
Embrapa
STRENGTHENING AGRICULTURAL RESEARCH

Brazilian Agricultural Research Corporation
Social Communications Office
Ministry of Agriculture, Livestock and Food Supply

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Brasilia, Brazil, 2010

Embrapa. Assessoria de Comunicação Social

O Fortalecimento da Pesquisa Agropecuária/Embrapa, Assessoria de Comunicação Social. – Brasília, DF: Embrapa, Assessoria de Comunicação Social, 2010.

48 páginas.

1. Fortalecimento Institucional. 2. Agropecuária. 3. Desenvolvimento agrícola. 4. Desenvolvimento social. 5. Desenvolvimento econômico. I. Embrapa. Empresa Brasileira de Pesquisa. II. título

CDD 630.72

International Cataloguing Data (CIP)
Social Communications Office

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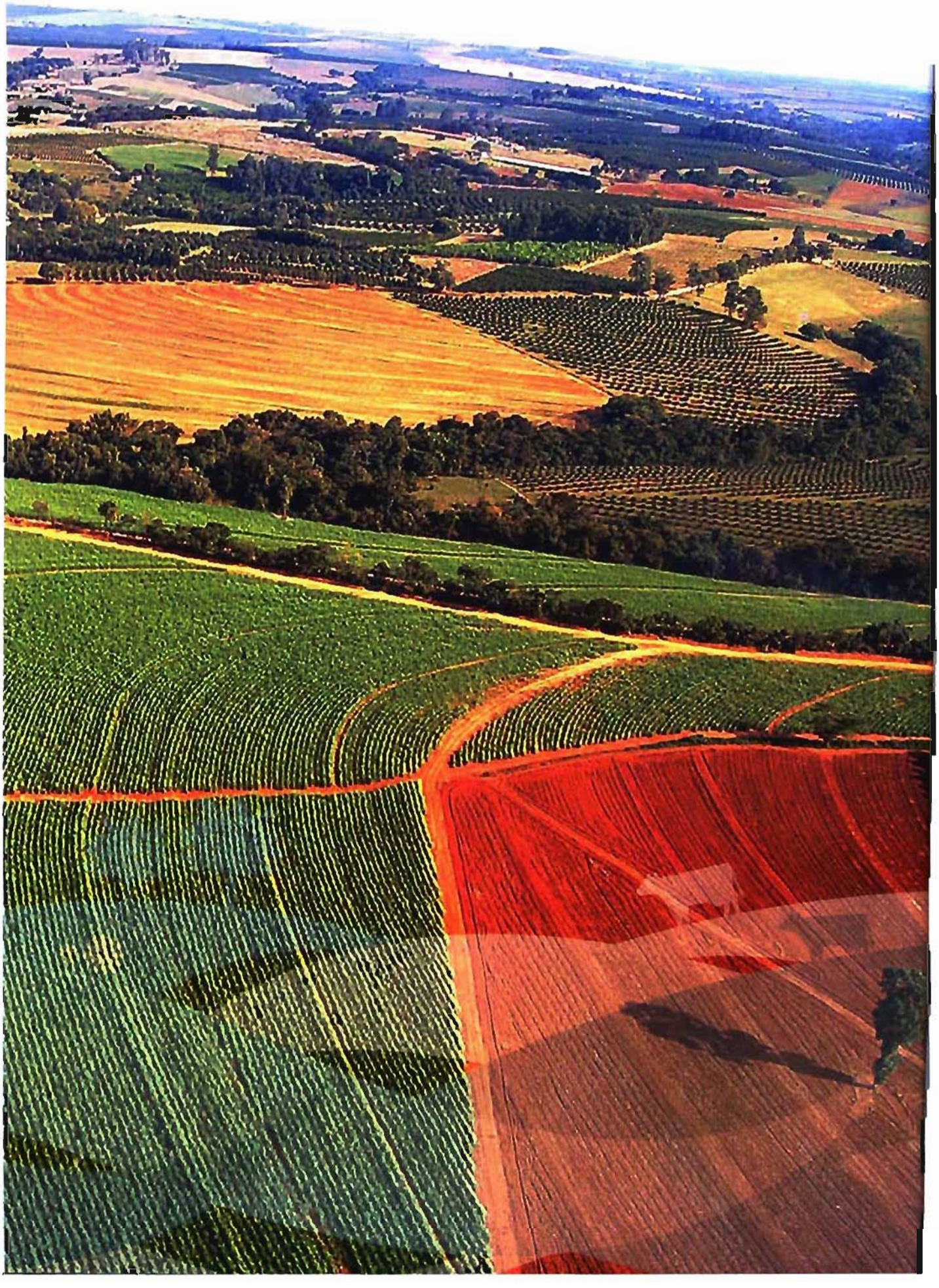


In the history of EMBRAPA, the year 2009 shall be remembered as a watershed in the construction of the company's physical infrastructure, only surpassed by 1982, when most of the current network of federal and state laboratories and experimental fields were built.

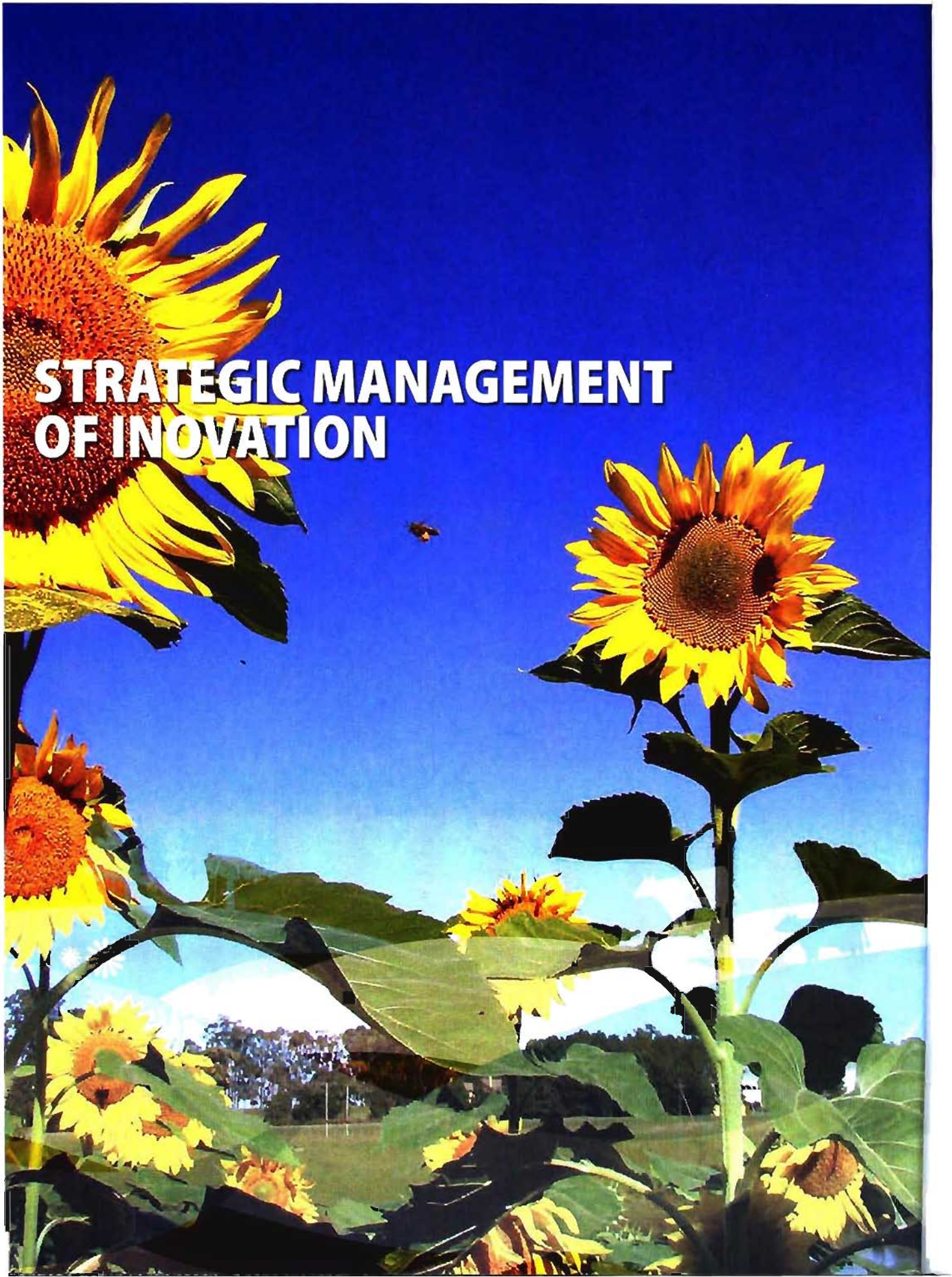
The implementation and consolidation of President Luiz Inácio Lula da Silva's PAC – Growth Acceleration Plan, aiming at the growth, revitalization and strengthening of agricultural research at the state and federal levels, occurred in 2009. Henceforth, EMBRAPA and the National Agricultural Research System shall play an even more decisive role in the agricultural development and social welfare of Brazil and all tropical countries throughout the world.

Concomitantly, EMBRAPA has also refined its international action plan, as the technological arm of the Ministry of Agriculture, Livestock and Food Supply (MAPA, in Portuguese), Brazilian agricultural companies and the Brazilian Cooperation Agency of the Ministry of Foreign Relations, for the purpose of taking the experience of the Brazilian modern agriculture to all countries throughout the Tropical World.

The more relevant details of EMBRAPA's management of research to face the challenges of Tropical Agriculture, execute the EMBRAPA PAC and enhance its international actions are highlighted in this publication, which celebrates the company's 37 years of commitment to Brazilian prosperity and also signals the beginning of a new era of broadening the frontiers of tropical agricultural knowledge.

