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Economic Assessment of Common Bean Variety BRS Estilo in Brazil

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Introduction

In Brazil, the 2013 crop year were produced around 2.6 million tonnes of common beans (*Phaseolus vulgaris* L.), 1.9 million hectares in the three crops, with average yield of 1,353 kg/ha (Embrapa Rice and Beans, 2014).

'BRS Estilo' variety is indicated in 2009 for the crops during summer (rainy) season in the states of Goiás, São Paulo, Paraná, Santa Catarina, Rio Grande do Sul and Pernambuco; during autumn (end of rain) season in states of Goiás, Paraná, Santa Catarina, Rondônia, Mato Grosso and Mato Grosso do Sul; and during winter season in the sates of Goiás, Mato Grosso and Tocantins. Its plant type is upright, with lodging resistance, well adapted to fully mechanised harvest and its cycle takes 85 to 90 days from emergence to physiological maturity (Melo et al., 2009).

This study aimed to economically evaluate the 'BRS Estilo' common bean variety, a variety of common bean (*Phaseolus vulgaris* L.), of 'carioca' commercial type, developed by Embrapa Rice and Beans and its partners.

Material and Methods

The economic analysis was referring to earlier technology – the variety Perola –, which was commercially released in 1994 for the same coverage area. We evaluated four successive years of 'BRS Estilo', i.e. the crop 2010/2011, 2011/2012, 2012/2013 and 2013/2014.

Production costs of the earlier technology (Pérola variety) and the new technology (BRS Estilo variety) at adopting farm level were calculated following Avila et al. (2008).

Adoption has been estimated based on interviews with key informants in growing regions and on secondary data from Kleffmann Group (2011), IBGE (2014), Silva & Wander (2013) and Embrapa Arroz e Feijão (2014).

Based on economic data at plot level multiplied by adoption we reached a regional economic surplus model.

Results and Discussion

In the above region, there have been considerable increases in the factor prices, mainly inputs, which resulted in the increase in the average product cost. Prices received by bean producers also varied and ranged from R\$ 95.40 to 205.17 per 60 kg bag. This variation did not compromise the bean business, which is economically viable and guaranteed in the production chain. The common bean producers, by adopting the common bean cultivar 'BRS Estilo', in the average of the reporting period, the first and second cropping seasons, with the cost of R\$ 2,414.38 to

produce 33 bags of 60 kg per hectare and the winter crop, with production of 53 bags of 60 kg per hectare at the cost of R\$ 3,876.84, obtained an average financial return on investment of 112% in the winter crop and 105 % of the average for the first and second cropping season. The ‘BRS Estilo’ variety contribution over that period, to the bean agribusiness in Brazil was R\$ 239,431,760.83 (US\$ 106.00 million). The transfer process of the ‘BRS Estilo’ to the productive sector represents 7.5 % of the total cost for the development of technology since the year 2000. In addition to the economic benefit provided by the adoption of this technology, there has also been generating more jobs and increased product supply on the market.

Table 1 shows the economic benefits of the adoption of ‘BRS Estilo’ variety in substitution of ‘Pérola’ variety in the states that cultivate common beans during summer (rain) and autumn (dry) seasons.

Table 1: Economic benefits of using ‘BRS Estilo’ variety compared to ‘Pérola’ variety in Center-West and Southern Regions, and states of Rondônia, Pernambuco, São Paulo and Minas Gerais, in average of summer (rainy) and autumn (dry) seasons.

Year	‘Pérola’ variety yield (kg/ha)	‘BRS Estilo’ yield (kg/ha)	Price (R\$/kg) ¹⁾	Additional costs (R\$/ha) ¹⁾	Net benefit (R\$/ha) ¹⁾	Adoption (ha)	Net economic benefit (R\$) ¹⁾
2011	1,620	1,980	1.59	(2.36)	576.69	7,000	4,036,830.00
2012	1,620	2,000	2.70	(6.35)	1,033.02	70,950	73,292,769.00
2013	1,560	2,000	3.42	15.05	1,491.10	84,531	126,044,174.10
2014	1,500	2,120	2.17	154.71	1,188.64	116,663	138,670,308.32

¹⁾ Values of 2011, 2012 and 2013 converted into current values using IGP-M of FGV (April/2014=100).

Source: Research results.

Table 2 shows the economic benefits of the adoption of ‘BRS Estilo’ variety in substitution of ‘Pérola’ variety in the states that cultivate common beans during winter seasons, in tropical states, using irrigation.

Table 2: Economic benefits of using ‘BRS Estilo’ variety compared to ‘Pérola’ variety in the states of Goiás, Mato Grosso, Tocantins, São Paulo and Minas Gerais, in winter seasons.

