Will the soybean boom in Brazil never end?

Conflicts and alternatives

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1 An unstoppable dynamic

The spread of the yellow "miracle bean" in Brazil is almost impossible to check. In May 2003 figures for a record soybean harvest became known. In the 2002/03 harvest year 52.2 mio. tons were harvested on 18.5 mio. hectares, after 42 million tons had been harvested on 16.3 mio. ha the year before. This was moreover the case despite declines in yields of up to 20 % in regions like West Bahia because of fungal infestation by "ferrugem", or rust disease. Brazil's soybean producers, agricultural politicians and traders have been working in a euphoric atmosphere, striving to challenge the role of the USA as the world's market leader. World demand for the highly valuable protein feed is growing unbrokenly - particularly since the BSE crisis - and in the first half of 2003 the soybean price at the Chicago stock exchange rose to 12-13 US-$, making investment in this grain legume attractive. It is a long time since harvests in Brazil were financed only by development banks. They are now mainly financed by international corporations like Bunge, Cargill, Dreyfus and ADM, and by fertiliser and pesticide companies which supply technology packages at the same time. Brazil had a foreign exchange income of over 6 bio. US-$ in 2002 from soybean exports, a sum urgently needed to service its foreign debts and stabilise its foreign trade balance; over 8 bio.US-$ revenue from soybean exports are expected for 2003.

2 Ecological and social impacts

But the yellow grain mountain of soybeans produces not only foreign exchange but also social and environmental consequences.

2.1 Deforestation

According to the public agricultural research institute, EMBRAPA, another 100 mio. hectares can be opened up for growing soybeans in Brazil, most of it on Cerrado land (bush savannah) bordering the Amazonas area (see overview below).

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1 The author has, within her Master studies in „Tropical Agriculture“ at the University of Bonn, visited 14 Brazilian States from March-July 2003, doing research on „Soybean expansion, socio-environmental conflicts and food security“. The present article will be published shortly in the final report of the Soybean dialogue project of the Lutheran Academy of Loccum (www.loccum.de/aktuell/soja). It is based on investigations in São Paulo, Brasilia, Goiás, Roraima, Amazonas, Pará, Maranhão, Tocantins, Piauí, Bahia, Paraná, Mato Grosso do Sul, Mato Grosso and Rio de Janeiro, and on additional analysis of documents collected on site. Für reasons of better readability, it is renounced on footnotes. For further reading, it is referred to the bibliography which will published in early 2004 together with the author’s master thesis. For questions: ulrike.bickel@epost.de.
Overview: Potential for expansion of areas in federal states*

North-east
- **Maranhão**: additional 1 mio. ha (to date 274,000 ha). Besides southern region (Balsas), new "small" front in Baixo Parnaíba in the north.
- **Piauí**: 5 mio. ha, particularly in the south (until now 120,000 ha).
- **Bahia**: additional 1 mio. ha for mechanised crops (to date 850,000 ha soybeans, main crop in total of 1.2 mio. ha for agro-industrial land use).

North
- **Tocantins**: 800,000 ha (until now 145,000 ha).
- **Roraima**: 1-1.5 mio. ha "lavrado" (= cerrado) (until now c. 3,500 ha), with state support through Embrapa research and construction of eight silos with storage capacity of 50,000 t.
- **Amazônas**: to date approx. 3,000 ha; soybean production has now become technically and economically feasible; high requirements for "correcting" (liming, fertilising) the low-nutrient soils; potential for expansion in Itacoatiara (until now 360 ha) and half a mio. ha of *campos naturais*, natural grassland, around Apuí, Manicoré and Humaitá (until now 1,560 ha, supervised by EMBRAPA in Porto Velho, Rondônia). The state government's main concern is to prevent further logging and see better use made of areas which have already been degraded.
- **Pará**: regions around Santarém (7,000 ha in 2002/3, should in two years increase to 50,000 ha), Paragominas (until now 40,000 ha mechanised grain, 8,000 of this soybean; potential particularly in rehabilitating one mio. ha of degraded pasture); Redenção.
- **Rondônia**: to date 36,000 ha. High potential – around 10 mio. ha - in southern Rondônia (Chapadão do Parecis).
- **Acre and Amapá** are unsuitable because of great proportion (80 %) of protected Indian areas and areas of forest required to be protected, and Acre is further unsuitable because of its remoteness and the high transportation costs that would be incurred. But at present high pressure from cattle breeders to deforest in Acre. It is to be hypothesised that if, in a few years, pastures are degraded, they will be "rehabilitated" by soybeans.

Central-west
- **Goiás and Distrito Federal**: areas of expansion, regions around Rio Verde and Chapada dos Veadeiros. To date 2.2 mio. ha (Goiás) / 43,000 ha (DF).
- **Mato Grosso**: To date 4.5 mio. ha (biggest producer in Brazil in terms of area). Enormous potential of 40 mio. ha (particularly the regions around Sinop, Sorriso, Chapada dos Parecis; Rondôpolis and Sierra do Roncandor).
- **Mato Grosso do Sul**: areas of expansion around Dourados, Rio Brilhante, Maracujá, Pedro Gómes, Camapuá and Costa Rica. Potential particularly in rehabilitating degraded pastures with help of soybeans (rotation and/ or integration with raising cattle). To date 1.4 mio. ha.

South-east
- **São Paulo**: to date 604,000 ha.
- **Minas Gerais**: to date 830,000 ha (potential for expansion has not been assessed).

South (Paraná, Santa Catarina, Rio Grande do Sul)
- To date 7.4 mio. ha; expansion only possible at expense of share of land for other crops, since almost all land able to be used agriculturally is already being exploited.