Good reading!

Pedro Antonio Arraes Pereira
Director-President


STRATEGIC MANAGEMENT
OF INOVATION

The strategic management of an organization to ensure its capacity to innovate in the field of technology demands that the human capital, the research and development (R&D) infrastructure and the technology transfer schemes, (TT) and the operating costs resources be handled in an articulate manner, closely adjusting both the provision and the use of those inputs.

Such articulation encompasses the resources earmarked for administrative operations, R&D and TT, which determine to what extent the human capital will mobilize the creation infrastructure. Scarce operating cost resources would make it impossible for the human capital to implement all technological solution proposals and, thus, reduce the efficiency of the resources invested in professionals, machinery and equipment.

Under normal conditions, the investments in human resources and capital goods made when setting up the R&D and TT functions have different destinations. The machinery and equipment relentlessly walk toward obsolescence, either from the failure of the materials, or because they have become outdated.

The human capital, on the other hand, are enhanced and become more valuable as time goes by: the professionals increase their knowledge and skills, participate in frequent training activities, or are replaced by other individuals with more up-to-dare training.

Thus, most of the time, the strategic management of innovation must only ascertain that the operating cost, the machinery and the equipment, on account of their scarcity or obsolescence, do not become limiting factors to the innovating action of the human capital. Nevertheless, there are circumstances in the life of all organizations in which even the human capital faces obsolescence, since time places physical burdens and limitations on people as regards their professional updating.

Throughout the years the strategic management of innovation at EMBRAPA has faced all of those challenges. In 1982, the company was clearly dealing with the obsolescence of its laboratories, which limited the innovation capacity of its recently trained human capital. In the 1990s, insufficient resources for upkeep throttled the production capacity of both the human capital and the R&D and TT infrastructure.

In 2009, the implementation and consolidation of EMBRAPA's Growth and Strengthening Program (PAC) brought about a convergence – and a challenge – rather uncommon in the strategic management of innovation resources: the obsolescence of its infrastructure combined with an actual and significant renovation of its human capital.

During the period 2001-2009, EMBRAPA replaced 3,257 professionals from practically all areas, i.e., an amazing 37% of its creative force. In 2009, specifically, the company concluded the renovation of all its laboratories and added some new ones. The challenge to the strategic management of innovation beginning in 2010 will be to obtain from the new human capital and the renewed infrastructure the necessary synergy to conduct Brazil's Tropical Agriculture to a new level of sustainability.

STRATEGIC MANAGEMENT OF THE INSTITUTION

From the institutional point of view, 2009 was marked by a change in the corporative governance at EMBRAPA that led to the evaluation and revision of an important set of management macro processes, in addition to the EMBRAPA PAC major impact on the reformatting and expansion of the company's experimental field network in Brazil and abroad and the institutional revitalization of the state agricultural research organizations.

EMBRAPA's governance, in respect to the supervision of the operational units, has varied as a function of the strategic objectives of Brazilian agriculture or those of the company itself: guided by regional needs (North, Northeast, and Center-South) or even by the focus of the research conducted in the operational units (products, ecoregions, scientific field of knowledge).

Beginning in 2009, EMBRAPA began focusing on the macro processes that structure the company's mission, namely, Research&Development, Technology Transfer (communications and business) and Administration. This change brought about a deeper commitment to the improvement of the corporate management processes and increased quality and efficiency.

The new corporate management model sets a correspondence between the company's organizational chart and the organizational charts of each of EMBRAPA's operational units. A natural outcome of this shift was the creation of an operational unit within the central administration, in charge of coordinating the actions of all the research centers and technology transfer services.

In the second half of 2009, the company developed evaluation mechanisms for evaluating research center managers and engaged external evaluators for each EMBRAPA Virtual Laboratory Abroad (Labex). Another initiative was the reevaluation of the EMBRAPA Management System (SEG, in Portuguese), with a view to its restructuring, and of other management mechanisms in operation for more than ten years, such as the operational unit evaluation system and employee performance evaluation system.

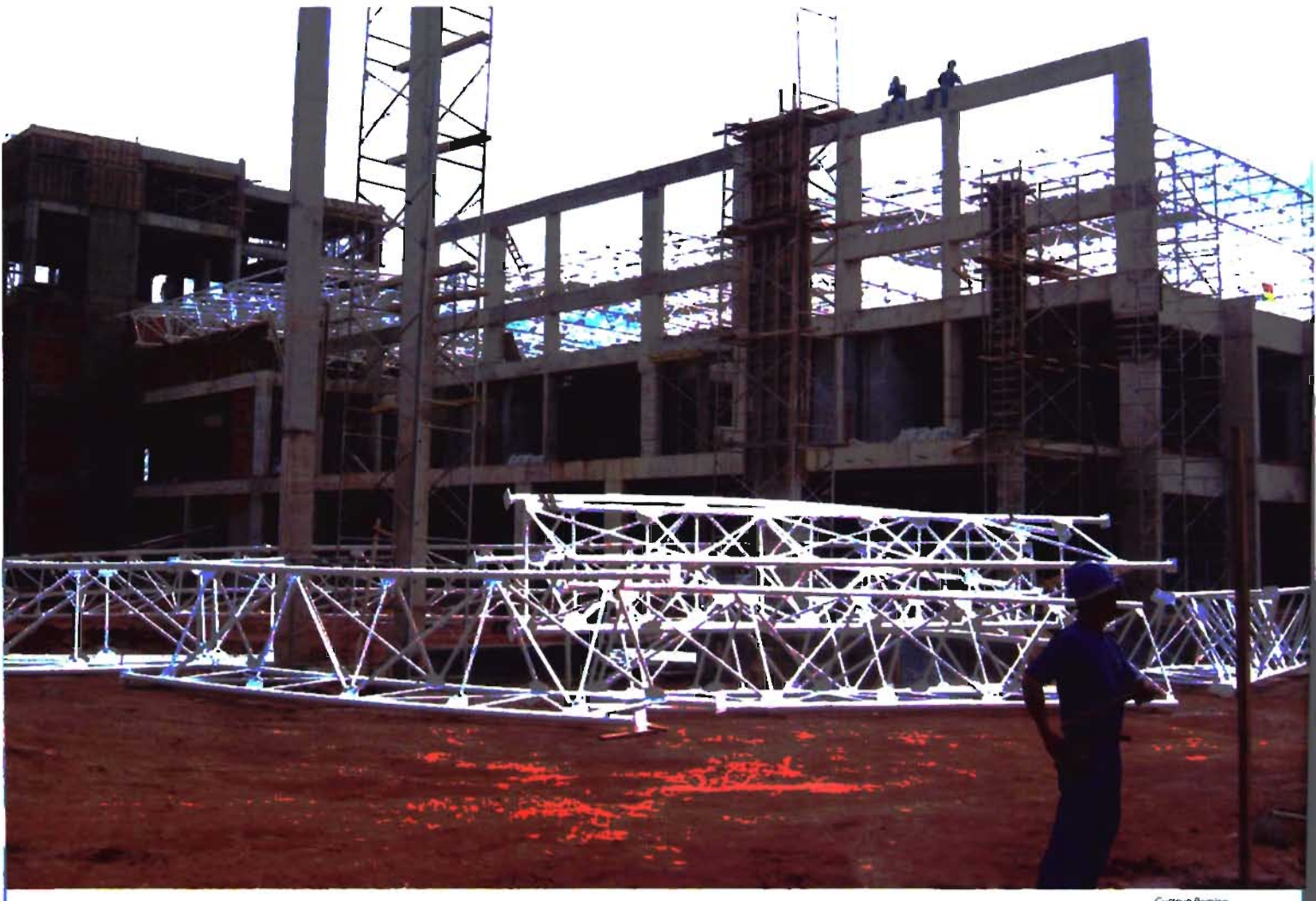
The restructuring of the EMBRAPA Management System also implies an adjustment of all collegiate levels that affect research programming, such as the EMBRAPA Management Committee, Internal Technical Committees and the External Advisor Councils of the research centers.

Expanding R&D

Once the studies and technical opinions were in hand, the company was finally able to begin setting up three new research centers in the states of Mato Grosso, Tocantins and Maranhão, thus expanding its experimental field network and filling an institutional void in terms of agricultural research in a region undergoing intense technological transformation in agriculture.

In May, EMBRAPA's Board of Directors created EMBRAPA Agrosilvopastoral Agriculture in Mato Grosso, whose main focus will be integrated agricultural production systems, with a view to achieving increased production sustainability in agricultural frontier areas. In November, the design of the administrative and laboratory facilities (8,400 square meters) of the new center were concluded and the keystone, set. The campus of EMBRAPA Agrosilvopastoral Agriculture covers 612 hectares and is located in the town of Sinop.

In August, the company created EMBRAPA Fisheries and Agricultural Systems, whose headquarters will be located in Palmas, the capital city of the State of Tocantins. The Tocantins Government has allocated an area of almost 100 hectares for the center's main complex and an experimental field of 484 hectares in Buritirana.



Gustavo Porpino

EMBRAPA Coconut Groves and Flood Plains was created in December, with the mission of developing sustainable management models for those biomes. The center will be located in the Municipality of São Luis. State of Maranhão, in an area still to be determined.

In view of the increased international demand for research training in the development of agricultural technologies for tropical conditions, EMBRAPA's Board of Directors decided to restructure its Center for Research in Macro Strategies, created in late 2008, so as to incorporate those objectives to its mission, thus instituting the Center for Strategic Studies and Training in Tropical Agriculture.

