Since the early 1970's, Brazilian agribusiness has passed through great transformations instigated by equally significant changes in its agricultural base.

In the first period, which ran to 1988, grain cultivated areas consistently grew incorporating new areas heretofore believed unproductive. The production of commodities grew more than expected and there were gains in productivity. From 1989 onwards, productivity gains were even greater and more evident. Grain harvests increased while tillage areas diminished. Lands freed were left to recover or suffer less erosive processes such as pastures, forests, and fruit trees. This meant obvious gains for environmental conservation.

In all these transformations and in whatever direction they went, EMBRAPA - Brazilian Agricultural Research Corporation - has been there.

Whether this meant operating research laboratories or leading a complex network of federal and state R&D called the National Agricultural Research System, EMBRAPA has placed its acknowledged scientific and technological competence at the service of the development of agriculture and agroindustry.

Products, processes and services offered by EMBRAPA and its partners have contributed in general to the increase of efficiency of Brazilian agribusiness. They have helped to increase productivity, to reduce costs and use of chemicals on farms, especially in the traditional crop areas of high technology agriculture.

They have created a modern agriculture and livestock for the cerrados, so-called savannas, and they have transformed the semi-arid regions in the Brazilian Northeast in the greatest exporter of fine tropical fruits. EMBRAPA has permitted Brazil to enjoy new plants, new animals, new products and processes and to create new and sophisticated agribusiness and agroindustry from such diversified ecosystems as Amazônia, Cerrados, Semi-Arid and the Pantanal.

This multidisciplinary scientific capacity and EMBRAPA's institutional flexibility have helped not only Brazil but various other countries and scientific institutions abroad. By means of technical cooperation agreements and contracts, EMBRAPA has carried out research in joint ventures, trained researchers and technical personnel, helped to organize R&D institutions for developing countries, exchanged or simply sold genetic materials and even registered some international patents.

This partnership has been made with such promoting institutions as the Rockefeller Foundation, JICA, GTZ, CIMMYT, CIRAD. ICRISAT, IFPRI and so many others. Partnerships have been developed in more than 20 countries such as Argentina, South Africa, Cuba, Egypt, Nicaragua and Tunisia.

Today, EMBRAPA has an admirable work force allowing the generation of agricultural and agroindustrial technology. This is particularly the case of the demands in the tropical agribusiness sector. With its 39 research units, modern laboratories and 9,500 specialized people - 2,100 are researchers, EMBRAPA believes that it can offer help in tropical agribusiness all over the world.
PROGRAMS

- Natural Resources
- Genetic Resources
- Biotechnology
- Grains
- Fruits and Vegetables
- Animal Production
- Raw Materials
- Forestry and Agroforestry Production Systems
- Rationalization of Subsistence and Low Income Agriculture
- Post Harvesting, Processing and Preserving Agricultural Products
- Environmental Quality
- Agricultural Automation
- Regional and Rural Development
- R&D Activity Support Information
- Technical Cooperation
- Funding the State Research System
- Management and Institutional Development

PRIORITIES

Modernize tropical agriculture by

- increasing the supply of foods and improving the quality of produce
- reducing the production costs of farming activities
- maintaining the quality of the environment
- modernizing technology for the agroindustrial complex
- stimulating the creation and development of small and medium agribusiness
- rationalizing agricultural and livestock production for small farms.
EMBRAPA researches every product of Brazilian food from bread to meat and from milk to beans. It aims at improving the quality of foods, increasing yields and reducing the price for the customer. This work begins in the laboratory. Each year, EMBRAPA devises dozens of new varieties of plants which are more productive, nutritional and resistant to diseases and pests together with modern techniques for the increase of productive efficiency in the Brazilian cattle industry.

EMBRAPA, the greatest national producer of basic seeds, produced around 14 thousand tons of basic seeds for such products as beans, corn, soybeans, wheat, rice and cotton in 1993. These seeds together with the other technologies developed by research helped the country to harvest in 1995 more than 80 million tons of grain. This was 15% more than the 92/93 harvest. This result also reflected on the national production of fruits and vegetables which reached 32 million and 11 million tons respectively in 1992.

In the field of animal production, technology resulting from research in nutrition, genetic breeding, reproduction, sanitation and agricultural engineering was partially responsible for the increase in the Brazilian production of chicken meat which went from 500 thousand tons in 1975 to more than 3 million tons in 1994.
Corn the champion of productivity

EMBRAPA has put on the market approximately 30 corn cultivars, hybrids and varieties in Brazil. This has resulted in greater profits for farmers, increased employment and mainly it has allowed for both a quantitative and qualitative rise in food available. When the double hybrid BR-201 corn cultivar was put on the market with its high tolerance to acid soils and yields of 8.5 to 15 tons per hectare, EMBRAPA offered a franchise to UNIMILHO which is a group of 27 small and medium grain producing firms acting throughout 8 states. EMBRAPA transfers technology, controls quality and offers both technical assistance and training. This franchising contract yields US$ 1.2 million each year. This money is put back into new research by EMBRAPA. At present, the BR-201 corn cultivar occupies 14% of the market for hybrid corn in Brazil. EMBRAPA has also put the BR-106 corn variety on the market representing 9% of all the selected corn seed grown in Brazil. This variety of corn is noted for its high social and productive potential. The BR-106 is widely grown by farming communities, collective systems or by certified seed producing cooperatives, substituting bin corn seeds.
Soybean is a guaranty of profit

On average, EMBRAPA has offered 4 new soybean cultivars each year which are adapted to the different ecological regions in Brazil. These varieties, given their high-yield characteristics and resistance to the main diseases, have guaranteed the stability of regional production and the increase of income at the farm level. Also developed by EMBRAPA, technology is available to improve the process of production of high quality seeds. This has allowed soybean seed farmers a minimum return of one 60 kg sack/ha/year.

Modernization comes to bean harvesting

Bean culture, once marked by primitive crop practices, has nowadays been totally mechanized from sowing to harvesting. Thanks to efforts made by research, the Safira cultivar - an erect bean variety - permits mechanical harvesting with the conventional harvesters equipped with kits. This has allowed for the expansion of this culture in areas where labor is scarce. Furthermore, the possibility of harvesting beans mechanically is an incentive for cropping at enterprise levels.
Pest control reduces losses of stored wheat

Integrated pest management for stored wheat with preventive measures taken after sampling and monitoring inspection, has permitted a loss reduction of at least 5% of stored wheat. Utilization of this EMBRAPA technology, only for the domestic wheat yields of around 3 million tons each year, would mean that Brazil would cease to lose some 150 thousand tons. This amount would be sufficient to feed almost 4 million people.
White corn - a new alternative

EMBRAPA has put on the market the BR-451 white corn variety which produces well and has a high protein content. This variety contains high rates of lysine and tryptophan which are two aminoacids essential for humans and animals, principally swine and poultry. The white coloring facilitates the use of corn meal mixed with wheat flour for the baking of bread, cakes, biscuits and pastas for macaroni and does not alter the color while increasing the nutritional value of these foods. Studies are being done together with the counties using the BR-451 for food production in central Minas Gerais state.

Cassava: return on research

EMBRAPA researchers have identified the best way to obtain flour from the aerial part of the plant which traditionally has been thrown away. This flour which can be easily made at home is rich in vitamins A, C and complex B, iron and calcium and has been recommended as a complementary food mainly for pregnant women and undernourished children.

Great vegetable advance

Research has offered great advance in the field of genetic breeding and in the improvement of vegetable production systems. EMBRAPA has put on the market 34 new cultivars and hybrids of carrots, cucumbers, sweet corn, cabbage, sweet potato, potato, squash, tomato, onion, eggplant, peas, lentil and mustard. This has meant an increase in yields, improvement in quality, the regularization of the supply of market garden products, decrease in production costs, less aggression to the environment and a diminution of dependency on the importation of seeds from almost 70% in 1981 to less than 30% in 1991.
Expansion of fruit culture in temperate climates

The blackberry, introduced by EMBRAPA, at present counts on the Tupi, Guarani and Caigangue cultivars which have been raised for Brazilian conditions. Given its high yields, low production costs and stature, the blackberry offers an excellent alternative for the small farmer, mainly. New peach cultivars, to be created for Rio Grande do Sul state and the South of Minas Gerais state make possible increasing the harvest period of 20 days to almost 3 months, involving 30 thousand people engaged in this activity between the months of November and February.

New food options from the Brazilian Cerrados

EMBRAPA has researched some 40 fruit species from the cerrados with a view to taking advantage of their food and medicinal properties. Some of these native species, such as pequi, araticum, mangaba, cagaita, baru, macaúba, guariroba and buriti - rich in proteins and vitamin C - are marketed on a small scale and consumed by people both "in natura" in the form of ice cream, desserts, liqueurs, jams, flours, oils, condiments, heart of palm and salted dishes.

Triple yielding cashew

The technique of substituting cashew crowns and low-yielding cashew trees by grafting, using propogules of selected clones has been adopted by big, medium and small producers in the Northeast of Brazil. This technique permits the increase of the present productivity of cashew nuts from 200 to 600 kg/ha/year and also uses intensive labor thus reducing in around 65% the production costs. It can be easily adopted due to low investments demanded and little use of inputs. Capital invested is recovered within a period of two years. Its adoption with 14.3% of cashew in the Northeast offers more than 5,000 jobs directly and indirectly.
National milk yields increase four times

Dairy cattle research seeks to improve and accumulate knowledge on nutrition, reproduction, breeding, sanitary conditions, forage and management of dairy herds which are pure bred or mixed breeds. Technologies already developed allow at least a four-fold increase in the control of the average yields in this sector which do not exceed 2 liters/cow/day. Technology is available to 1.2 million milk producers of which 1 million are small farmers whose production is below 50 liters daily. The technique of the strategic feeding of cows in the period before and after birth permits a reduction in the interval between births from 20 to 14 months, thus allowing a net annual increase of 30% for each cow.

