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Current status of soybean production and utilization in Brazil

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Commercial production

The first introduction and evaluation of soybean germoplasm in Brazil was made in the state of Bahia, at 12°S, in 1882. The germoplasm came from the United States of America (USA), was not adapted to such low latitudes and did not succeed in the area. Ten years later (1891), new varieties were introduced and tested in the state of São Paulo (SP), at 23°S, with reasonable production of hay and beans. In 1900, soybeans were tested at 30°S in Rio Grande do Sul (RS), the southernmost state of Brazil, where climatic conditions are similar to those prevalent in Southern USA, origin of the introduced varieties.

Soybean remained a marginal crop in southern Brazil until 1960 and was grown in small properties to produce hay for dairy cattle and beans to feed pigs within the properties. The first reference of commercial production in Brazil was in 1941 (Bonato, E.R and Bonato, A.L.V): an area of 651 hectares and production of 457 metric tons (MT). However, the real stimulus for large commercial production was in the mid 1950's, following a government decision to provide official incentives to grow wheat, aiming at self-sufficiency of this cereal. Soybean was equally benefited by the program, since it was the best option for a summer crop following wheat, under both a technical (a legume following a grass) and economical (use of same machinery and farm infrastructure) viewpoint.

In 1960, the soybean area was 177.000 hectares and production around 206.000 MT, with yields of less than 1.200 kg/ha. By the end of the 1960's, the area had increased to 906.000 hectares and production reached 1,056,000 MT, but no yield increase was observed during that decade. The South of Brazil, represented by the states of RS, Santa Catarina (SC), Paraná (PR) and SP claimed 99.5% of the production (respectively, 70,2%, 3.0%, 20.5% and 5.8%). Genetic material was entirely introduced from the USA.

In spite of the five fold increase in production during the 1960's, the real *boom* of national production occurred during the first half of the 1970's, consolidating soybean as the lead crop of Brazilian agriculture. Production increased from 1.5 million MT in 1970, to 12.5 million MT in 1977. The

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increment was due to the incorporation of new areas (1.3 to 7.1 million hectares), as well as to increase in yield (1.14 to 1.77 kg/ha). In 1977, production outside of the Southern Region was restricted to 7% (0.89 million MT).

The good profits obtained by farmers growing soybean in the South during the 1970's, turned cropland very expensive and unavailable in the region. Excited about the possibility of making more money by planting larger areas, many soybean growers made good profit by selling their small properties in the South and buying larger areas in the savannas (Cerrado) of central Brazil (Figure 1), where land was cheap and plenty, but unfertile. Existing varieties grown in the South were not adapted to the lower latitudes of Midwest Brazil and research organizations had to go after those pioneers, looking for the technologies they were demanding to farm the new soybean frontier. The initiative was successful, turning the cheap, unproductive and unpopulated Cerrado land, into the most important cropping area of Brazilian agriculture. Despite being chemically poor, the soils have very good physical characteristics, flat topography and good rainfall distribution during the soybean growing season.

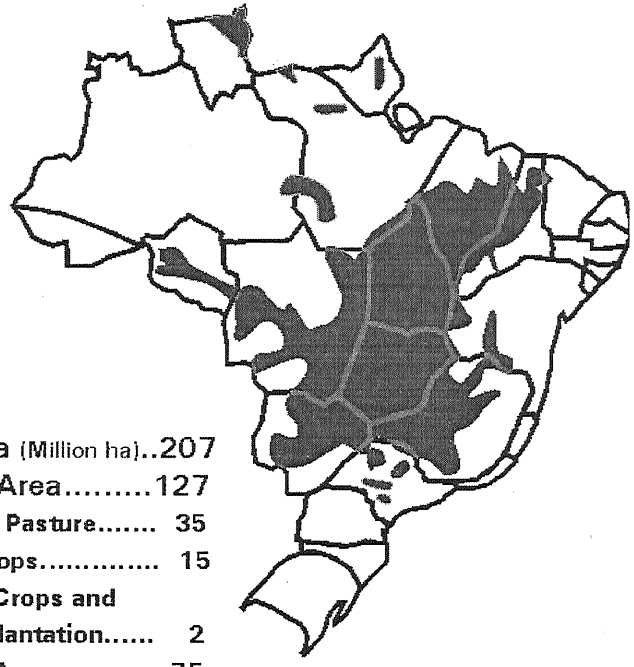


Figure 1. Brazilian Cerrados

The Cerrado region is still drawing new farmers into the area. Land is no longer cheap, but still cheaper than in the South. As a result, soybean production in Cerrado increased from 2% in 1970, to 20% in 1980, 40% in 1990, and claimed more than 60% of the 52 million MT harvested in 2003, despite the simultaneous increase in the traditional producing zone (Figure 2). Trends indicate more concentration of soybean in the Cerrados, in the future.