* Sources: own survey of soybean producers, traders, agricultural politicians and researchers; makes no claim to be complete; current data from IBGE National Statistics Institute, 2003.
Soybean producers, most notably Blairo Maggi, the new governor of the state of Mato Grosso and for a long time the world's biggest single soybean producer, frequently pretend no forest has to be cut down for expanding soybean cultivation, saying it would be too costly to remove the deep roots in the Amazon forest and the climate there being too unstable because of the heavy tropical rainfalls. In the Amazon region ("Amazônia Legal", comprising nine federal states) there is moreover also Cerrado and transitional vegetation, 35 % respectively 50 % of which have been put under protection by the Forest Law, but is often not adhered to.

Clearances abusing these protection regulations are made both in forests and on Cerrado land, because a lack of finances and personnel, and corruption, hamper the federal environmental authority, IBAMA, in making efficient controls (For example, an IBAMA forestry engineer from Balsas in Maranhão lamented that "we are a poor, under-developed country - here Ibama doesn't have a car or petrol to follow up accusations ", but didn't pursue a case of land being illegally cleared to grow soybeans because his cousin owned the fazenda and his brother was in charge of the clearance). Mato Grosso is the sad leader concerning forest losses. Here 30 mio. ha have been cleared in the last 20 years for gigantic soybean, cotton and maize plantations, and for pastureland for livestock. This is almost half of the 75 mio. ha of forest and Cerrado land which covered the state in the 1980s.

For a long time the Cerrado was propagated - by some environmental organisations, too - as an alternative which would open up new areas for agricultural use and take off pressure on the Amazon for it to be deforested. The Cerrado has an area of 200 mio. ha and covers a quarter of Brazil, making it the second biggest ecosystem after the Amazon. It is regarded as the savannah richest in species in the world and, in having approximately 4,400 endemic species in a total of 10,000 species of plants, is classified as one of the earth's 25 biodiversity "hot spots". But the areas designated as protected - barely 1.5 % - are far fewer and smaller than in the Amazon. The extent of the destruction of the Cerrado is now evident. Two-thirds of its original vegetation has already been destroyed or severely degraded. Cultivation of soybeans in the Cerrado has since 1970 risen from 20,000 to 29 mio. tons, an increase in Brazilian soybean production from 1.4 % then to 58 % today. Since state planning on land use - determining where how much primary vegetation should be converted to land for agricultural use - exists only in a rudimentary form, advancing soybean expansion is one of the main factors threatening the Cerrado ecosystem.

Roughly half - 50 mio. ha - of the land that could potentially be used for growing soybeans is regarded as degraded secondary vegetation, land which was already cleared for cattle pasture years ago and has been left idle after being exhausted. The Amazonas environmental research institute, IPAM, has however stated that secondary vegetation on land cleared 30 to 40 years ago has regenerated to a great extent , and would again be fulfilling over 80 % of the functions of the original vegetation - so that clearing it again has negative environmental impacts on the climate, biological diversity, the water supply, and other ecological services, similar to those of logging primary vegetation.

In June 2003 new, alarming data on the deforestation of the Amazon region became published, stating the area involved to be 2.55 mio. ha, the highest figure since 1995. Shortly afterwards the environment ministry published figures saying that only in 2002 the area in agricultural use in the Amazon had increased by 1.1 mio. ha, 70 % of this due to the expansion of soybean farming, and smaller percentages on account of maize, rice and coffee plantations. This made all the more derisive Governor Maggi's statement, during a visit by the federal environment minister to Mato Grosso at the end of July, saying that she should not be impressed by 24,000 km² of deforestation (= 2.4 mio. ha, he said rounding off the figure), as this meant absolutely nothing compared to the total expansion in the Amazon. Maggi is the driving force in industrialising agriculture and pushing forward the agricultural frontier in the Amazon region.

Against this background the fact that the World Bank subsidiary, the International Finance Corporation, in autumn 2002 made a 30 mio. US-$ loan to the Maggi corporation for the expansion of its soybean activities, is entirely incomprehensible. The IFC justified this by saying that even if a sector was under criticism as a whole, individual companies with a good
performance could surely still be financed. It moreover did this although a loan, at favourable interest, of 12 mio. US-$ to the Maggi corporation made in 2001 by the Deutsche Investitions- und Entwicklungsgesellschaft (DEG), a German public investment and development bank, and the Dutch Rabo Bank had triggered off huge protests by environmental organisations. The World Bank itself - which co-ordinates the G7's Pilot Programme to Conserve the Brazilian Rain Forest (PP-G7) - has stopped making loans available for soybean farming in the Amazon. But public-private financing for the soybean expansion goes on: In June 2003, the Maggi group published the signature of another 80 mio. US-$ loan from a banking syndicate headed by the German West LB for financing its soybean cultivation, 30 mio. US-$ of which were already disbursed.

Finally, a comment by EMBRAPA's engineer Emeleocípio in Belem: "Soybeans will spread like fire. Where the climate is humid, as in the rainforest, they won't make any progress because of pests and disease; where it is dry, as in the Cerrado, they will be unstoppable."

2.2 Pesticides

Vast quantities of pesticides are used in industrial agriculture every year, contaminating people, waters and the environment. According to the movement for the preservation of the Araguaia and Tocantins rivers (Movimento pela Preservação dos Rios Araguaia e Tocantins), 220,000 people a year die from pesticide poisoning in Brazil. Between 1980 and 1999 Brazil's expenditure on pesticides almost tripled, from 695 mio. to over 2 bio. US-$.