Research advances to increase meat production

Beef cattle research has shown significant advance in the control of botulism, the hornfly and verminosis as well as orientation on controlled breeding seasons, selection of cows and bulls, supply of improved genetical material, cross-breeding techniques and artificial insemination and in the development of alternative vaccines against bovine babesiosis. The adoption of these technologies by breeders brings expressive advances in the growth of beef cattle productivity.
EMBRAPA produces the first test tube calves in the world

It is now possible to obtain a greater number of zebu embryos at lower cost. A very successful technological innovation carried out by EMBRAPA in the field of animal embryology has been responsible for the birth of the first test tube Zebu calves in the world. They are two Nellore calves. The technique used was "in vitro" fecundation already utilized in Europe, the United States and in Brazil, but only with taurines.

Poultry: Brazil's white egg races

In order to diminish external dependence on genetic materials, research has been developed with a view to forming and selecting competitive national poultry races. An example of this is the EMBRAPA 011, the only national race producing white eggs available today on the home market. The genetic potential of the EMBRAPA 011 can be understood by the production of 319 eggs within a period of 20 to 80 weeks, with average weight of 59 grams and reaching a production peak of 93% during 9 weeks.
New forage improves beef cattle production

Research has put several forage species on the market such as Tanzânia-1, Mombaça, Marandu, Stylosanthes Mineirão and Andropogon. These new forage options have contributed considerably to the increase of production and productivity of beef cattle in terms of kilograms of meat/ha/year. In central Brazil, the introduction of these forages can contribute to an annual increase of 200 thousand tons of beef production.

Economy with swine rations reaches US$ 700 thousand a year

The combination of technologies in genetic breeding using half-bred sows in commercial pig breeding, the employment of reproductive management techniques and the diminution of risk factors during maternity allows an increase in productivity of 18 suckling pigs/sow yearly. These technologies, added to others available, have permitted a reduction of up to 30% of the costs in pigs to be slaughtered.

Barreirão systems renews pastures and increase the production of grains

Almost all of the 117 million hectares of pastures of the cerrados are degraded. Now EMBRAPA has put the Barreirão System on the market. This system associates the renovation of pastures with the simultaneous production of grains. When applied each year in 20 million hectares of pastures, this technology permits the increase of 36 million tons in rice yields and 60 million tons of corn. To date, the system has been applied to 300 thousand hectares of Brazilian cerrados.
Besides producing more and with greater quality, the farming sector should also be concerned with production which is both rational and sustainable, satisfying the needs of the present generations but without compromising the natural resources to be used by future generations.

EMBRAPA holds environmental quality as a basic tenet and priority in all research conducted. Thus, it has generated and adapted numerous technologies, products and services destined for agriculture, livestock raising and the Brazilian forestry sector to permit and exploit the environment on rational and not predatory bases.

From every research unit, technologies arise concerned with ecology. Fungi and insects substitute chemicals. Plants control parasites in the soil. Bacteria supply nitrogen fertilizers. Planting techniques and management control erosion. Crop rotation and double cropping have recuperated soil fertility. Laboratory techniques have facilitated the germination of species threatened with extinction as well as afforestation.

In addition, EMBRAPA has developed computerized systems to protect the environment. These systems allow for the monitoring of burnings, for example, and direct efficient programs to control grasshoppers and other pests, make maps of the dynamic of the use of lands and conduct territorial zoning.
Paraná pine offers an alternative to erosion

The utilization of the regeneration of cut and bourned thickets, in low fertility soils, planting the Paraná pine, is an alternative recommended by EMBRAPA to increase the added value of the low timber worth of brushwoods, thus providing profits of approximately 140%.

Forestry and agriculture unit to conserve the environment

Exploitation models of exotic and native species such as pinus, eucalyptus, erva-mate, grevillea and bracatinga associated with other food crops or animals - sustainable alternatives to the production of foods and wood - have been divulged by research and adapted to other species such as the Paraná pine. Work with native species to serve as shade for pastures and the production of fence stakes have also generated economic and ecological alternatives for the improvement of animal production systems. This is especially the case in the southern regions of Brazil.

Parasites attack wheat aphid

To diminish the use of insecticides for the control of wheat aphids, EMBRAPA has introduced, researched, multiplied, divulged and released several kinds of aphid parasites. With this technology, the use of insecticides was reduced from three applications yearly wherever this cereal was cultivated to only one application over 5% of the area planted.
Expeditions guarantee food for the future

Expeditions to collect vegetal germplasm (plants, seeds and seedlings) have been carried out throughout Brazil, particularly in areas threatened by the advance of the agricultural frontier and by such great projects of engineering as the building of hydroelectric dams or mining. On these expeditions, primitive cultivars are collected for conservation and study, especially those in the hands of traditional farmers as well as forest species of value for research and plant genetic improvement. Besides those species of immediate economic interest, other species with future economic potential are retrieved for food, medicines, fibers and colorings and for the production of energy. More than 200 expeditions have been carried out and over 30 thousand accessions collected.

Nuclei conserve endangered species

Germplasm (semen and embryos) of bovines, buffaloes, equines, goats, sheep and swine form nuclei for breeding and preservation. These can be found in different Brazilian ecosystems - the Pantanal, Semi-Arid, the Pampas and Amazonia - where they have suffered natural selection over hundreds of years. Besides the cryopreservation (conservation in liquified nitrogen) of embryos and semen, these nuclei guarantee the survival of domestic animals, especially those threatened with extinction - Pantaneiro and Lavradeiro horses, Pantaneiro bovines, Criololageano and Mocho Nacional, Guará wolf, the northeastern donkey and Moxotó, Marota, Canindé and Repartida goats.

New techniques reduce loss of soil

Practices for the management and preservation of soils by research - control of water erosion and regeneration of the organic matter cycle - have contributed to the maintenance, recuperation and increase of production. These practices have lessened soil loss. These have reached the sum of 1 billion tons yearly, silting rivers and reservoirs. In the South, Southeast and Middle West, the adoption of recommended practices has brought significant results. For each dollar invested, there has been a return of 15.
Bioinsecticide preserves and helps the farmer to economize

EMBRAPA has developed and utilizes Baculovirus spodoptera to control the fall armyworm, the main corn pest in Brazil. Besides contributing towards the preservation of the environment, the bioinsecticide offers economy for the farmer. Application of this bioinsecticide by either aspersion or sprinkle irrigation, utilizing a portable sprayer which can be linked to the system, economizes labor, fuel and time.

Recommendations guarantee fewer agricultural chemicals on the farm

Recommendations for fungicides, period and suitable dosages for the control of mildew, anthracnose and oidium on vines together with green pruning and the elimination of dry pruning have guaranteed a reduction of costs in production, equivalent to two fungicide applications annually, on the Serra Gaúcha.

Sugarcane produces more with fewer inputs

Technologies developed for sugarcane such as, harvesting without burning and the use of the CB 15-3 or SP 7011-43 varieties, have permitted the increasing substitution of nitrogen fertilizers for the biological fixation of nitrogen. The application of this technology in 8 thousand hectares in the region of Campos-RJ and in the state of Pernambuco together with the possibility of economy for Brazil while maintaining productivity of crops permits a reduction of soil degradation.
Environment Atlas: research contributes to education

The Atlas of the Brazilian Environment has been elaborated especially for primary and secondary students and has been an important mark for the Brazilian publishing market. This original contribution has been published jointly by EMBRAPA and the Editora Terra Viva with the financial support of the Banco do Brasil Foundation. There are innumerable updated facts on environmental issues such as population explosion, urban growth, energy, erosion, desertification, pollution, devastation of the forests, world biomass and biodiversity, including the interrelationships between poverty and the environment, food, education and citizenship which have made this Atlas an indispensable instrument for our younger generations.

Original program evaluates environmental impact in irrigated areas

For the first time in Brazil, the environmental impact caused by the use of agricultural chemicals and biological control agents in irrigated farming areas is being evaluated. The project, which began in 1993, is being carried out by EMBRAPA in the region of Guafra (SP). This is the place of aspersion irrigation in Brazil. The Guafra Project studies differentiated microwaterbasins where, by means of semi-detailed environmental zoning, 5 subbasins and 49 microbasins have been delimited.
AGROINDUSTRY
The food business today employs 780 thousand persons and involves 46 thousand factories, thus constituting one of the main bases for sustaining the Brazilian economy. EMBRAPA’s research on food technology in Brazil aims at not only avoiding losses in agricultural production in all the phases of postharvest but also at creating more nutritive and healthier products for industrial processing. With technologies allowing modernization and the development of systematized food storage and processing which have been created, EMBRAPA also contributes to the growth and regularity of food supply for the Brazilian people. Furthermore, EMBRAPA stimulates through agroindustrial extension the spread of micro and small agribusiness throughout Brazil, contributing to increasing income and employment in towns and rural areas. EMBRAPA offers consulting services, technical assistance, training and support to firms in this sector.
Cashew nut: from the laboratory to industry

The new clones of the precocious dwarf cashew tree developed by research are more resistant and present productivity ranging from 800 to 1000 kg/ha of cashew nuts. They also present favorable industrial characteristics such as an easy peeling of the skin which envelopes the kernel, difficult opening of the protection of the kernel during industrial processing, high-yield of the entire nut, and with a higher fruit pulp. These clones present an industrial return of 85% of the entire kernel, whereas the current types yield 55%. The utilization of these new clones permits an increase in returns on each lot of a thousand kilos of cashew nut processed.