EMBRAPA PAC resources were invested (close to R$ 17.5 million) in the architectural and engineering studies and design and the purchase of the initial machinery, equipment, vehicles and furniture necessary for the implementation of the new operational units.

Multilab

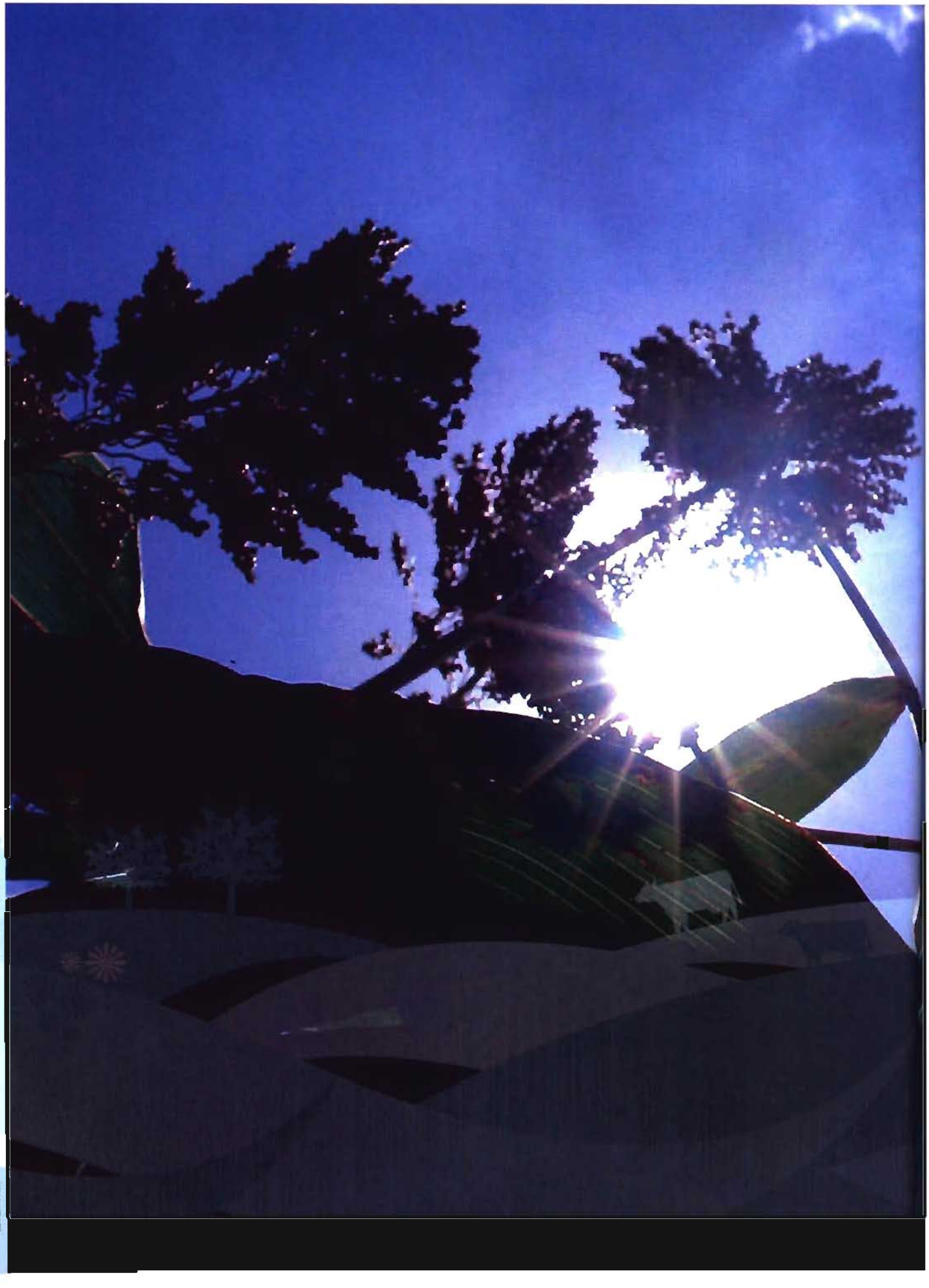
In 2009, EMBRAPA began structuring a new institution, the Advanced Multi User Laboratory (Multilab), considered essential for implementing the new quality research paradigms. The function of the Multilab is to perform unusual and extremely complex scientific tests and analyses. To that end, the laboratory will have specialized equipment and technical staff able to perform the most sophisticated analysis procedures

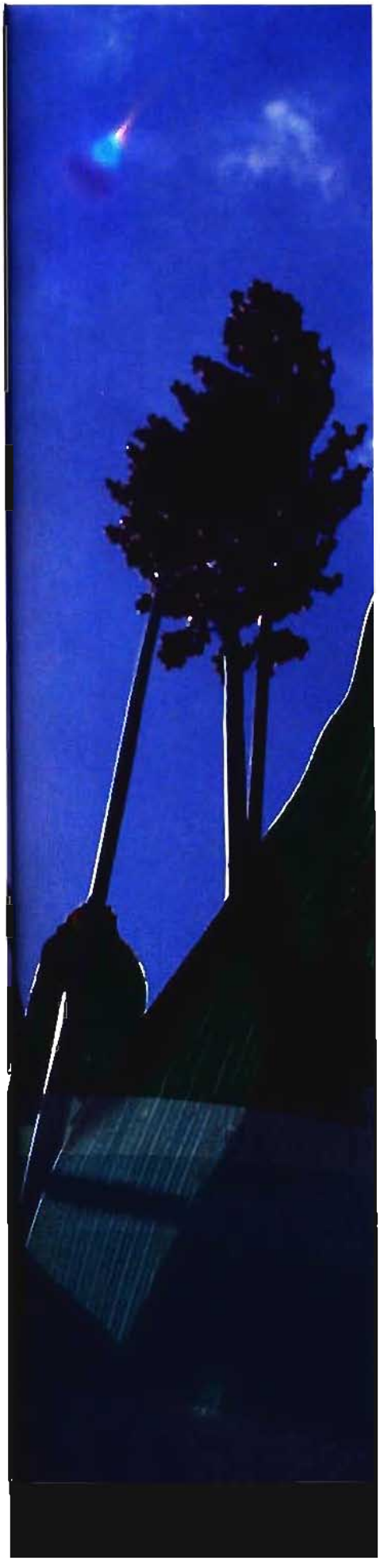
Although located in one of the company's research centers, the Multilab will operate as a service unit and will meet the demands not only of the EMBRAPA research centers, but also of the public and private partners of the agricultural research network.

The Multilab will be managed jointly by its users, in order to ensure adequate planning, flow of financial resource, maintenance of its infrastructure, and manpower availability. In 2009, EMBRAPA began the implementation of the Bioinformatics Multilab at EMBRAPA Agricultural Informatics, in Campinas.

The building and equipping of the Natural Product Chemistry Multilab at EMBRAPA Tropical Agroindustry, in Fortaleza, is scheduled for 2010. Ceará's congressmen have earmarked R$ 22.8 million to the Fortaleza multilab in the 2010 Budget of the Union.