According to Embrapa, the state agricultural research agency, figures about 20 % of the costs of producing soybeans - about 1,000 reais (approx. 300 euro) per hectare - are for pesticides. Depending how intensely technology is used, five to ten litres of pesticides per hectare are sprayed. This means that on a soybean-growing area of 18.5 mio. ha between 92.5 and 185 mio. litres of pesticides are released into the open environment in Brazil every year.

In addition to the toxins released, there is an accompanying problem of the waste mountain of empty packaging. No data for soybeans alone are available, but according to the IBAMA environmental authority a total of 27.8 mio. kilograms of empty pesticide packaging accrued in 2001. The true figure is undoubtedly higher, as the triple washing and return of packaging to collecting points prescribed by law since 2000 is costly and not adhered to everywhere. This sad record is headed by the agriculturally "advanced" states of São Paulo (6.4 mio. kg), Paraná (4.4 mio. kg) and Mato Grosso (4.3 mio. kg), followed by Rio Grande do Sul (2.9 mio. kg), Goiás (2.4 mio. kg) and Minas Gerais (2.3 mio. kg), while amounts in the technologically "backward" north and north-east are smaller.

850,000 ha of a total of 1.2 mio. ha of cultivated land in the agrarian development "pole" of Barreiras in West Bahia are being occupied with soybeans. On a visit to the Campos Limpos ("clean fields") collecting point for pesticide containers, there were noticeably large amounts of German companies' (Bayer, BASF) chemicals, some of which are not permitted in German law. Since the start of operations at the facility in June 2001, 1.3 mio. empty pesticide packages have been collected, 750,000 of these in the first half of 2003 alone, and the million mark is expected to be crossed by the end of the year. The waste is pressed and taken to São Paulo to be recycled. This is certainly a small advance on the "wild" waste disposal that used to be practised, but does still not eliminate the cause of the problem, the agricultural application of poisonous substances.

To cite two examples. NUSAT, the state agency for health and labour, reported on 16 cases of pesticide poisoning in Barreiras in 2002. The actual number of poisonings is many times higher, as the local rural workers' union, STR, reported. But not all of the health agencies diagnose the cause correctly (leaving matters at the description "nausea, headaches and stomach aches, dizziness"). Some rural workers don't dare to report pesticide poisoning for fear of losing their jobs. A worker who had fled from working as slave labour in Mato Grosso (see 2.5 below) reported that he had asked his supervisor about the protective clothing legally required but the latter had told him "Don't worry, it's only ant poison", and he had thus sprayed the poison wearing rubber sandals, in short-sleeves and without any mask or protective gloves.
Another adverse effect of the massive use of pesticides is to destabilize ecosystems increasingly, with the result that crops are more and more infested by pests. Small farmers in the south of Maranhão and in east Tocantins, surrounded by huge soybean monocultures, reported that as a result of insecticide usage, pests had moved across to their small, neighbouring fields, which had not been sprayed, attacking especially beans that are botanically related. Some farmers at Campos Lindos in Tocantins suffered severe shortages in their food supply as a result of losing up to 50% of their yields for rice, and this year almost all their citrus fruits have been destroyed by pests.

In the Vão do Salinas community in southern Maranhão, 14 farmers' families were repeatedly harmed by a soybean producer who sprayed pesticide by aircraft on the high plain and cut down vegetation up to the edge of the slope. The rain washed the chemicals down into the deeper parts of the valley where they contaminated the farmers' fields and drinking water, killed fish and domestic animals and contaminated harvests, thus threatening the community with starvation and malnutrition. Despite two letters of complaint the Ibama environmental authority, through "lacking a vehicle", never made investigations in this remote area and satisfied itself with the soybean producer's assurance that "it would not happen again". Although, one year after the complaints were made, the edges of the slope have been planted with eucalyptus, the producer has nonetheless not paid to the peasants' families the reparations which have since been imposed by the court. As damage continues from the pesticides being sprayed, the international human rights organisation FIAN has in the meantime started up an urgent action with letters of support to help the small farmers regain intact bases for their lives.

2.3 Food security

While soybean production for the international market keeps on increasing, growing of staple foods for domestic consumption has been and is being neglected. The area used for growing these has declined in absolute terms, to be only just compensated for by increases in productivity. Overall the area of land used agriculturally has increased from 48.6 mio. ha (in 1993) to 53.5 mio. ha (2002), mainly due to the expansion of production of soybeans for export.

When comparisons are made in the development of farming areas for main foods in the last ten years, the following can be stated.

The areas on which soybeans are cultivated increased by 80%, from 10.6 mio. ha in 1993 to 18.5 mio. ha in 2002, while the amount increased almost two and a half times, from 22.6 to 52.2 mio. tons, on account of advances in productivity. About 40% of the soybeans is exported, making them Brazil's primary agricultural export product in value terms. Since the total area used agriculturally only increased by five million hectares from 1993 to 2002, the area used for soybean grew at the expense of crops like rice, maize (first harvest) and cotton, and pasture for livestock.

Given an annual growth in population of 1.3%, however, production of staple food has to rise in order to guarantee the country's supply. Brazil has ratified the United Nations' International Covenant on Economic, Social and Cultural Human Rights (ICESCR), and according to Article 11 is obligated to respect, protect and provide its peoples the right to feed themselves.

The area on which Brazil's main food, rice, is grown, fell from 4.6 mio. ha in 1993 to 3.2 mio. ha in 2002, while the amount of it produced increased slightly, on account of advances in productivity, from 10.1 mio. tons (1993) to 10.5 mio. tons (2002). 40-50% of rice is produced by small family concerns and the rest by mechanised industry. Rice, which is undemanding and tolerates acidity, is grown on freshly cleared land in order to prepare the soil for soybean cultivation, which is more demanding, in the following year. But soybeans are now being sown in the first year directly after land has been cleared, with soils being "corrected" by applying high amounts of fertiliser. According to CONAB, the national food supply authority, the decline
in the area used for rice is mainly due to the increase in soybean cultivation. As Brazil consumes 11-12 mio. tons of rice a year, the missing amount has to be imported.

