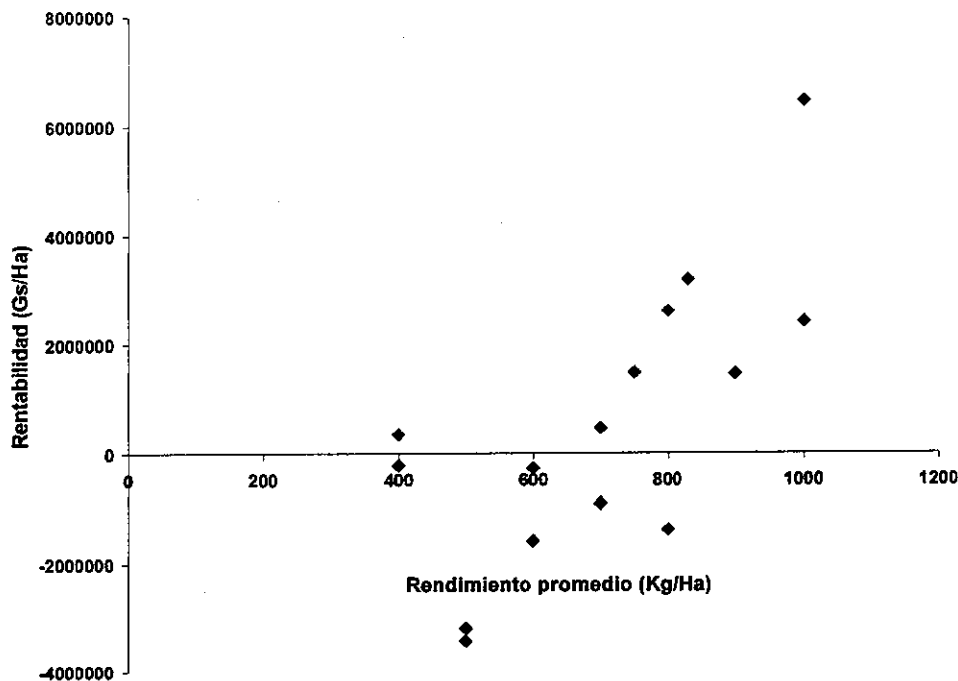


**Figure 27: Relationship among total production cost of cotton and yield per hectare.**

The correlation between the total cost and the seedcotton yield per hectare was low (correlation coefficient 0.236) and it didn't reach to be significant at 5 % significant level (Figure 28). This correlation absence could indicate differences in soil quality and possibly the erratic rainfall distribution in a year of hidric deficit in the reproductive stages of the crop, since in the intermediate levels at an equivalent cost, quite different yield levels are obtained.

In Figure 10, the correlation among the yield average (Kg. /ha.) and the profitability (Gs. /ha.) (net margin), existent in the cultivation of cotton from the interviewed small non soybean growers was significant at the 0.05 level of significance, with a value of 0.701, considered as "very strong", observing a direct lineal tendency that intercepts the value of 0 net margin of profitability, at a yield average of 700 Kg. /ha., below which almost all the data threw monetary losses for the year under study.



**Figure 28: Relationship between profitability and yield per hectare of seedcotton**

In this harvest year, the average price average by the surveyed cotton growers was of 1.364 Gs/ Kg. (minimum 1.300, maximum 1.500 Gs/ Kg.) of seedcotton at farm level, equivalent to 0,22 US\$/ Kg.

In relation to the **system of livestock production**, at present it is submitted to the competitive pressure of the soybean production system, mainly through the land leasing from hundreds to thousands of hectares plots, consisting in the pastures reconversion of those that are currently degraded or uncleared from trunks. According to statements from local informants it would be averaging an annual profit value from 50 to 70 US\$/ ha. The majority of the pastures leasing prices paid by large soybean producers which were mentioned ranged between 70 and 100 US\$/ ha. Yearly, according to different zones.

The low price of the bovine cattle would have been the main reason of the productive reconversion in the department of Amambay. According to a high secretary of this department government, *"the soybean cropping was a strategy of cattle raisers when the border was closed because of the foot and mouth disease outbreak"*. It should be remarked that the outbreak of this illness had affected particularly to this region, closing the bovine cattle export to the traditional regional markets.

The above mentioned fact would be able to explain the significant soybean area expansion in the San Pedro department. The profit value margins difference between the soybean production and the cattle raising (caused by cattle low prices) should have given dynamics to the farm real estate leasing market in this region. In this respect, the leader of an agricultural cooperative of this department has declared us that the return of the stockbreeding oscillates between 50 and 60 US\$ by ha., while the producers of soybean pay around US\$ 70 per hectare to lease the fields. The livestock production displacement was not only due to the profit margins difference per hectare. Many cattle raisers saw in land leasing a secure and profitable solution before the proliferation of cattle thefts.

The reconversion of cattle to soybean has not been, in many occasions, an election of the same producers; but it has been given as a result of transactions of leasing or sale of lands. This phenomenon has been more common in the regions of present expansion of the soybean border (Canendiyú lowlands, Caaguazú and some districts of Alto Paraná North and San Pedro).

#### B1.2: Effects on cattle livestock production.

Most of the interviewed have observed in the region a reduction of the land surface destined to pastures cattle raising. This phenomenon itself was attributed to two main factors: a) the introduction of genetically modified varieties they would have facilitated the soybean cultivation on cultivated and natural pastures, and b) the current prices of the cattle has been unfavorable, facilitating the productive reconversion. These factors contributed to offer greater profit value margins to the soybean production with regard to the cattle raising.

The introduction of genetically modified varieties has facilitated the sowing of this crop on previously considered as inappropriate lands for the production of soybean. The cost reduction in the cropping management and the possibilities for a better weed control stimulated producers to cultivate in the natural meadows of the Misiones department, and on not so appropriate soils for this crop that characterized some rural peasant colonies. Consequently, some plots that before lacked interest for the soybean producers turned out suddenly to be "attractive" due to the technological change, which has been translated in tempting offerings so that cattle raisers and peasant small farmers leased or sold their lots to mechanized agricultural producers.

The bovine beef cattle production did not had greater economic importance in the traditional soybean production zones. Nevertheless, many interviewed informants in this region have remarked that the introduction of genetically modified soybean has facilitated the conversion of remaining pastures to plots of soybean.

The districts visited in the Department of Canendiyú show different particularities than the observed in the other departments. In spite of the fact that also has been shown an important increment in the surface sown to soybean, it seems that this expansion would not have displaced other productive agricultural systems with the same intensity that has been observed in the

departments of Itapúa and Alto Paraná. The production expansion has been the effect in a much greater degree by the cattle raisers ranch reconversion to soybean cropping through the land sale or leasing.

(C30b) The evolution of the cattle population was not reported as worrying in the different zones neither among informants. Both the negative statements and affirmatives were equivalent in both zones, (43%) "not" and (57%) "yes". Although in the traditional soybean zone a light majority affirmed that "yes" it had diminished. As for the informant types, the majority of the municipal representatives declared the decrease of the cattle in the zone. (Table 48, Annex 4).

The mayor from a soybean traditional district of upland region in the Department of Canindeyú has declared that the only remaining cattle in the region belongs to small producers. The large and medium producers practically have sold all their cattle to use their plots for the production of soybean.

On the other hand, the mayor from a traditional soybean municipality from the Itapúa Department thinks that this phenomenon is normally current. In his words, "*many pasture lands have been rotated to soybean but they will return in some years to grassland*".

(C30c) When the incidence of the soybean system on the local slaughtering of cattle for consumption is analyzed, it tends to be differences among zones, given that 25% of the informants they responded that yes, it was affected in the traditional zones. On the other hand, in the new zones, by unanimity, they answered that there was no effect. (Table 49, Annex 4). As for informant types there were not discrepancies among them, with a majority in each case affirming that were not detected major effects.

The cattle raisers that opted to transform their pastures to soybean cultivations (whether directly or by leasing), they produced generally for the Asunción beef market or for export. The production reduction would have not affected the consumption demand at the local level. Therefore, the slaughtering levels were maintained stable, same as the local meat prices that have fluctuated based to the national supply and demand.

(C30d) The reconversion of natural and cultivated pastures to cropping plots can also have effects on the generation of rural employment, above all for labor in the cattle raising activity. Nevertheless, many of the interviewed have coincided in indicating that the effect of the loss of "cattle raising jobs" is not of great importance. For example, the Executive Director of a MAG's project, has declared that any form of agriculture generates more occupation than the bovine beef production, above all the extensive and semi-intensive. Besides, in the majority of the visited districts (where the production of soybean is traditional) the cattle raising activity had little relative importance.

The departments of Misiones, Canindeyú and Concepcion constitute an exception with regard to the other visited regions. In these zones the cattle

raising activity was traditionally important; and this should be able to explain the appreciation from a senior officer of the Canindeyú departmental government, who has identify the “horse riding workers” as “losing actors” in the phenomenon of the soybean border advance in his department.

It fits to remark that the productive reconversion observed in the majority of the visted regions would not mean an especially negative economic impact in the region. In the first place, the cattle raising production does not generate too much employment, for which it has not been given an important labor displacement.

### B1.3 Leasing of farms

In recent years, considering that the agricultural border by opening of new lands has arrived at its limits, the practice of land leasing for mechanized soybean production is being generalized, so much in large cattle raisers farms like in small producers fields. In order to quantify the process this variable was included in the farm survey.

In reference to leasing of lands, 14% of the surveyed farmers reported to have done it (Table 36). The land surfaces leaseed varied from a minimum of 2,5 hectares up to 1 102 ha. plot, with a median of 10 ha. As for the annual value for land leasing it varied from a minimum of 400.000 Gs./Ha. (64,5 U\$S/ha.) to a maximum of 1.000.000 Gs./Ha. (161,3 U\$S/ha.), with a median that represents more frequent values, of 700.000 Gs. /ha. (113 U\$S/ha.)

**Table 39: Lots leased by surface size and transaction value**

Número de plots	Hectares	Total amount (Gs.)	Amount in Gs./Ha.	Ranking
1	20	20.000.000	1.000.000	1
2	5	4.000.000	800.000	2
1	6	4.800.000	800.000	3
1	10	8.000.000	800.000	4
1	29	21.750.000	750.000	5
1	18	12.600.000	700.000	6
1	75	52.500.000	700.000	7
1	4,5	3.000.000	666.667	8
1	100	50.000.000	500.000	9
1	20	9.300.000	465.000	10
1	4	1.600.000	400.000	11
1	5	2.000.000	400.000	12
1	102	28.560.000	280.000	13
14	398,5	218.110.000	635.513	

Source: Own elaboration. Note: Exchange rate is of Gs. 6.200 per US Dollar.

### B2: Profit value of the genetically modified soybean compared to the conventional varieties.

One of the most mentioned arguments in favor of the genetically modified soybean adoption is based in that the profit value increase because the relative

costs decrease. In order to investigate this concept, the surveys data were analyzed in reference to production costs, yield performances per hectare and prices perceived by farmers for the conventional and genetically modified (RR) soybean varieties.

Economic performance of differentiated soybean (2004/5). (Relative Competitivity)

Subsequently the descriptive statistics of the farm surveys economic results are presented, where these indicate trends that can be biased by representing an atypical campaign. The 2004/05 crop season was characterized by have been affected by late drought in the reproductive phase, affecting growth and the yield performance. Likewise, it was atypical by the unfavorable international prices for soybean when compared with the values obtained in the previous year (Table 40).

**Table 40: Relative economic performance of differentiated soybean by farm strata and soybean type**

Farm strata	Yield Ton/ha		Soybean price US\$/ton		Total Cost US\$/ha		Net Margin US\$/ha	
	Conv.	RR	Conv.	RR	Conv.	RR	Conv.	RR
Small	2,3	1,8	174.3	180.5	287,1	239,7	113,79	91,06
Medium	2,5	1,9	172.2	174.8	281,9	267,4	148,6	64,2
Large	2,6	0,8	170.0	177.2	308,6	242,2	133,4	-100,44

Source: Own elaborationa. Obs.: Conv.: conventional soybean.

When examining the data corresponding to economic performance per hectare, an interaction is observed, given that in conventional soybean the yield performance very was similar in the three farm size strata (2.3, 2.5 and 2.6 ton/ha for small, medium and large farms, respectively), in contrast to the abrupt yield descent of soybean RR to the extent that the production scale increased (1.8, 1.9 and 0.8 ton/has, respectively). This would be able to be explained given that in smaller farms the soybean plot is established in very short time in more opportune timing in comparison to the large extensions, which require more time to establish several sowings therefore submitting the crop to varying climates in different phenological stages.

As for the sale price of the harvested soybean there was not greater difference, varying between 170.0 and 180.0 US\$/ha, with a slight decreasing tendency to the extent that the farm size enlarges.

On the other hand, there was not discrimination in the full prices paid for grains of conventional and genetically modified soybean. The grains of organic soybean and the ones for direct human consumption do include price quotations that from time to time can be well higher over the other varieties. According to a technician in southern Itapúa, the introduction of genetically modified varieties contributed to increased prices for the organic crop, that in our days is receiving up to a 50% higher price.

In relation to the total cost per hectare, a general average of 292,53 US\$/ha over all farm size strata is observed for conventional soybean, compared with 249.76 US\$/ha in soybean RR, representing an average difference of 42.76 US\$/ha in favor of the genetically modified soybean.

When comparing among size strata, it is noted that the costs tend to increase slightly to the extent that the crop size enlarges, indicating a relative advantage for the smallest farms. Likewise, the difference suggests that it would be able to be stressed in favor of the genetically modified varieties to the extent that the farm size enlarges.

As a consequence of the analyzed values a slight tendency is observed toward the increase in the net margin (profit value) per hectare to the extent that the scale of production enlarges, benefiting the "medium" size producers, in the case of the conventional soybean (113.79 US\$/ha. for small, 148.6 for medium and 133.4 for large soybean plots). In contrast, in the case of the soybean RR the inverse situation is presented, considering the large effect associated to the decrease of yield performance per hectare when the crop size enlarges (91,06 US\$/ha. for small, 64,2 for medium and -100.44 for large soybean plots). This should be able to be interpreted based on the farmers statements registered in the interviews, according to which, in years of drought the genetically modified varieties (genotypes adapted to temperate zones) have shown a notorious vulnerability to the effects of water deficit, in contrast to the traditional conventional varieties, better adapted to subtropic.