Year	‘Pérola’ variety yield (kg/ha)	‘BRS Estilo’ yield (kg/ha)	Price (R\$/kg) ¹⁾	Additional costs (R\$/ha) ¹⁾	Net benefit (R\$/ha) ¹⁾	Adoption (ha)	Net economic benefit (R\$) ¹⁾
2011	2,820	3,120	1.59	(100.87)	579.47	1,000	579,470
2012	2,820	3,120	2.70	(89.59)	954.11	2,655	2,533,162.05
2013	2,640	3,200	3.42	129.94	1,786.99	9,836	17,576,833.64
2014	2,760	3,300	2.17	274.96	895.06	24,608	22,025,636.48

¹⁾ Values of 2011, 2012 and 2013 converted into current values using IGP-M of FGV (April/2014=100).

Source: Research results.

Adding the economic benefits of cultivating beans with the new variety ‘BRS Estilo’, compared to ‘Pérola’ variety we obtain an economic surplus of R\$ 4.6 million in 2011, R\$ 75.8 million in 2012, R\$ 143.6 million in 2013 and R\$ 160.7 million in 2014. Together, during four years of adoption of ‘BRS Estilo’ variety, the accumulated economic surplus reached R\$ 384.8 million.

It is estimated that for the launch of a new cultivar on average 10 years of work in breeding are needed (Table 3). As the variety ‘BRS Estilo’ was launched in 2009 to calculate the cost was taken as the base year 2000. The calculation of the cost of hand labor involved in the improvement of the common bean was made according to Almeida & Yokoyama (2000). These authors considered a composite team, on average, by a researcher level I and III, two researchers level II, four rural workers, and three laboratory technicians. In addition, they adopted the following methodology: in the first year of the development of farming, we calculated the full

salary of all staff and considered spent with hand labor. From the second year, a reduction of 10% per year was applied, considering that new cultivars are being developed in parallel. This was the method used to calculate the cost of hand labor. To fund the research, it was considered the cost of administration (administrative staff, consumables, maintenance and preparation of experimental fields, agricultural machinery, costing with capital, among other services), which was calculated as 40% of the labor.

The total cost of generation technology, since the beginning of the study, release and transfer, i.e. from 2000 to 2014, was R\$ 12,888,133.00, and the transfer of 'BRS Estilo', which has been held since 2009, the amount of R\$ 966,077.12, has the participation of 7.5% in the total process.

From 2009 were considered the technology transfer costs, which have been fixed from year to year, reaching R\$ 131,000 in 2009, R\$ 289,000 in 2010, R\$ 312,000 in 2011, R\$ 337,000 in 2012 R\$ 364,000 in 2013 and R\$ 393,000 in 2014.

Table 3: Costs (R\$) to develop and transfer the 'BRS Estilo' variety to farmers¹⁾.

Year	Personnel	Research funding	Capital depreciation	Administration	Technology transfer	Total
2000	363,875.91	229,350.90	91,739.71	41,282.17	-	726,248.69
2001	395,517.30	249,294.41	99,717.55	44,872.63	-	789,401.88
2002	429,910.11	270,972.14	108,388.64	48,774.08	-	858,044.96
2003	464,302.91	292,649.86	117,059.73	52,675.53	-	926,688.04
2004	501,447.15	316,061.81	125,717.05	56,890.13	-	1,000,116.14
2005	541,563.09	341,347.27	136,538.91	61,441.65	-	1,080,890.92
2006	631,678.73	398,146.70	159,258.68	71,665.54	-	1,260,749.65
2007	682,213.03	429,998.44	171,999.37	77,398.79	-	1,361,609.62
2008	736,790.07	464,398.31	185,759.32	83,590.69	-	1,470,538.39
2009	795,733.27	501,550.18	200,620.07	90,277.94	131,691.52	1,719,872.99
2010	88,008.88	-	-	58,513.13	142,226.41	288,748.41
2011	95,049.59	-	-	63,194.18	153,604.52	311,848.29
2012	102,653.55	-	-	68,249.71	165,892.89	336,796.15
2013	110,865.84	-	-	73,709.69	179,164.32	363,739.84
2014	119,735.10	-	-	79,606.46	193,497.46	392,839.03

¹⁾ Values of 2000-2013 converted into current values using IGP-M of FGV (April/2014=100).

Source: Research results.

The investment, considering a period of ten years, in a research project for the development of bean cultivars, was budgeted at R\$ 11,194,161.29. The results of the financial analysis considering the period of 2000 until 2014, including the last four years of adoption have already shown interesting results: IRR of 45% and NPV of R\$ 68.5 million to a 12% interest rate. It is expected that these results will improve even more in the coming years, considering the quality of grain of this cultivar, which should provide increased adoption and expansion in planted area.

Conclusions and Outlook

The 'BRS Estilo' variety was economically viable in all cropping seasons. Compared to the previous technology ('Pérola' variety), 'BRS Estilo' is higher yielding with moderate or without increases in costs.

Considering the development of the technology, the 'BRS Estilo' after only 4 years of adoption already shows good investment indicators, with 45% of IRR, NPV of more than R\$ 68.5 million at a 12% interest rate. Since the adoption of this variety is still increasing, the indicators will raise even more the following years.

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