Cláudio Melo



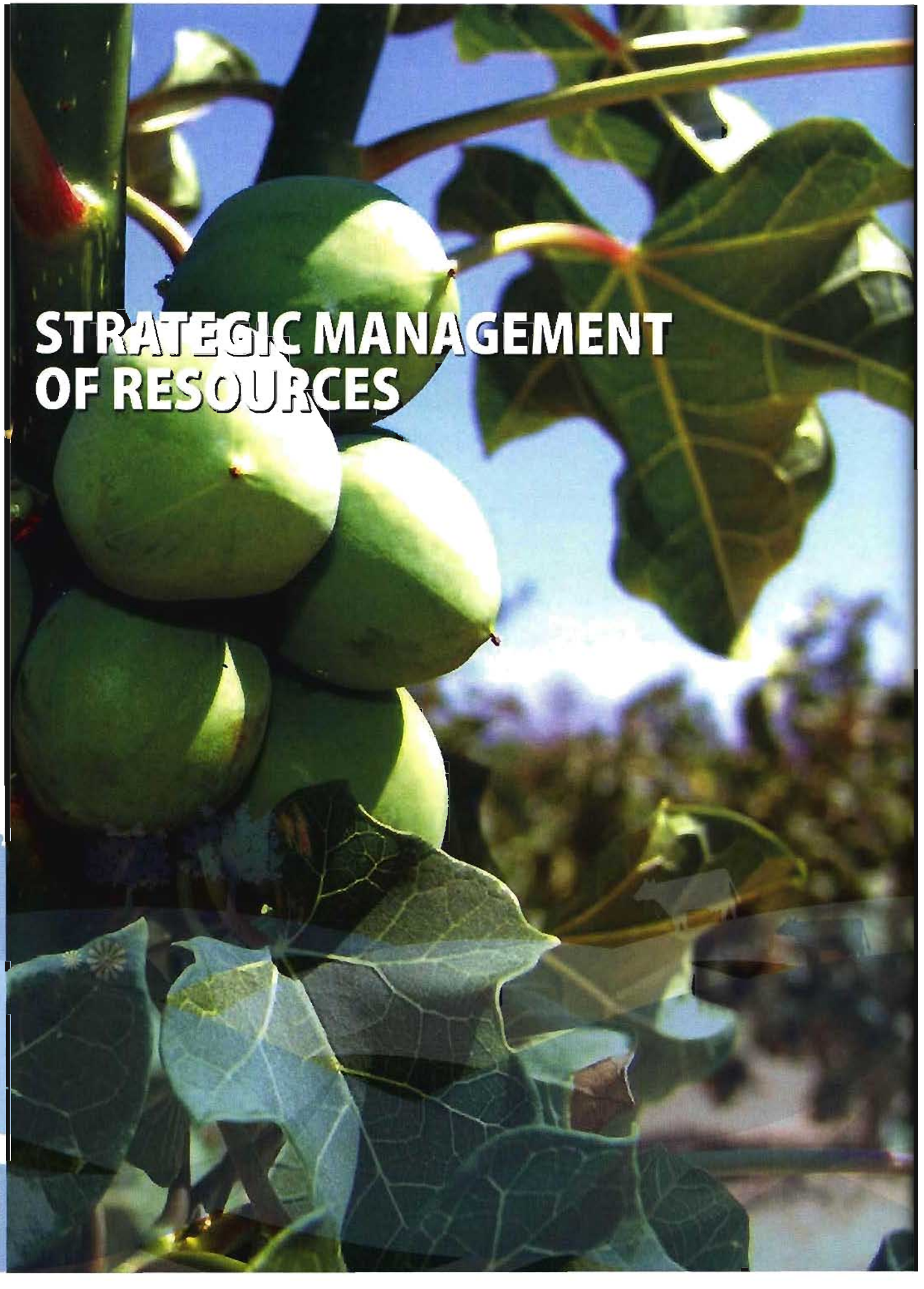


At the international level, EMBRAPA has added two more posts to the virtual laboratory network abroad: Labex Korea, the first in Asia, and the English arm of Labex Europe, in Rothamsted. The new laboratories abroad will be coordinated by Mauricio Antônio Lopes and Alexandre Morais do Amaral, respectively.

Labex Korea has been installed in the city of Suwon in partnership with the International Technology Cooperation Center of the Rural Development Administration (RDA) of South Korea. It will undertake research in the areas of engineering and automation, botany, animal science, genetic resources, agroecology and environmental science

As counterpart and special feature of the cooperation agreement, EMBRAPA will receive Dr. Bohsuk Yang, a senior researcher who specializes in animal science, at the company's headquarters in Brasilia. Dr. Yang will observe the animal reproduction research carried out in Brazil.

In 2009, EMBRAPA also approved the creation of EMBRAPA Americas, to be implemented at the Ciudad del Saber, in Panama, in 2010, with the support of the EMBRAPA PAC. The purpose of EMBRAPA Americas is to transfer tropical technology, promote technology transactions and establish an R&D platform of interest to Central America counties. Thus, EMBRAPA Americas expands the tropical knowledge sharing network initiated with EMBRAPA Africa and EMBRAPA Venezuela



STRATEGIC MANAGEMENT OF RESOURCES

As foreseen in the 2008 strategic plan, which set forth the design of the EMBRAPA Growth and Strengthening Program, the 2009 budget could only be compared with the budgets for 1982, 1991 and the 1996/97 two-year period. The difference in the budget execution between those years and the years in between is the increased capacity to plan on the basis of a long-term strategic vision.

As regards 1982, when a very large number of laboratory equipment was imported, the similarity rests on the priority assigned to investments in civil works and capital goods. At that time, it was necessary to equip both EMBRAPA and the state agricultural research system; now, the facilities must be expanded and the researchers' tools, updated from the technological point of view.

Concerning 1991 and 1996/97, the situation is similar because of the strong weigh of expenditures with human resources resulting from early retirement/facilitated resignation plans. In 1991, the sole reason for adopting the personnel reduction option was to cut government expenditures. In the 1996/1997 period, human resources expenditures increased for two reasons: another early retirement/facilitated resignation plan and the renewal of the technical staff by hiring recently trained researchers in advanced areas of knowledge, such as biotechnology, nanotechnology and information science.

Financial resources

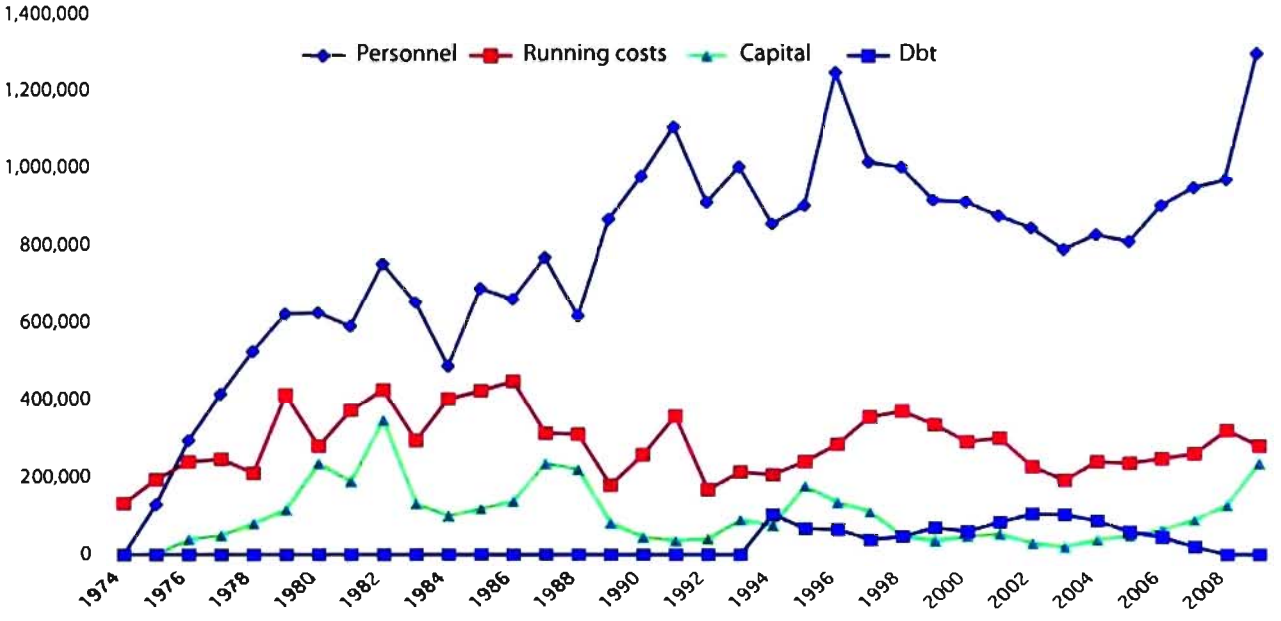
In 2009, EMBRAPA's outlay with personnel, civil works and capital goods, administration, and the operating expenditures of all research and technology transfer activities totaled R$ 1,815,670.00. It was the largest budget in the history of the institution, a 27.9% increase when compared with 2008.

The consolidated data show the maturation of the process of restructuring EMBRAPA for the long-term challenges set forth in its most recent Master Plan. Those challenges guided the design of the company's growth and strengthening plan (the EMBRAPA PAC), which contributed R$ 238 million to the 2009 budget.

The most important stays of the restructuring process were the renovation and updating of the human capital, the reformulation and expansion of the research facilities, the renovation and technological modernization of the equipment, machinery and vehicles, as well as support to the renovation and overhauling of the facilities, machinery and equipment of the state agricultural research organizations.

As shown in the graph below, the growth of expenditures occurred in the Personnel and Capital (works, machinery and equipment) accounts. The direct operating costs of research, which pay for the inputs, consumer goods and services necessary to the operation of the research structure and execution of experiments, totaled R$ 282 million in 2009, or 12.3% less than in 2008.

EMBRAPA: investments by type of expenditure
In thousand reais, 2009



Values corrected using the IGP-DI index of the Getúlio Vargas Foundation (FGV)

The cutback can be explained by the fact that a substantial number of facilities were unavailable due to the renovation work and sizable personnel turnover. The EMBRAPA PAC program contributed R$ 46.5 million of the total amount, of which R$ 13 million were spent with facility and equipment maintenance.

The largest growth item was Capital (84.48%), because of the dire need to renovate the laboratories, expand the research facilities, particularly in agricultural frontier areas, and the technological modernization of the machinery and equipment throughout the public agricultural research system.

Expending more than R$ 237 million in Capital items partly compensated EMBRAPA's much lower expenditures from 1998 to 2006, as show in the previous graph. The investment constraint in the state agricultural research system lasted even longer, albeit for different reasons.

At that time, in the case of EMBRAPA, the enormous difficulty to build and equip laboratories and experimental fields was due to the reduced investment capacity of the Federal Government and the need to pay international loans previously made for that same purpose.

The expenditures with personnel grew by 33.7%, much less than capital goods, but had a higher impact because of the effort to renew the intellectual capital. There were two contributing factors: on the one hand, the early retirement/facilitated resignation plan addressed to the older employees and, on the other hand, the salary adjustment plan to bring EMBRAPA's initial stipends up to par with market salaries. The imbalance was causing the loss of recently hired employees.

The adjustment of the initial remuneration levels, together with the result of the union negotiations (6%), had a considerable impact (31%) on the cost of the payroll. The early retirement/facilitated resignation incentives represented less than 8% (R$100 million) of the total personnel account. A substantial part of the increased cost with personnel was due to changes in the social security contributions, especially expenses associated with the so-called social taxes (FGTS, INSS and complementary retirement plans).

Support from the National Congress

The EMBRAPA budget is complemented by amendments to the Union Budget introduced by congressmen. Those amendments both add the funds required for company's activities and signal that its agricultural modernization program has been well understood and accepted, that the congressmen acknowledge the fundamental role played by the modernization of agriculture in the development of the Brazilian regions and in leveling off regional disparities.