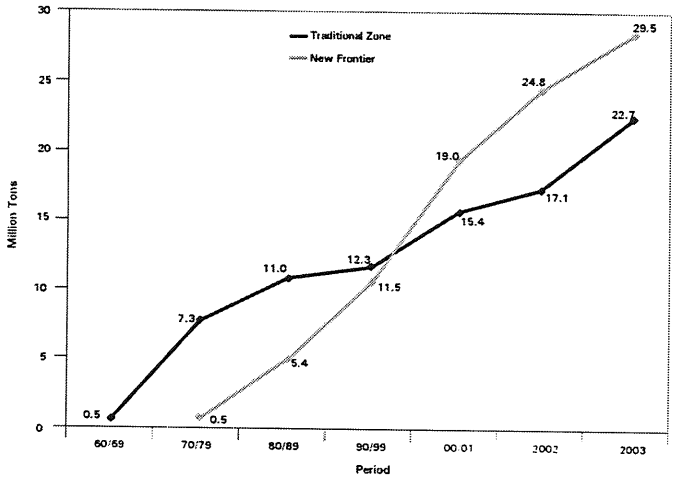


Figure 2. Evolution of soybeans in the South and Midwest Brazil

Reasons for the expansion

Several factors contributed to promote soybean expansion in the South during 1960's and 1970's and on the savannas of central Brazil from mid 1970's. Among those factors, a few deserve to be pointed out:

- similarity of the Southern USA climate and that of the Southern Brazil, enabling Southern Brazilian farmers to succeed in the establishment of soybeans in the 1950's and 1960's, using American technologies, particularly varieties;
- fiscal incentives, beginning in mid 1950's until the late 1970's, to promote wheat production, that also helped promote soybean;
- increased market demands for soybean as a protein component for animal rations and as cooking oil;

- high market prices, particularly during the early 1970's;
- establishment of an important industrial park, including processing, farm machinery and agricultural supplies;
- improvements in the transport, export and communication systems;
- construction of Brasília, the new Brazilian Capital, in the center of the Cerrados, improving the regional infrastructure, thus facilitating access and communication;
- low value of Cerrado lands, compared to prices in the South;
- development of proper technologies for the Cerrados, particularly varieties adapted to low latitudes; and,
- good economic and technology levels of farmers migrating from the South to central Brazil, as well as the previously mentioned good soil physical characteristics, flat topography and rainfall regime.

Soybean processing

In 1977, Brazilian soybean processing capacity was 12 million MT, similar to the Country's production. Crushing plants were concentrated in South Brazil (RS, SC, PR, SP). Also, small plants, processing up to 600t/day were responsible for more than half of the crushed beans. Five years later (1982), following government incentives given to the processing industry, capacity increased to 27 million MT and more than 70% of the beans were processed by plants larger than 600t/day (Figure 3). The Country's present crushing capacity is around 40 million MT, but beans processed do not exceed 30 million MT and around 35% is being crushed in plants located in the new soybean frontier.

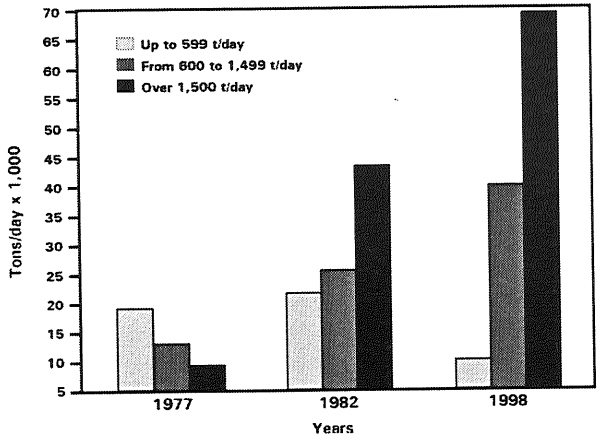


Figure 3. Evolution of processing capacity by plant size

Soybean impacts in Brazil

The explosive increment of soybean production since 1960, of about 260 times in four decades (Figure 4), determined paramount positive transformations in the Brazilian agribusiness. Soybean was responsible for or was a main driving force in the development of commercial agriculture in the Country. They, also, accelerated farm mechanization, increased technification of other crops (mainly corn), supported modernization of ports and transport systems, expanded the international trade and the agricultural frontier, supported Brazilian authorities in the effort to move population to the West, as well as decentralized the agroindustry, sponsoring the expansion of poultry and swine industries.