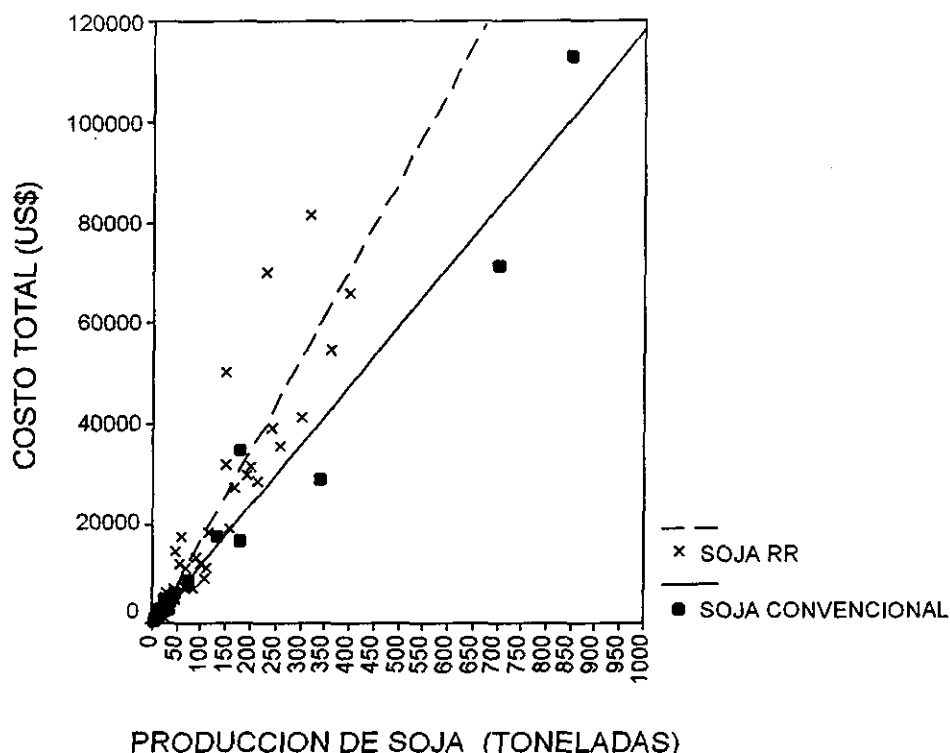
In the future, could be expected that new cultivares with RR genes inserted in genotypes better adapted to subtropical conditions can show a similar or better behavior over the conventional varieties in their adaptation to the environment.

In summary, the profit value of one or another soybean type is found determined by various indicators. In the first place the cost of production favors to the genetically modified varieties, which presented a savings that, according to different interviewed sources, can fluctuate among US\$ 15 and US\$ 65 per hectare.

In second place, the yields of the genetically modified varieties of soybean apparently are lower than the observed in conventional varieties. According to a southern cooperative leader of Alto Paraná, the difference in yield performances is so marked and the production cost difference so small, that the collection of a canon for the genetically modified variety can affect the profit value.

Finally, the price differentiation does not seem to exercise a determinant role for the election of the technology to be utilized. There was no discrimination of prices paid by genetically modified and conventional grains, and the soybean produced for human consumption seems to have higher costs and pronouncedly higher demands that they neutralize the benefits of the better prices.

In the correlational analysis, when the information is analyzed by soybean type produced, differences in the sample distribution at low production levels are not detected. However, to the extent that the scale of production increases up from 150 hectares, the conventional soybean tends to produce more tons of grain for each increment of the total cost. (Figure 29)



**Figure 29: Differentiated soybean, Relationship among total cost and total production in tons.**

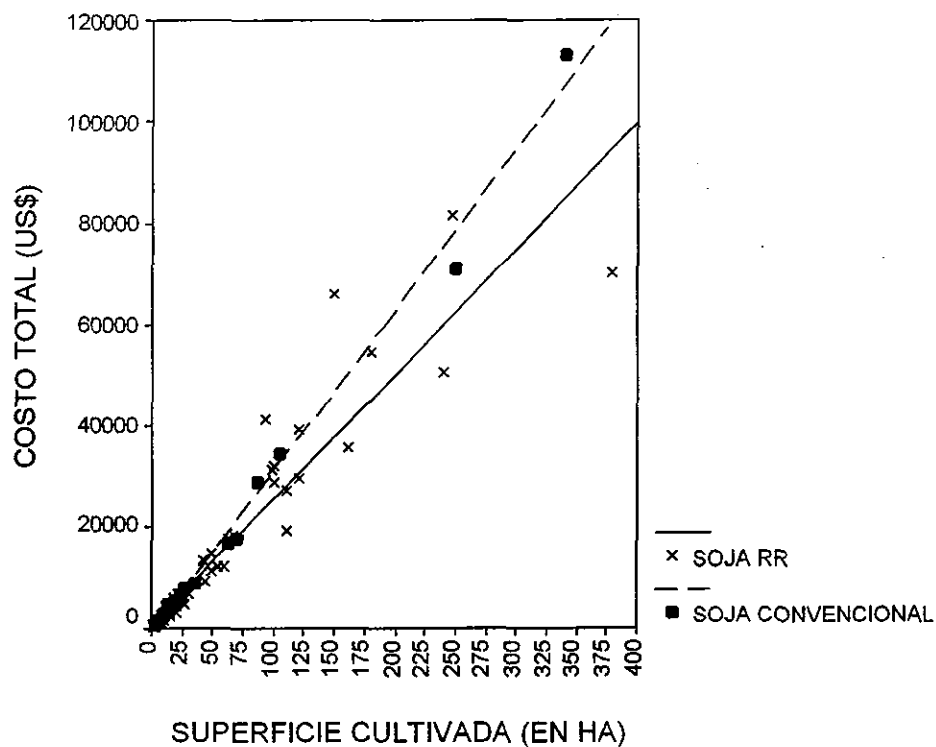
**Table 41: Correlations among total cost and soybean production**

		Total Cost (US\$)
Soybean Production (in Tons) Harvest year 2004/05	Pearson correlation coefficient	0.895**
	Probability (2 tails)	0.000
	N	79

Source: Own elaboration. Note: \*\*statistically significant at 1% (2 tail test).

When itemizing the tendency among the total soybean cultivated surface and the total cost at the farm level by the different types of soybean produced, a greater dispersion of data is observed for the soybean RR, in comparison to the conventional, which sow a more lineal trend (Figure 30).



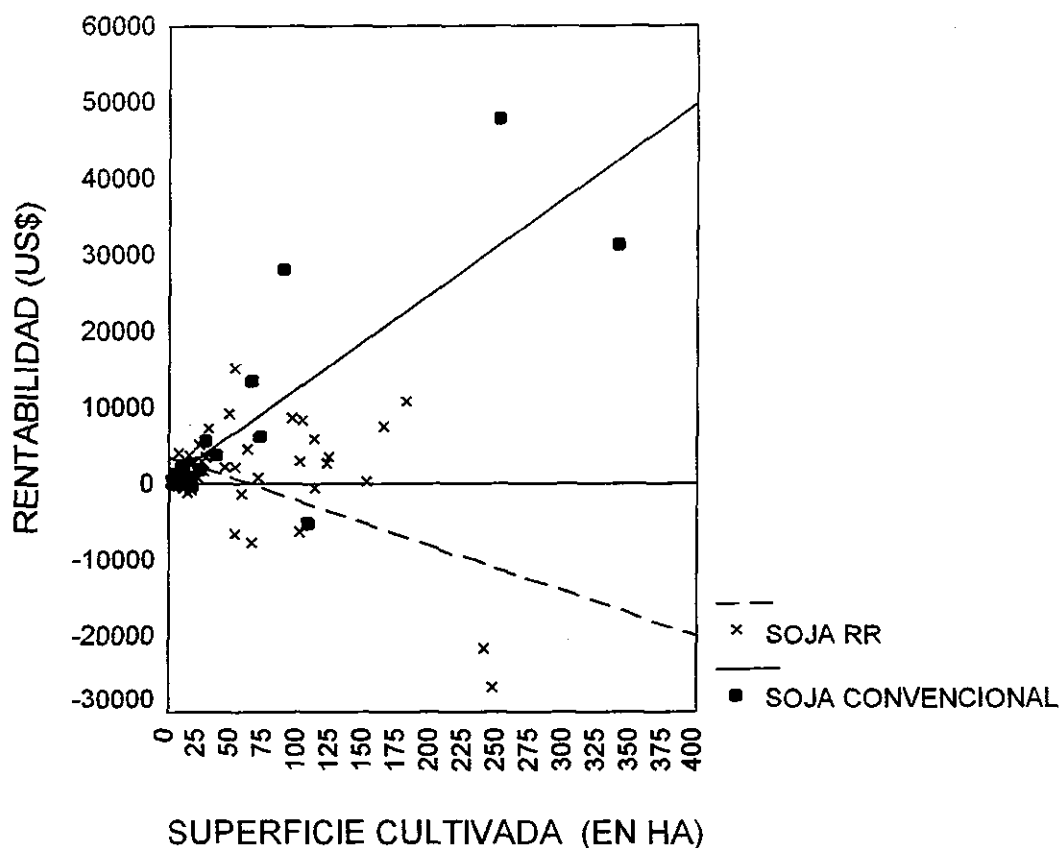


**Figure 30: Differentiated Soybean: Relationship among planted area and total cost of production**

**Table 42: Correlations among total cost and soybean cultivated area**

		Total cost (US\$)
Soybean cultivated area (in Ha) (Harvest year 2004/05)	Pearson correlation coefficient	0.953**
	Probability (2 tails)	0.000
	N	79

Source: Own elaboration. Note: \*\*Statistically significative at 1% (2 tail test).



**Figure 31: Differentiated soybean: Relationship among farm size and profitability**

**Table 43: Correlations among profitability and soybean cultivated area**

		Soybean Cultivated Area (in Ha) (Harvest year 2004/05)
Profitability (US\$)	Pearson correlation coefficient	-0.333
	Probability (2 tails)	0.774
	N	79

Source: Own elaboration. Note: \*\*Statistically significant at 1% (2 tails test).

It is observed that the relation between the profit value and the soybean cultivated area is practically nonexistent. Now, like the regressions indicate it is observed that for conventional soybean it shows a total profit value fitted to the increase in cultivated surface as expected. On the other hand, in the genetically modified soybean it is shown again that there is not appreciable difference in performance at low levels of production until approximately 125 hectares. However, up from that level in the large and medium plots the profit value has increasingly been reduced becoming negative finally, at least under the conditions of extreme drought registered in the campaign 2004-2005.

B3: Contribute tax of the production of soy differentiated.

In recent years it has been debated the perception that the mechanized system of soybean production contributes little to the public treasury, above all at the local level. In the present section are analyzed both the informations from the farm surveys like the statements of qualified informants about the contributions perceived by the local municipality.

The interviewed tended to agree in their perception on the existence of a positive relation between the soybean area expansion and the municipal tax collections. A leader from a production cooperative declared us that the tax collection increases to the extent that the assets of the businesses and the producers increase.

(C29) in relation to the perception about the soybean system incidence on the municipal tax collections, there was a great difference between zones but not among informant types. In the traditional soybean zones, 83% of the interviewed perceives a favorable contribution to the municipal tax collections, while in the new zones 57% said that the soybean advance has "not" had impact. One must stand out that in no case it was told that it affected negatively. When comparing the statements by informant types in the new soybean zones only a third of the representatives from municipalities declared positive impacts, but the majority of them declared that they still did not noted changes yet. (Table 46, Annex 4).

Also it has been stated that many businesses have proliferated as a result of the soybean expansion, which has increased the tax collections by municipal patenting. The increment of the automobile park, like derivation of the greater incomes by the soybean producers, has been another motive for increments of the municipal tax collections.

The land concentration would have been of some beneficial impact for the tax collections of local governments. In words of a manager, "the small producers do not pay taxes, but they require support for roads, schools, etc". The old colonies of IBR (land reform institute) did neither pay taxes because many settlers have not titled properties. Once they transferred their land to farmers of larger scale, the municipal collections in real estate tax were increased.

On the other hand, some local governments representatives have declared that the effect of the expansion of soybean cultivation would have been nil on the municipal tax collections. Other municipal managers have complained that the tributes paid to the municipality are insufficient and many times are distorted in made up balances.

If we consider that the technology applied in the production of genetically modified varieties facilitated the reconversion of agricultural lands which belonged before to the traditional rural small producers; it would be able to infer

that this technology has been positive for the tax collections of local governments.

B4.: Risks of insertion in importing markets by production of genetically modified soybean.

One of the currently most debated points consists in the risk of future placement of genetically modified soybean in some of the main importing markets of the world. It was investigated on the possible price difference that could exist among the grain of conventional soybean compared with that paid for the genetically modified one. Besides, the possible introduction prohibitions of genetically modified soybean to other countries. The mentioned point was analyzed in the study on international trade.

B5.: Redistributive effects of the production of genetically modified soybean.

It is affirmed that when producing the genetically modified soybean, from the moment that it substitutes labor for herbicides, it causes unemployment of farm workmen, who transfer their crisis to the local environment, decreasing in their role as producer / wage-earning / consumer. On the other hand, it is presumed that the producer of genetically modified soybean would not obtain a significant improvement in his standard of living only by the adoption of this technology.

In order to verify the previous concepts, it was estimated in the survey results the total value of the differentiated soybean production distributed by producers size segments, the income distribution reflected on the indicators of material welfare, and the average incomes obtained by the economically occupied population (PEA) in activities related to the soybean conglomerate. Likewise, it was asked to the interviewed at community level which were the groups of actors benefitted or damaged by the soybean advance.

B5.1.: Social Groups of benefitted / harmed by the soybean expansion.

(C27a) At community and institutional level the interviewed informants perception was identified on which are the benefitted or harmed groups of local actors by the advance of the soybean system in general, registering the following answers:

1. All the types of informants identified unanimously to the big mechanized farmers as beneficiaries, so much in the traditional soybean zones like in the new areas (Table 34, Annex 4).

2. Most also identified as beneficiaries to the medium size producers (94%) (Table 35, Annex 4).

3. As for the small producers, the opinions were more divergent among informants types than among areas. In the soybean traditional area, a scarce majority of 55% says that they was benefitted, while a third estimated that it harmed them and only 10% says that they are not affected (Table 36, Annex 4).

Among informants' types, all cooperativists affirmed that the small producers were benefitted with the soybean advance. In contrast, half of the municipal informants estimated that it harmed them, against 37% that affirmed that it benefits them. The agriculture secretaries of agriculture also, affirmed in majority that small farmers were harmed.

4. As for agricultural daily laborers, a majority concluded that they were harmed (Table 37, Annex 4).

Among informants' types, the cooperativists were divided in 57% by saying "beneficiaries" and 43% "harmed". The other informants almost unanimously estimated that the rural wage earners were harmed.

5. In relation to the effects of soybean advance on the cattlemen, in the traditional area 53% manifested that the cattlemen were "not affected", 27% that they were benefitted, and 20% harmed (Table 38, Annex 4).