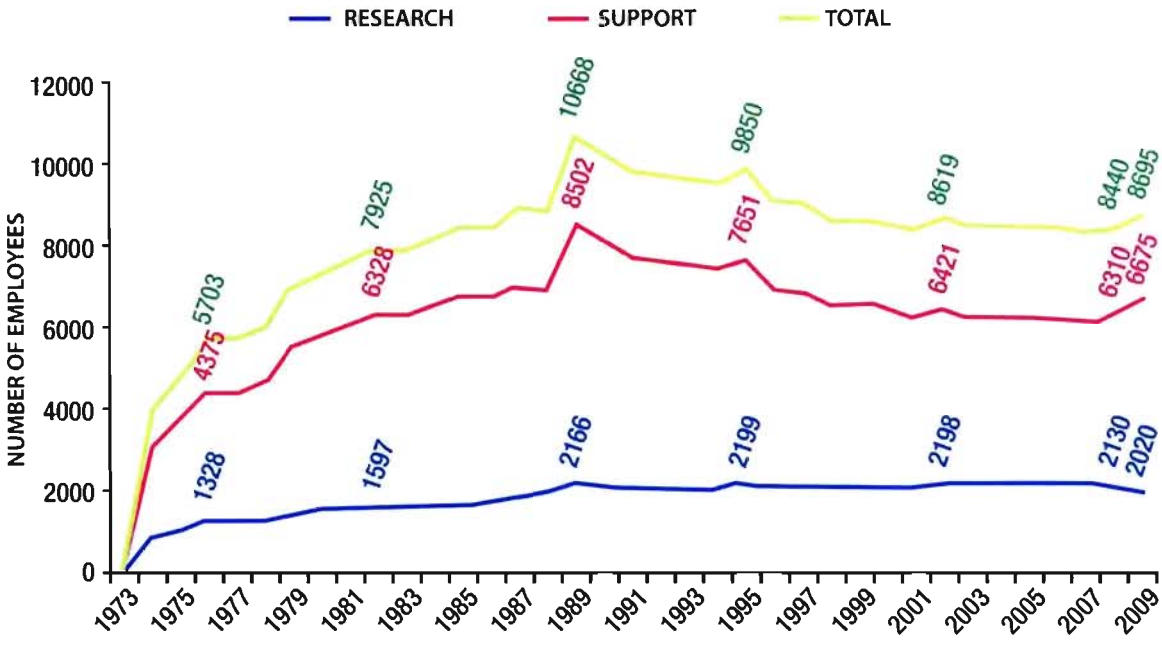
In 2009, EMBRAPA's research activities, capital good investments and technology transfer actions were financed to the tune of R$ 8.59 million through amendments introduced by the Senate Agriculture Committee and R$ 13.72 million from individual amendments sponsored by congressmen and senators from ten parties (DEM, PCdoB, PHS, PMDB, PP, PSB, PSC, PSDB, PT, and PV).

For 2010, the National Congress has approved amendments totaling more than R$ 114 million, introduced by individual parliamentarians, political parties, and Senate and House committees. Many of the amendments focus on the need to revitalize the research and technology transfer infrastructure throughout the national territory in areas identified but not contemplated in the EMBRAPA PAC – Growth and Strengthening Program.

Intellectual Capacity

In 2009, EMBRAPA hired 867 staff members to replace 641 employees who had resigned, retired, or been dismissed. Thus, the company's cadre comprised 8,695 affiliates in December 2009, closer to its goal of bringing up its workforce to the 1995 level. EMBRAPA is also focusing on boosting its creative capability by hiring researchers trained in the more advanced areas of knowledge, such as nanotechnology, knowledge management, advanced biology, and others contemplated in the company's new research program.

Evolution of the EMBRAPA staff over time



Source: Embrapa/DGP

The human capital is upgraded not only through the amassing of experience and hiring of new talents, but also by a continuous corporate educational effort at all employee levels and, in particular, in the technical and scientific areas, with master's and doctorate programs that will upgrade the qualifications of the researchers.

Last year, 33 employees obtained master's (10) and doctorate (23) degrees and 32 new candidates were admitted to the graduate/postgraduate program: 13 are seeking master's degrees and 19, PhDs. EMBRAPA maintained 181 employees in that program, of whom 154 attended Brazilian universities and 27 trained abroad.

During 2009, 113 staff members attended specialization courses, while 26 concluded that kind of training. In addition, 808 employees participated in technical events abroad.

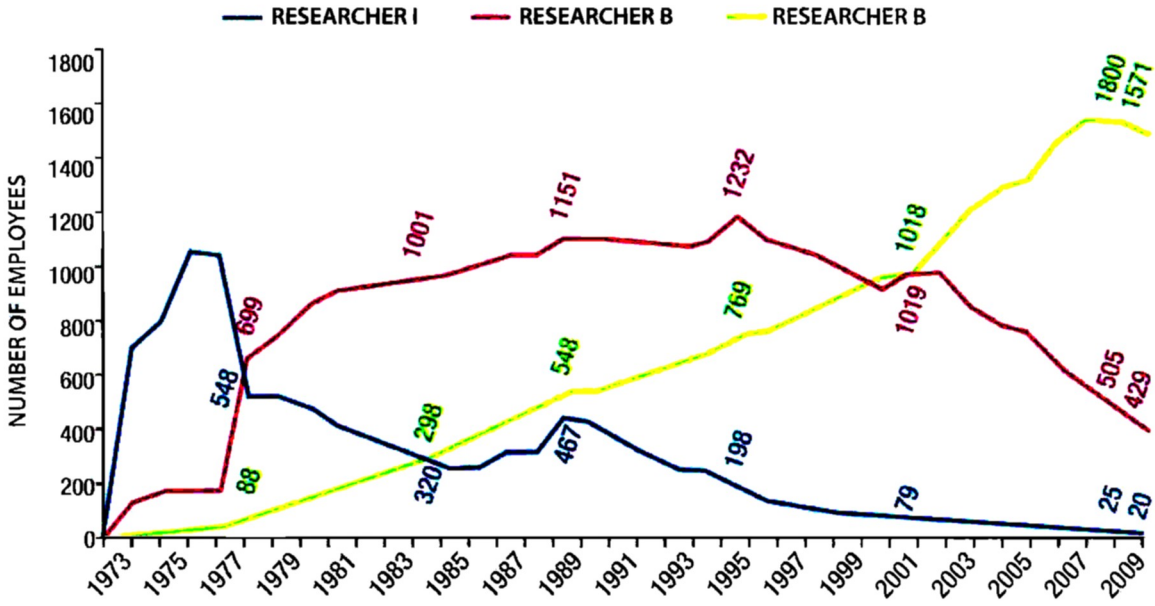
Another training venue is the Internet. EMBRAPA offered 18 online courses, in which 3,262 students participated, 2,581 of whom had concluded the training course by December 2009. The company sponsors 303 training projects, which trained more than 6,100 employees last year.

Gustavo Porpino

EMBRAPA also provided managerial training to 337 employees, including 122 holding strategic posts. Finally, 249 field workers from ten research centers were maintained in primary and secondary education programs in 2009.

The company's training effort does confine itself to its cadre. EMBRAPA also contributes to the training of new professionals in science and technology careers, through

Evolution of researcher qualifications



Source: Embrapa/DGP

internships and research-assistant scholarships open to high school and college students. Last year EMBRAPA offered 1,948 such educational opportunities.

Material resources

In 2009, EMBRAPA invested R$ 72.5 million in civil works at its research centers and another R$ 47.8 million in machinery and equipment. At the experimental fields of the state agricultural research system the expenditures were R$ 62 million and R$ 48.9 million, respectively, together with R$ 5.5 million for disbursements authorized in 2008 and paid in 2009, for a total investment of R$ 236.7 million in capital goods for the revitalization of the research infrastructure.

Of the total amount, the EMBRAPA PAC invested R$ 191.7 million in new facilities, renovations, machinery, equipment, and vehicles required to carry out research. Almost R$ 120.5 million were spent in revitalizing the infrastructure of the state agricultural research system and another R$ 71.2 in the EMBRAPA research network.

The new and renovated facilities add up to more than 251,000 m2 built in 2009, for which the EMBRAPA PAC disbursed R$ 44.9 million. The new facilities include an expansion (4,298 m^2) of the company headquarters to house the new Center for Strategic Studies and Training in Tropical Agriculture (CECAT, in Portuguese) and the continuation of the work at the EMBRAPA Agroenergy headquarters and laboratories, which cover 9,490 m^2.

At CECAT, the raw work (masonry, concrete and plaster) was concluded and the finishes phase (floors, windows and doors, sanitary facilities, metals, plumbing, and electricity) were initiated. At EMBRAPA Agroenergy, the concrete and masonry phases were concluded and the metallic structures, electricity and plumbing phases, begun.

The architectural and engineering designs of the EMBRAPA Agrosilvopastoral facilities (8,235 m2) in the city of Sinop were concluded, the biding process executed and the construction contract signed also in 2009.

Updating equipment, instruments and tools

Another fundamental point for the revitalization of the research infrastructure was the renovation of the instruments and tools used in research, which includes from simple glassware, tools and animals to sophisticated measuring and analysis equipment, some of which were damaged and, therefore, replaced, while others had to be technologically updated, because they had become obsolete.

In 2009, EMBRAPA bought more than 19,000 items. Machinery, vehicles, computers and peripherals, and laboratory equipment account for a third of the purchases and will substantially modernize the laboratories and experimental fields, from the technology standpoint.

The purpose of the investment in informatics equipment, which includes both the purchase of nearly 4,000 items and the renovation of the networks to increase the data transmission capacity at EMBRAPA's headquarters and several of its research centers, was to prepare the company for the implementation of its Information Technology Master Plan (PDTI, in Portuguese).

The PDTI follows the strategic orientation of the Master Plans that guide the management of the company. Its priority is to maintain EMBRAPA in close alignment with the guidelines of the Federal Government as regards the Electronic Government (e-GOV), accessibility (e-MAG) and interoperability (e-PING) models, and sectoral regulations.