Gum can be extracted from the cashew tree

The process of extraction of gum or resin from the cashew tree has been made feasible by EMBRAPA permitting the obtaining of 1 kg/plant/year. When used on 2,060 hectares in the Brazilian Northeast, this technology permits the elimination of the importation of this product and provides sufficient arabic gum to meet all the needs of food industries, cosmetic and pharmaceutical manufacturers, and for varnishes.
Research improves the quality of wines

EMBRAPA grape research seeks to improve the final quality of its products - wines, grape juice and subproducts. This also involves the maintenance of satisfactory levels of productivity and reduction of production costs. This technology has meant an improvement in the quality of these products, especially so in the case of fine wines.

Nutritive macaroni attacks hunger

Developed jointly with ABIMA-Brazilian Pasta Manufacturers Association- this supermacaroni, with vitamin supplementation, made from common wheat flour, is intended for children and for nursing mothers. This new product is enriched with vitamins A, B1, B2, B6, PP (nicotinamide) iron, lysine to increase protein potential and other minerals. Each 100 grams of the dry product after cooking, supplies 60% of daily caloric needs.

Equipment to make the cod industry viable

EMBRAPA has developed a fish drying equipment which is of low cost to build and operate. This is also allied to sanitary control and technical conditions for drying (temperature, velocity of the air and relative humidity). With this device, it is possible to produce 320 kg of fillet which is salted and dried - such as codfish - monthly.
Drier guarantees more income for the fruit grower

EMBRAPA has developed low cost equipment to dry such fruits as banana, pineapple, cashew and apple. It has been geared to small farmer needs. Up to now, the existing equipment was destined for use on a large scale and demanded high investments. The drier reduces loss and is easy to build and handle. Although it has only been recently put on the market, approximately 7 thousand farmers, especially in Minas Gerais and Rio de Janeiro states, have shown interest in acquiring the construction and operational manual.

Technology produces tropical fruit aromas

The aroma of such tropical fruits as soursop, cupuaçu, bacuri, taperebá and murici are being extracted and added to the most diverse industrialized foods. This has been possible due to the adaptation of technology to obtain natural aromas. A process has also been developed to process guaraná and heart-of-palm in the form of powder and also technology for making cheese and yoghurt from buffalo milk, with exotic tropical fruit flavors.
EMBRAPA and SEBRAE stimulate new agribusiness

EMBRAPA in partnership with SEBRAE-Brazilian Support Service for Micro and Small Enterprises has carried out an experience involving the temporary loan of industrial equipment to set in order the production line of small food agribusiness. This is happening in 3 enterprises working with juices, drinks, and soluble coffee in Rio de Janeiro. The idea is to raise the technological standards and production of these agroindustries, helping them to dominate new technology and capitalize in order to acquire new equipment. In this same line, EMBRAPA maintains a contract with INTI - Agroindustry and Commerce Ltd. This is a family firm which manually produces guarana syrup and drink to sell on the beaches of Rio de Janeiro. Thanks to a loan from EMBRAPA of an automatic measuring and dispensing device, INTI has increased by 300% income from production and has made 50 new jobs available. EMBRAPA has also helped the Cooperfrut - Fruit Growers Cooperative from Imburi da Barra-RJ to install a passion fruit juice industry offering equipment for a given time to pasteurize and dispense automatically this product.

Agroindustry uses EMBRAPA corn

EMBRAPA has developed the BR-410 sweet corn, a simple hybrid with the average yield of 10 tons per hectare. This corn is used as a vegetable and offers more suitable conditions for use as a conserve or canned. From 1993 on, the BR-410 was processed industrially in the form of a conserve by Peixe Fábricas. Peixe, under agreement with EMBRAPA, utilized this technology and put EMBRAPA's achievement on the customer's table.

Dehydrated apple on the market

Research has developed apple processing technology in the form of chips and also processes to utilize the apple in the form of juice, jams and jellies, and desserts. EMBRAPA has also developed jams and jellies from blackberries, using the natural juice of the fruit.
In addition to helping the agricultural sector produce more food for the Brazilian population, assuring food safety and furnishing more raw material for the transformation industry, a key mover of the economy, creating export goods and increasing the foreign exchange of the country, the research carried out by EMBRAPA has also been concerned with creating more jobs and producing income for municipalities, thus reducing the migratory flows to the cities.

EMBRAPA had done this by introducing into regional agriculture, technological knowledge, services and products available in its Research Units and by dedicating itself to the generation of new knowledge for agroindustry.

The study, the survey and the regionalized classification of natural resources, together with the zoning of technologies to be generated or already available, considering the socio-economic profile of the regions and its human geography, are examples of actions conducted by EMBRAPA to assure the economic viability of regions with an agricultural potential and the interiorization of development.
The Northeast has agroecological zoning

The Agroecological Zoning of the Northeast, elaborated by EMBRAPA, is the most complete atlas of its type in Brazil. It defines 172 geoenvironmental units grouped into 20 ecosystem units offering references and information on the natural resources, such as soil, relief, vegetation, climate and water resources together with such socio-economic resources as production systems, main products, land structure and population density.

Living with drought

Living with drought technology has been developed by EMBRAPA. Such technologies include dams for salvation irrigation, underground dams, rural cisterns and “in situ” catchment. They have been tested and approved to catch and hold rainwater, thus guaranteeing the survival of man, plants and animals in the Brazilian semi-arid regions.
Map orients Brazilian agriculture

EMBRAPA gathered information on soils, climate, vegetation and rainfall over 40 years in order to elaborate the Macroecological Design Map of Brazil on a scale of 1:5,000,000. This is an important instrument for planning and reducing risks taken in farming production. The Map constitutes a basis for the orientation of regional development since it indicates the areas of greater or lesser potential for agriculture and livestock activities and for preservation of the environment.

Research evaluates the agriculture and livestock occupation of Amazônia

For almost 10 years, EMBRAPA has accompanied more than 450 rural properties in Machadinho D'Oeste, Rondônia, characterizing and monitoring the farming occupation of the Amazon region and evaluating its environmental impact. Periodically, using remote sensing techniques, geographical information systems and geocodified surveys in the field, 200 variables have been collected, 2 big databases set up and updated and more than 200 maps plotted. Production systems used in the region are described and their sustainability evaluated.
The Semi-Arid region is the new exportation center for fruits and vegetables

EMBRAPA research for the irrigable areas of the Brazilian Northeast has been directed to irrigation engineering, a soil-water-plant atmosphere complex, seeds and alternative production systems. EMBRAPA, for example, introduced and developed, production systems for such cultures as grapes, dates, various types of melons, tomatoes, asparagus and fruits in several areas of the Semi-Arid region. Today, the Petrolina-Juazeiro center is important for irrigated agriculture and for the production of these horticultural products. Asparagus, for example, can be cultivated in the region all year round with yields up to 7 t/ha, while in the South this culture is limited to yields of, at the most, 2 t/ha and with harvest periods of only two months each year.

The Feliz Center - a successful initiative

EMBRAPA created centers for diffusion of technology, demonstrative areas installed in easily accessible places. With the objective of finding alternatives in order to shorten the time lag between the generation of knowledge and its incorporation into the productive process and accelerate regional development. EMBRAPA offers technological support, carries out some field work and acquires necessary inputs. EMATER - state diffusion and extension services, transfers results to the interested parties.

The city of Feliz is the headquarters of the center for diffusion in the state of Rio Grande do Sul. Fruit culture has gained its place at the local level, offering new alternatives of income for farmers. With the establishment of this Center, the farmers of the region are expanding on a commercial scale the production of blackberries and of figs in the off season. This has permitted supplying this fruit for the region before it arrives from other states.
Silvânia - an example of partnership

The county of Silvânia-GO, over the past few years has been the stage of a promising experiment promoting development in the southwest of the state of Goias which is a typical region of Brazilian cerrados. The so-called Silvânia Project, begun in 1987 by EMBRAPA together with Emater-GO, aims at identifying and evaluating the production systems of the county and analyzing the factors which hinder the development of the farms. These factors may be either technical, economic or social.

In the Silvânia project, research and rural extension act in direct collaboration with farmers awakening their interest to organize and manage their business in a community arrangement. Thus, they can receive financial credit or funds for the adoption of the recommended technologies and improve the managing and productivity of the farms. The project also seeks to train farmers in the utilization of suitable techniques for the system of production and exploitation of the environment, improving their socio-economical conditions. Among the results of this Project, 23 associations were formed as well as a headquarters created for the small farmers of the county. This strategy should strengthen associativism. Resulting from these actions, factories were set up to transform products into household goods administered by the members themselves. There are two factories for sweets and another for cassava flour. The implantation of community farms for the production of improved seeds and for the capitalization of the associations was made.
EMBRAPA - conducted research in production systems is supported by solid rural engineering which includes such areas as mechanization, irrigation, drainage, drying, storage, rural instrumentation and automation.

Acting in such fields as information science, physics, electronics, optical and mechanical instrumentation, EMBRAPA has been dedicated to research and development of new instruments and techniques for the modernization of Brazilian agriculture. In the field of farming mechanization, investigation has several different approaches. The intent is to seek new machinery and tools which will be suitable for soils and for the automatized management of the crop production systems and for confined animals, which will be more compatible with the farmer’s purchasing power and at the same time capable of reducing time and costs with energy in rural activities.
Device reduces fungicide spraying

The electronic humectographer developed by research allows the farmer to economize expressive amounts of fungicides only by the monitoring of the period of the wetting of the leaves. This is the period in which the water runs free on the surface of the plants thus favoring the growth of the pathogens. The local temperature of the crops, mainly fruit, should also be monitored. With this device, for example, fungicide sprayed on vines and on tomatoes can be reduced in up to 50% and 70% respectively.