6. The effect of the soybean advance on the local merchants was, for wide majority in both producing areas, 85%, that they were benefitted. Among informants' only 1 agriculture secretary informant types mentioned that it "doesn't affect them", and 1 municipal that they were harmed. (Table 39, Annex 4).

7. Also, the effect on outsiders merchants, in both areas it was considered that they were benefitted. Only in the traditional area, 20% estimated that it harmed them and just 1 that didn't affect them". (Table 40, Annex 4).

8. As for local mechanics, the informants only said that in the traditional area they were benefitted (Table 41, Annex 4).

9. The effect on local tractor drivers was in general that it benefitted them, 76%. (Table 42, Annex 4).

10. The effects on the truck drivers of the community, were in majority, by 81%, that benefits them or that they are not affected (Table 44, Annex 4).

11. As for lumbermen, most didn't respond and of those that did it, surprisingly estimated that it benefits them, 85%, or that they are not affected. (Table 45, Annex 4).

In previous sections, the social impact of the small production displacement as a consequence of the soybean cultivation expansion has been discussed. This displacement has important economic consequences at local level. According to the interviews maintained with qualified informants in the different regions; the consequences of displacement of the peasant productive system can be focused from two different perspectives: on one hand the concentration of the production factors for parcels selling, and on the other hand, the productive reconverting of the same small farmers.

The production factors concentration has not only affected to the universe of farmers at the local level (less farmers with revenues), but rather it has derived its consequences to other economic sectors of the communities. The displacement of small producers has also affected to small trading because the concentration of soybean production and their revenues reduced considerably the number of consumers.

On the other hand, the incorporation of soybean on the part of farmers who previously were producing other crop items has rebounded in an improvement in their income levels. The technology used in the production of transgenic varieties seems to have facilitated this reconverting, because it could also have determined higher revenues for small producers.

In sum, one could say that if the introduction of these varieties has facilitated the annexation of small properties to larger size establishments, this phenomenon would have had a negative economic impact at local level due to the decrease in the number of agricultural establishments with rent activities. On the other hand, when the transgenics introduction facilitated the adoption of an item with better rent perspectives for the small producers, the same phenomenon had a positive economic impact on this group of farmers.

#### B5.2.: Material Welfare of the different types of interviewed producers.

To determine the effects of production of the different rent groups on producers well-being, the index of material lifestyle was used. This index establishes a connection among the individual and the material world expressed by the consumption of goods through which social status is acquired. (Sanginga et al, 1999).

In the surveys of farms it was requested the identification and the total value, in nominal guaranies (Gs.), of possessed goods which are related to the material well-being of the families, according to farmers stratification by different land property size, and types of soybean produced. The collected data reflected great differences. (Table 44)

**Table 44: Total value of acquired goods by type of farm**

FARM TYPES	CROP PRODUCTION TYPE	N	Standard deviation	Median	Average	Minimum	Maximum
Small (up to 20 Ha. of soybean)	Conventional soybean	10	8.812.399	3.300.000	6.340.000	0	28.905.000
	Soybean RR	30	82.713.083	12.777.500	48.602.000	780.000	346.980.000
	Both	1		12.120.000	12.120.000	12.120.000	12.120.000
	Total	41	72.998.622	10.060.000	37.404.390	0	346.980.000
Intermedium (21 to 200 Ha. of soybean)	Conventional Soybean	7	50.103.373	44.100.000	51.160.000	630.000	148.060.000
	Soybean RR	27	106.691.173	47.570.000	104.446.519	5.500.000	364.355.000
	Both	4	55.280.963	309.255.000	300.762.500	225.810.000	358.730.000
	Total	38	115.050.129	55.080.000	115.295.421	630.000	364.355.000
Large (201 and more Ha. Of soybean)	Conventional Soybean	2	82.869.379	185.467.500	185.467.500	126.870.000	244.065.000
	Soybean RR	3	119.080.962	258.660.000	235.040.667	105.920.000	340.542.000
	Both	2	150.468.788	180.602.500	180.602.500	74.205.000	287.000.000
	Total	7	102.085.624	244.065.000	205.323.143	74.205.000	340.542.000
Small farmer non soybean grower	Total	15	6.712.234	1.200.000	3.254.667	0	26.980.000
	Total	15	6.712.234	1.200.000	3.254.667	0	26.980.000
Total	Conventional Soybean	19	65.445.597	10.060.000	41.708.158	0	244.065.000
	Soybean RR	60	104.149.926	26.460.000	83.053.967	780.000	364.355.000
	Both	7	131.674.179	287.000.000	225.196.429	12.120.000	358.730.000
	Small non-soybean grower	15	6.712.234	1.200.000	3.254.667	0	26.980.000
	Total	101	103.995.907	21.310.000	73.276.119	0	364.355.000

Source: Own Elaboration.

The most important difference corresponds to the value of the goods possessed by the small farmers non soybean growers (1.200.000 Gs.), in contrast to the small soybean producing farmers (10.060.000 Gs.). If it is detailed according to the soybean produced type, it registers an important contrast among the median of those producing conventional Soybean (3.300.000 Gs.), compared to the producers of Soybean RR and of both types (12.777.500 and 12.120.000 Gs., respectively).

In all the soybean producing strata, both the median as well as the average, they demonstrate the biggest investment realized on durable goods by the farming families producing Soybean RR comparing with the conventional ones.

Also, the investment levels corresponding to small soybean producers (10.060.000 Gs.), medium size (55.080.000 Gs.) and large (244.065.000 Gs.), they reflect a great difference in access to these types of goods. One of the items that has larger impacts in the totals corresponds to the possession (or not) of all types of vehicles.

When the data are examined to know the different farmer strata access to different types of durable goods, being classified by type of cultivated soybean, surprising results are observed.

The most significant comparisons correspond to both types of small farmers. In Table 42, it is observed that the small non soybean producer is the one that have fewer possessions of characteristic goods for material well-being, when possessing only 9 out of the 27 identified items. Also, the percentages indicate that refrigerators only are possessed by 3 out of 4 producers (73%) followed by TV sets (67%) and bicycles (53%); the other goods: like ovens, tape recording radio, sound systems and fans are possessed for less than half of those belonging to this stratum. As for mobiles, only 7% declared to possess motorcycle or van.

When comparing among them the small soybean producing farmers, according to the type of Soybean that they have, large differences are observed in the possession of these goods. Those producing conventional Soybean declared to possess 14 out of the goods listed, while those producing soybean RR declared to possess, in variable degree according to item, 26 out of the 27 listed goods, all but "canoe / boat". Also in most of the goods shared by both types it tends to be higher the percentage of good possession, corresponding to those producing transgenic soybean.

**Table 45: Durable goods possessions by type and size of produced soybean, in percentage (Small farmers)**

ORDER	GOODS	Small farmer, no soybean	Conventional	RR	Both	Organic	Total Soybean
1	Stove (gas, electric or logs)	27	90	87	100	0	88
2	Refrigerator	73	50	87	100	0	78
3	Electric oven	0	10	30	0	0	24
4	Microwave	0	10	7	0	0	7
5	Freezer	0	30	47	0	0	41
6	Multi-processor	0	0	3	0	0	2
7	Vacuum cleaner	0	0	17	0	0	12
8	Grass	0	0	27	0	0	20
9	Video cassett	0	0	10	0	0	7
10	DVD	0	0	10	0	0	7
11	Tape recorder	47	50	67	100	0	63
12	TV set	67	60	93	100	0	85
13	Sound	27	10	37	100	0	32
14	Fan	27	40	77	100	0	68
15	Air conditioner	0	0	17	0	0	12
16	Electric shower	0	20	40	0	0	34
17	Water heater	0	0	17	0	0	12
18	Bycicle	53	30	67	100	0	59
19	Motorcycle	7	40	40	100	0	41
20	Car	0	10	33	0	0	27
21	Pick Up	7	0	27	0	0	20



22	Truck	0	0	20	0	0	15
23	Boat/ Canoe	0	0	0	0	0	0
24	Sewing Machine	0	0	17	0	0	12
25	Computer	0	0	10	0	0	7
26	Laundry Machine	0	0	3	0	0	5
27	Parabolic	0	30	13	0	0	17
	Total Number of producers	15	10	30	1	0	41

Source: Own elaboration.

One of the big differences among the small producers of soybean RR compared to those of conventional soybean and non soybean cotton growers, resides in the possession of vehicles. While the latter hardly possess them, a third of the small producers of soybean RR own car, van or truck. These items are those that largely increase the value of the possessions.

When comparing within the medium size soybean producers strata (Table 46), again those soybean RR producers declared to possess in different proportions all types of goods (except canoe / boat), while those producing conventional soybean didn't possess "microwave oven, water heater, sewing machine, computer and laundry machine". When looking to the items shared in common by each type of producers, the percentage of goods held by them tends to be superior in those producing soybean RR.

**Table 46: Possession of durable goods by soybean type and size of production, in percent. (Medium size producers)**

ORDER	GOODS	Small farmer, no soybean	Conventional	RR	Both	Organic	Total Soybean
1	Stove (gas, electric or logs)	86	93	100	0	92	
2	Refrigerator	86	93	100	0	92	
3	Electric oven	57	41	25	0	42	
4	Microwave	0	26	75	0	26	
5	Freezer	57	81	100	0	79	
6	Multi-processor	14	26	50	0	26	
7	Vacuum cleaner	14	22	50	0	24	
8	Grass	43	33	50	0	37	
9	Video casset	14	26	25	0	24	
10	DVD	14	22	100	0	29	
11	Tape recorder	86	59	50	0	63	
12	TV set	86	96	100	0	95	
13	Sound	14	52	100	0	50	
14	Fan	86	81	100	0	84	
15	Air conditioner	14	33	75	0	34	
16	Electric shower	86	70	50	0	71	
17	Water heater	0	15	50	0	16	
18	Bycicle	43	56	50	0	53	
19	Motorcycle	43	37	75	0	42	
20	Car	29	52	75	0	50	
21	Pick Up	57	52	100	0	58	

22	Truck	14	19	75	0	24
23	Boat/ Canoe	0	0	25	0	3
24	Sewing Machine	0	22	0	0	16
25	Computer	0	15	50	0	16
26	Laundry Machine	0	19	0	0	13
27	Parabolic	43	7	0	0	13
	Total Number of producers	7	27	4	0	38

Source: Own Elaboration.

The same superiority of the soybean RR growers is manifested among the big farmers, although in this stratum the number of interviewed farms was very low (7 properties) (Table 47) In all strata, the group with both types of soybean produced was very scarce, being able to affect the percentages.

**Table 47: Posesión of durable goods by soybean type produced and crop size, in percentage. (Big farms)**

ORDER	GOODS	Small farmer, no soybean	Conventional	RR	Both	Organic	Total Soybean
1	Stove (gas, electric or logs)	100	100	100	0	100	
2	Refrigerator	100	100	100	0	100	
3	Electric oven	50	100	50	0	71	
4	Microwave	50	67	0	0	43	
5	Freezer	50	100	100	0	86	
6	Multi-processor	50	67	0	0	43	
7	Vacuum cleaner	50	100	0	0	57	
8	Grass	50	33	50	0	43	
9	Video cassett	50	100	0	0	57	
10	DVD	0	0	0	0	0	
11	Tape recorder	50	100	50	0	71	
12	TV set	100	100	100	0	100	
13	Sound	0	100	0	0	43	
14	Fan	50	100	50	0	71	
15	Air conditioner	50	100	50	0	71	
16	Electric shower	100	100	50	0	86	
17	Water heater	50	67	0	0	43	
18	Bycycle	0	67	0	0	29	
19	Motorcycle	0	67	100	0	57	
20	Car	50	67	50	0	57	
21	Pick Up	100	100	100	0	100	
22	Truck	0	33	50	0	29	
23	Boat/ Canoe	50	33	0	0	29	
24	Sewing Machine	50	67	0	0	43	
25	Computer	0	33	0	0	14	
26	Laundry Machine	100	67	0	0	57	
27	Parabolic	0	33	0	0	14	
	Total Number of producers	2	3	2	0	7	

Source: Own Elaboration.

The presented comparison is attractive and although it is not able to attribute a cause/effect relationship, they represent circumstantial evidences of the better standard of life measured by the possession of durable goods of those soybean producers, in contrast with the comparative poverty of those producing

cotton (non soybean growers, traditional peasants), and of those producing of the different types of soybean, among them. On the other hand, the adopters of new technologies frequently are the innovators of the community, being able to represent differences due to other concurrent possible causes, such as their level of entrepreneurial capacity.

**B5.3.: Average income of the population engaged in soybean production.**

When analyzing the data at the macro level of the Agricultural Survey by Sampling 2002 (DCEA - MAG) and projecting on them the population's mean income of the soybean occupied population, detailing by strata of property sizes, obtained in the survey of properties of the present study, differences can be appreciated in Table 48 including the extrapolation from their data to scale macro.

Firstly big differences are observed according to the statistic type used when comparing among them the average and the median. When analyzing the net income average of the farm, few differences are observed among small and medium producers, being becoming more than the triple amount in the large size farms. When comparing among them the medians, the difference among strata is accentuated in five times between small and medium size farms, and in nine times between medium and large farms. When obtaining the average per cápita income the same disparity is observed in the results.

**Table 48: Per capita income estimation for soybean engaged EAP. Comparison between the average and medium. Harvest season 2004/05**

<b>INGRESO MEDIO DE LA POBLACIÓN OCUPADA EN SOJA (US\$) (PROMEDIO)</b>				
Tamaño de la finca	Ingreso neto de la finca	Promedio del Número de PEA en las fincas	Promedio del Ingreso per Cápita	Número de fincas por estrato
PEQUEÑOS	2.106	4,44	474	18.111
MEDIANOS	3.631	3,66	992	5.294
GRANDES	11.971	4,86	2.463	1.089
<b>TOTALES</b>				<b>24.494</b>

<b>INGRESO MEDIO DE LA POBLACIÓN OCUPADA EN SOJA (US\$) (MEDIANA)</b>				
Tamaño de la finca	Ingreso neto de la finca	Promedio del Número de PEA en las fincas	Promedio del Ingreso per Cápita (PEA)	Número de fincas por estrato
PEQUEÑOS	627	4	157	18.111
MEDIANOS	2.970	4	742	5.294
GRANDES	31.396	5	6.279	1.089
<b>TOTALES</b>				<b>24.494</b>

Source: Own elaboration.

When these data are projected to estimate their distribution on the total population of soybean producing farms, they register two widely contrasting results: i) if the income concentration for each stratum is estimated by using the

average, a falling concentration exists as the production scale increases. ii) when it is estimated by using the median, the inverse situation occur, where the biggest per capita income is progressively concentrated as the size of the soybean production increases.

In summary the projection using the average would estimate the total income concentration of each stratum, while the projection based on the median would reflect the income distribution within each stratum.