The area on which beans are grown (feijão being the most important staple food in Brazil after rice) likewise declined from 4.7 mio. ha in 1993 to 4.3 mio. ha in 2002, falling during that time to as low 3.8 mio. ha (in 1998 and 2001). But production was able to rise from 2.5 to 3 mio. tons during this time. In 2002 2,000 tons of beans were exported while demand for imports was at almost 82,000 tons.

There was also a decline in manioc root, which contains starch and is mainly produced and consumed by small farmers. The area on which it was grown fell from 1.9 mio. ha in 1993 to 1.7 mio. ha in 2002, while production of it increased, on account of growth in productivity, from 21.8 mio. tons (1993) to 23.1 mio. tons (2002).

Wheat, which is mainly produced in the temperate climate of southern Brazil, is clearly in under-supply. Although the cultivated area increased slightly, from 1.5 mio. ha in 1993 to 2.1 mio. ha in 2003, only 4.5 mio. tons were produced. As 10.7 mio. tons are consumed, 6 mio. tons had to be imported.

In the period from 1993 to 2002 the areas used to grow products mainly consumed domestically, such as sweet potatoes, bananas, onions, rye and oats, likewise declined, while plantations for sugar cane, oranges, tomatoes and sorghum (grown as a fruit interchanging with soybeans) increased.

Only developments in maize as a staple food can be adjudged as being favourable. Maize is grown partly by small farmers for human and animal consumption, but mainly (as feed for fattening animals) in crop rotation with soybeans in mechanised farming. The area used for it, 12.8 mio. ha in 1993 and 12.9 mio. ha and 2003, has remained almost constant, but production has increased in this period from 30 to 43.5 mio. tons. Here soybean cultivation expanded at the expense of the first maize harvest (-1.6 mio. ha), which takes place at the same time, while the second maize harvest, which takes place in winter beyond the soybean harvest, expanded by 1.9 mio. ha. According to the CONAB national food supply authority this is due to presently attractive prices for maize, with the overall result that the total maize area has not been reduced to the benefit of soybeans.

Neo-liberal reforms in the 1990s dismantled and privatised public storage arrangements, causing food reserves in Brazil to have fallen to almost zero. The new government under President Lula has now reactivated the CONAB national food supply and storage authority and wants to stimulate agricultural production by family farmers by buying up and giving price guarantees for food. This is undoubtedly an intelligent, productive measure in the context of Brazil's zero-hunger programme. But it is doubtful if this can halt the trend for "modern" export products like soybeans to expand at the expense of the production of staple foods. For the foreseeable future, traditional small-scale family farming and capital-intensive agricultural industry will certainly continue to exist alongside each other in Brazil. In producing 40 % of food today, family farming makes a major contribution to Brazil's food security; it produces in a labour-intensive way and uses little or no pesticides. Agricultural policy - much as with efforts at reform in the EU - ought to tie all subsidies and loan issues to environmentally-sound production methods in order to bring the agricultural industry increasingly on a route of sustainable production and to preserve the natural bases of life in the long term.
2.4 Effects on distribution

According to the land reform institute's 1996 land ownership atlas, 62.2% of all agricultural operations are *minifundio* operations which are on land of up to 1 ha (1.9 mio. out of a total of 3.1 mio. farms) and own only just under eight % (26 mio. ha) of all land. In contrast, only 0.1% of all agricultural operations (6,300) are over 100 ha in size; but they are concentrated in 26% (84 mio. ha) of land ownership. The 300 biggest farms have an average of over 100,000 ha, giving Brazil the second most unequal land distribution in the world. More recent data are not available, but with the migration of many soybean producers from southern Brazil to the north-east, where land prices are much lower, the concentration of land has increased. About 30 years ago there began a wave of emigration by small and medium-sized producers (following European immigrants) in southern Brazil to the central west, and later north-east, of the country. There they acquired huge domains and began growing soybeans using machinery. Demand on the world market for soybeans as a feedstuff high in protein grew steadily as a result of increasing factory farming in industrial countries, and even now lures new producers to the Cerrado, which was regarded as unproductive only a few years ago.

In some regions small farmers have fled from the land because buyers from the south have been offering them prices per hectare which are relatively attractive, but still many times below what can be got for selling land in the south. In the city these large one-off sums are used up within just a few months. In Santarém in Pará, for example, two villages have already become completely depopulated as a result of migration away from new areas where mechanised rice and soybeans are being grown. As a result, districts on outskirts of the cities often grow faster than new jobs are created and than the government can follow up to provide the basic infrastructure for health and education.

Gerson Teixeira, an agricultural advisor in the labour party, spoke of "reciclagem do latifundio", or land re-concentration, through the expansion of soybean cultivation. Given the high investment costs involved in mechanised agriculture, growing soybean only becomes profitable upward of 1,000 ha. In contrast to the "classical" latifundios (huge farms), which are used, for example, for intensive grazing for livestock, this kind of ownership of large areas of land is however highly productive. It therefore does not come under the provision of the 1998 constitution which says that unused land does not fulfil its social function and should therefore be confiscated and redistributed under the auspices of land reform. A lawyer very recently however moved that huge agricultural farms which destroy natural resources by clearing land and using pesticides were equally damaging to the social function of ownership and thus had to be confiscated. This is a view no doubt shared by the landless people's movement but not by the big producers.