It also seeks internationally-accepted information technology governance standards, practices and models such as Cobit and Itil, as well as process enhancement standards, practices and models and other existing quality standards for the sector.

Land regularization

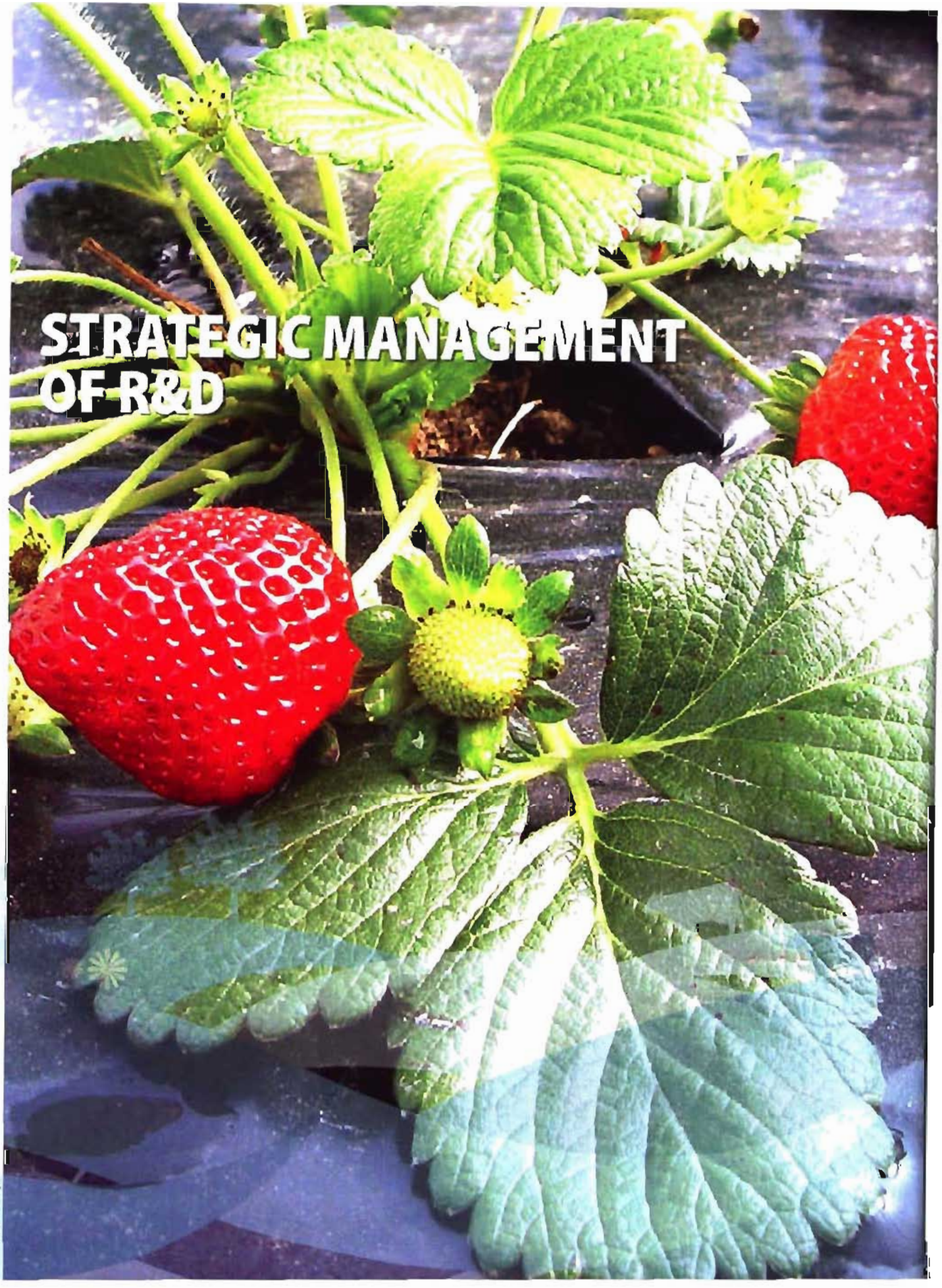
In conducting its agricultural research and technology transfer actions, EMBRAPA manages 262 properties extending over more than 110,000 hectares. Only slightly more than 15,000 hectares have been loaned to the company's public and private partner organizations under commodate. Another 19,000 hectares belong to public partner organizations and are used by EMBRAPA.

That is the case of the land where EMBRAPA's headquarters and operational units are located in the Federal District. The dual management of those rural areas and the fact that some of them have been encroached by urban development, with problems such as new taxes and appropriation by third parties, have increased considerably the management costs.

Thus, it is important to regularize land use, not only by solving any existing property issues, but also by selling any property not used in forwarding the company's scientific mission.

In order to make those decisions, EMBRAPA issued invitations to tender process for topographic survey services of all such properties, referenced to the Brazilian geodesic coordinates system, not only as regards the boundaries, but also any ecologically relevant features.

EMBRAPA's management is interested in asserting, for each property, the coordinates of its boundaries and neighboring properties; permanent preservation and legal reserve areas; springs, lakes and rivers; cropped, forested and pastureland areas; location of any roads or structures, such as buildings, pens, fences, and electric power grids. The survey is being paid with EMBRAPA PAC resources and will be ready by December 2010.



STRATEGIC MANAGEMENT OF R&D

The EMBRAPA research centers executed 1,191 projects from six macro programs in 2009. This represented a growth of slightly more than 21% over the 2008 performance. The increase in production shows the impact of the maturation of the EMBRAPA Growth and Strengthening Program, the EMBRAPA PAC, which sought to strengthen the project portfolio during its second year of implementation by defining research actions better adjusted to its priorities.

Out of that total number of projects, 737 are registered in the EMBRAPA research program management system (SEG, in Portuguese) and, among them, 390 received PAC investment resources in order to ensure the purchase of small pieces of equipment for specific use in some projects, as well as research infrastructure to meet the needs of all project.

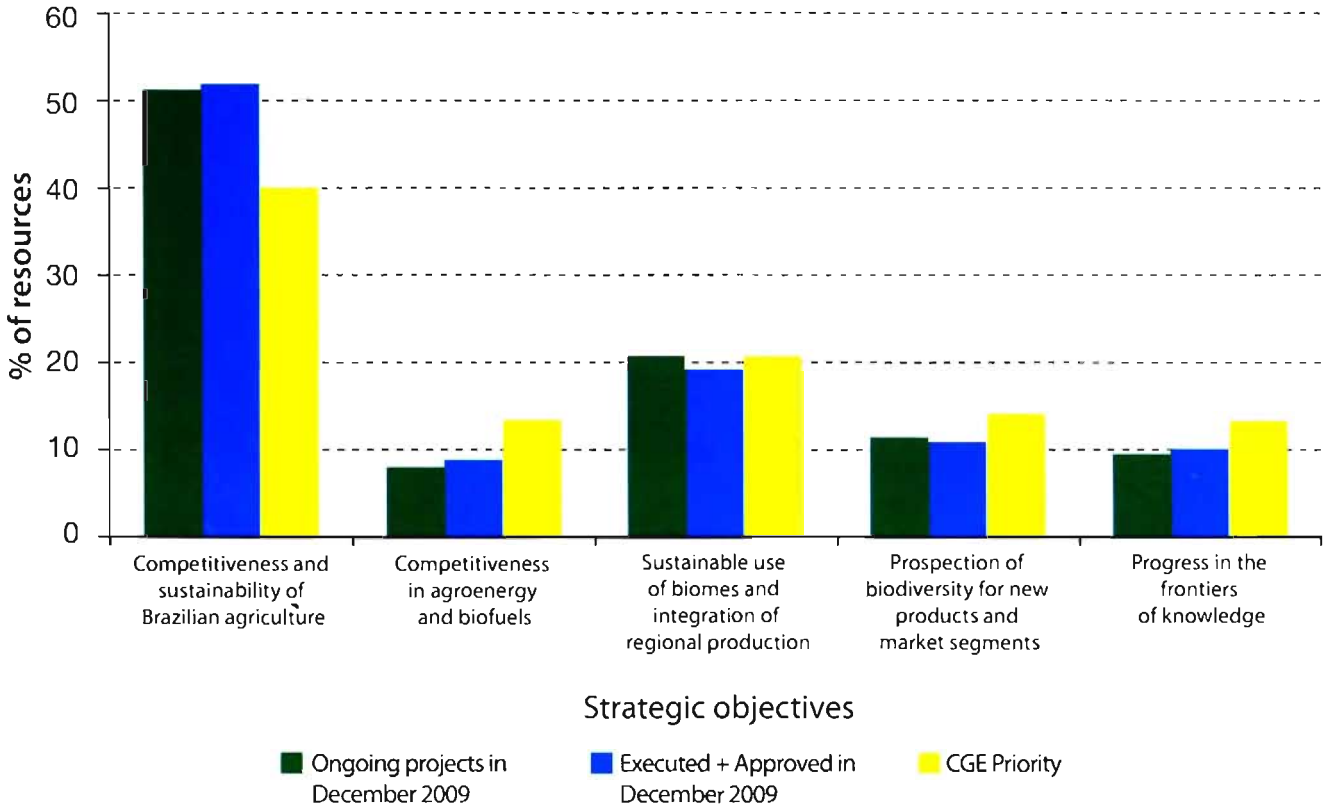
EMBRAPA PAC also financed typical operational costs, such as the purchase of reagents, glassware, fuel, seeds, fertilizers, and other input in 144 of those projects. This set of SEG registered projects is called the "EMBRAPA PAC project portfolio". They include 69 projects that embody the PAC's effort to help EMBRAPA narrow the focus of its research program and enhance the quality of its projects: 48 are considered Priority, because they focus on the priorities defined in the EMBRAPA PAC; 17 are labeled Commissioned, as they address macroeconomic problems; and four are described as Creativity, because of free orientation and inspiration.