Considering the median, the small properties would concentrate the 73% of the occupied population engaged in the production of soybean. However, it would distribute for this activity only 20% out of the net revenues at national level. The large farms represent 56% of the net revenues for the production of soybean; in spite of counting this stratum with only 5% of the population occupied in the sub-sector of this oil crop production.

#### **B6.: Local retention of the revenues from soybean production.**

There is a widespread perception that the mechanized production of soybean does not revert in direct benefit of the local community. It was asked about the source of local financing as well as the geographical destination of the expenditures carried out by the producing soybean growers. The information was raised from the interviews to qualified informants.

The phenomenon of productive factors concentration is closely related with the re-distributive effect that could exert the soybean frontier advance. In this respect, it has been consulted to the interviewed about their perception with regard to the effects of the bigger soybean production on the levels of circulating money in the local town. The answers to this consultation have been quite antagonistic as it can be appreciated.

The directives and members of production cooperatives production perceived a larger flow of money during the last years. The same ones manifested that the increased revenues obtained by farmers through the production of soybean have been translated in a larger consumption level, besides of providing jobs and incomes to an important number of town dwellers like merchants, mechanics, tractor drivers, truck drivers, and others. These informants consider that the soybean cropping has benefitted equally to small and large producers.

The local political authorities that have been interviewed tended to perceive that the phenomenon of production concentration in fewer farms has had a null or even negative impact in the volume of circulating money in the region. It has been remarked that the concentration of incomes reduced the local circulation of money, and besides there also appeared complaints for the behavior of farmers from Brazilian origin that, according to some informants, they tend to spend their money exclusively in their countrymen's businesses or that they even repatriate the revenues to Brazil.

It can also be highlighted that no interviewed has identified a specific relationship between the introduction of transgenic varieties of soybean and the perceived change in the levels of circulating money in the region. Most of them referred to the soybean complex in general when they emitted opinions to this respect.

B7: The advance of soybean increases imports of productive capital goods.

In order to quantify the effect of the imports of machineries, equipments and inputs dedicated to the mechanized soybean production like main mechanized crop, the level of investments carried out in the last 5 years was raised, as well as their weighting with the soybean and derived byproducts. The main source of information was secondary data from the country external trade at macro level.

The Figure 32 reflects the evolution of tractors and machineries sales in function to the economic performance of harvests following 1996. The sales figures coincide with the years of strong increases of soybean international prices, in close coincidence with the total value of the soybean exports in those years.

Although the purchase / sales corresponds directly to the economic result of each campaign, it should also be mentioned that the current requirements of investment have lowered considerably for unit of surface, thanks to the widespread diffusion of the direct sowings or no-till farming. This technology, besides their soil conservation effects has contributed to lower investment requirements and therefore of fixed production costs resulting in an enhanced competitiveness. In the case of tractors, the useful tractor life, estimated in the 70's and 80's around five years with a double cropping with conventional tillage, at the moment have been more than being duplicated with no-till farming.

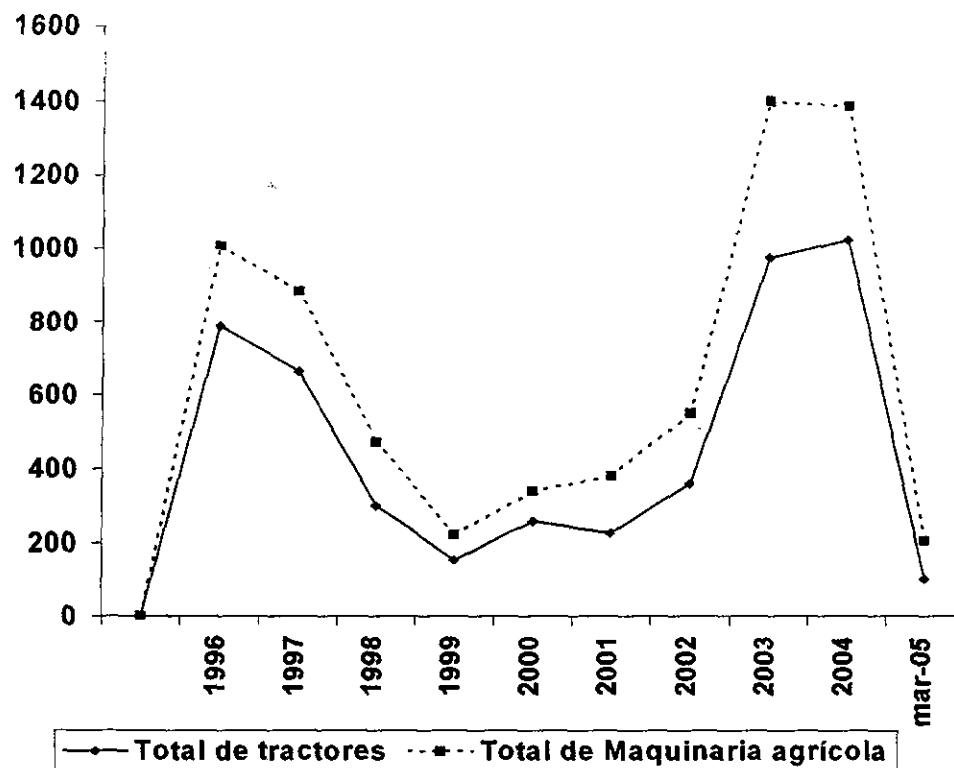


Figure 32: Imports of tractors and machinery, 1996 through March, 2005

At the micro level, in the farm surveys, it was investigated the level of investments carried out by soybean producing farmers in both the acquisition of production inputs as well as in machineries, equipments and imported vehicles. In Table 49 the descriptive statistics corresponding to the mentioned variables are presented. Without considering the production scale neither the type of produced soybean, it is observed that a soybean farm realized an investment in production inputs on an average of 116 US\$, being the median slightly higher than the average. The farm in which it was invested less carried out an expenditure of 16 US\$ compared to a maximum of 300 US\$.

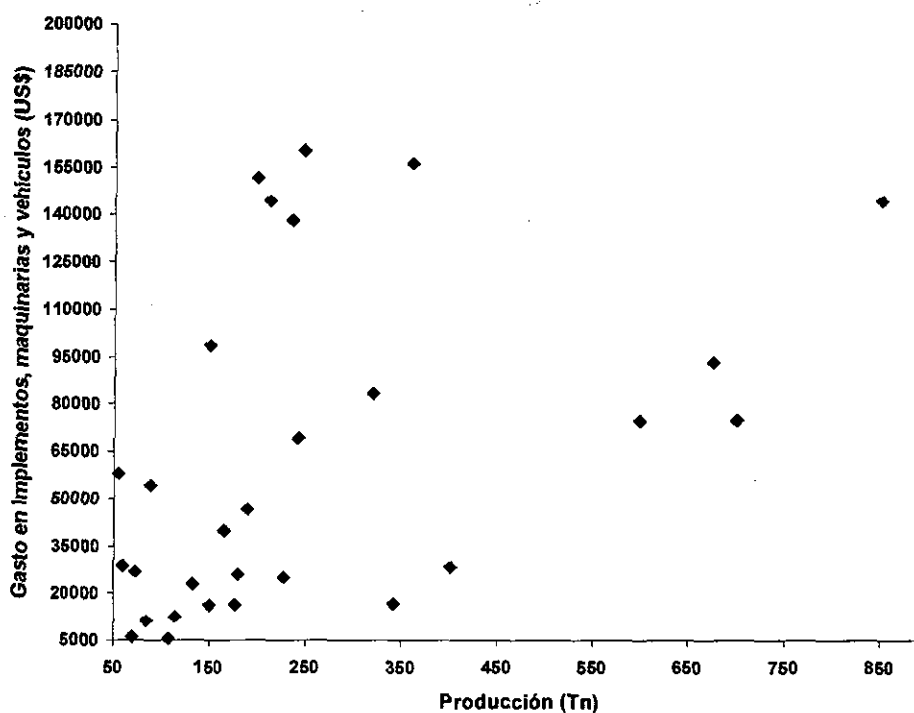
Table 49: Descriptive statistics of investments levels from soybean producers in production inputs, implements, machinery and vehicles

	Gasto en Insumos Importados (US\$ / ha)	Gasto en Implementos, Maquinarias y Vehículos (US\$)
Media	116	35.460
Intervalo de confianza		
Límite superior (95%)	127	47.797
Límite inferior (95%)	105	23.123
Mediana	119	3.908
Desviación estándar	51	58.353
Valor mínimo	16	0

Valor máximo	300	231.923
Amplitud de variación	284	231.923
Asimetría	0,77	1,75
Curtosis	1,94	2,12

Fuente: Elaboración propia.

On the other hand, the investment carried out in equipments, machineries and vehicles presented like it is obvious a great variation, reflected in an average of 35.460 U\$S like central tendency, in contrast to a median value of 3.908 U\$S. The variation range presented a minimum of 0 and a maximum of 231.923 U\$S, in a large farm. The analysis was carried out by valorizing to new the possession of this type of capital goods.



**Figure 33: Relationship among total soybean production and expenditures on machinery and equipment**

When studying in the surveyed farms the obtained total production (in tons) and the total expense (in U\$S) in investments in capital goods such as equipments, machineries and vehicles (Figure 33) and comparing the same expenses with the total surface of soybean produced (in hectares) (Figure 24) in both cases is observed a great dispersion of data (moderate correlations of 0,415 and 0,443, respectively, and in both cases statistically significant at 1%) although it is suggested a growing tendency.

When observing the distribution in more detail, in both cases, it is appreciated that it is in the medium farm size strata where the capital investment stands out, especially in the range of 100 to 175 hectares, being relatively smaller in parcels superiors to 200 hectares of soybean.

Also, in the case of the obtained total production, it is registered the same situation showing a clear lineal growing tendency up to 250 hectares, while from there exists a smaller total investment in larger farms. In other words, at intermediate levels of production, the total investment in equipment could become more onerous when having limitations in the expected level of production.

As for the relationship among the total expense (U\$\$) in imported inputs for cultivation of soybean with the total crop production (tons) and the cultivated surface (hectares) a similar tendency is observed (Figures 23 and 24).

The correlation among these variables, as it was already described was of 0.342; moderate, and 0.205; low, respectively. A lineal growing trend is observed from the lowest levels up to a total expense of 250 U\$\$ in inputs corresponding to around 400 tons. In the bigger farms (with higher levels of total production) a constant value of expenditures in inputs is observed, around 150 U\$\$ for hectare. Again, some medium size farms have higher expenses in inputs per hectare.

For this section of the study it has been looked for to raise information from the key actors interviewed (at departmental level) on the eventual economic impacts associated to the expansion of transgenic crops production. It has been sought with it to identify the impact at local communities level (district, company, department), considering that the impact at level of the whole economy has been approached in the section of longitudinal studies by using secondary information sources.



### **C) Considerations about the effects of differentiated soybean production on the environment.**

There have been delineated a series of guiding questions to be applied to the qualified informants from different regions. The questions have been designed to promote the discussion on the impact of the expansion of differentiated soybean on different environmental indicators as they are: the deforestation, biodiversity, agricultural practices that degrade soils, presence of chemical residues, water quality, etc.

It is assumed that the mechanized agricultural system has caused a strong environmental impact in its expansion, when compared to the other productive activities. In order to estimate the soil degradation and erosion and the eventual air and water contamination, the degradative agricultural practices of the floor were investigated. Also, it was investigated the contamination of water, decrease of the fish fauna and possible imbalances in pest populations. There have been used for such purpose surveys with local information, and at community level by the declarations of qualified informants.

#### **C1.: Symptoms or concern for natural resources degradation**

At community and institutional level it was investigated about the local perceptions on the degradation of natural resources, being obtained the following information:

(B18) There were not bigger differences among the answers of informants about symptoms or concern for the degradation of Natural Resources, neither among areas nor among informants' types. With high degree of unanimity in the traditional soybean producing areas, 78% of the informants manifested that "yes" worrying signs existed as well as in the new areas, 80%. (Table 20, Annex 4).

(B19) On the main symptoms of natural resources degradation in their nearest environment, there were no discrepancies among areas, but yes among informants. (Table 21, Annex 4). In both areas " deforestation " was declared as the main impact of the expansion of agriculture.

It has not been possible to establish a differentiated relationship among the production of soybean in their different forms and the decrease of the forest area. The soybean expansion, whether conventional or transgenic, would have equal impact on deforestation. Organic soybean, on the other hand, would be the only type being produced under more friendly conditions to the environment.

The second most mentioned symptom corresponded to "soil erosion", according to 20% of the informants declarations in the soybean areas, and 19% of the informants in the new areas. In third place it was mentioned "quality and contamination of water" in 16% and 19%, in soybean areas and new ones, respectively.

Other categories less frequently mentioned were: "Wildlife" and "wood quality", while the artificial "wetlands" drainage was mentioned by two municipal representatives of the soybean traditional area.

The introduction of transgenic varieties doesn't seem to have contributed much to the worsening of that situation. The interviewed farmers manifested that transgenics reduced the use of agrichemicals, and therefore they cannot have additional effects on the contamination. In this respect, a producer from Alto Paraná manifested that since he used transgenic varieties he finds more partridges in his plantations. This would be explained by the fact that the transgenic soybean management involves the use of noxious products with lower quantity.

Among informants, it calls the attention the weight attributed by a third of the municipal informants about the "quality and quantity of water", in contrast with all the other informants. The rest of them prioritized "deforestation and erosion" with few references to the other causes.

Consulted about the knowledge about polluting residuals in soils and water, the interviewed have identified in some cases that complaints have taken place because of contamination of nascent water, streams and rivers. The population's knowledge in these aspects seems to be limited yet, however the diffusion of the possible damages for introducing transgenics that would represent a higher agrichemical use has motivated the population's concern, mostly of rural peasant extraction.

Nevertheless, it has not been possible to determine the additional effect of transgenic varieties production on water contamination. When deepening the questions, the interviewed pointed to bad practices in the application of agricultural chemicals as the main cause.

According to some interviewed informants, the mechanized farmers usually have little care to security criteria for loading of sprayers when using natural water streams, as well as in the deposition of empty pesticides containers. The project PARN has contributed to solve this problem establishing water suppliers at field conditions in order to provide water under safety conditions to farmers.

Other complaints have also risen about the quality of water related to soil erosion. This has been the effect of the wrong local roads design that acted as funnels, driving silts to the sources of water.

(B20) Among the main identified causes of the natural resources degradation there were not differences between areas neither among informants. In a wide majority in both areas the "expansion of mechanized agriculture" was pointed out by 54% of informants, especially in the old soybean area by 56%, occupying the 2<sup>o</sup> place in frequencies the "expansion of cultivated pastures" with 18%. In third place of importance the "wood extraction", 10%, was identified in the old areas as well as, 26% in the new areas. In fourth place, and

only in the traditional area, it was mentioned the "expansion of family agriculture" 10% (Table 22, Annex 4).