The privileged treatment agricultural policy historically accords to the agriculture industry is also reflected in the new government's budget. Subsidies for small-scale agriculture for the 2003/04 harvest year, it is true, have been doubled, from the previous year's 2.7 bio. reais to 5.4 bio. reais (c. 1.7 bio. euros). But 27.1 bio. reais (6.4 bio. euros) have been made available for large-scale, mechanised agriculture, although it only accounts for the minority of agricultural enterprises.

A broad alliance of social movements just recently published a list of demands in its *Carta da Terra*, or Earth Charter. It calls for a maximum limit on private ownership of land and appropriation of large areas of land to "democratise access to land and put into practice the right to work of rural people who have been traditionally excluded". But this campaign has a poor chance of realising its goals. President Lula's new coalition government has a very heterogeneous composition (e.g. the Ministers of Agriculture and Industry are representatives of the agrobusiness) and at present heavily engaged in other projects (pension and tax reforms); and, following the latest wave of occupation of land, the well-organised big landowners have strengthened their resistance to land reform, which acts in parts in a brutal way.
2.5 Land conflicts

At some places soybean production penetrates protected nature or Indian reserves, such as the Mirador National Park in Maranhão or the Xingú Indians’ Parque do Xingú in Mato Grosso. In northern Tocantins, to cite another example, organisations like the Quebradeiras de coco (women who gather and process the babaçu palm fruit), supported by the church’s pastoral land commission and NGOs, have since 1999 been protesting for three years against the Sampaio project, which aims to introduce irrigated soybean cultivation with high state investment. The project would see Indians, fishers and even landless people who have just been relocated in land reforms, having to be resettled. In losing the reserves, the women living from coconuts, oil extraction and craftwork, in particular, would lose their sources of income and their living space. The environmental impact assessment initially made was absolutely inadequate and had to be greatly improved. The last public hearing took place in extremely precarious circumstances. The new, 2,000-page environmental impact assessment which had already existed for half a year was only sent to those affected and social and environmental organisations two weeks beforehand to enable them to "prepare" at short-notice. The IBAMA environmental authority finally approved a slightly modified version of the project in July 2003, incorporating consolatory offsets such as a few fruit plantations for small farmers. Over 30 mio. reais (9.2 mio. euro) of public investment in over 7,000 hectares are expected to create only 176 jobs. Were this amount to flow into the Prouambiente programme for the sustainable development of small-scale agriculture proposed by social and environmental movements, 1,382 families could each benefit from 22,000 reais and 4,147 jobs could be created without a single family being dispossessed or moved.

Cases of grilagem, i.e. illegal appropriation of land by dubious transactions facilitated by Cartórios (a mixture of private registry of land and notary public office responsible for the property registry), turn up again and again. The national land reform institute, INCRA, is at present making an inventory of Terras da União (lands given on loan to private individuals by the Portuguese colonial power and after Brazilian independence were to revert to the government). But some of these lands were illegally assigned to private persons by Cartórios. According to an INCRA consultant 3.2 mio. ha of such government lands, irregularly used by big farms, exist in Mato Grosso, for example. To date, however, these lands have not been re-claimed by INCRA and used to settle landless people as part of a land reform, as provided for in the 1988 Brazilian Constitution. Whether or not this will be done depends on the political will and the ability of the new government to get its way.

An ongoing, pressing problem is the use of slave labour on some big farms. The CPT Pastoral Land Commission has just drawn attention to this in its book, Vidas roubadas (stolen lives), and its new annual report on land conflicts. Last year alone 5,559 cases of slave labour were recorded, including 58 child slaves of minority age, the majority (4,227) in the state of Pará. The real number is much higher, since the Ministry of Labour’s mobile group cannot discover all cases because of their limited material and personnel resources. Not only soybean farms are involved. This exploitative practice has also been resorted to on sugar cane farms and in livestock farming and charcoal production. Part of the dirty work slaves are often used for is clearing primary vegetation to make way for plantations. Typical in the use of such forced labour are exploitative working hours, precarious accommodation in fields under plastic sheeting, no sanitary facilities, poor food and water provisions, lack of protective clothing, no social security provisions whatsoever, indebtedness through extortionate prices for goods and tools, as well as supervision by armed guards. Two slave-labour workers from Maranhão who had fled from a fazenda growing soybeans and maize in Mato Grotto reported on working days going from three in the morning until seven or eight at night, and at times of high activity until midnight, saying that "there was sometimes very little sleep!” The new government is now considering a law aimed at confiscating farms where slaves are found and redistributing them to landless families.

2.6 Genetic engineering
Following a long tussle within the government of very mixed factions, selling the last GM soybean harvest – with mandatory labelling – was in April allowed as an exception for the domestic market and international market. Soybean producers and dealers from southern Brazil now describe separating and labelling GM soybeans as technically impossible since growing it has been illegal and cannot be traced back through buyers' collecting and mixing of the quantities harvested. Sales came to be allowed as a result of pressure from the biotechnology-friendly agriculture minister, Roberto Rodriguez, despite opposition from the committed environment minister, Marina Silva. The decision caused vehement protests by social and environmental movements who saw it as inconsistent and harmful to consumers. This "one-off" exception was described by small organic soybean producers as a fatal error as the state had failed to intervene decisively and soybean farming could now be expected to expand in the following harvest year. With support from Monsanto and Embrapa the soybean producers had created a fait accompli which evaded the laws in force.