Pregnancy detector guarantees 100% accuracy

Research has developed a device to detect, by means of transrectal touch, pregnancy in mares and cows with 100% indication. This happens 22 and 35 days respectively after covering. In the traditional process, this result can only be found after 60 days by means of manual touch. Utilizing this technology, the farmer can economize substantially with the necessary management in the gestational period.

Frozen embryos count on new equipment

Equipment for the freezing of embryos has been put on the market and substitutes the imported cold chambers. This equipment can be used by farmers who use genetic breeding to increase milk and meat yields and to choose birth data without needing to synchronize host and donator animals. In addition, this equipment facilitates the transport of embryos over long distances.
Lard can now be measured by ultrasound

EMBRAPA put the first Brazilian lard thickness measurer, using ultrasound, on the market. Used on live animals, the measurer supplies information on carcass quality and is easy to handle, diminishing in 80% the time necessary for the measuring of lard thickness. This measurement is direct, rapid and precise, eliminating the risk of contamination in animals. The device is especially useful for both breeders and farmers. It offers economic advantages since the genetic gains are permanent and can be transferred to third parties through the sales of hogs.

Tomograph goes to the field

EMBRAPA has developed a computerized tomograph technique for the analysis of soils and plants. It has also developed a laboratory and portable tomograph for use in the field. The portable equipment permits the detailed analysis of soils, compaction, roots and humidity and of trees up to 30 centimeters in diameter. Tomograph image, besides not destroying the sample, can be scrutinized in the field.
Solar Collector cleans the soil

This equipment which uses solar energy for disinfesting the substrata (soils, manure and turf) is another of EMBRAPA’s inventions. The Solar Collector permits, in one day alone with a cloudless sky, the elimination of the greater part of soil pathogens, including such weeds as the native tiririca. Easily built, it also allows for the survival of beneficial microorganisms to control reinfestation. The equipment does not represent any danger to the user and can be used by farmers, especially vegetable growers and research institutions using pots for trials.

Equipment facilitates sunflower harvesting

Original in Brazil, this corn platform harvester was adapted to gather sunflower and was put on the market by EMBRAPA in 1994. It represents a technological advance for the cultivation of sunflower and guarantees harvests practically free of losses. In essence, it is a kit made up of chains and blades which can be easily adapted to the harvester and works at a 7 - 9 km/hour speed.
High technology for the analysis of seed

The technique of nuclear magnetic resonance which permits the quantification of the oil content in seeds after a few seconds is the secret this device holds. This equipment does not destroy the seed and permits the selection of the better ones, thus increasing the efficiency of genetic improvement projects. It can also be used by cooperatives and agroindustries for the determination of the oil content in grains.

Software facilitates rural administration

EMBRAPA, together with COOPERVAP - Vale Paracatu Agricultural Cooperative, has developed software which is capable of supplying the rural producer with a simple cost plan. Thus, it is easier to obtain technical recommendations, analyze the viability of projects and improve the cost-benefit ratio. Also included in the program are techniques for the control of pests, diseases and weeds and a database for farm records.

Information science helps agriculture

In partnership with INPE - National Space Research Institute, SPRING - System for the Processing of Geo-Information - has been developed with NTIA software for agriculture. This System is the only Brazilian technology which incorporates the functionalities of geoprocessing, management of information and statistical analyses and are written in C and C++ programming languages. Thus, they can be run on the silicon graphics SUN and IBM workstations.
MIDDLE-WEST

National Center for Research on Genetic Resources and Biotechnology - GENARGEN
SAIN, Parque Rural, W/3 Norte (final)
Phone (061) 273-0100
Telex (061) 1622
Fax (061) 274-3212
Caixa Postal 02372
CEP 70770 - 900 Brasília-DF

Objectives
- Guarantee the diversity of genetic resources and develop biotechnological methodologies and processes for their utilization for the benefit of society.

Some Technologies Produced
- Protocols for detection of viruses, viroides, bacteria, fungi, nematoides and insects in post-entry quarantine
- Methodology for the biochemical and molecular characterization of plants, animals and microorganisms of agricultural interest
- Techniques for the long-term conservation of vegetal germplasm "in vitro"
- Management techniques for vegetal and animal genetic resources
- Active germplasm bank network for the principal native and cultivated species of the country
- Bioinsecticide production process for control of the urban mosquito
- Long-term conservation of genetic resources in a base collection (COLBASE).

National Center for Research on Rice and Beans - CNPAC
Rodovia Goiânia/Santo Antônio de Goiás - km 12
Phone (062) 212-1999
Telex (062) 2241
Fax (062) 212-2960
Caixa Postal 179
CEP 74001-970 Goiânia-GO

Objectives
- Generate, promote, divulge and transfer knowledge and technologies of wide application, in a direct and/or integrated manner, to other institutions, for the sustainable development of rice and bean cultures in the country, for the benefit of society

Some Technologies Produced
- Making viable a third planting date for beans in the Center-West region with use of technologies for a greater stability of grain offer
- Recommendation, jointly with the SNPA, of various dryland rice cultures which presently occupy about 80% of the planted area in Central Brazil and of irrigated rice
- Recommendation of various bean cultivars, in response to consumer requirements concerning grain characteristics
- Development and diffusion of the bioinsecticide production process
- Making viable the technique for pasture renovation with rice and corn, called the "Sistema Barreirão"
- Development of an integrated control technique of brusone
- Incorporation of arcelines, protein responsible for genetic resistance to worms of the bean plant, into bean grains of the commercial type.

National Center for Research on Beef Cattle - CNPCC
Rodovia BR 262, km 4
Phone (067) 763-1030
Telex (67) 2153
Fax (067) 763-2245
Caixa Postal 154
CEP 79106-970 - Campo Grande-MS

Objectives
- Generate, adapt, promote and transfer knowledge and technology for the sustainable development of the national beef production complex, for the benefit of society.

Some Technologies Produced
- Mineral formulas for the control of "cara inchada" of cattle and for supplementation of stable-bred cattle in the cerrado
- Introduction jointly with IAPAR, CPAC, CPATU, CPAF-AC, CEPALC and EPAMIG of Panicum maximum cultivar "Mombaça" and joint introduction with CPAC of the cultivar "Mineirão" (Stylosanthes guianensis)
- Introduction of Marandu and Tanzania-1 grasses
- Determination of the genetic value of zebu bulls controlled by the Brazilian Association of Zebu Raisers (ABCZ) throughout the whole national territory, in order to elaborate bull summaries
Some Technologies Produced

- Introduction of cultivars and hybrids of carrot, cucumber, sweet corn, cabbage, potato, sweet potato, melon, tomato, onion, eggplant, pea, mustard and lentil, totaling 34 new materials
- Introduction of new horticulture options for the national producer, such as lentil, chick pea, mustard and cucumber for conserves and establishment of the technical-economic viability of the culture of potato, seed potato, pea, sweet corn and tomato for processing in the cerrado region of Central Brazil
- Production of virus free seed potato and basic seed of carrot, pea, sweet corn, onion and other horticultural crops formerly totally imported
- Introduction of noble garlic cultivars suitable to the climate and soil of Central Brazil, with respective production systems
- Production of an anti-serum for detection of plant viruses, especially for diagnosis in potato and Cucurbitaceae
- Development of new tomato varieties resistant to the virus "vira-cabeça" of tomato
- Development of precocious varieties of Peruvian carrot (six to eight months), of high productivity (25 t/ha.).

Center for Agriculture Research on the Cerrados - CPAC
BR 020, km 1B, Rodovia Brasilia/Fontaleza
Phone (061) 389-1171
Fax (061) 389-2953
Telex (61) 1621
Caixa Postal 08223
CEP 73301-970 - Planaltina-DF

Objectives
- Conduct research to become acquainted with the natural and socioeconomic resources of the cerrados and their potential for utilization, in order to create technologies appropriate to the region.

Some Technologies Developed

- Utilization of native species (pequi, jagua, baru, cagaita) of the cerrados for human and animal feeding
- Development of fertilization techniques for the cerrados
- Studies on biological nitrogen fixation in soybean, pea, bean, green manures and forages
- Recommendation of cultivars of wheat, soybean, fruit trees, cassava, eucalyptus, coffee and pinus for the region of the cerrados
- Recommendation of fruit trees, eucalyptus, coffee, and pinus for the cerrado region
- Technology on soil management, integrated pest control, under cerrado conditions
- Technologies on irrigation mechanization and animal management under cerrado conditions.

Center for Agriculture and Livestock of the West - CPAO
Rodovia BR 163 km 25J
Phone (067) 421-0411
Telex (67) 4026
Fax (067) 421-0811
Caixa Postal 661
CEP 79804-970 - Dourados-MS

Objectives
- Generate, adopt and diffuse scientific and technological knowledge for the sustainable development of agriculture in the western region of the country for the benefit of society.

Some Technologies Produced

- Utilization and aerial application of Baculovirus anticarsia for control of the soybean pest Elasmopalpus lignosellus
- Recommendations of technologies generated and/or adapted for soybean, wheat, rice, bean and corn for Mato Grosso do Sul (recommendations are made annually, based on research results obtained in the state)
- Introduction of cultivars of soybean, wheat, irrigated rice and bean for Mato Grosso do Sul
- Recommendation of species of black oat, forage turnip, rape, flax pea, forage pea and rye for cover and winter green manuring
- Introduction of the termite borer for destruction of the mound termitae
- Systems of soil management, quantification of hydric erosion losses, water and nutrients
- Recommendation of wheat cultivars of high industrial quality with superior characteristics, and improvement of common wheats.