(B21a) As for the consequences of natural resources degradation identified in the local urban towns there were a spread of different appreciations between areas and informants. Most of them in the old soybean producing areas manifested "climatic variations" as one of the more remarkable aspects (43%). In second place it was mentioned the decrease in "access to and quality of water" (10%) in the traditional area. In the new areas, 2 informants identified "health problems" due to agrichemical use, like some of the most frequently perceived consequences of environmental deterioration (Table 23, Annex 4).

Some city representatives have manifested that the effects of deforestation have begun to be perceived. Most have pointed to "climatic change" as the main symptom of the degradation of forests, but it has also been remarked the "loss of options for distraction" (fishing and others).

(B21b) In comparison to the urban dwellers, the symptoms of environmental deterioration in the rural areas are similar, not existing differences in opinion among areas nor among informants. In both cases the main observed symptom was the decrease in "access and quality of water", continued by "climatic variations" and "lower yield / productivity" (25% of the answers in both cases) (Table 24, Annex 4).

(B21c) Among the soybean growers, again "climatic variations" and decrease in "access and quality of water" as the main degradation symptoms were mentioned. "Agrichemicals" and "soil erosion" have been mentioned in much smaller scale. (Table 25, Annex 4) The cooperativists and municipal informants agree, while those from the agricultural secretaries mostly mentioned to "climate" change and "agrichemicals".

On the other hand, The traditional small farmers (peasants) have complained about problems of crop losses suffered by the extensive use of herbicides in adjacent soybean parcels. Many times the application of defensive pesticides is carried out without respecting certain safety criteria like the wind direction and speed, the minimum security belt for spraying with regard to neighboring plots, and the application time. This results in that herbicides drift can affect to different crops of the neighboring family agriculture plots, causing economic, environmental and even potential damages to the health of family members.

The entrepreneurial soybean producers argue (in opposition) that the introduction of transgenic soybean has borne a pronounced reduction in the use of herbicides, that this should mitigate the eventual collateral effects of this productive system on neighboring farms. However, it should also be considered that both productive systems are geographically closer distanced currently, which can favor the drift of crop defensive products toward small farms. Also, it has been verified during the interviews the frequent use of herbicides potentially more harmful for crops that are typical of small farming (cotton, manioc and

other), like 2,4 D and others as the Gramoxone (Paraquat) which can even affect human health.

(B21d) As for the environmental deterioration that impacts the indigenous populations in an unanimous way the "decrease of wildlife" it was mentioned and to the populational "displacement". In a case the impact was mentioned on the autochthonous "culture". (Table 26, Annex 4).

The indigenous people have been frequently identified as the main affected ones by the deforestation. This is due to the fact that forest constitutes for the natives their "supermarket or natural foodstore" where habitually they satiate most of their needs.

(B24) When investigating the final destination of used pesticides containers in the community, there were not disagreements between areas neither informants. (Table 29, Annex 4). In the soybean growing areas, prevailed the answer "recycled" in 36% of the cases, continued for "thrown everywhere" 18%, then "burned" 15% and finally, "buried" 10%. In the new areas on the other hand, it was remarked "burned" as the more frequent answer in 36%, not differentiating all the other options.

Many organizations have established mechanisms for the gathering of empty pesticide containers, and it has even been identified a couple of private recycling companies that collect and takes advantage of these containers without cost for the producers.

## C2.: The soybean production and perceived effects on human health.

In the last years have also been multiplied the fears of possible damages caused to public health in the environments surrounded by large soybean plantations. In order to determine the existence and extension of this problem it was included specific questions in the questionnaire forms, so much in the surveys as in the interviews to qualified informants.

### C2.1.: Use of Agrichemicals

(B22) The indicator used to verify the effects of soybean production, both conventional and transgenics, has been the frequency of complaints about contamination on the part of the population as mentioned by qualified informants. There has been a clear differentiation in the answers of the interviewed actors; basically registering two positions sustained respectively by representatives of mechanized producers and from the local political authorities (Table 27, Annex 4).

In a third of the cases it was reported that they didn't have health claims due to pesticides, being 21% of the informants from the soybean areas and half from the new areas. Of those that declared that "yes" existed claims, half of them came from "small farmers families", 10% of claims from the same "soybean growers" and 7% the "inhabitants of the local town". In the new areas

there were few claims, being 40% of them from "small farmers families" and no claim at all from "soybean growers" and neither from "urban residents."

The representatives of mechanized soybean producers tended to minimize the frequency of the complaints. Some recognized that these existed, but they manifested that, before to be due to real causes, the complaints for intoxication were motivated by political reasons. Half of the cooperativists from the soybean area, they denied the existence of health claims for agrichemicals, in contrast to the other informants according to which most informed that "yes", there were claims. In both areas they coincide in indicating small farmers families as the main claimants, while in the traditional soybean area, the second most reported claims were from the same soybean producers, 23% (according to the municipal informants but not according to the cooperativists).

The local political authorities identified a higher number of complaints for population's contamination. The same manifested that health complaints generally came from small farmers located in areas where entrepreneurial agricultural properties are prevalent. In contrary to the representatives from the "farmer" sector, the municipal mayors didn't deepen about the truth of these accusations, and none of them could verify if proven clinical cases existed. It cannot be omitted mentioning the case of a boy who has died in the Itapua department for supposed intoxication caused by pesticides; being this case at the moment in judicial stages.

It is important to remark that intoxication potential to the population neighboring soybean plantations would not have been increased with the introduction of the transgenic technology. This conclusion is based in that the mentioned technological change has not supposed a significant change in the types of used products, except in the application doses. The transgenic varieties, although requiring less agrichemicals, uses a higher glyphosate dosage, whose harmful potential effects for human health are not of the most dangerous. On the other hand, it has been mentioned that the GMO technology has incorporated the frequent use of other harmful chemical products such as Gramoxone.

The eventual damages that agrichemicals used in the soybean production complex can cause on family agriculture would be constituting, from the small farmers vision, in an expulsion factor for many families. The damages caused by chemicals used for soybean cropping, as farmers expulsion factor, added to the high prices offered to their lands, as factor of attraction, they jointly could explain some causal relationship among the expansion of the soybean production system with transgenic varieties and the expulsion of rural small farmers families.

(B23) Before the question if accusations of water contamination existed in the area, there were not wide opinion differences among areas, but yes it does among informants types. (Table 28, Annex 4). In 37% of the cases they were mentioned that signs of water contamination were not perceived, but in the rest of the cases, 35%, they mentioned "dead fishes", 10% "vomits / digestive dysfunctions", 5% "death of domestic animals", and 10% other symptoms.

Most of the cooperativists, 75%, minimized the effects of water contamination, while most of the municipal informants stressed the fish death toll as an effect of contamination, coinciding in their importance with those informants from the agriculture's secretaries.

### C.2.2. Secondary Information on the topic

On the supposition that the extension of soybean production damages the environment it is made reference to the publication of Palau<sup>26</sup> (Palau: 2004) in which a summary is presented elaborated by Jaquelina Ortega about the entirety of publications appeared on national newspapers (ABC Color, The Nation and Last Hour) of the reported cases of intoxication, deaths and people's mobilizations due to contamination of the environment related to the use of agricultural toxics.

The above mentioned summary extends from January, 2003 until April, 2004. The total number of publications on cases of intoxication and deaths are 68, of which 43 are those publications that make reference to cases of rural population's reaction in opposition of the transgenic soybean advance. The mentioned Departments were Itapúa, Caaguazú and Alto Paraná that correspond to the traditional soybean producing departments.

### C3.: The soybean production advances at expenses of the forest zones.

Perhaps the major environmental impact recognized to the expansion of soybean mechanized production system should be the deforestation that it caused in the colonized zones. As much in the surveys as in the statements of qualified informants it was ascertained about the present state of this degradative process, and the measures of mitigation or conservation of natural resources implemented at present.

The perception of the interviewed informants on the deforestation as eventual consequence of the soybean establishment and expansion is varied. Though the majority of the interviewed has denoted a worry by the deforestation occurred, the analysis of this problematic has several sides depending on the type of informant interviewed.

Many representatives of the productive sector from traditional zones have mentioned the deforestation as a negative phenomenon produced in the past. According to them, the forest areas remaining at present are currently respected with few exceptions. Indeed, many cooperatives include reforestation plans to revert the caused damage. However, these plans are still small and unconsolidated, therefore little advance in this matter has been noted.

The informants who do not corresponds to the productive sector have declared their worry by the deforestation as a current problem. A technician

---

<sup>26</sup> PALAU, Tomás, Capitalismo agrario y expulsión campesina: El avance del monocultivo de soja transgénica en el Paraguay, Asunción, QR Producciones Gráficas, 2004.

from an environmentalist NGO from Itapúa region has declared that soybean expansion in this department and Caazapá continues deforesting the Saint Raphael forest reserve. In zones where the soybean crop is still expanding, still can be seen areas of natural forests that recently have been cleared for the production of seasonal agricultural products.

*It fits to emphasize that many interviewed have identified as the main reason for deforestation the expansion of cultivated pastures. This argument is found supported by the statistics of deforestation, considering that the deforested area is quite superior to the soybean cultivated area.*

When the interviewed informants were consulted on the main causal "actors" for the deforestation, "the faults" have been distributed. The local political representatives in many cases indicated that the "farmer" type tends to show less respect for forests than the small rural farmers. The representatives of the business agricultural sector tend to share their responsibilities with the small farmers rural sector, arguing that these are "naturally" lumber extractors, and that they live on from the timber extraction for logs and coal.

### C3.1. : Application of natural resources conservationist measures

In a community reaction to revert the process of NR degradation the compensatory measures were identified which are presently applied in the soybean zones.

(B25a) As for the identification of natural resources conservationist measures carried out by the small farmers there were not differences among zones, although they tend to be differentiated among informants (Table 30, Annex 4). In both zones it was mentioned as the main measures practiced by small farmers "conservationist management of soils", by a third of the informants, and "preservation of native forests" in the same proportion. In smaller proportion were mentioned "reforestation" 22%, and "other" measures, 14%.

(B25b) When identifying the same practices on the part of mechanized producers there were no discrepancies among zones, although some differences appeared among informants (Table 31, Annex 4). In both zones it is agreed that "soil management" is the most generalized practice by the mechanized soybean growers (27/60) for half of the informants, while 20% reported in second place the "reforestation" and even less the "preservation of native forests".

(B25c) as for the cattle raisers there were no discrepancies between zones neither among informants types (Table 32, Annex 4). The majority, (57%) of the informants mentioned the "preservation of native forests" and 28% "reforestation" as the main conservationist measures of natural resources in the livestock producing farms.

## CONCLUSIONS OF OBSERVED RESULTS IN THE CROSS SECTIONAL COMPONENT

### *Social impacts*

The secondary data reflect that during the 1991-2002 period the soybean producing area was increased considerably. The same data reflected that there was not a significant increment in the number of soybean producing farms larger than 50 hectares. On the other hand, in the traditional region of soybean production has been appreciated an important reduction in the number of farms with less than 50 hectares.

The above mentioned results suggests: a) that the production of this crop has developed in a system characterized by the increment in scale of production at the farms, and b) that the rapid growth registered in the area of production is explained especially by the incorporation of medium and large new farms. With the simple annexation of small farms would not have been reached the surface presently sowed with soybean.

Nevertheless, at least a fraction of the soybean cultivated area that has been increased in the mentioned period it would have developed on lots belonging before to family farmers. Many small producers would have sold or leaseed their plots due mainly to the attractive prices offered by neighboring soybean growers who sought greater scale of production.

The introduction of genetically modified technology would have had a marginal additional impact on this phenomenon. This technology permitted the valorization of small plots with little attractions before for soybean production. The soybean varieties RR facilitated the management of weeds, besides of reducing costs of production and, by consequence, to result in greater profit margins.

Another important social effect of soybean expansion is the one related to the migratory movement at the local level. It was found that in the majority of the predominantly soybean Districts, the rural population diminished and the urban population was enlarged compared to the population growth rate of the last decade at national level.

Many interviewed informants coincided in the perception that the nearby cities have been the most frequent destiny of the rural population that has sold their plots. This phenomenon is more characteristic in the traditional zones of production. In the new zones, the soybean expansion practically does not explain the rural migratory movement.

Finally, it has not been verified in the field visits some migratory movement of importance in the soybean producing zones. Apparently, the flows of Brazilian immigrants would have decelerated, and even reverted, during the 90's decade.



The realized interviews collected a majority perception that the mechanized soybean production does not generate jobs by substituting the labor factor by machinery and technology. Among the opportunities of employment lost as a result of the technological advance has been identified the "hoeing" (seasonal activity that previously reverted of importance for the agricultural workmen) and the tasks related to forest lumbering.

In the farm surveys it was found as the main source of work the activities of temporary wage earners, being almost nil the hired permanent personnel, even in the farms of greater size. The soybean production system is characterized for a high concentration and dependence on family labor, even in farms of medium and large sizes. The practiced farm surveys revealed that great part of the family members nucleus destine at least a part of their time to work in the farm or at home.

An additional effect is presumed produced by the diffusion of the genetically modified soybean on the level of urban and rural employment in the producing zones for substituting totally the labor (hoes) by herbicide employment, specifically glyphosate, of total action, to which the soybean RR is resistant.

In the farm surveys a high correlation was found among the quantity of hired labor and the type of soybean produced. In conventional soybean, the *greater the soybean cultivated surface the greater number of personnel were contracted*, while in the genetically modified soybean case is frequent the hiring between one and two personnels in the small and medium size farms, tending to diminish and even to disappear in larger farms.

When the genetically modified soybean is produced at small and medium scale, it seems to offer higher possibilities of seasonal employment than that of conventional varieties. This result contrasts with the previously mentioned assumption. However, the same survey indicates that the large soybean RR producing farms practically do not absorb labor (in coincidence with the supposition).

The effects of soybean production on unemployment would depend as much to the production scale, as to the variety. At the farm level, the producers of conventional soybean would hire more personnel according to the extent that the size of the crop enlarges. In contrast, the majority of the genetically modified soybean growers hire two personnels in small and medium soybean producing farms, up to approximately 200 hectares, decreasing from that point in the greater plots.

Curiously, the aggregated averages obtained from the surveys analysis indicated a greater contracting of labor by producers of soybean RR. The producers of soybean RR hired on average almost twice of the temporary personnel than the producers of conventional soybean.

The colonization of the traditional soybean zones with foreign immigrants of diverse origins has caused in some cases adaptation and assimilation social

problems. A certain social segregation is attributed as possible effect of cultural, economic and language differences, having resulted in some cases into conflict situations. Results of the present study really showed that in general the possibilities of out of farm jobs are higher within national groups than among groups of different nationalities. The private properties occupation conflicts, often indicated by the interviewed informants, would have certain relationship with this aspect. Nevertheless, we have not found in the present study strong links on these aspects.

