible to calculate consumers' willingness to pay for quality attributes of beans.

2.1 Preliminary results

So far it was not possible to appraise all data from our last sample collection in 2008 which includes ricebean only but in March 2007 we already collected a set of 73 pulse samples on markets in and near to Kathmandu in Nepal. Within our set were following 9 pulse species: Ricebean, Kidney bean, Black gram, Green gram, Kabuli Chickpea, Desi Chickpea, Cowpea, Pea and Horsegram. The characteristics in Table 1 which were included in to the hedonic price analysis were chosen by reviewing articles about the nutritional composition of ricebean and characteristics affecting domestic processing and cooking (KAUR, 1992 and MALHORTA, 1988). After choosing the traits we selected chemical analysis from the AOAC (Association of Official Analytical Chemists) catalogue.

Table 1: Selected characteristics for the pre-test hedonic price analysis

Bean characteristic	
1. Fat content	7. Swelling capacity
2. Protein content	8. Water up-take
3. Water content	9. Form
4. Ash content	10. Colour
5. Carbohydrates content	11. Share foreign matter
6. 100-seed weight	

Source: own depiction

The selected characteristics can be separated in evident and cryptic ones. Evident characteristics like colour and form are visible for consumers whereas cryptic characteristics refer to chemical and nutritional qualities which are not directly visible, but which can be experienced

by consumers. Both types of characteristics are related to each other. Thus consumers infer from evident about cryptic characteristics. We all know for instance, that a really green apple will taste sour whereas red or yellow apples are sweet (JIMÉNEZ PORTUGAL, 2004).

Some of our first results are presented in Table 2. We have conducted a stepwise backward multiple regression with price as dependent variable. In the beginning 17 variables were included in the model and all irrelevant independent variables are eliminated step by step (BÜHL, 2002). We had to create dummy variables for the different pulse species. Among these pulse species peas and horsegram are significantly disliked which is visible by the negative coefficient and the highly significant t-value. Whereas green gram, black gram and cowpea are preferred by Nepalese consumers. In regard to quality characteristics the fat content is significantly preferred and there is a positive evaluation of water uptake, which describes the ability of pulses to enlarge their volume during swelling. Quality characteristics which are less preferred within this sampleare 100-seed weight and high water content. Generally pulses are dried carefully before they are sold, which could explain the dislike of water content.

The results of our pre-test are showing that the hedonic price analysis is an applicable method to investigate preferred traits of pulses and thus also for ricebean in India and Nepal.

Table 2: Results of the pre-test

	Coefficient	T-value
Constant	-0.006	-0.632
Kidney bean	0.039	1.397
Peas	-0.133**	-8.431
Green gram	0.161**	4.863
Kabuli chickpea	0.095*	2.356
Black gram	0.167**	4.095
Horsegram	-0.129**	-2.982
Cowpea	0.120**	5.287
100-seed weight	-0.469	-1.353
Water uptake	0.485	1.411
Water content	-0.224	-1.306
Fat content	0.087**	3.776
	R^2: 0.853	adj. R^2: 0.823

Notes: **significant at $\alpha = 0.01$; * significant at $\alpha = 0.05$
Source: Own calculations

3 MARKETING OF UNDERUTILIZED PLANTS

Ricebean belongs to the group of underutilized plant species which survive because they are still useful to local people or occupying special niches in production systems because of their adaptability to low input and marginal lands (GRUÈRE, 2006). We investigated the supply chain of the ricebean to analyze the supply chain for stages and linkages where product value may be compromised or lost.

As first step all visited market places were divided in rural markets in villages, markets in mid-size towns and markets in big cities. The last two types represent urban areas. The results differ between India and Nepal. For India a simple calculation of mean prices (Table 3) of ricebean shows that the highest prices exist in villages and the lowest prices persist on markets in towns and big cities.

Table 3: Mean prices of market types in India, 1st quarter 2008

	Rural markets	Mid-size towns	Big city markets
Mean price INR/kg	26.40	19.17	21.97
Standard deviation	6.904	6.030	6.367

Source: own calculations

A regression analysis on the Indian data (Table 4) with price as dependent variable and the different market types as independent variables underlines the results. Both dummy variables which represent urban areas (mid-size town and big cities) are significantly negatively influencing ricebean prices. The variable state shows that the ricebean prices in Orissa are significant lower than in Uttarakhand. The prices of ricebean decrease with increasing proximity to markets in urban areas. When income increases the demand for ricebean declines so there is not much to gain from transporting ricebeans into urban areas of India. Since urban areas have higher per capita incomes than rural areas ricebean has a negative income elasticity.

Table 4: Regression results with Indian ricebean prices and market types

	Coefficient	T-value
Mid-size town	-4.172*	-2.193
Big cities	-4.078**	-2.495
State	-8.689**	-5.537
	adj R^2:	0.457

Notes: **significant at $\alpha = 0.01$; * significant at $\alpha = 0.05$
Source: Own calculations

Table 5 presents mean prices of the 3 different market types in Nepal. Here we find the lowest prices for ricebean in rural areas and higher prices in urban areas. This confirms on site findings because it was possible to buy ricebean in the capital Kathmandu.

Table 5: Mean prices of market types in Nepal, 1st quarter 2008

	Rural markets	Mid-size towns	Big city markets
Mean price NPR/kg	31.66	47.65	46.54
Standard deviation	9.691	9.554	3.524

Source: own calculations

Nepal in contrast to India shows rising prices for ricebean in urban areas. This is depicted by the significant influence of the variables mid-size town and big cities on ricebean prices, presented in Table 6. Whether the ricebeans were bought in Hill or Terai District of Nepal has no significant influence on their prices.

Table 6: Regression results with Nepalese ricebean prices and market types

	Coefficient	T-value
Mid-size town	14.932**	7.830
Big cities	13.404**	3.298
District	-1.473	-0.325
	adj R^2:	0.437

Notes: **significant at $\alpha = 0.01$;
Source: Own calculations

Comparing ricebean supply chains in Nepal and India showed that ricebean in India stays in remote rural areas whereas in Nepal ricebean can be found in big cities like Kathmandu and Pokhara.

4 CONCLUSION

The pre-test with the sample set from Nepal 2007 provides results which confirm the applicability of the hedonic price analysis to define preferred characteristics of the ricebean. Further results of the newly collected set will provide more precise findings which will be used by breeders of the project.

The comparison of ricebean prices in relation to rural and urban areas clearly shows that there are big differences between India and Nepal. Since India has a GDP per capita of 2,700$ and Nepal a GDP per capita of 1,100$ it is possible that Nepal (CIA WORLD FACTBOOK) will develop the same way. Therefore deeper investigations are necessary.

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