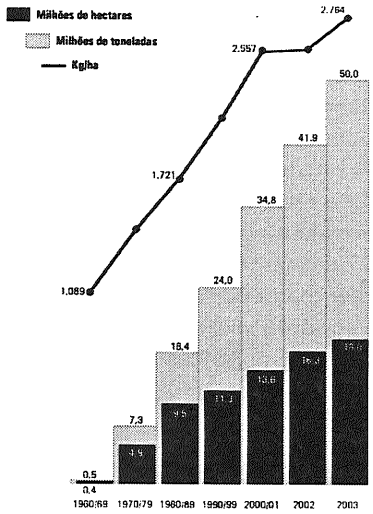
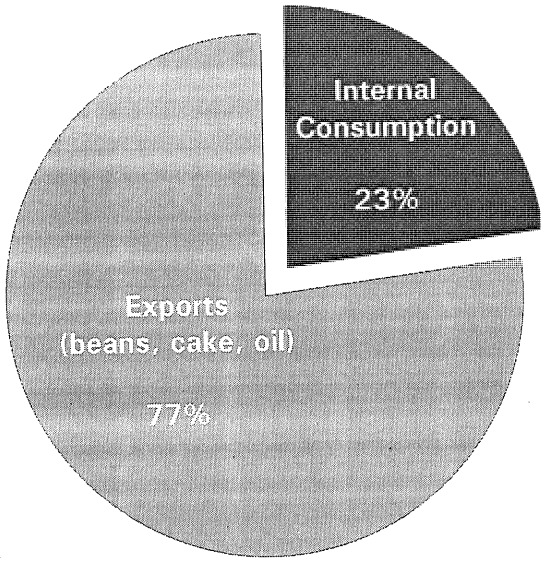


Figure 4. Evolution of soybean production in Brazil

Total exports of beans (22 million MT), cake (14,5 million MT) and oil (2,4 million MT) represented 77% of soybean produced in Brazil in 2003 (Figure 5), responsible for US$ 8.2 billions of direct external revenues (Figure 6) and 12% of total Brazilian income from exports (Figure 7). Along the last 30 years, as the leading crop of Brazilian agriculture, soybean commanded the implementation of a new civilization in Midwest Brazil, carrying the progress and the development to the Cerrados, thought to be wastelands before soybean development took over the area. The regional economy is based on the soybean complex, that greatly improved regional infrastructure. Mato Grosso, presently the leading soybean producing state in Brazil (13,5 million MT), was a marginal producer 23 years ago (117,000 MT in 1980).