Center for Agricultural Research on the Pantanal - CPAP
Rua 21 de Setembro, 1880
Phone (067) 231-1430
Telex (67) 7044
Fax (067) 231-1011
Caixa Postal 109
CEP 79320-900 - Corumbá-MS

Objectives
- Generate, adapt and transfer knowledge and technologies, aiming at the development of the Pantanal following conservationist principles.

Some Technologies Produced

- Definition of calf management technology (early weaning) in native pastures in order to increase the birth rate
- Definition of the mounting season which increases the birth rate by 70%
- Development of technologies for improvement of cattle raising by means of mineral supplementation with calcium and phosphorus, vermifugal application and rational management of native and cultivated pastures
- Definition of the best period for protection of spawning as a subsidy to fishing legislation of Mato Grosso do Sul
- Techniques of monitoring of natural populations of alligators
- Techniques for the evaluation of the reproductive potential of the alligator
- Techniques of monitoring of natural populations of the capybara.

Information Production Service - SPI
SAIN Parque Rural (Final W J Norte)
Phone (061) 348-4155
Telex (61) 2074
Fax (061) 272-4168
Caixa Postal 40765
CEP 70770-901 - Brasília-DF
Objectives

- Promote the strategic value of information
- Identify, anticipate and satisfy the demands of clients for information
- Produce, in real time, qualified information which meets the needs of the market
- Promote and cause the insertion of qualified information into the segments of printed and electronic media
- Guarantee the rights of protection of intellectual property for the information products developed by the SPI
- Adjust the production of information to the best levels of quality and productivity known in the market
- Promote the organization and integration of knowledge bases, allowing access of the various social segments to the information produced
- Market information products produced through the SPI
- Increase the use of information engineering for the elaboration of information products determined by the market.

Some Results Obtained

- The SPI, founded in 1991, produces and is marketing vehicles with qualified information, including, within the printed media, the following titles: Coleção Planar (nine titles edited); Coleção Tecnologia da Produção (three titles edited); and Coleção Paradidática (one title at press-Atlas do Meio Ambiente do Brasil). Edits, prints and markets monthly the journal PESQUISA AGROPECUÁRIA BRASILEIRA (PAB) and elaborates technical and institutional videos.

Basic Seed Production Service - SPSB
SAIN Parque Rural (Final W3 Norte)
Phone (061) 348-4433
Telex (061) 173B
Fax (061) 347-9668
Caixa Postal 04.0315
CEP 70770-901 - Brasília-DF

Objectives

- Supply seeds and transplants
- Transfer technologies and offer technical assistance in the areas of seeds and transplants
- Support the Brazilian Seed and Transplant System
- Interact with research in the search for technologies for the agroindustrial complex of seeds and transplants.

Some Results Obtained

- The SPSB does not introduce technologies, but divulges and disseminates seeds of the cultivars created and introduced by EMBRAPA and by the SNPA. It is the largest producer and distributor of basic seeds in the country, working with the following products: cotton, rice, oats, potato, onion, rye, barley, African oil palm, pea, bean, forages, chickpea, melon, corn, fruit tree transplants, soybean, sorghum, wheat, triticale and vigna. It is estimated that 40% of the Brazilian production of grains originates in EMBRAPA cultivars distributed through the SPSB.
Objectives

- Generate, adapt and transfer technologies and processes which contribute to the improvement of tropical agroindustry.
- Promote a qualitative leap forward in research.

Some Technologies Produced

- New clones of precocious dwarf cashew trees
- Vegetable propagation of the cashew tree through shoot grafting
- Identification of types of unproductive cashew trees and orchards
- Recuperation of the cashew tree, unproductive or of low productivity, by means of crown substitution
- Identification and control of pests and diseases of the cashew tree
- Establishment of procedures for the extraction of cashew gum
- Identification and elimination of microorganisms in cashew kernels.

Objective

- Contribute to an increase in production, productivity and profitability of goat and sheep culture, with stability and sustainability of the production systems and an equitable distribution of the results.
- Increase the quality and characteristics of tropical goat and sheep products to meet consumer demand
- Generate, adapt and diffuse technologies which make efficient, production systems with tropical goats and/or sheep as their principal components.

Some Technologies Produced

- Supplementation for dairy goats in the semi-arid Northeast
- Buffelgrass, (Cenchrus ciliaris L. Cultivar Aridus)
- Utilization of arboreal-shrubby forages as a protein bank for supplementation of herds of goats and sheep during the dry period
- Performance improvement by means of race selection,
crossings, and parent selection, establishment of the period and duration of the mounting season and production systems for meat and skins in the semi-arid Northeast

- Rationalization of goat and sheep management involving early weaning, artificial nursing, vermifugal application, ration balancing and pasture management
- Freezing of caprine semen and use in artificial insemination
- Ovine races for finishing in confinement

National Center for Research on Cassava and Tropical Fruit Culture - CNPMF
Rua EMBRAPA, S/N
Phone (075) 721-2120
Telex (75) 2074
Fax (075) 721-1118
Caixa Postal 007
CEP 44380-000 - Cruz das Almas-BA

Objectives
- Develop and promote technologies and knowledge which make more efficient cassava and tropical fruit cultures on the national level, and of citrus in the north and northeast regions of Brazil, with emphasis on the sustainable use of natural resources, for the benefit of society.

Some Technologies Produced
- Increase in the efficiency of floral induction of pineapple
- Introduction of the “Perolera” and “Primavera” pineapple cultivars, resistant to fusarium
- Recommendations, of cultivars of banana “Prata Anã”, “Mysore” and “Pacovan” and creation of hybrids of the banana PV 03-76 and banana “Prata” JV 03-15, resistant to black sigatoka disease
- Introduction of superior hybrids of the banana PA 12-03 (“Prata Anã” x “Lidi”) PA 03-22 (Banana “Prata” x “Calcutá”) and PV-03-44 (“Pacovan” x “Calcuta”)
- Production of the acid lime “Tahiti” in the off season
- Use of a weak virus strain of tristeza in programs of prevision in citrus
- Monitoring and control of the fruit fly in mango

Center for Agricultural Research of the Mid-North - CPAMN
Av. Duque de Caxias, 5.650, Bairro Buenos Aires
Phone (086) 225-1141
Telex (86) 2337
Fax (086) 225-1142
Caixa Postal 1
CEP 64006-220 - Teresina-PI

Objectives
- Generate, adapt and transfer technologies and technical-scientific knowledge, which contribute to the sustainable development of agrosilvipastoral activities in the region of the mid-north of Brazil, in benefit of society.

Some Technologies Produced
- Introduction of nine soybean cultivars and spacing and density practices
- Introduction of a dryland rice cultivar and recommendation of six cultivars, among which “Araguaia” and “Rio Parnaíba”
- Recommendation and introduction of corn cultivars and determination of seeding density
- Introduction of seven “macaser” bean cultivars and respective production systems consisting of relative seeding date in intercropped corn x bean, determination of seeding density and spatial arrangement
- Recommendation of tomato and lettuce cultivars
- Genetic preservation of the “pé-duro” breed of cattle
- Improvement in systems of production and productivity of goats and woolless sheep.

Center for Agricultural Research on Coastal Tablelands - CPACT
Av. Beira Mar, 3.250
Phone (079) 217-1300
Telex (79) 231B
Fax (079) 231-9145
Caixa Postal 44
CEP 49025-040 - Aracaju-SE

Objectives
- Make an inventory of natural and socioeconomic resources; develop sustainable agrosilvipastoral systems which are adequate to the region and to the necessities of producers and consumers and develop knowledge and technologies for the coconut.

Some Technologies Produced
- Biological control of the coconut leaf miner
- Integrated control of the coconut beetle
- Introduction of the “São Francisco”, “Sertanejo” and “Asa Banea” varieties of corn for the Brazilian Northeast
- System of exploitation for small properties in the semi-arid Northeast
- Cultivation techniques for the coconut, including production of precocious seedlings, fertilization, intercropping and control of diseases
- Development of rational exploitation systems for intercropping of corn and beans
- Development of the product “Curadermite” for control of scalp of sheep and goats

Center for Agricultural Research of the Semi-Arid Tropics - CPATSA
BR 428, km 152, Zona Rural
Phone (081) 862-1711
Telex (81) 0016
Fax (081) 862-1744
Caixa Postal 23
CEP 56300-000 - Petrolina-PE

Objectives
- Conduct research for the purpose of generating and adopting technologies for production in the diverse agroecological areas of the tropical semi-arid region.

Some Technologies Developed
- Development of production systems for horticultural species such as asparagus, tomato, onion, melon and watermelon and fruits such as guava, mango, banana, dates and avocado
- Development of storage systems for water
- Utilization of technologies generated for rain-dependent areas (dryland agriculture): technologies of living with drought in the rural areas of northeastern states
- System of production of bovines and goats in the semi-arid regions
- Recommendation of forest species of rapid growth for reforestation in the semi-arid region
- Agroecological zoning of the Northeast
- Biological control of the tomato moth (Scrobipalpula absoluta), of the banana “moleque”, (Cosmopolites sordidus) and of the green mite (Tetranychus spp.) of cassava
National Center for Research on Agrobiology - CNPAB
Antiga rodovia Rio/São Paulo, km 47 Seropédica
Phone (021) 682-1500/682-1086
Telex (21) 32723 - EBPA-BR
Fax (021) 682-1230
Caixa Postal 74505
CEP 23851-970 Seropédica - Itagual - RJ

Objectives
• Generate, promote and diffuse scientific and technical knowledge on agricultural systems which principally use biological inputs and organic management.