Among the most frequent motives of registered conflicts were emphasized the environmental contamination mainly by agrichemicals as the most sensitive theme, followed by occupations of private properties and, in some cases, other political motivations

### *Economic impacts*

The primary information, collected through surveys and interviews, verifies the higher profit value of the soybean production in comparison to other traditional crop typical of peasant family agriculture and the cattle raising production. This fact could be the main reason that explains the soybean expansion over the other farming systems. It can be emphasized that these results were obtained in a year characterized by an intense drought during the reproductive stages of these crops, associated with sensitively lower international prices compared to the former year.

In the case of the cotton grower small farmer it stands out the low crop yield performance (lower than 700 Kg. / ha) that has derived in net losses for these farms. Also, it is surprising the average small size of the cotton plots, reaching barely 0,69 hectares / farm. It is obvious the high level of poverty of the non soybean grower reflected in the scarce goods possession of goods to the small soybean producers which possessed 8,4 times more goods in total value, in number of items and percentage of possession.

The price paid by land leasing indicates a greater economic return for the production of soybean in comparison to cattle raising. The farmers are used to pay land rents that surpasses in about 20 US\$ / ha. over the profit value habitually obtained by livestock producers. The rents offered have been sufficiently attractive to generate an important process of pastures conversion to crops. Nevertheless, this phenomenon would not have been sufficiently significant as to reduce the local cattle slaughtering nor increase the meat prices at the local level.

The farm surveys reflect that the land leasing for soybean production is quite frequent. Nevertheless, it has not been possible to identify a definite pattern in these leasing; above all what concerns to the dimensions of rented plots and prices paid. The quantity of leased lands varied from small to large plots, by an annual cost of a minimum of 64,5 US\$/ ha to a maximum of 161,3 US\$/ ha.

The surveys also reflected a larger profit value margin among the producers of conventional soybean in comparison to their peers who opted for genetically modified varieties. The qualified informants interviewed stressed the vulnerability to drought of the current genetically modified soybean varieties better adapted to the temperate zone than to subtropics. The resultant difference of the soybean average yield performance varied from 2,41 ton/ ha. for conventional soybean to 1,85 ton/ ha. for the genetically modified plots.

Under the climatic conditions of this year, the average profit value of genetically modified soybean varieties was lower than the conventional one in all the strata but especially in the large farms. Nevertheless, in more normal years the margin of profit value in the genetically modified soybean surpasses to conventional varieties by having average lower costs between 15 and 65 US\$/ ha according to scale of production.

Surprisingly, it would exist a marked difference in the possession of goods among the small producers of conventional soybean compared to the genetically modified producers. While the first ones possessed 14 items of a list of 27 options, the producers of conventional soybean possessed 26 of the 27 items. Likewise, it was registered marked differences between farmers from medium and large size farms producing both types of soybean. It is interpreted that in a series of years this situation reflects the higher profit value margins accumulation pertaining to the larger strata of production and to production of genetically modified soybean.

At community level when identifying the perception on which are the groups of actors benefited or damaged by the advance of the soybean system in general it was found that the mechanized large and medium farmers, local merchants, outside of the community merchants, and services providers like mechanics, tractor drivers, truck drivers and even lumbering, were classified like benefited groups.

In contrast, the rural wage earners workers were identified by unanimity as groups that have been negatively affected. Likewise, in the zones where the expulsion of small farmers was registered more frequently also resulted affected the small merchants and the intermediaries dependent from these clients.

Not all small farmers would have been displaced by the production of soybean at larger scale. The adoption of genetically modified soybean would also have benefited a group of small farmers since the use of the herbicide glyphosate permitted them to adopt the no-till farming and to enlarge the scale of production in their own farm. This technology would have enabled the overcoming of the scale limitation imposed by hand hoeing weeding required for the cultivation of conventional soybean.

### *Environmental consequences*

In all soybean producing zones it was relieved that currently existed worries about the natural resources degradation at the local level. Among the main issues it was stressed the deforestation, followed by soil erosion and the loss of quality and contamination of water.

Among the main causes of environmental degradation that have been identified it was mentioned (with highest frequency) the expansion of mechanized agriculture, and in second place the expansion of cultivated pastures. The expansion of the small farming family agriculture remained in fourth place after the extraction of woods from forests.

In relation to the perceived environmental degradation effects in the urban areas, the majority of the interviewed informants declared that they perceive extreme climatic variations, less access and quality of water and health problems due to agrichemicals use. The health claims by inadequate use of agrichemicals originate mainly from the small farmers rural families, although scarce complaints were also relieved from the same soybean growers and from urban inhabitants. The water contamination symptom more often indicated has been the fish death or the decrease of fish fauna.

The complaints about the improper management of agrichemicals refer to the bad use of water nascent and streams for filling pesticide tanks sprayers, the imprudent deposition of empty pesticide containers, the lack of respect to a minimum strip of security during the spraying operations, and the agrichemical products application schedule.

It should be emphasized that positive experiences in the conservation of natural resources have also been collected or in the mitigation of negative impacts. There exists isolated initiatives of reforestation, and campaigns relatively extended for recycling of empty containers of agrichemicals. Also, an important development of infrastructure for the safe water supply for sprayers has been verified which contemplate measures of environmental security.

## CONCLUDING REMARKS

### Economic importance of soybean and legal framework

The production of soybean at world and national level has been determined during the last years by several events: i) the good prices in the international markets that have stimulated the increase of the production, ii) the incorporation of varieties genetically modified and iii) a growing concern for environmental issues.

The events at global level have importantly rebounded at national level. The aggressive expansion in the cropping area of this oilseed has resulted in a growing dependence of the Paraguayan economy toward the production of soybean. The exports of soybean have been increased in parallel to the production, until represent a significant share of the total of the Paraguayan exports.

The tendency to concentrate the national exports on soybean makes to our economy more vulnerable to the fluctuations of this commodity in the international markets. When we study the macroeconomic effects of the fluctuations registered by the performance of the soybean exporter-sector in Paraguay; we observed that the fluctuations of soybean's international prices are inversely correlated with the fluctuations of the nominal exchange rate. In other words, an increment in the international price of this oilseed results in an appreciation of the local currency (or vice versa).

The fluctuations of the international price of soybean seem not to have a direct impact in the fluctuations in the real exchange rate. However, the real exchange rate is mostly explained by the fluctuations in the nominal exchange rate. Therefore, the international market of soybean could have an indirect effect (although marginal) on the fluctuations of the real exchange rate.

The fiscal sector would have some immunity to eventual fluctuations in the international soybean markets. This situation is due to the scarce current tax pressure on the soybean productive system. A change in the fiscal policy that increases the tax pressure on the sector would take to a bigger dependence of the Central Government's revenues on the fluctuations of the international markets of this grain.

Likewise, the analysis carried out for this study indicates that any shock in the soybean market has an effect, in the same address, on the national economic activity. Furthermore, the effects of the transitory perturbations of soybean's prices have a persistent character in the real GDP and in the domestic expenses. In other words, a fall in the international prices of soybean leads to a reduction of the economic activity and the domestic expense that it would delay in being reverted, in spite that these prices are leveled or stabilized in their long-term average values.

Finally, the fluctuations of soybean's international prices could have consequences on the inflation and have effects in the financial system. The

effect on the inflation is a derivation of the impact of international prices on the nominal exchange rate. Similarly, bad prices could commit the payment capacity of economic agents who have debts in foreign currency. Considering that a high fraction of the loans portfolio is granted in foreign currency and to the agricultural sector; unfavorable prices of the grain can contribute to make to the financial system most vulnerable.

Because the high dependence of the Paraguayan economy in the production of soybean, any change in the international markets would have an important effect (not only in the agricultural sector but in the whole economy). The recent technological developments have supposed the differentiation of the soybean production in (at least) three product types: a) the conventional soybean, b) transgenic soybean and c) the organic soybean. In the short or medium term, one could be speaking not of one but of several international markets for this grain depending on their particular feature.

The, at least, three systems of soybean production that are currently developing in Paraguay are determined by a complex but incomplete legal framework. The normative one that rules the production of soybean is particularly complex when refers to genetically modified varieties. Two big groups of regulations keep relevance for this system: i) the environmental legislation and ii) the regulations related to property rights.

Because of the recent technological developments, the environmental legislation has become of particular importance for the release, production and commercialization of transgenic soybean varieties. These normative could have, in turn, national or international reach for the case of agreements ratified in institutions belonging to multilateral organisms.

The release of genetically modified varieties for commercial production is an attribution of national governments. In such a sense, the Paraguayan normative is not clear enough; and although some GMOs varieties are authorized for the inscription in the National Register of Cultivars for its commercialization, the definitive authorization for these varieties requires the approval from other organisms like the Secretary of the Environment and the Ministry of Health.

While legal inconsistency exists, we run the risk of having to appeal to judicial stages to settle on the degree of legality for the production of crops with transgenic varieties. In Brazil, for example, there have sat down precedents of judicial conflicts to forbid commercial production of RR soybean, despite that the institution in charge of the release of these cultivars had already approved it several years ago.

This documents has also analyzed the implications of international agreements for the production of transgenic varieties. One of the most relevant agreements is the (recently ratified) Bio-safety Protocol that keeps implication for the commercialization of GMOs.

The Bio-safety protocol has the objective of assuring trans-border movements of Living Organisms Genetically Modified. The ratification of the Bio-safety protocol forces Paraguay to declare if the grain exports contain GMOs. On the other hand, the protocol confirms the right of the signatory countries to establish their own norms with regard to GMOs. In other words, the receiving country keeps the right of accepting or not exported loads that contain GMOs, and in which conditions.

It is necessary to highlight that the protocol forces the labeling of products that contains GMOs keeping differentiated approaches: i) if the species will be introduced intentionally to the environment, they require the clear identification as GMO; ii) the products to be used for later industrial transformations should indicate (if pertinent) that "they might contain" GMOs. It is assumed that in the second case the GMOs are not intended to be deliberately introduced to the environment, but this norm constitutes the precedent for the segregation, identification and traceability of the GMOs. (The protocol does not demand labeling at consumer's level).

The implications related to property rights also keep relation to the production of transgenic varieties. Considering that a single company has patented the RR soybean technology at international level, and our country lacks clear rules for genes registration, there is a gap that could give place to judicial conflicts for stating the rights of the developers and the users of the mentioned technology.

The inscription in the National Register of Cultivars of four RR soybean varieties<sup>27</sup> has constituted a precedent for the negotiation of property rights agreements between the Monsanto Company and 24 producers' unions and agriculture commodity exporters. The agreement is based on a proposal of the company for the payment for technology and settles down that, starting from the 2004/5 season, Monsanto would perceive a royalty for the use of RR technology according to a contract of grants authorization agreed with soybean exporting companies<sup>28</sup>.

The subscribed agreement would be mostly based on the patent rights with which the company accounts in the destination markets. The Paraguayan legislation recognizes the right on cultivars; but not on technology. Therefore, it becomes difficult the revenue of a royalty for technology when the producers use seeds acquired in previous years.

The fulfillment of the royalty payment would depend of the willingness of the whole production and commercialization unions, and of the requirement of reasonable royalties from Monsanto Company. While the national normative would not foreseen the possibility of patenting technology, there is a risk of suing similar to those happened in the Republic of Argentina. In this country, the government is against the payment of royalties for technology because the national normative only recognizes property rights on the seeds. Therefore,

---

<sup>27</sup> Resolution Number 1261/04.

<sup>28</sup> The details of the agreement can be downloaded from the site [www.modit-paraguay.org/html](http://www.modit-paraguay.org/html).

farmers who use harvested RR soybean grains as seed are exempted of paying any fee for technology.

The features related to the property rights would have impact at local level when the production costs of RR soybean slightly increase. The rise in the cost of production would slightly decrease the competitiveness of the sector that had used this technology for free. However, while the stated "technological fee" would be reasonable, the producers do not perceive a very negative effect when paying fees for technology.

The environmental legislation and the ratified international agreements would have another type of implications for the production and export of soybean. These features are related with the growing concern of consumers about the worsening of the environment and the food security. The growing concern of consumers can affect -in the medium or long-term- the demand in the international markets for the production of differentiated soybean.

Implications of the trends in the international market of soybean:

We have mentioned that the Bio-safety Protocol set the foundations for the segregation, identification and traceability of GMOs. In the section that has analyzed the trends of the international markets we have mentioned the different labeling Norms in the main countries consumers of soybean.

Most of these countries have chosen for the labeling of shipments that contain transgenic soybean grains with limits of mixture tolerance, which vary among 1 and 5%. That is to say, all shipment of conventional soybean that contains more than 1 or 5% of transgenic grains should clearly state that it contains genetically modified organisms.

The introduction of labeling norms could basically have two negative implications for the production of soybean in Paraguayan: a) that the final consumers of products derived from soybean rejects GMOs, and this results in penalizing the prices for transgenic grains and, ii) the implicit costs for the segregation of the production.

Outlooks suggest an increment in the projected demand for soybean. This situation is basically due to the growth of the Chinese economy and, as a consequence, to the consumption growth of soybean based products in that country. Although China demands the segregation of conventional soybean from GM soybean, the large current demand allows a practically null differentiation among the different types of grains.

On the other hand, the transgenic crops based foods would have shown a strong rejection in the main consumers' markets. This rejection is due to intense information campaigns carried out by consumers' organizations and environmentalists that warn the population about the possible negative effects of transgenic products.



Although the information disclosed by detractors to transgenic crops can be partial and of debatable scientific validity, it seems certain that this information can cause an adverse effect on consumers. A study carried out by the USDA<sup>29</sup> highlights that when consumers have access to positive and negative information about a product, they likely to weight more the negative information. This situation can result in a rejection from consumers toward transgenic products, or be willing to pay significantly lower prices for GM products in comparison to its conventional equivalent.

According to some authors, some statements of the Bio-safety protocol can facilitate the violation of previously ratified free trade agreements. For example, the ban for GM products in some signatories' countries of the Bio-safety Protocol can be appealed at the WTO for violating free trade agreements<sup>30</sup>. Although this barrier can be solved in international instances, the risk of change toward a negative perception of consumers on GMOs it should be considered.

The labeling demands also result in higher costs for the grains' segregation. Assuming the development of a differentiated market that rewards the conventional soybean over the GM one, it is possible that this extra price would be neutralized by the over-cost enclosed in the segregation process. Conventional soybean growers would be the most concerned in identifying their product like "non GMO" and, therefore, they should assume most of the segregation cost.

Any change in the production cost or in the sale price that is resulted from the introduction of new technology will have direct impact in farmers. That is to say, the technology introduction can have a strong impact in the production areas, so much at individual as community level.