The ban in the year 2000 on growing genetically modified organisms in Brazil was suspended by a judge in mid-August 2003, and in September President Lula finally authorized the cultivation of genetically modified soybeans for the next growing period despite massive protests of environmental, social and consumers’ organizations. In any case, the national environmental council, CONAMA, has to carry out an environmental approval procedure and environmental impact assessment before growing and trading GMOs can be allowed in a specific case. The lifting of the moratorium on genetically modified cultures in Europe may have had an effect on the Brazilian decision, since the European market, in being a significant source of demand for GMO-free products, has until now been used as a justification for the Brazilian ban on cultivating them.

It is commonly claimed that growing GM soybeans - until now illegally - is confined to the mild warm south of Brazil since the beans (commonly known as "Maradona" or "Mercedes 70") would have to been smuggled in from Argentina, and there would be no varieties suitable for the tropically hot north and north-east. 70% of soybeans from Rio Grande do Sul and 20% of those from Paraná are estimated to be genetically modified. The landless people’s movement in May occupied and/or destroyed Monsanto and Embrapa GMO trial fields in Ponta Grossa in Paraná, EMBRAPA being the state agrarian research institute, in order to turn them areas for ecological trials. The branch of EMBRAPA researching on soybeans in Londrina in Paraná has said that work to improve soybeans genetically is already using methods which are 50% genetic engineering and only 50% conventional.

But GMO traces are very evident in the north-east, too. EMBRAPA's representative in Balsas in Maranhão said in April 2003 that if growing transgenic cultures were finally allowed in Brazil they would have already soybean seeds for distribution to farmers. In Uruçuí in Piauí a farmer said he had (with the aid of Monsanto's competitor, Syngenta) grown 1,700 ha of GM soybeans from seed smuggled out of Bahia. Another producer said a kilogramme of GM seeds could be bought from Balsas in Maranhão for 3.60 reais, or about one euro. Monsanto is using Roundup (herbicide) to promote its products in the Balsas area; and, in the states of Roraima and Rondônia in the Amazon, too, EMBRAPA and Monsanto are conducting trials with GM soybeans on adaptation to an equatorial climate. In Barreiras "Fundação Bahia", a private agricultural research institute, said "only" about 2% of soybeans in the West Bahia soybean region were genetically engineered. In an area of 850,000 ha this is equivalent to 17,000 ha, or, assuming an average productivity of only 2 tons per ha, a harvest of 34,000 tons of GM soybeans. While the Bunge international food corporation has its soybean mill in Barreiras controlled by the Swiss certifier, SGS, to check its soybeans are GM-free before being exported, the other Bunge branches operate without this check – for both the domestic market and for exports of animal feed. Where do the GM soybeans in Bahia come from? Three or four years ago Monsanto wanted to produce GM soybean seeds on 40 irrigated 100-hectare areas here, but this was at the last minute prohibited. According to an agrarian consultant in Barreiras, 15 areas were already sown and had not been destroyed or confiscated but "diverted". Calculations – assuming an average productivity of three tons (higher on account of the irrigation) on 1,500 ha – quickly
arrive at a figure of 4,500 tons of climatically adapted GM soybeans circulating in the north-east region.

In general a whole number of soybean producers have said they want to have the freedom to try out genetically modified seeds, linking this above all to hopes (regularly awakened by Monsanto) of falling costs through using less herbicides, for example, and of higher yields. Some farmers are of the view that they must be compensated by higher prices for not growing GM soybeans (which would maximise profits) and for having higher production costs.

Resistance to GM soybeans in civil society in Brazil is organised by the "For a Brazil free of genetic engineering" (Por um Brasil livre de transgênicos) campaign, in which the consumer protection institute, IDEC, and Greenpeace are very much involved. The main arguments concern the uncertain adverse impacts of GMOs on health (e.g. allergies, resistance to antibiotics) and ecosystems (increasing instability, resistant "super" weeds, resistance to pesticides), and the increasing dependency on international corporations which levy patent fees for their animal and plant products. According to information provided by Greenpeace at the World Social Forum in Porto Alegre in January 2003, Monsanto already dominates the Brazilian market for conventional maize and soybean seeds – meaning, in turn, that there is a dangerous power which will become more concentrated still if growing GMOs becomes allowed.

A biosafety law is now under discussion, with scientists and civil society organisations involved. Its aim is to regulate, among other matters, adequate labelling of genetically modified foodstuffs in order to protect consumers' interests. No widespread resistance on the part of consumers can be felt apart from these NGO activities. This may be because of the lack of information. The very poor in Brazil buy cheap soybean oil which may already be derived from genetically engineered soybeans. Many people have no idea that soybean lecithin is used in the industrial processing of thousands of products like biscuits, cakes and binding agents.

Demand from Europe for conventional soybeans may possibly increase when the European directive requiring feed to be labelled comes into force. This would be an incentive for producers in Brazil to continue not to grow genetically modified soybeans.

The idea that the world's food security problem can be solved through genetically engineered "improvements", as for example in Monsanto's Golden Rice, seems doubtful. Hunger is a distribution problem, not a technical problem. There is a lack of access to productive resources like land, particularly in Brazil, where five million landless families live alongside big landowners. Flavio Valente, the Brazilian special rapporteur for the human right to food, land and water, recently noted at a congress on trade liberalisation and food security that we don't bolt down just calories, like animals, but we eat diverse, lovingly prepared foods. That is, instead of spreading GM rice enriched with vitamin A, which makes farmers dependent on international seed corporations and displaces their traditional varieties of rice, we should aim to see there is access to loans for production and appropriate advice on cultivation such that small farmers can themselves grow diversified products.