Some Technologies Produced
• Inoculation of bean seeds
• Pelleting of bean seeds with micronutrients
• Rhizobium inoculant for cowpea
• Nitrogen fixation in sugarcane
• Green manuring of the corn culture
• Revegetation of degraded areas
• Management of organic fertilizer.

National Center for Research on Agricultural Instrumentation - CNPDA
Rua XV de Novembro, 1452
Phone (0162) 72-9628
Telex (16) 2406
Fax (0162) 72-5958
Caixa Postal 741
CEP 13560-970 - São Carlos-SP

Objectives
• Develop new methodologies, systems and elements to measure, control, evaluate, process, transfer and store physical chemical and biological data essential for the sustainable development of the agricultural, agroindustrial and agroforestry complexes.
• Organize, systematize and diffuse knowledge accumulated in agricultural instrumentation.
• Advise EMBRAPA Units in the area of agricultural instrumentation.

Some Technologies Produced
• Development and construction of a nuclear magnetic resonance apparatus for the non-destructive selection of oil seeds (soybean and corn, among others)
• Computerized minithomograph for soils which makes possible investigations of soil water, compaction, roots and other applications which open new frontiers in soil physics
• Ultra-sonic pregnancy detector which permits detection of pregnancy of 22 days for horses and of 35 days for cattle
• Micromanipulator for cattle and horse embryo bipartition and a programmable system for embryo freezing
• Computerized climatological stations
• Device to measure the thickness of land by ultrasound technique
• SIARCS - integrated system for Analysis of Roots and Soil Cover.

National Center for Research on Dairy Cattle - CNPGL
Rodovia MG 133, km 42
Phone (032) 27-8550
Telex (32) 17157
Fax (32) 215-8550 (Extension 166)
CEP 36155-000 Coronel Pacheco-MG

Objectives
• Serve Brazilian society by generating, adapting and diffusing knowledge and technologies for the sustainable development of the dairy sector.

Some Technologies Produced
• Software for genetic evaluation of bulls and cows
• Cost of production schedules for milk
• Process of bovine embryo transfer
• Establishment and management of elephantgrass for milk production under pasture conditions
• Development of milk production technology involving feed, animal management, pasture rotation and sanitary control
• Technology of raising, precocious weaning, shelter, feed, control of endo-and ectoparasites and ticks
• Semen tested cross-bred Holstein-Friesian x Zebu bulls and of Zebu bulls (Gir race) genetically improved for milk production
**National Center for Research on Monitoring and Evaluating Environmental Impact - CNPMA**

Rodovia SP 346, km 127,5 - Bairro Tanquinho Velho  
Phone (0192) 57-5633  
Telex (19) 2655  
Fax (0192) 57-5225  
Caixa Postal 69  
CEP 13820-000 - Jaquariúna-SP

**Objectives**
- Contribute to the adoption of the sustainability model as the guiding principle for agriculture, conceived from a perspective of agricultural, cattle raising and forestry activities and interface with the industrial sector
- Contribute to knowledge of the structure and functioning of the agroecosystems which present indications of problems of environmental degradation in terms of the biotic, abiotic and social components
- Develop, adapt and implement methodologies for the monitoring and evaluation of environmental impact
- Direct the knowledge generated on environmental impact, aiming at subsidizing the development of technologies which are adequate to the agroecosystems and to the elaboration of public policies
- Develop actions which facilitate the insertion of technical-scientific knowledge on the environment and agriculture into the National System of Agricultural Research (SNPA), as well as into other segments of society.

**Some Technologies Produced**
- Hand lever-operated pneumatic electrostatic back sprayer
- Solar collector for soil disinfection
- Resistant lines of Trichoderma harzianum for control of root diseases, principally in horticultural crops
- Technique for the quantitative detection of bacterial sunburn caused by Xanthomonas campestris pv..phaseoli in bean seeds
- Bacterization technique for bean seeds for the control of root rots, utilizing the bacteria Bacillus subtilis
- Biological control system of the red spider mite in horticultural crops with the use of predatory mites of the family Phytoseiidae
- Introduction of eight species of biological control agents of rhizophagous pests in sugarcane, tomato, cassava, banana and apple, with the adoption of methods of creation of these organisms in the laboratory.

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**National Center for Research on Soil - CNPS**

Rua Jardim Botânico, 1024  
Phone (021) 274-4999  
Telex (21) 23824  
Fax (021) 274-5291  
CEP 22460-000 - Rio de Janeiro-RJ

**Objectives**
- Make and promote basic and applied studies in all areas of soil science
- Execute and promote studies of environmental characterization, including classification, surveys and interpretations for various ends for utilization of the soil
- Study the behavior of the soil in its environment, involving anthropic processes and degradation factors
- Normalize actions and procedures for diagnosis of the physical sphere, analytical characterization, and evaluation of the use potential of lands and zonings
- Systematize knowledge available in the area of soil science for implementation of a georeferenced data base
- Develop models of use, management and conservation of soils on all levels of planning.

**Some Technologies Produced**
- Land aptitude evaluation system
- Brazilian Soil Classification System (third approximation)
- Macroagroecological delimitation of Brazil
- National inventory of the problems and critical areas of soil degradation
- Agroecological zoning of the Northeast
- Manual of soil analysis methods
- Norms and criteria for pedological surveys.

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**National Center for Technological Research on Agricultural Information - CNPTIA**

Rodovia Dom Pedro I, km 143,6 (SP 65) - Campo dos Amarais  
Phone (0192) 40-1073  
Telex (19) 7720  
Fax (0192) 40-2007  
Caixa Postal 5010  
CEP 13089-500 - Campinas-SP

**Objectives**
- Coordinate, execute and promote research which generates technically adequate alternatives, economically viable and socially desirable, for corn and sorghum, transferring them to producers and the agroindustry.
- Develop, according to the requirements of the SNPA and of the agricultural area, methods, techniques and tools in software engineering, for the production of software, integration of systems and processes, data communication and information systems, reengineering of software and reuse of components
- Promote training of human resources in methods, techniques and tools for software engineering, according to the necessities of the SNPA and of the agricultural area
- Satisfy demands for service rendering, consultancy and technical counseling in methods, techniques and tools of software engineering, according to the necessities of the SNPA and of the agricultural complex.

**Some Technologies Produced**
- Software environment for NTIA which offers the capacity for the treatment and manipulation of archives, recuperation of information, data entry, generation of menus and of reports, statistical analysis and calculation, and composition of graphs in two and three dimensions
- Development of a processing system for georeferenced...
• System for Agricultural Property Administration-FMS, and automated generation of factors applicable to the administration of agroindustrial businesses
• Development of the information system AINFO, as a technological base for the software environment of CNPTIA.

Center for Cattle Research of the Southeast - CPPSE
Rodovia Washington Luiz, km 234
Phone (016) 272-7611
Telex (162) 389
Fax (016) 272-5754
Caixa Postal 339
CEP 13560-970 - São Carlos-SP

Objectives
• Generate, adapt and diffuse knowledge and technologies adequate for the sustainable development of animal systems in the southeast region of Brazil.

Some Technologies Produced
• New lines of Canchim cattle
• Use of Canchim cattle in crossings to obtain yearlings
• Optional treatment of poisoning of domestic animals by the "jararaca", "urutu" and "jararacuçu" snake species
• Pharmacological stunning of animals (with anesthetized darts)
• Nutritive evaluation of forages by kinetic digestion in cattle
• Physical models of intensive production systems for milk of animals of the Holstein-Friesian race, semi-confined, with generation of coefficients for the elaboration of a schedule of costs of class "B" milk
• New cultivars of Andropogon and forage oats adapted to the central region of the state of São Paulo.

National Center for Research on Agroindustrial Food Technology - CTA
Av. das Américas nº 29,501 - Bairro Guaratiba
Phone (021) 410-1353
Telex (21) 33267
Fax (021) 410-1090
CEP 23020-470 - Rio de Janeiro-RJ

Objectives
• Promote the development of the food agroindustry through the generation and transfer of technologies which seek:
  a) integration of the agricultural sector with the food agroindustry;
  b) minimization of harmful impacts of the food agroindustry on the environment and the rationalization of the use of natural resources;
  c) an increase in the quality and productivity of the food agroindustry;
  d) an increase in food security of consumers.

Some Technologies Produced
• Production of essential oils of species of native aromatic plants; enzymatic extraction of oils and production of essential oil and resin oil of ginger
• Technology for utilization of by-products of corn and sorghum in the food industry
• Concentrated tropical fruits utilizing membrane technology
• Driers of fruits, fish and grains for small proprietors
• Silo grain drier (solar and eolic energy)
• Husker of soybean
• Vitamin complex dough enricher.

Environmental and Natural Resource Remote Sensing Unit - NMA
Av. Dr. Júlio Soares de Arruda, 803, Parque São Quirino
Phone (019) 252-5977
Telex (19) 7686 EBPA BR
Fax (0192) 54-1100
e-mail: postmaster@nma.embrapa.br
Caixa Postal 491
CEP 13007-970 Campinas-SP

Objectives
• Conduct research, develop, adapt, evaluate and diffuse technical-scientific knowledge in the areas of monitoring of the agrosilvipastoral use of lands and evaluation of resulting environmental impact.