The projects on the reclamation of degraded areas, increasing the efficiency of agricultural inputs, water preservation and quality, and machinery and equipment for family agriculture are some of the examples.

In addition to the SEG portfolio, there are 454 ongoing projects financed by 120 external sources such as CNPq; FINEP; the state agricultural research foundations; Banco do Brasil Foundation; investment banks such as BNB and BASA; international organizations such as the World Bank; foreign government agencies such as NASA; and public and private companies such as Petrobras and Monsanto.

By the end of 2009, the investments on the projects that meet strategic objectives 3, 4 and 5 were close to the alignment recommended by EMBRAPA's Strategic Management Council (column in yellow). Better alignment of the projects that meet strategic objectives 1 (competitiveness and sustainability of agribusiness) and 2 (agroenergy) depends, respectively, on the conclusion of ongoing projects (and their substitution with better aligned initiatives) and the conclusion of the work on the agroenergy research laboratories.

Alignment of projects with the Strategic Objectives



New technologies and knowledge

EMBRAPA's research centers concluded in 2009 the development of more than 50 new plant cultivars, over ten new agricultural inputs, almost 150 scientific methodologies, nearly 600 new dynamic agricultural monitoring and zoning maps, in excess of 40 agroindustrial processes and close to 100 software applications, some of which are shown below.

FAMILY AGRICULTURE

Rice

BRSGO Serra Dourada, a cultivar for small, non-irrigated rice farming operations in the highlands of the State of Goiás. The production potential of this new long-grain upland rice variety is close to 3,500 kg per hectare. This short-stature cultivar is more resistant to rice blast and lodging. Another favorable feature is its high yield of unbroken grains (almost 56%) after milling.

Cowpea

Cultivars BRS Cauamé (Branca), for the North and Northeast regions, and BRS Pajeú (Mulato), BRS Potengi (Branca) and BRS Tumucumaque (Branca), for the North and Northeast regions and the states of Mato Grosso and Mato Grosso do Sul, have high protein and zinc contents, are resistant to the main cowpea pests and diseases, but susceptible to CSVM (cowpea severe mosaic virus) and web blight. Its average grain yield is 800 kg/ha. When irrigated, the yield increases to over 1,700 kg/ha.

Eugenia Ribeiro

Corn

Cultivars BRS Caimbé and BRS Gorutuba, recommended for family farming in regions, sowing times and environments which have traditionally lead to low yields and greater risk of harvest loss. In addition, when the basic seed production criteria are obeyed, the grain can be saved for the next planting.

Guilherme Viana

Manual milking of goats

Manual milking kit, originally developed for cows, adapted to dairy-goat family-farming operations in the states of Paraíba, Rio Grande do Norte and Ceará, to improve milk quality with simple hygiene measures that reduce significantly the bacterial and somatic cell counts of milk.

Sisal-hemp residues

At the request of the women of the Boa Fé community, located in the municipality of São Domingos, State of Bahia, a method for processing sisal-hemp residues left behind in the extractivist fields, to make cache pots and orchid growing supports and generate additional income, especially for the young people.

AGROENERGY

African palm land

Evaluation and zoning, in 1:250,000 scale, of the African palm farming potential, in non-irrigated schemes, on the basis of the physical, chemical and mineralogical characteristics of the land and weather risk for the crop in the State of Pernambuco, indicate 248,000 ha of suitable lands, of which 135,000 were classified in the middle to high range adequacy to this crop.

Dayo Rodrigues

Genetics for high glucose contents

Biochemical and genetic test system led to the identification of the characteristics and genes responsible for spontaneous mutations such as high glucose contents, which could be extremely valuable for the production of ethanol. The roots of the manioc varieties studied contain sugar instead of starch, which could lead, therefore, to a substantial reduction – in excess of 25% – of the energy costs of the ethanol production process.

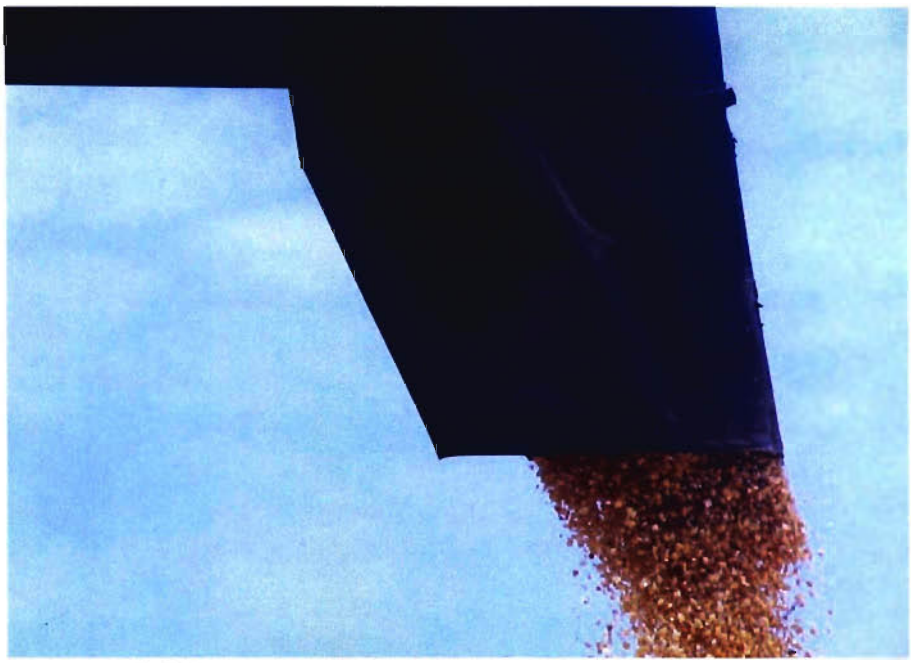
Straw for energy

Genotypes of elephant grass were ranked according to their biomass production potential, in the presence of low levels of hydrocarbon-based fertilizers, in order to guarantee a positive energy balance. The idea is to use elephant grass as a renewable source of energy. Among the more suitable elephant grass genotypes identified, Incaper F06-3 had the highest potential to replace firewood to produce energy.

COMPETITIVENESS

Corn for the Northeast and Mid-North regions

On the basis of an evaluation of cultivars developed by public and private companies, 20 hybrids and one cultivar (São Francisco) were indicated as the best adapted and most productive cultivars for the states of Pernambuco, Sergipe and Bahia. In addition, more than 30 hybrids and two varieties (São Francisco and Asa Branca) were classified as the best adapted and most productive for the states of Maranhão and Piauí (Mid-North).



Deva Rodrigues

Corn

Simple-hybrids BR 1055 and BR 1060, with semi-early cycle, high yield and production stability, indicated for both in-season and early-planting schemes, good tolerance to lodging and rootless corn syndrome, moderate resistance to leaf pests, such as the gray leaf spot and leaf spot of corn, bad host to the Melodoygenes javanica nematode, recommended for the entire country, except subtropical areas. Appropriate for silage, because of its optimal mass production and the good digestibility of the dry matter.

Triple-hybrid BRS 3040, early cycle, high yield and production stability, tolerance to lodging and rootless corn syndrome, bad host to the Melodoygenes javanica nematode, orange dent kernels, recommended for the entire country, except subtropical areas. Appropriate for silage, with excellent mass production and dry matter digestibility. It is adaptable to high and low productivity farming, with or without water stress.

Hybrid cucumber

Cultivar BRS Curumim for pickle production. Good tolerance to powdery mildew (Sphaerotheca fuliginea), vigorous growth, high percentage of crunchy fruits, shiny dark green.

Grain sorghum

Hybrids BRS 320 and BRS 322 have high grain yield potential and are adapted to unfavorable environments, low level of phenol compounds, protein contents higher than 10% in the grains, no tannin, medium-size plants, good resprouting capacity, recommended for the Southeast and Center-West regions of the country, for planting after summer crops.

Pasture sorghum

Simple hybrid BRS 802 and BRS 810, alternatives to the forage sorghum production for high-tech cattle production systems, high dry matter production potential in successive cuts or resproutings, extraordinary capacity of regrowth and tillering, high tolerance to draughts, high nutrition value, high digestibility, good resistance to the main leaf pests and downy mildew.

Wheat

Cultivar BRS 296, early cycle and medium to high stature, excellent health, resistant to the wheat mosaic virus and powdery mildew, leaf rust (adult plants) and spike diseases, such as Fusarium head blight or wheat scab and Septoria nodorum glume blotch. It is classified as bread wheat

Guaranteed dairy zebu breeds

Progeny tests have proven the quality of Zebu bulls as sires able to transfer quality milk production traits to their offspring. Six Guzerá, seven Girolando and 19 Gir Leiteiro zebu bulls were tested. As more bulls are approved as sires, producers may be assured of the quality of the semen purchased and used in their herds.

Rita Luengo

EMBRAPA vegetable crates

The second generation of the EMBRAPA Vegetable Crate can now be used not only for fruit vegetables (tomatoes, peppers, etc.) but also for flower and inflorescence structures (broccoli, cauliflower, etc.), leaf vegetables (lettuce, collards, etc.), and roots (potatoes, yams, etc.). Varying but proportional in size (the length of the smallest crate fits into the width of the largest), the crates were designed so that the different formats can be used together as a single palletized set. The crates have lateral openings for better air circulation, the idea being that the vegetables are conditioned and washed inside the box, move on to the final sales point, without intermediate packaging changes, thus reducing damages and losses.