Source: Abiove, Conab

Figure 5. Total Exports of Beans, Cake and Oil

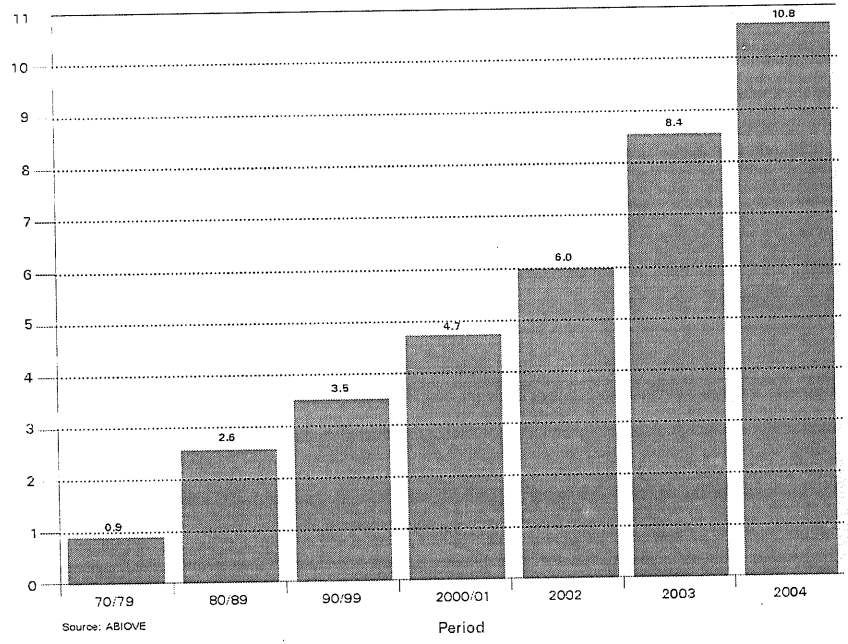


Figure 6. Soybean Complex – External Revenues in US$

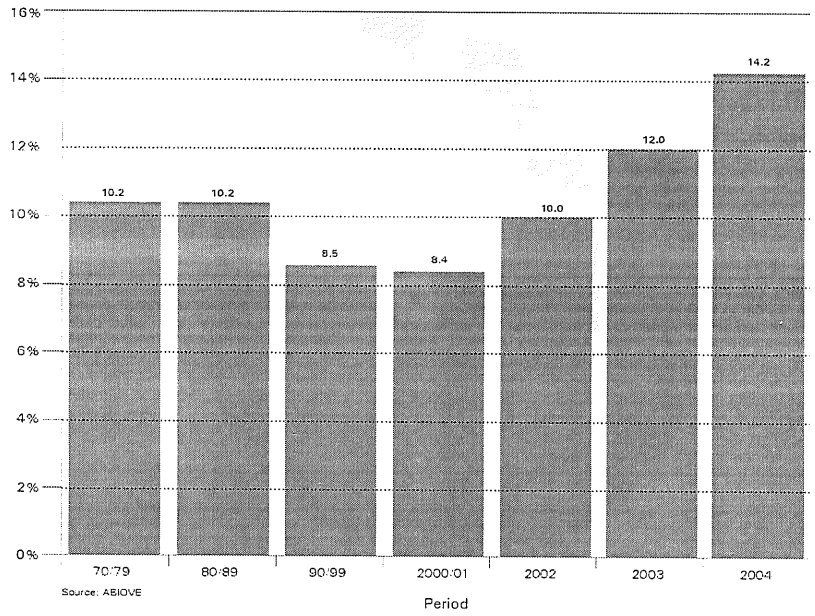


Figure 7. Soybean Complex – Participation over total Brazilian Exports

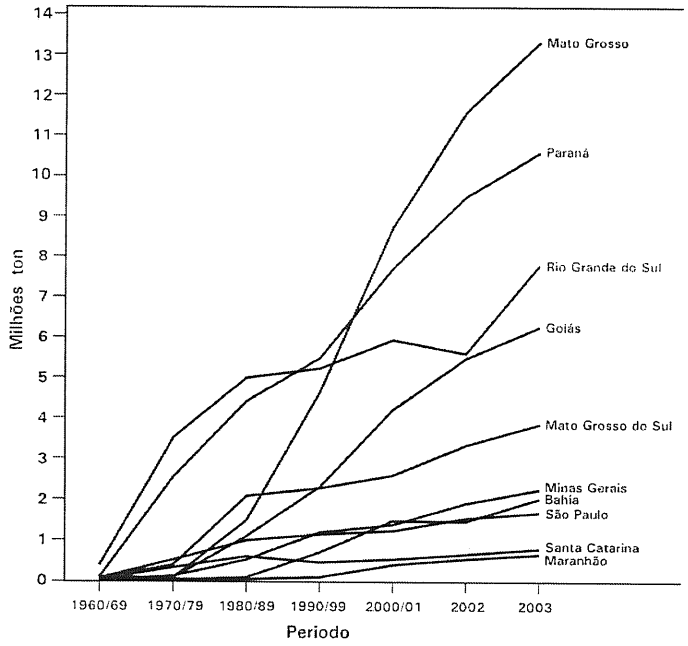


Figure 8. Evolution of soybean production by state

Perspectives of Brazilian soybeans

We see clear skies for soybean in this country, because:

- world demand and consumption will continue to expand, since human population will continue to increase;
- average income is expected to increase, particularly in Asian countries, where soybean is largely consumed;
- new industrial uses of soybean will increase global demands;
- fears to consume beef, due to the Mad Cow disease, will continue to promote the consumption of pork and chicken, fed mainly with soybean proteins;
- internal consumption in Brazil shall increase, due to the increase in poultry and swine industries, as well as to expected governmental policies promoting soybean as a human food;
- subsidies provided to growers of Developed Countries and the heavy taxes falling on the soybean chain in Brazil are expected to decrease, promoting more internal production due to better market prices, and
- new areas of major soybean producers (USA, Argentina, China and India) are restricted, giving Brazil the opportunity to supply future additional demands, by easily incorporating large uncultivated Cerrado areas, into crop lands. Less than 10% of the total of 207 million hectares of Cerrado are under cultivation with annual crops. At least 50 million hectares of wild Cerrado are suitable and available for soybean production and could be easily transformed into croplands, in case market demands so require. Keeping up with the present pace of world consumption, Brazil is expected to respond with more production, becoming the leader in soybean production by the end of the present decade.