Some Technologies Produced
• Environmental monitoring of Amazonia
• Delimitation of the extractivist reserve of Alto Juruá-Acre
• Environmental cartography of the Island of Fernando de Noronha
• Monitoring of forest burnings in Brazil
• Evaluation of kinetic and animal extractivist resources in Rondônia, Acre and Tocantins
• Systems of agroecological, socioeconomic and critical areas monitoring.
• Alert, Information and Communication Network.
National Center for Forest Research - CNPF
Estrada da Ribeira, km 111 - Guaraltuba
Phone (041) 359-1313
Telex (041) 30120
Fax (041) 359-2276
Caixa Postal 319
CFP 83411-000 - Colombo-PR

Objectives
- Develop production systems for planted forests
- Develop systems which facilitate the management of natural forests
- Develop agroforestry systems
- Implement programs of environmental education and of diffusion and transfer of forestry technologies.

Some Technologies Produced
- Production of improved seeds of various eucalyptus species for diverse edaphoclimatic conditions
- Adoption and development of technology for mass production of a specialized and specific nematode for control of the wood wasp
- Development of techniques for economic production of seedlings of diverse forest species, such as guapuruvu, imbuia,erva-mate, bracatinga, acacia-negra, Eucalyptus viminalis, Pinus patula, etc.
- Elaboration of ecological zonings for forest plantings in Paraná and Santa Catarina, with recommendations and indication of 145 species and provenances for various uses
- Development and adaption of techniques for collection, processing, storage and germination of seeds of various species such as acacia-negra, caroba, caixeta, angico bracatinga, canafistula, canela-guaica, guaparuvu, mandioca, wild peach, Paraña pine, peroba and uva-do-japão
- Selection of races of Rhizobium for inoculation of bracatinga and acacia-negra
- Computer programs for planning and management of planted forests.

National Center for Research on Swine and Poultry - CNPSA
BR 153, km 110, Vila Tamanduá
Phone (0494) 44-0122
Telex (492) 271
Fax (0494) 44-0681
Caixa Postal 21
CEP 89700-000 - Concórdia-SC

Objectives
- Serve as a national reference center for swine and poultry culture in the program of animal production and/or related systems
- Produce or adapt technological knowledge, services and inputs, in order that they reach the target public, directly or by appropriate channels of diffusion
- Give incentive to other institutions and organizations to generate knowledge, technologies, services and inputs relevant to the mission of the CNPSA
- Promote the effective management of the resources of swine and poultry culture so as to satisfy human needs, maintaining or improving environmental quality and conserving natural resources
- Organize existing knowledge in order to make it useful in the national swine and poultry culture area
- Assure that research results on swine and poultry contribute to diminishing food and employment shortages, increase purchasing power, reduce regional differences, and are useful to society.

Some Technologies Produced
- Feed chemical composition table for the formulation of rations
- Vaccine for atrophic rhinitis of swine
- Technology for production of antiserums, antigens and conjugates
- Utilization of non-conventional phosphates for swine and poultry, in the growing and finishing stages
- EMBRAPA 001 layer of white eggs
- Methodology for identification and correction of risk factors in swine culture
- Development of the "PROSUINO" software for ration formulation, and the "ATEPROS" software for technical-administrative management of swine culture for calculating their production cost.
National Center for Research on Soybean - CNPSo
Rodovia Carlos João Strauss (Londrina/Warta) Entrance Orlando Amaral - Distrito de Varta
Phone (043) 320-4166
Telex (43) 2208
Fax (043) 320-4168
Caixa Postal 1061
CEP 86001-970 - Londrina-PR

Objectives

• Generate and promote knowledge and technology for the development of soybean and sunflower, considering their interrelation with other cultures and their insertion in the agroindustrial complex, for the benefit of society
• Make knowledge and technology reach the target public (technicians, producers and society in general) through appropriate diffusion and transfer mechanisms.

Some Technologies Produced

• Creation of 35 new soybean varieties, more productive and resistant to the principal diseases, for the various producing regions
• Introduction of the juvenile period in new varieties to increase the planting period, guaranteeing plants of adequate height
• Total elimination of nitrogen fertilizer in soybean after determination of the efficiency of symbiotic fixation of nitrogen by bacteria of the genus Bradyrhizobium
• Biological control of the soybean caterpillar with Baculovirus anticarsia
• Biological control of Easmopalpus by the wasp Trissolcus basalis
• Utilization of kitchen salt to reduce insecticide doses in control of Nezara viridula
• Regulation of planting periods for tropical and subtropical regions for greater productivity and improved seed quality.

National Center for Research on Wheat - CNPT
BR-285, km 174
Phone (054) 312-3444
Telex (54) 5319
Fax (054) 312-3495
Caixa Postal 569
CEP 99001-970 - Passo Fundo-RS

Objectives

• Develop and diffuse knowledge and technologies with the aim of making national production of wheat and of other winter cereals more competitive
• Contribute to an increase in competitiveness and sustainability of the grain producing complex in the southern region of the country
• Contribute to diversification of regional agricultural production, making viable new cultures and/or utilization systems.

Some Technologies Produced

• Creation of 57 new wheat cultivars for cultivation in the various regions of the country, with a consequent increase in productivity, and of 8 soybean cultivars
• Development of production systems, including fertilization and liming, control of diseases and pests, rotation of cultures and minimum tillage
• Development of technology for the culture of wheat tissues and introduction of the first wheat cultivar in the Americas obtained through biotechnology for control of diseases, pests, weeds and a technique of soil correction and fertilization
• Introduction and recommendation of triticale cultivars BR-1, BR-2, accompanied by technology for control of diseases, pests, weeds and technique of soil correction and fertilization
• Introduction and recommendation of triticale cultivars BR-1, BR-2, BR-4 and EMBRAPA - 18, with establishment of a proper cultivation system which includes fertilization and soil correction, and dates, densities and spacings most appropriate for the cultivation and production of seeds
• Development of a minimum tillage planter for winter cereals
• Biological control of aphids of cereals and technology for control of the "tamanjua" (Solutea pocilla) of wheat.

National Center for Research on Grapes and Wine - CNPUV
Rua Livramento, 515
Phone (054) 451-2144
Telex (54) 3603
Fax (054) 451-2792
Caixa Postal 130
CEP 95700-000 - Bento Gonçalves-RS

Objectives

• Generate technologies for the improvement of rural productive systems and agroindustrial processes and for quality control of the sector, seeking a greater identity of grape and wine products with the production regions
• Adapt the quality of the raw material and of products of the agroindustrial complex to the demands of the market, and reduce production costs
• Increase the efficiency of the grape and wine agroindustry and fruit culture for the southern region of Brazil
• Promote and speed up marketing and the transfer of scientific and technological information and of products and services
• Some Technologies Produced
• Recommendation of cultivars for fine white and red wines
• Development of technology for obtaining virus-free vegetal material, with production and distribution of grafting and producing stock to nurserymen and grape raisers
• Selection of the yeast Saccharomyces cerevisiae - EMBRAPA-208, to improve the quality of national wines
• Development of alternative technologies to classical winemaking for red wines and of the "Charentais" method for distilled drinks of high quality
• Recommendation of alternative cultural practices for soil management, with an indirect influence on productivity, economy and erosion control
• Introduction of the precocious cultivars of table grapes "Vênus" and "Dona Zélia" and "Tardia de Caxias" as production alternatives for the wine grower and for extending the offering period for consumers
• Identification of two new viroses - necrosis of nerves and stain of nerves - which occur in a latent form in the majority of grape vines in Rio Grande do Sul.

Center for Temperate Climate Agricultural Research - CPACT
BR 392, km 78, 9th Distrito
Phone (0532) 21-2122
Fax (0532) 21-2121
Telex (53) 2301
Caixa Postal 403
CEP 96001-970 - Pelotas-RS

Objectives

• Characterize and evaluate the regional socioeconomic and natural resources, aiming at sustainable development.
• Generate, adapt promote, transfer and diffuse technologies for the agricultural complex, to increase the efficiency and quality of the productive system
• Produce and/or utilize basic knowledge and incorporate new research techniques, with the idea of amplifying the producing base of new technologies
• Diffuse research areas and generate technologies for environmental conservation or recuperation, observing the various regional ecosystems.

Some Technologies Produced

• Introduction and recommendation of bean, soybean and corn cultivars for the plateau of the South of Rio Grande do Sul state and for utilization in lowlands

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• Peach cultivars for industry - "Granito" and "Ametista" - and for consumption in natura - "Pampeano" and "Guaiaca"
• Control of black rot and of bacteriosis of the peach tree (Xanthomonas campesiris pv. pruni)
• Introduction of the cultivar Ya-Cy of Brazilian guava
• Development of genetic manipulation technologies for the improvement of irrigated rice, bean and soybean
• Technology for production of lettuce and asparagus
• Utilization of Thidiazuron for breaking dormancy of the apple tree, and in the process of production of transplants of kiwi fruit, meristem culture and micropropagation of pear cultivars.

Center for Research on Cattle Raising on Southern Brazilian Grasslands - CPPSUL
BR 153, Km 141, Vila Industrial, Zona Rural
Phone (0532) 42-4499
Telex (53) 2500
Fax (0532) 42-4393
Caixa Postal 242
CEP 96400-970 - Bagé-RS

Objectives
• Generate, adapt and promote scientific and technological knowledge for the development and modernization of integrated systems of agriculture, giving priority to cattle and sheep, and preserving the natural resources in southern Brazilian grasslands.