3 Are organic soybeans an alternative?

In constituting under one per cent of the market and land, organic farming in Brazil has until now occupied a niche. At present, according to Brazil's biggest organic soybean producer, Clodoveu Franciosi, roughly 22,000 tons of organic soybeans are produced in Brazil (there are no official data). This is just under one fifth of world production of organic soybeans, 120,000 tons, which makes hardly a mark when compared to the total world production of soybeans of 194 mio. tons a year. The lead in demand for soybeans (198 mio. t) is at present pushing up the prices for conventional soybeans, reducing the gap in price to organic soybeans and making it less attractive to grow from a commercial viewpoint. The margin for organic soybeans, which have cost about 50% more in the past few years (an average of 15 US-$ a 50 kg sack as compared to 10 US-$ for conventional soybeans), has greatly diminished in the first half of 2003 as a result of conventional soybeans rising in price to 12-13 US-$. 
Organic soybeans are mainly grown by small family farmers in the temperate, warm climate of southern Brazil. These peasants have wanted to switch to producing healthy food on account of their own adverse experience with pesticides. They produce an impressive array of plants in a labour-intensive way. A few consumer goods aside, they are almost self-sufficient, including producing seed for staple foods like rice, maize, wheat and oats. As a result of this high diversification, the ecosystems involved are very stable and pests occur only to a limited extent. They are combated biologically and cheaply by using domestic materials, e.g. infestations with grain borers by cow's urine and salt in plastic bottles. The buyers of the organic soybeans – who sell most notably via the Nuremberg BioFach congress to European importers for human consumption and cosmetics (the Body Shop) – provide technical advice on growing them. Stringent controls on genetically engineered impurities are an important aspect in buying up harvests.

This positive experience cannot however be easily transferred to large-scale soybean monocultures which are highly mechanised and only need one worker for 100-250 ha. According to Clodoveu Franciosi, who produces organic soybeans on 5,000 ha in Tangará da Serra in Mato Grosso, there are, certainly, solutions to all the technical problems in production. He sprays large areas by plane, for example – just like conventional farmers – to combat caterpillars, but uses the biological insecticide Baculovirus. He has even found a plant hormone which is effective in countering the new fungal disease, ferrugem (rust). And he controls the pressing problem of weeds in organic farming, by using intelligent spacing between plants and paying careful attention to sowing times, choice of varieties, catch cropping and crop rotation. Nutrient bottlenecks have been overcome by using green manure and fertilisers allowed in organic farming, such as raw phosphate.

Why then are organic soybeans not produced everywhere? The main problem appears to be not so much of a technical nature as farmers' lack of information and the complex demands organic farming makes on producers. Public subsidies have for decades gone (and do on the whole still go now) one-sidedly into agricultural research in the interests of industrial corporations utilising the technology package of the green revolution. Economic interests of the powerful "agrobusiness" (fertiliser, pesticide and seed corporations, farm machinery manufacturers, buyers, food and feedstuff corporations and banks) are also behind this. Public development banks have issued loans on condition that certain fertilisers and pesticides are used. Biological combating of pests is still a niche in the soybean branch of the EMBRAPA agricultural research institute. Growing organic soybean founders finally on the lack of will on the part of the majority of producers, whose primary corporate aim is to maximise profits and not to see agriculture which is sparing of resources.

Further critical considerations are that natural vegetation (Cerrado or forest) is cleared for large-scale organic soybeans plantations too; that above several thousand hectares such plantations are then part of the latifundios or large-scale land properties which consolidate the uneven distribution of land in Brazil; that confining farming to a few main cultures (e.g. soybeans/maize) causes a drastic reduction in biodiversity; and that "organic" does not always mean "social" – cheap seasonable labour without long term social security for heavy physical labour is also employed on organic soybean plantations.

It is thus technically possible to convert huge conventional soybean plantations to organic farming, and this would mean a step in the direction of ecologically sustainable agriculture would be taken. This stands or falls, in the final analysis, on the will of producers and state incentives. Until now, however, the Brazilian institutes for organic certification have tended to work oriented on demand rather than pro-actively, nor is there any public strategy to provide incentives for more sustainable production methods.

There is a need for social reforms of a structural nature which tackle problems of land distribution and concentration, and which go beyond making agriculture ecological. These are being dealt with in sections 2.4, 2.5 and 3.
4 Concluding observations

International debate has in the last few years concentrated on the problematic consequences of growing soybeans since they are the main product bringing in foreign exchange and Europe has a special responsibility here on account of its high demand for protein feed. But it would be too narrow to limit the issue of environmental and social impacts to soybeans alone. Criticism must centre on the agro-industry's model of the Green Revolution, in which extensive monocultures dominate and a great amount of chemical fertilisers, pesticides and fossil fuels are used. This has meant immense areas of land being completely cleared of natural vegetation (bush savannah – cerrado – and forest) and transformed into annual crops and prone to erosion. Diversification is taking place in the Cerrado – not only in Mato Grosso but also in south Maranhão, West Bahia and other regions – for example, big producers who have made capital from growing soybeans are increasingly investing in cotton which, while more expensive to grow because it is much more pesticide-intensive, is more lucrative. Deforestation for livestock farming and charcoal production is a further threatening factor.

The issue of the ban on growing genetically engineered organisms is not only a soybean issue, it is also about Bt maize resistant to corn borers, genetically modified varieties of cotton, and other GMO cultures.

Public investment in developing the infrastructure for exporting soybeans, as envisaged in the last pluri-annual plan ("Avança Brasil") and at the moment being re-negotiated, likewise presents a threat to natural habitats. It is beyond the scope of this article to go into this in detail. It may be pointed to the years of protests by environmental organisations against the Araguaia-Tocantins and Paraná-Paraguay waterways, the construction of which is raised again and again, and the asphalting of federal highway 163 from Cuiabá to Santarém. What is crucial in big infrastructure plans being implemented is their ecological effects and impacts on distribution. What irreversible environmental damage will society be encumbered with, and who profits from the use of scarce resources – the poor, marginalised rural population or a minority which is strong in capital?