#### Potential impacts at sub-regional level.

The analysis of the instruments applied at department or district level has not determined much additional social impact by the introduction of RR soybean. However, this technology can contribute to peasant's uprooting mainly for two reasons:

- c) The lower production costs result in more profits and this encourages the expansion of the cropping area. As a consequence, many peasant farms placed next to soybean commercial farms can be absorbed.
- d) The remaining of peasant communities in the soybean regions was generally set not in lands so capable for the production of this oil-crop. The introduction of transgenic technology can allow getting bigger profit from these lands and turning them attractive for the commercial

---

<sup>29</sup> Tegene A. (et all). (2003). The effects of information on consumer demand for biotech food: Evidence from experimental auction. Technical Bulletin Number 1903. USDA-ERS. Accedido de <http://www.ers.usda.gov>.

<sup>30</sup> For a further discussion about the issue see: Nielsen & Anderson (s.f) Genetically Modified Foods, Trade, and Developing Countries: Is Golden Rice Special? Accedido de <http://www.agbioworld.org/biotech-info/topics/goldenrice/specialgoldrice.html>

agriculture. In this context, peasants would be (once again) tempted to sell their farms.

The economic impacts at sub-regional level will depend on the degree of segregation of the international price for the grain. Until now, there is not such a prices difference and, therefore, RR soybean growers obtain higher profits because the transgenic technology seems to be a low cost technology. Although the yields of RR varieties have been lower than its conventional counterparts during the year of the study, farmers expect -in the future- the development of better-suited varieties, which would neutralize this difference.

The environmental features considered for this study indicate that RR Soybean does not have significant additional effects. We should remark that we have mostly considered the effects on the population and other productive systems. In such a sense, the producers who chose conventional varieties of soybean (or other crops) can run risks of being economically damaged for bad practices in the application of agrochemicals (mainly herbicides).

### **Recommendations:**

The main recommendations based on the results obtained from the Study of Socioeconomic Impact of the production of differentiated soybean in Paraguay are presented next, organized according to the different components.

### **Soybean performance and its macroeconomic effects**

- 1- Considering the competitiveness of the more important commodities from the primary sector, we should prioritize the support to investments in the agro-industrial sector when international market makes it advantageous. The proposals of strengthening initiatives within the framework of development strategies, the Animal-Feed-Cluster should be implemented as development strategy for the cereals and oil-seed chain, with soybean as the main product.
- 2- In order to compensate the growing concentration of the country's exports in a single item, the Government should increase its support to the production, industrialization and export of diversified agricultural products; especially those coming from peasant agriculture. We cannot disregard traditional crops of this kind of producers, such as the cotton and the sugar cane around which there is important industrial investments. But we should adopt and sustain policies that support to non-traditional products for emergent and dynamic markets, such as the case of Asian and the Developing World.
- 3- The government should elaborate a set of economic policies for compensating the macroeconomic effects that are not transitory, and means lost or earnings and wealth within the economic agents.
- 4- In the long-term, the effort should be addressed toward a higher development of the financial system (in general), and the improvement of the conditions for accessing to credits (in particular).

## **Legal framework.**

- 1- It is recommended the revision of the country's current normative and bring them up to date on the basis of the advances fostered by technological innovations, the demandable requirements for risks evaluation, the ratified International Agreements and the intellectual property rights for developers of modified genes.
- 2- A proposal, to the Congress, for a new legislation in the framework of the Agreement for Biological Diversity, which allows a more appropriate regulation, management and enforcement of biotechnological risks to avoid damages to human health or the environment, clearly identifying the duties of the different institutions as Authorities for the Application of laws. The Government should coordinate the duties of the MAG, SEAM, MSPyBS and SENAVE.
- 3- The new national legislation should determine the arbitration bodies for the solution of disputes currently in the court. Also, it should be regulated the analysis' protocols that would be used as indicators to demonstrate the presence (or not) of genes and registered genotypes which would support court decisions.

## **Soybean International market**

- 8- It is expected that the strengthening and modernization of the normative and enforcement institutions would be achieved in a way to acquire the necessary international credibility.
- 9- With the aim of preserving or improving the competitiveness of the Paraguayan soybean sector, we should deepen the adoption and diffusion of technology for the increase of productivity. This fact preferably implies the diffusion of recommendations from the non-till-farming package, which is being partially applied by most farmers, insisting in crop rotation and the periodic use of green manure, as the best viable alternative for the sustainable increase of the soils' productivity.
- 10-The country should advance in the process of making transparent and to legalize the production of transgenic soybean. Also, the probable market demands for differentiated and certified soybean should be foreseen, in which case a segregation system (that avoids non-controlled mixtures) is necessary since the production until the export processes.
- 11-In front of eventual risk of adverse reaction in the destination markets toward transgenic products, it is important the provision of genetic material (seed) for conventional cultivars. It would be important that the country keeps (at least) 30% of the soybean cropping area with conventional varieties.
- 12-At the moment, we lack of legal normative and institutional capacity to certify the presence (or not) of GMO seeds in export lots. It is required to

modernize these capacities and to clarify the application activities, considering that duty overlapping could exist between the recently created SENAVE and the National Institute of Technology and Normalization (INTN), dependant of the Ministry of Industry and Trade. The responsible institution will be strengthened in its capacities and internationally accredited. Also, a definition of roles is required, since the process of certification will be able to be exercised by certifier companies from the private sector, under the enforcement of the public sector.

- 13-In the case that organic soybean or soybean for direct human consumption acquires important volumes of external demand, the trading and export logistics needs to be strengthened in order to allow the controlled segregation of the product. While the first part corresponds rather to the private sector, the public's harbors infrastructure needs to foresee the necessary investments for the delivery of a reliable service.
- 14-The requirements certified organic soybean require a territorial or community focus according to the current demands from consumers. Organic Soybean can be an alternative cash crop in the peasant agriculture; therefore its promotion could be an alternative, especially in those districts that are currently producing organic sugar cane or other organic items as part of a productive strategy of diversification.

### **Social impacts**

- 15-Officials should foster support programs for peasant agriculture in the surrounded areas where the soybeans' frontier of production at commercial scale is currently advancing. Among the main objectives, the sustainable use of natural resources should be prioritized at farm and community levels, prioritizing the soil conservation technologies in order to improve the productivity. Also, we should analyze the obstacles that constrain the switch to a differentiated soybean production system in the same (or higher) level of competitiveness than the large-scale production system.
- 16-Government offices should define support programs especially to peasant agriculture, which include training and services access to agricultural mechanization that allows the increase of the production scale within the farm as a strategy of enhance family's incomes through productive activities.
- 17-Competent institutions should promote training programs, targeted credits and technical assistance for the creation and consolidation of urban employments in areas of high concentration of soybean production.
- 18-Programs should care financial resources for urban centers in the soybean production traditional area, in order to stimulate the building of urban or rural infrastructure of the district, which would allow the generation of employment in the short and medium term to the uprooted population.
- 19-As a way of changing the attitudes among producers from different national origins, we should explored the feasibility of promoting mutual services or

complementary productive and commercial activities, looking forward to generate a collaborative attitude instead of a competitive one or (even) more uprooting.

20-Authorities should promote, through the SENAVE and Municipalities, the establishment of tighter normative that regulate the use of agrochemicals for minimizing the negative impact of its random use, at neighborhood's level, on the urban or rural population. Authorities should also establish precautionary measures such as living barriers facilities, security bands and other measures of environmental protection.

### **Economic impacts**

21-Paraguay should promote the transparency and legalization of transgénica soybean production; in order to capitalize the profitability margins that increase the competitiveness of the Paraguayan soybean sector.

22-It is important to identify better genotypes adapted to the soil and climate conditions of the different productive areas of the country that use the RR gene, as a strategy to stabilize the production in critical years and to improve the yield in favorable years.

23-The price paid, as royalties, for transgenic crops should be monitored in their impact on the profitability of the crop; with the aim of foreseen the necessary measures for the segregation of the production and export of conventional varieties grains.

24-Government officers might promote programs addressed to obtain high productivity in the main products from peasant agriculture, especially cotton. The program should be focused to the diffusion of sustainable technology for production, proven experimentally in the country, such as no-till-farming, Integrated PLAGUES Control, crop illnesses and weeds, and transgenic cultivars for the main commodities with genes approved in most of the international markets (Bt and RR).

25-Authorities should also monitor the application of taxes for weighting the tax contribution of the commercial exporting farming system and the redistribution of income for the achievement of economic and social objectives, especially at district level.

### **Environmental impacts**

26-The Law 536/94 of Forestry and Reforestation should be review in order to establish a compensatory mechanism for investments carried out in forestry activities, in order to establish a gradual system of incentives, prioritizing its application in the soybean production traditional area, like partially compensatory mechanisms for the deforestation experienced in that region.

- 27-Federal institutions could promote, at district level, the definition and application of regulations and normative related to the use of agrochemicals, with participation of specialized bodies from the centralized public sector.
- 28-Federal government should strengthen and support district governments for the establishment of deposits or control the drop of empty cases of agrochemicals or waste. It is expected that, when concentrating volumes, it will be facilitated the sale or free provision to recycling companies which operate in the main productive areas.
- 29-The quality of the water has to be monitored. It is necessary to develop and apply a scheme of sanctions for the careless contamination of water streams. We need the shared commitment of specialized institutions at national level together with the district authorities.
- 30-Finally, it is important the ban and control of agrochemical entry to the country, especially those forbidden because its toxicity to humans or to the environment, foreseeing the confiscation and application of legal sanctions to those people who has produced damages to the health or the environment.

## **LIST OF TABLES**

TABLE 1: STRATIFIED CLUSTER SAMPLING SELECTION OF DIFFERENTIATED SOYBEAN FARM UNITS

TABLE 2: EXPORTS 1980-2003

TABLE 3: IMPORTS OF MACHINERY, INPUTS AND EQUIPMENT RELATED TO THE SOYBEAN SECTOR

TABLE 4: ANALYSIS OF PERSISTENCE AND COMOVEMENTS RELATIVE TO THE NOMINAL AND REAL EXCHANGE RATES

TABLE 5: ANALYSIS OF PERSISTENCE AND COMOVEMENTS RELATIVE TO TRIBUTARY REVENUES

TABLE 6: ANALYSIS OF PERSISTENCE AND COMOVEMENTS RELATIVE TO TRIBUTARY REVENUES

TABLE 7: ANALYSIS OF PERSISTENCE AND COMOVEMENTS RELATIVE TO GDP AND DOMESTIC EXPENSES

TABLE 8: WORLD PRODUCTION OF SOYBEAN

TABLE 9: SOYBEAN PRODUCTION IN THE MAIN PRODUCER COUNTRIES AT WORLD LEVEL (THOUSAND OF TON)

TABLE 10: WORLD TRADE OF THE MAIN OIL CROP SEEDS (MILLIONS OF METRIC TONS)

TABLE 11: LABELING POLICIES FOR GMOS IN SELECTED COUNTRIES

TABLE 12: VALUE AND MARKET SHARES FOR ORGANIC PRODUCTS

TABLE 13: PREMIUM FOR ORGANIC PRODUCTS IN THE USA (IN %)

TABLE 14: SAMPLE OF THE SOYBEAN PRODUCTION DISTRICTS, METHOD PROPORTIONAL TO THE SIZE OF STRATIFIED CLUSTERS

TABLE 15: NUMBER OF SURVEYED FARMS ACCORDING TO DEPARTMENT, TYPE OF FARM AND VARIETY OF CULTIVATED SOYBEAN

TABLE 16: SIGNIFICANCE OF DIFFERENCES AMONG DECLARATIONS OF QUALIFIED INFORMANTS. (CHI SQUARE TEST)

TABLE 17: LAND ACQUISITION IN THE POPULATION SURVEYED

TABLE 18: NUMBER OF PRODUCERS WHO MADE TRANSACTIONS IN THE LAND MARKETS ACCORDING TO THE TYPE OF FARMER (N = 100)

TABLE 19: NUMBER OF PRODUCERS WHO MADE TRANSACTIONS IN THE LAND MARKETS ACCORDING TO DIFFERENTIATED KIND OF SOYBEAN.  
(N = 100)

TABLE 20: EVOLUTION OF THE NUMBER OF SOYBEAN FARMS AND SOYBEAN CROPPING AREA

TABLE 21: PLACE OF WORK OUTSIDE THE FARM IN THE LAST YEAR

TABLE 22: OFF-FARM JOB LOCATION WHERE HE/SHE WORKED DURING THE LAST AGRICULTURAL YEAR AND FAMILY LINKS WITH THE HEAD OF THE HOUSEHOLD

TABLE 23: WORKERS' RECRUITING IN FARMS OF SOYBEAN PRODUCERS AND SMALL-SCALE NON-SOYBEAN FARMERS

TABLE 24: WORKERS' RECRUITING ACCORDING TO TYPE OF FARM AND KIND OF SOYBEAN

TABLE 25: QUANTITY OF MEN HIRED IN PERMANENT FORM FOR THE HARVESTS 2003/04 AND 2004/05

TABLE 26: QUANTITY OF MEN HIRED WITH SEASONAL CONTRACTS FOR THE HARVESTS 2003/04 AND 2004/05

TABLE 27: HOUSEHOLD MEMBERS OCCUPATION DURING THE LAST YEAR

TABLE 28: INTENSITY OF HOUSEHOLD MEMBERS IN AGRICULTURAL ACTIVITIES WITHIN THE FARM

TABLE 29: INTENSITY OF AGRICULTURAL (OFF-FARM) ACTIVITY OF HOUSEHOLD MEMBERS THAT REPORTED TO WORK MAINLY IN THEIR OWN FARMS

TABLE 30: OCCUPATION OF FAMILY HEADS' DEPENDANTS DURING THE LAST AGRICULTURAL YEAR, ACCORDING TO PRODUCER TYPE

TABLE 31: WORK INTENSITY WITHIN THE FARM ACCORDING TO THE KIND OF PRODUCER AND FAMILY'S RELATIONSHIPS

TABLE 32: CORRELATIONS BETWEEN THE QUANTITY OF HIRED LABOR FORCE AND THE SOYBEAN CROPPING AREA

TABLE 33: CORRELATIONS BETWEEN THE QUANTITY OF HIRED RURAL LABOR AND SOYBEAN PRODUCTION

TABLE 34: NATIONALITY OF THE LABOR FORCE



TABLE 35: FEASIBILITIES OF OFF-FARM WORKING IN FARMS MANAGED FOR PRODUCERS WITH ANOTHER NATIONALITY

TABLE 36: PERCEPTION ABOUT OFF-FARM WORKING OPPORTUNITIES WITH FOREIGNERS ACCORDING TO THE NATIONALITY OF THE INTERVIEWEE