Some Technologies Produced
• Creation of the Ibagé race of beef cattle
• Development of the white clover BR-1 Bagé cultivar
• Programs for strategic control of verminosis in beef cattle and sheep
• Reduction from four and a half years to two and a half years in the slaughter age of beef yearlings
• Increase from 55% to 75% in the rate of conception, and reduction from 9% to 5% in the mortality rate of calves
• Development of a vesicular clover cultivar (Trifolium vesiculosum) EMBRAPA-28, highly productive and adapted to the ecological conditions of the southeast region of Rio Grande do Sul
• Reduction of the mating age of beef cattle from three to two years.
National Center for Agroforestry Research of Western Amazonia - CPAA
Rodovia AM-010, km 24, Estrada Manaus/Iracoiara
Phone (092) 622-2012
Telex (92) 2440
Fax (092) 622-1100
Caixa Postal 319
CEP 69011-970 - Manaus-AM

Objectives
- Generate knowledge for the utilization and conservation of the renewable natural resources of western Amazonia
- Develop and test alternative sustainable systems in order to improve agricultural activities, cattle raising, forestry and agroforestry activities, making possible a longer time of occupation of production areas of the different ecosystems of western Amazonia
- Develop management techniques to recuperate and make productive areas altered and/or degraded of western Amazonia
- Generate and adapt agroindustrial technologies for the utilization and improvement in quality of regional products
- Develop new agricultural alternatives, especially aquaculture, in western Amazonia.

Some Technologies Produced
- Recommendation of "xingu" cultivars of rice for terra firma and "Ajuricaba" for low grassy plains ("varzeas")
- Introduction of cultivars of cowpea, BR-8 "Caldeirão", for "varzeas" and terra firma, and "IPEAN V - 69," for terra firma
- Introduction of cassava cultivars "Im-006", "BGM-021", "IM-025", for terra firma, and "IM-175", "IM-158" and "Amazonas-EMBRAPA-8", for "varzeas"
- Improvement of the technique of exploitation of rubber plantations through the stimulation of latex production, with an increase superior to 100%, and indication of new combinations crown/stem, designed for control of the principal foliar diseases
- Introduction of pollinating insects, natives of Africa, aiming for a 100% increase in the production of the African oil palm
- Recommendation of guaraná clones
- Production of hybrid African oil palm seeds of high quality

Center for Agroforestry Research of Acre - CPAF-Acre
Rodovia BR-364, km 14
Phone (068) 224-3932/224-4035
Telex (68) 2589
Fax (068) 224-4035
Caixa Postal 392
CEP 69008-970 - Rio Branco-AC

Objectives
- Generate, adapt and diffuse technologies and knowledge which promote the diversification of production and the increased efficiency of agroforestry systems and agroindustries, emphasizing regional products
- Develop technologies and knowledge, especially for small and medium-sized producers, with emphasis on mixed production systems, sustainability and environmental problems resulting from agroforestry activities
- Produce fundamental knowledge, incorporating new research techniques so as to broaden the base for the generation of new technologies
- Promote technology transfer, technical-scientific information, products and services to society.

Some Technologies Produced
- Pineapple cultivars ("Rio Branco," "Cabeça de Onça", SNG-2 and SNG-3), of cowpea ("Rio Branco" and "Caná Verde"), of corn (BR-5109 and "Milhacre") and of rice ("Acrefino")
- Recommendation of cultivars of rice, onion, black pepper, coffee ("Catuai" and Icatu), and garlic, carrot, beet, guaraná and bean
- Recommendation of silvicultural management techniques in native rubber plantations
- Recuperation of degraded soils with the utilization of biofertilization with legumes
- Utilization of mulch for control of bean mildew
- Survey, identification and control of pests associated with cultures of cassava, mahogany, custard apple, rice, corn, cowpea and forage grasses
- Production system for woolless sheep, sheep and double-purpose buffalos (meat and milk)
Center for Agroforestry Research of Amapá - CPAF-Amapá
Redovia Juscelino Kubitschek, km 5 (Macapá-Fazendinha)
Phone (096) 241-1551
Telex (096) 2399
Fax (096) 241-1480
Caixa Postal 10
CEP 68902-280 - Macapá-AP

Center for Agroforestry Research of Rondônia - CPAF-Rondônia
BR 364 KM 5,5
Phone (069) 224-9211
Telex (95) 2137
Fax (091) 226-9845
Caixa Postal 48
CEP 78900-000 - Porto Velho-RO

Center for Agroforestry Research of Eastern Amazonia - CPATU
Trav. Dr. Enéas Pinheiro s/n, Bairro do Marco
Phone (091) 226-1941/226-1741
Telex (91) 1210
Fax (091) 226-9845
Caixa Postal 48
CEP 66095-100 - Belém-PA

Center for Agroforestry Research of Roraima - CPAF-Roraima
BR. 174, km 08, Distrito Industrial
Phone (095) 224-9211
Telex (95) 2137
Fax (095) 224-3802
Caixa Postal 133
CEP 69301-970 - Boa Vista-RR

Some Technologies Produced
• Genetic seeds of corn: cultivar BR 5150, low stature, hard dent grains; BR 5103, medium stature, semi-hard grains with productivity around 3,000 kg/ha. - Cassava plantations with improved cultivars of cassava: “Piranucu”, “Amarelona”, “Coela de Jacu” and “Pão do Acre”
• Improvement of dairy cows, buffaloes for milk production, crossbred goats of double purpose (milk and meat) and wooled sheep
• Native forest species (Guapuru, Parapara and Morotolu) of rapid growth for recuperation of deforested areas
• Production of transplants of elite material (clonal) of the “cupuaçu” (Theobroma grandiflorum)
• Utilization of the grass B. Humidicola and legumes in pasture recuperation and introduction of guinea grass ‘Cameroon’ under conditions of Rondônia
• Production system for cotton in sparse areas and of perennial cultures in mixed cropping: Seringueira x Senna, Seringueira x Cacau.

Objectives
• Promote the utilization of technologies and/or knowledge for the development of sustainable systems of agroforestry and agro-silvicultural systems to meet the needs of the population, maintaining or improving the quality of the environment
• Generate, adapt or promote technologies and knowledge to assure a continuous production of food, to minimize the importation of these products
• Generate technologies or adapt economically viable practices which facilitate the exploitation of potentially utilizable areas
• Diffuse and/or promote technology transfer and marketing of scientific and technological information, products and services.

Some Technologies Produced
• “Taxij branco”, (Sclerolobium paniculatum) forest species for utilization in degraded areas, and well adapted to cerrado areas, for production of wood and charcoal
• Cultivars of rice “Ajiwara” for flat grassy plains (“varzeas”) and “Xingu” for drylands
• Cultivar of cowpea-CNC 0434
• Cultivars of tomato “Caraiba” and “cucumber Spring 440”
• Cultivars of “Crimson Sweet” watermelon; squash “Caipira Regional”; okra “Piranema” and cabbage “Sooshu” (KK Cross)
• Cultivars of “Grandes Lagos” lettuce
• Variety of pepper “Ruby King”.

Center for Agroforestry Research of Pará - CPAF-Pará
R. Senador Oscar Jorge, km 10 (Macapá-Fazendinha)
Phone (096) 241-1551
Telex (096) 2399
Fax (096) 241-1480
Caixa Postal 10
CEP 68902-280 - Macapá-AP

Objectives
• Generate, adapt and diffuse knowledge and/or technologies in agroforestry and silvicultural systems which permit the sustained development of agricultural and forestry systems, for the benefit of society.

Some Technologies Produced
• Genetic seeds of corn: cultivar BR 5150, low stature, hard dent grains; BR 5103, medium stature, semi-hard grains with productivity around 3,000 kg/ha. - Cassava plantations with improved cultivars of cassava: “Piranucu”, “Amarelona”, “Coela de Jacu” and “Pão do Acre”
• Improvement of dairy cows, buffaloes for milk production, crossbred goats of double purpose (milk and meat) and wooled sheep
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Center for Agroforestry Research of Eastern Amazonia - CPATU
Trav. Dr. Enéas Pinheiro s/n, Bairro do Marco
Phone (091) 226-1941/226-1741
Telex (91) 1210
Fax (091) 226-9845
Caixa Postal 48
CEP 66095-100 - Belém-PA

Objectives
• Contribute to sustainable rural development of Amazonia, seeking the rational use and conservation of its natural resources, through the generation, adoption and diffusion of scientific, technological and socioeconomic knowledge.

Principal Technologies Produced
• Recuperation of degraded pastures in deforested areas of the Amazonian forest and development of management and exploitation techniques for native forest with auto-sustainable yield
• Recommendations of cultivars of rice, corn, black cassava, cowpea, tomato, mallows and black pepper and development of a technique for preparation of transplants of mangosteen by grafting
• Study of an agroforestry production system involving the combination of some forestry species with short-cycle perennial cultures
• Storage, maintenance and dissemination of herbarium, wood deposit and vegetal information on the Brazilian Amazon (SISFITO) and development of an agroclimatic information system (SISCLIMA)
• Development of technologies which make possible the transport of logs of up to 22 meters, reducing the residues which remain in the forest, and losses in saw mills, and increasing productivity for each m3 of wood extracted
• Development of technologies for improving buffalo culture in the Brazilian humid tropics
• Development of technologies for a better performance of the African oil palm culture in the state of Para and for processing of African palm oil.
TECHNICAL RECORD

Coordination: Heloíza Dias da Silva
Text: Heloíza Dias da Silva
English Translation: Brendan Patrick Walsh
Revision: Charles M. Mettel
Collaboration: Marita Cardillo
Maylena Clécia
Sidival Lourenço
Renato Cruz Silva
Roberto Penteado

Coordination and Graphic production: Letícia Valle
Electronic Editing: Ubiraci Rafael Gomes
Photographic Editing: Waldir de Pina
Photographer Credits: Arnaldo de Carvalho Júnior
Cláudio Melo
Kim-ir-Sen
Silas Siqueira
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