According to Philip Fearnside, professor at the INPA national Amazon research institute, the following measures urgently need to be taken in order to reduce the diverse negative effects of soybean expansion on biological diversity and sustainable development: (1) creating protected areas in advance of soybean frontiers; (2) eliminating the many public subsidies which speed the expansion of soybeans beyond what would otherwise occur from market forces; (3) social and environmental impact assessments prior to soybean expansion; and (4) strengthening the environmental-impact regulatory system, including the commitment not to implant infrastructure projects with probable excessive environmental impacts (P Fearnside, INPA: Soybean cultivation as a threat to the environment in Brazil, Manaus, 2000).

Cheap labour with people exploited in slave-like conditions is used time and again to clear land and perform other dirty work (such as spraying pesticides), whether it be in growing soybeans, maize, cotton or sugar cane, in producing charcoal or operating livestock facilities. Here it is necessary to expand the staffing and material capacities of the labour ministry's mobile task group, and to impose penalties rigorously as a deterrent to other farm owners.

The extreme concentration of land means that minor correctives are not clearly enough, and a fundamental change of course in agricultural policy is necessary. The traditional approach of according privileges to an agro-industry strong in capital ought to give way to greater support for small-scale sustainable production methods. Civil society organisations have made many proposals to this end:

- the "Carta da Terra" referred to in 2.4;
- the Proambiente programme for an agro-ecological reform of agriculture;
- the annual "Grito da Terra" (cry for land) by the rural workers' federation, CONTAG;
• the "National Plan for agrarian reform" at present being worked out by the Ministry for Land Reform and the INCRA national land reform institute with the participation of social movements; and

• many small local projects of all kinds being carried out by a wide range of committed people.

In Brazil people have had great hopes for social reforms since the change in government and since the creation of a series of initiatives to strengthen participation by civil society. But the government is restricted in its real room for manoeuvre in making far-reaching changes because of its high indebtedness and the conservative forces, referred to above, in the heterogeneous government coalition. Some processes like the expansion of soybean cultivation, which is mainly privately financed, are at the moment far removed from state control because, for example, violations of the law on forests (such as clearcutting) are often not investigated.

Brazilian environment and labour legislation is progressive but at many points not respected. For over ten years a law has prescribed that "ecological-economic zoning" be made at state level as a basis for rational land planning. A whole host of technical data have in the meantime been recorded in many states, but nowhere have they become an aid to decision-making on the sensitive questions of how much forest and natural vegetation like the Cerrado ought to be preserved and with the aid of which instruments.

Taking earlier studies as a basis, scientists like the ecologist C. Klink of Brasília University and A. Moreira of the World Bank regard it as appropriate for there to be agricultural and ecological zoning of the Cerrado in which a third of the area should be put under protection. A workshop by the Ministry of Environment, scientists and environmental NGOs in 1999 worked out detailed proposals in its study, "Priority action to preserve the biological diversity of the Cerrado and Pantanal wetlands", which are waiting to be put into practice.

Mention should be made of the proposals by the NROCerrado network, Rede Cerrado, which calls for a moratorium on further agricultural expansion in the Cerrado. As alternatives it states: making the Cerrado a national cultural heritage, increasing protected areas in the Cerrado to at least five per cent, priority use of degraded areas for agricultural cultivation (instead of clearing primary vegetation), support for sustainable agricultural practices, protecting the native population and their gathering of reserves, agro-extractivism, eco-tourism, sustainable use of medicinal plants, handicrafts, etc.

On the part of the industrial countries, more attention should be paid to political coherence. It is particularly to be urged that donors in the G7's Pilot Programme to Conserve the Brazilian Rain Forest not issue development loans for infrastructure projects and expansion of the agricultural frontier, which accelerate the destruction of the forest and Cerrado. This applies also to international organisations like the World Bank and its subsidiary organisations and to state organisations like the DEG, which have prescribed protection and sustainable use of the forests in their Forest Policies. At the same time, the new government's zero-hunger-programme and especially an expansion of staple food production for the domestic food supply ought to be supported.

The Rios Vivos ("living rivers") coalition, an umbrella organisation of over 400 Brazilian NGOs, is committed to realizing better standards in agricultural trade in soybeans between Europe and South America. Minimum social and ecological standards which ought to be heeded in importing soybeans are in their view:

• a general ban on importing soybeans stemming from newly cleared land (regulation with deadlines);

• socially acceptable cultivation, i.e. the respect of international labour standards;

• a general ban on importing soybeans from farms involved in land conflicts;

• a general ban on importing genetically modified soybeans; and
• a general ban on importing soybeans from farms using highly poisonous pesticides ("the dirty dozen").

Demand for soybeans can furthermore be reduced by increasing the cultivation of **indigenous feedstuff legumes** in Europe. This would make a useful contribution to dismantling the EU's agricultural surpluses, having shorter trade paths and increasing transparency in feed production. More far-reaching proposals range from **reducing meat consumption**, which would enable us, in addition to enjoying meat of higher quality, to roll back intensive fattening of animals - to raising animals in a more species-appropriate and extensified way. Finally, all initiatives - public as much as private - committed to expanding **organic farming without neglecting minimum social standards**, are to be welcomed.

**Note**

Due to limited space, not all social and ecological alternatives can be treated in detail here. It is referred to the author’s master thesis in Portugiesisch which will be elaborated in the coming months on “Soybean expansion, socio-ecologic conflicts and food security in Brazil”.