Trends also indicate that Brazilian soybean will concentrate on more competitive large commercial operations in the Midwest, leaving to the southern small family farms the option of migrating to other profitable activities such as milk, poultry, swine, fruits and vegetables, that are ideal for smaller areas with abundant labor force, as typical of family operations, and where land is scarce.

To guaranty future competitiveness of Brazilian soybean in the global market, farmers will need to keep on investing in modern technologies to increase yields. Governmental support is also needed to reduce transportation costs, much higher than those of our competitors, due to the predominance of truck transportation (67% in Brazil and 16% in USA).

Research and development in Brazil

The increase in production and competitiveness of Brazilian soybean was always associated with scientific advances and the adaptation of modern

technologies by farmers. Soybean research was poor and concentrated in the South until the late 1960's, operating by introducing and adapting American technologies.

The rapid development of soybean began in the decade of 1960, and gave rise to an aggressive soybean producing sector, demanding technologies that research programs were not prepared to offer, thus urging government research organizations to increase research activities, particularly in the latitudes below 20°S. The establishment of Embrapa Soybean in 1975, was a result of such an effort, complemented with new public and private programs located mainly in the new soybean producing states of central Brazil.

As main achievements of soybean research programs, it is worthwhile to point out the development of soybean varieties adapted to low latitudes (up to 0°), the incorporation into commercial varieties of resistance to main soybean diseases, the implementation of an Integrated Pest Management Program, the development of biological control for the velvetbean caterpillars and stink bugs, the improvement in soybean fertilization and inoculation management, the promotion of crop rotation and no till practices (greatly supporting sustainability of production systems) and the agroclimatic zoning of the Brazilian growing regions, that indicated the more adapted cropping areas for soybean production.

Literature

Bonato, E.R.; Bonato, A.L.V. A soja no Brasil: historia e estatística. Londrina: EMBRAPA-CNPSo, 1987. 61p. (EMBRAPA-CNPSo. Documentos, 21).

Miyasaka, S.; Medina, J.C., (Ed.). A soja no Brasil. Campinas: ITAL, 1981. 1062p.

Dall'agnol, A. Sem medo de competir. Agroanalysis, Rio de Janeiro, v. 22, n. 2, p.42-43, Fev. 2002.

Dall'agnol, A. The impact of soybeans on the Brazilian economy. AGJacto, n.2, p.16-17, Aug. 2000.

Caldwell, B.E., (Ed.). Soybeans: improvement, production, and uses. Madison: ASA, 1973. 681p. (ASA. Agronomy, 16).

CONAB. Indicadores da agropecuária. Brasilia, 2003. Available in: <http://www.conab.gov.br/> Access in: Nov. 2003.

A Abiove. Informativo. São Paulo, 2003. Available in: http://www.abiove.com.br/> Access in Nov. 2003

United States of America. Department of Agriculture. Economic Research Service. Data products. Washington , 2002. Available in: <http://www.ers.usda.gov/data/sdp/view.asp?f=international/93002/> Access in: 26 Nov. 2003.

Current status of soybean production and utilization in China

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As you know, soybean originated from China. It is one of the largest crops that ranked following rice, wheat and corn in China. It was domesticated from wild soybeans, and become the main source of protein for Chinese. In some sense, soybean has been fostering Chinese people. In recent five decades, soybean production cannot meet the needs of economic development, although it has been improved step by step, and now China still needs to import a great amount of soybeans every year.

Review of soybean production in China

In 1930's, soybean production in China came to the highest level and in 1936 the total yield reached to 11.3 million tons. During this period, a lot of soybeans, seed oil and bean cakes exported continuously via ports of Dalian and Yingkou. Since then, the soybean production descended because of war, the total products of soybeans only was 5.09 million tons in 1949. Soybean yield and total product kept increasing step by step since 1949(Table 1), although the planting area didn't change much. In short, soybean production started to resume in 1950's. The planting area come to 12.748 million hectares and the total products achieved 10.05 million tons in 1957. The planting area descended since the increase of population resulted in foodstuff in short supply in 1960's, and the yield and total products also kept on a low level. Profiting from the reforming and opening policy, during 1970's, although the planting area descended, the yield improved greatly, and achieved to the highest in 1998. In recent years the yield and total products steadily kept on a high level, this means that soybean production in China has stridden into a new step and has a booming foreground.

There are three main soybean production regions in China, the largest is Northeast spring sowing soybean production area, including Heilongjiang, Jinlin, Liaoning and east part of the Inner Mongolia Autonomous Region. In this region soybean was sowed in Spring (early and mid May) and harvest

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