TABLE 37: COTTON DESCRIPTIVE STATISTICS

TABLE 38: DESCRIPTIVE STATISTICS OF SOYBEAN

TABLE 39: LOTS LEASED BY SURFACE SIZE AND TRANSACTION VALUE

TABLE 40: RELATIVE ECONOMIC PERFORMANCE OF DIFFERENTIATED SOYBEAN BY FARM STRATA AND SOYBEAN TYPE

TABLE 41: CORRELATIONS AMONG TOTAL COST AND SOYBEAN PRODUCTION

TABLE 42: CORRELATIONS AMONG TOTAL COST AND SOYBEAN CULTIVATED AREA

TABLE 43: CORRELATIONS AMONG PROFITABILITY AND SOYBEAN CULTIVATED AREA

TABLE 44: TOTAL VALUE OF ADQUIRED GOODS BY TYPE OF FARM

TABLE 45: DURABLE GOODS POSSESSIONS BY TYPE AND SIZE OF PRODUCED SOYBEAN, IN PERCENTAGE (SMALL FARMERS)

TABLE 46: POSSESSION OF DURABLE GOODS BY SOYBEAN TYPE AND SIZE OF PRODUCTION, IN PERCENT. (MEDIUM SIZE PRODUCERS)

TABLE 47: POSESIÓN OF DURABLE GOODS BY SOYBEAN TYPE PRODUCED AND CROP SIZE, IN PERCENTAGE. (BIG FARMS)

TABLE 48: PER CAPITA INCOME ESTIMATION FOR SOYBEAN ENGAGED EAP. COMPARISON BETWEEN THE AVERAGE AND MEDIUM. HARVEST SEASON 2004/05

TABLE 49: DESCRIPTIVE STATISTICS OF INVESTMENTS LEVELS FROM SOYBEAN PRODUCERS IN PRODUCTION INPUTS, IMPLEMENTS, MACHINERY AND VEHICLES

## LIST OF FIGURES

- FIGURE 1: VOLATILITY OF THE INTERNATIONAL PRICE OF SOYA
- FIGURE 2: EVOLUTION OF PRICE AND EXPORTS OF SOYA RELATIVE TO GDP GROWTH
- FIGURE 3: SOYBEAN: BALANCE OF TRADE
- FIGURE 4: SOYBEAN: SHARE OF THE IMPORTS AND EXPORTS OF THE SOYBEAN SECTOR IN THE AGGREGATE
- FIGURE 5: CYCLES OF THE SOYBEAN PRICE AND THE NOMINAL EXCHANGE RATE (GS/US \$)
- FIGURE 6: CYCLES OF THE SOYBEAN PRICE AND THE EFFECTIVE REAL EXCHANGE RATE
- FIGURE 7: CYCLES OF THE NOMINAL AND REAL EXCHANGE RATE (GS/US \$)
- FIGURE 8: CYCLES OF NOMINAL EXCHANGE RATE (GS/US \$) AND INFLATION
- FIGURE 9: CYCLES OF THE PRICE OF SOYBEAN AND TRIBUTARY REVENUES
- FIGURE 10: CYCLES OF SOYBEAN EXPORTS AND TRIBUTARY REVENUES
- FIGURE 11: EVOLUTION OF SOYBEAN PRODUCTION IN USA, BRAZIL, ARGENTINA AND PARAGUAY
- FIGURE 12: EVOLUTION AND PROJECTIONS OF THE DEFLATED INTERNATIONAL PRICE OF SOYBEAN
- FIGURE 13: MARKET SHARE OF PARAGUAY IN THE WORLD EXPORTS OF SOYBEAN, AVERAGE OF THE PERIOD 2000/01-2004/05
- FIGURE 14: EVOLUTION OF SOYBEAN EXPORTS
- FIGURE 15: MAIN WORLD IMPORTERS OF SOYBEAN, AVERAGE 2000/02-2004/05
- FIGURE 16: FORECAST OF THE WORLD EXPORTS OF SOYBEAN
- FIGURE 17: STIMATED GROWTH OF SOYBEAN IMPORTS, PERIOD 2003/04-2014/15
- FIGURE 18: FORECAST OF SOYBEAN IMPORTS OF THE MAIN IMPORTERS
- FIGURE 19: DIFFERENTIATED SOYBEAN: LEVEL OF LABOR HIRED, FOR SIZE OF FARM
- FIGURE 20: DIFFERENTIATED SOYBEAN: LEVEL LABOR HIRED, FOR VOLUME OF PRODUCTION
- FIGURE 21: RELATION BETWEEN THE TOTAL COST AND THE TOTAL PRODUCTION OF SOYBEAN

FIGURE 22: RELATION BETWEEN THE TOTAL COST AND CULTIVATED AREA OF SOYBEAN

FIGURE 23: RELATION BETWEEN TOTAL PRODUCTION OF SOYBEAN AND EXPENSES IN IMPORTED INPUTS

FIGURE 24: RELATION BETWEEN CULTIVATED AREA AND EXPENSES IN IMPORTED INPUTS

FIGURE 25: RELATION BETWEEN SOYBEAN PRODUCTION AND PROFITABILITY

FIGURE 26: RELATION BETWEEN PROFITABILITY AND CULTIVATED AREA OF SOYBEAN

FIGURE 27: RELATION BETWEEN TOTAL PRODUCTION COST OF COTTON AND YIELD

FIGURE 28: RELATION BETWEEN PROFITABILITY AND YIELD OF COTTON

FIGURE 29: DIFFERENTIATED SOYBEAN: RELATION BETWEEN TOTAL COST AND PRODUCTION IN TONS

FIGURE 30: DIFFERENTIATED SOYBEAN: RELATION BETWEEN CULTIVATED AREA AND TOTAL PRODUCTION COST

FIGURE 31: DIFFERENTIATED SOYBEAN: RELATION BETWEEN SIZE OF THE FARM AND PROFITABILITY

FIGURE 32: IMPORT OF TRACTORS AND MACHINERIES, 1996-MARCH 2005

FIGURE 33: RELATION BETWEEN TOTAL PRODUCTION OF SOYBEAN AND EXPENSE IN MACHINERIES AND EQUIPMENTS

FIGURE 34: RELATION BETWEEN CULTIVATED AREA OF SOYBEAN AND EXPENSES IN MACHINERIES AND EQUIPMENTS

## REFERENCES

- Bravo, E (s.f). *Derechos de Propiedad Intelectual y OGMs*. EcoPortal.net. Accedido desde: <http://www.ecoport.net/layout/set/print/content/view/full/45478/printversion/1>
- Burachik, M (s.f). *Bioseguridad de Organismos Genéticamente Modificados: Marco Regulatorio*. Accedido desde: [http://www.argenbio.org/h/biblioteca/libro/39\\_IX\\_2.pdf](http://www.argenbio.org/h/biblioteca/libro/39_IX_2.pdf)
- DGEEC-STP (2000) *Censo"Paraguay Total. Resultados Preliminares"*. Dirección General de Estadísticas, Encuestas y Censos Asunción-Paraguay
- EDEP, 2000. *Economic Development of the Republic of Paraguay*. Secretaría Técnica de Planificación/ Japan International Cooperation Agency. Asunción, Paraguay.
- Hernández Sampieri, R., C. Fernández Collado, P. Baptista Lucio. "Metodología de la Investigación". Primera edición. McGRAW-HILL México.
- IICA. (2003) *Oleaginosas. "Paraguay en el Mapa Competitivo del Mundo (Koa Ikatuta)"*. Informe Foro Estratégico, Coordinador Schapovaloff, Antonio Instituto Americano de Cooperación para la Agricultura, Oficina en Paraguay. Asunción , Paraguay
- James.Clive (2004) *SAAA Internacional Service for the Acquisition of Agri-Biotch Aplicattions. Situación Global de los Cultivos Transgenicos /GM comercializados* Accedido en <http://WWW.isaaaa.org>.
- MAG-DCEA. *Síntesis Estadística. Dirección de Censos y Estadística Agropecuaria. Ministerio de Agricultura y Ganadería. San Lorenzo, Paraguay.*
- Manson R., Douglas A. Lind, Willian G Marchal (2000). "Estadística para Administración y Economía" Décima Edición Alfaomega México.
- P.C. Sanginga, A.A. Adesina, VM Manyong, O Otite, and K.E. (1999)." *Social impact of soybean in Nigeria's sourthen Guinea Savanna*".IITA Dashiell. Ibadan, Nigeria
- Pineda E. B., E. Lua de Alvarado, F. H. de Canales "Metodología de la Investigación". Segunda edición 1994 Organización Panamericana de la Salud. Washintong, D.C.

Palau, Tomás, (2004) Capitalismo agrario y expulsión campesina: El avance del monocultivo de soja transgénica en el Paraguay, Asunción, QR Producciones Gráficas.

Roca, C (2.003) Impacto Económico de la soja y el algodón transgénicos en Argentina. Asociación semilleros Argentinos. Accedido desde: <http://www.argenbio.org/h/biblioteca/pdf/impacto-economico.pdf>

Soygrowers Opportunities for Identity Preserved Value- Added Soybeans. Accedido en: [www.soygrowers.com/library/timelynews/IPVAS.htm](http://www.soygrowers.com/library/timelynews/IPVAS.htm)

### **Mercado Internacional.**

Consumer International.(2005).New UN Standards on GM foods a ' victory for consumers'.Press Release.

Dohiman. E..Persuad S.. Landes R. (2003). "India's Edible Oil Sector: Imports Fill Rising Demand. " Economic Research Service. U.S. Department of Agriculture. OCS 0903-01.

Directorate General for Agriculture.(2000). Organization for Economic Cooperation and Development. Economic Impacts of Genetically Modified Crops on the Agri-Food Sector a Synthesis. 43 pg.

European Parliament. Regulation (EC) N° 1829/(2003) of the European Parliament and of the Council of 22 on Genetically Modified Food and Feed. Brussels.

Gale Fred.. Lohmar Bryan.. Tuan Francis. (2005) " China's New Farm Subsidies". Economic Research Service. U.S. Department of Agriculture. WRS-05-01.

Pedretti, Ricardo. (2004) Inversión en Programas de Diferenciación y Diversificación de Productos Oleaginosos en Paraguay. Documento de Perfil Detallado de Proyecto. Proyecto FAO de Apoyo a la Integración del Sector Agropecuario del Cono Sur para Contribuir a las Políticas de Seguridad Alimentaria (TCP/RLA/2910).

Plato Gerald y Chamber Willians. (2004). "How Does Structural Change in the Global Soybean Market Affect U.S. Price? " Economic Research Service. U.S. Department of Agriculture. OCS 04D-01.

Tuan F., Fang C., Cao Z. (2004) China's Soybean Imports Expected to Growth Despite Short-Term Disriptions. Economic Research Service. U.S. Department of Agriculture. OCS-04J-01.

IICA. (2003) Oleaginosas. "Paraguay en el Mapa Competitivo del Mundo (Koa Ikatuta)". Informe Foro Estratégico. Coordinador Schapovaloff, Antonio Instituto Americano de Cooperación para la Agricultura, Oficina en Paraguay. Asunción, Paraguay  
of Agriculture. (2003) Foreign Agricultural Service. European Union Biotechnology Update on EU Legislation for GMO Approvals. GAIN Report E2381.

U.S. Department of Agriculture. (2005) Foreign Agricultural Service. Biotechnology  
President Signs Law for 2004/2005 Biotech-Soybean Crop. GAIN Report BR5601.

U.S. Department of Agriculture. (2005) Foreign Agricultural Service. Oilseeds: World  
Markets and Trade, Circular Series. FOP 2-05

United States Department of Agriculture. (2005) Agricultural Baseline Projections to 2014. Baseline Report OCE-2005-1, 116pg.

### **Desempeño del Mercado de la soja y su efectos Macroeconómicos sobre sus indicadores.**

Boletín de Cuentas Nacionales, varios números. Gerencia de Estudios Económicos. Banco Central del Paraguay.

Chen, Yu-Chen y Kenneth Rogoff. (2002). "Commodity Currencies". Department of Economics, Harvard University.

Cresta, Juan y Ana Laura Badagián. (2004). "Caracterización de las fluctuaciones cíclicas de las variables fiscales en el Mercosur". Red Mercosur (por aparecer en Serie Coordinación Macroeconómica).

De Ferranti, D., Guillermo E. Perry, Indermit S. Gill y Luis Servén. (2002). "Securing our Future in a Global Economy". World Bank Latin American and the Caribbean Studies. The World Bank.

Gavin, M., y Ricardo Hausmann. (1998). "The Roots of Banking Crises: The macroeconomic context". Office of the Chief Economist. Inter-American Development Bank.

Gavin, M., R. Hausmann, R. Perotti y E. Talvi. 1996. "Managing Fiscal Policy in Latin America and the Caribbean: Volatility, procyclicality and limited creditworthiness". Inter-American Development Bank. Office of the Chief Economist. Working Paper No. 326.

Loza T., Gabriel. (2002). "El shock de precios de los productos básicos en Bolivia". Revista de la CEPAL No. 76.

Pindyck, Robert S. y Daniel L. Rubinfeld. (1998). "Econometría modelos y pronósticos". Cuarta edición. McGraw Hill.

Rojas, Patricio y Juan Cresta. (2004). "Objetivos de inflación en Paraguay: ¿están dadas las condiciones?" CADEP. Mimeo.

Sims, C. A. (1980). "Comparison of Interwar and Postwar Business Cycles: Monetarism Reconsidered". American Economic Review Vol. 70, No. 2.

Vial Joaquín. (2002). "Dependencia de recursos naturales y vulnerabilidad en los países andinos". Mimeo.

### **Páginas Web visitadas**

<http://www.fortwayne.com/mld/newssentinel/12036471.htm>  
<http://www.geinfo.org.nz/102004/02.html>

[http://www.grain.org/articles\\_files/atg2-es.pdf](http://www.grain.org/articles_files/atg2-es.pdf)

<http://www.cropchoice.com/leadstry3231.html?recid=2360>

<http://www.gene.ch/genet/2005/Mar/msg00073.html>

[http://www.checkbiotech.org/blocks/dsp\\_document.cfm?doc\\_id=9794;](http://www.checkbiotech.org/blocks/dsp_document.cfm?doc_id=9794;)

<http://www.organicconsumers.org/ge/brazil100603.cfm>

<http://www.brazzil.com/content/view/9015/76/>

[http://acd.ufrj.br/consumo/legislacao/n\\_bio\\_in18\\_98.htm](http://acd.ufrj.br/consumo/legislacao/n_bio_in18_98.htm)

[http://acd.ufrj.br/consumo/legislacao/n\\_ac260\\_99.htm](http://acd.ufrj.br/consumo/legislacao/n_ac260_99.htm)

<http://www.herbario.com.br/dataherb19/211brigatrangnc.htm>