Bovine genome mapping

The work of the Bovine Genome Sequencing and Analysis Consortium, which includes EMBRAPA and several institutions in the National Agricultural Research System, has been concluded. The work encompasses an evaluation with molecular markers of the genes of 15 bovine breeds, including Nelore and Gir Leiteiro and resulted in the identification of more than 22,000 genes, which establishes a new paradigm for the bovine genetic research and breeding.

Detection of "citrus sudden death"

The use of NMR spectroscopy to analyze the oils and fatty acids in orange peel has produced different outcomes in healthy plants and plants infected with the "citrus sudden death" vectors, as well as shown changes in the composition of those compounds which could indicate the progression of the disease. Thus, the use of NMR spectroscopy, associated with a set of preestablished standards of normality and infection, enables the quick identification of contaminated plants.

Software SisMate

SisMate was designed to predict current and future production of yerba mate (Ilex paraguariensis) plantations. The software makes it possible to quantify yield, evaluate nutrient export and the stock of carbon sequestered by the plantations, plan production and manage stands appropriately.

MANAGEMENT OF TERRITORIES AND PROPERTIES

ZAE sugarcane

Agroecological zoning, in 1:250,000 scale, indicating the areas appropriate for sugarcane production, by municipality and type of land use, covering close to 66.4 million hectares overall, not including the Amazonia and Pantanal biomes. From that total, 19.3 million ha have high, 42 million ha, average, and the remainder, low production potential. When the areas ready for expansion are considered, 37.2 million ha are degraded pastures, which indicates that sugarcane production can be expand without affecting food production.

Lands for irrigation

Maps of types of soils that accept sprinkler and surface irrigation for growing acerola, banana, sugarcane, onion, coconut, bean, guava, mango, watermelon, corn, and grapes.

Brazilian soil information system

Management application for a database holding soil profiles, fertility analyses and maps. The soil profiles are useful mainly for researchers and Soil Science students and the fertility information serves as input in the farmers' decision making process and in agricultural zoning efforts. Efficient search mechanisms also provide information about soils available throughout Brazil.

Weather risks in crop associations

In order to facilitate the implementation of integrated crop-livestock systems, weather risk zones have been established for highland rice-Brachiaria and bean-corn associations for the State of Goiás. The water consumption coefficients for highland rice-Brachiaria cropping were determined and 27 maps made, showing the most appropriate areas and periods for bean-corn associations.

MANAGEMENT OF NATURAL RESOURCES

Conservation of tropical fish semen

Description of the appropriate process of cryopreservation (using liquid nitrogen) of tropical fish semen, including capture stages, extraction and freezing. The freezing methodology, adapted and used for migrating fish of the Pantanal, has been shown to be efficient since it maintains the motility of the semen for future use.

Biological control with rhizobacteria

Five rhizobacteria were selected for the biological control of Southern blight, a disease with a broad spectrum of hosts for its causal agent (Sclerotium rolfsii), which can make it impossible to produce several crops under protected cultivation conditions, among which tomato. Previously, no rhizobacterium had been available for the biological control of that disease.

Forage plants in the Pantanal

Mapping of landscape units at Poconé, in the Pantanal of the State of Mato Grosso, reveals seasonally flooded forests (27%), seasonally flooded savanna areas (20%), dry forest areas (20%), and seasonally flooded grassland (14%). Some of the main native forage plants in the seasonably flooded areas include macega-branca (Paspalum wrightii), capim mimoso-de-talo (Hemarthria altissima), grama do carandazal (Panicum laxum), o capim-mimosinho (Reimarochloa spp.), capim-felpudo (Paspalum plicatulum), capim-de-capivara (Hymenachne amplexicaulis), capim fino (Axonopus leptostachyus), and capim fino grameiro (Leersia hexandra). This mapping is important in establishing management, conservation and public policy strategies.

Organic fertilizer

Compost made from a mixture of castor cake and elephant grass straw can be used as organic fertilizer. The raw materials are 100% plant origin, but it is not necessary to add inoculants or mineral fertilizers. It can be produced in small farms or large scale operations because the composting process is simple and does not require large investments in infrastructure.

Soil quality indicator

Testing soils from different areas under native forest vegetation for ten biological and biochemical properties showed that the damage or stress caused to the native soil lead to an imbalance that can be expressed in the predicted carbon (pC) and measured carbon (mC) ratio, due to the dynamic balance between the carbon content of soils and the carbon values of the microbial biomass and phosphatase enzyme activity.

Underground dam

The technology consists in damming the rainwater that percolates into the soil and the runoff by means of a wall built into the soil. This causes artificial ebbing that enables the soil to retain the water for a longer period of time, keeping the area moist beyond the rainy season and enabling sowing even during the dry season.

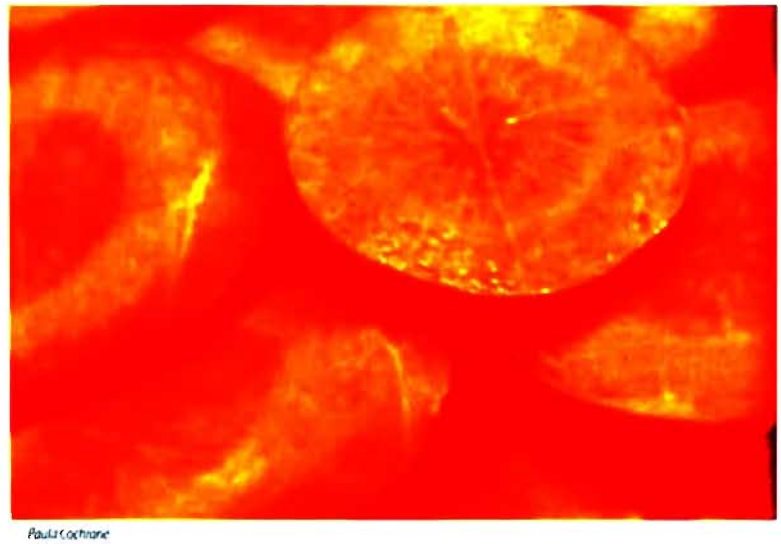
FOOD SAFETY

Pineapple

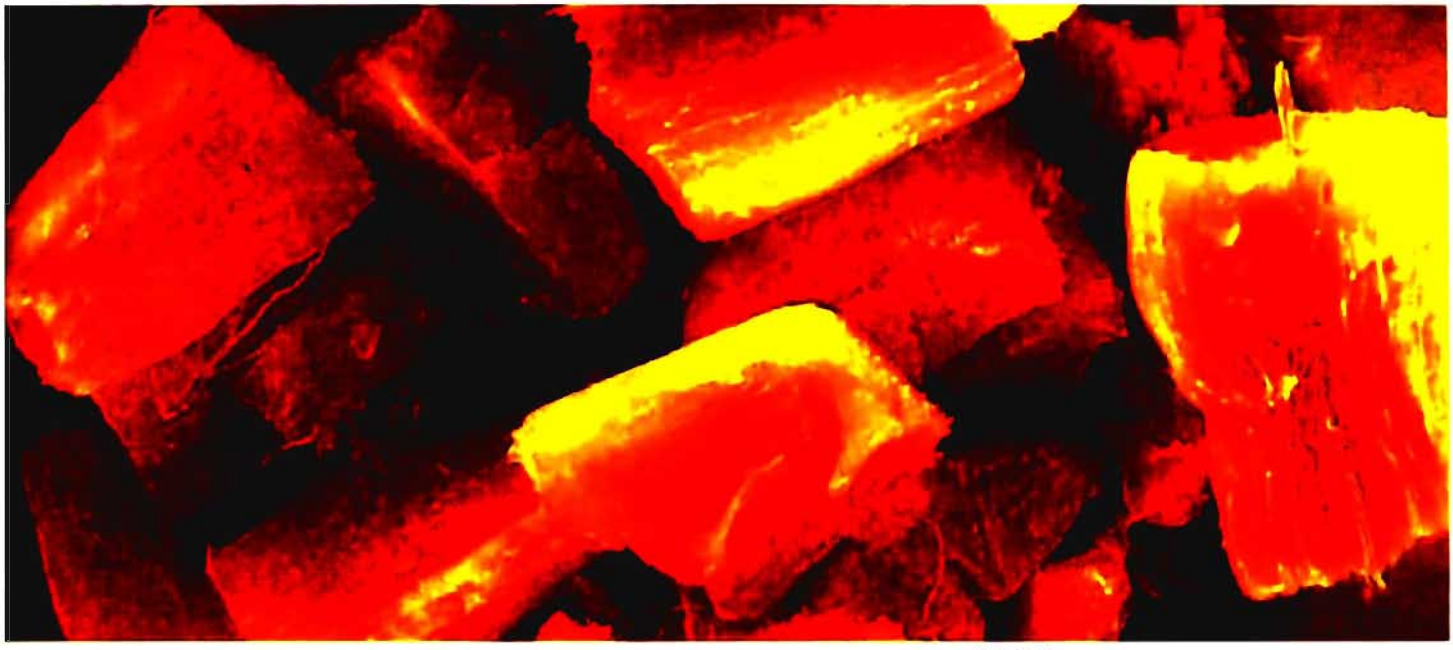
Hybrid cultivar BRS Ajubá, resistant to fusariosis (Fusarium subglutinans), does not require fungicides, recommended for the northeast of the State of Rio Grande do Sul and, particularly, for the Rio Uruguay Valley, for consumption fresh or industrialized.

Summer carrots

BRS Planalto, with behavior similar to the Brasília carrot cultivar, resistant to carrot leaf blight and root-knot nematodes and tolerant to early bolting, which increases the sowing season. The roots of this cultivar are very uniform in terms of size and shape; its carotene and provitamin A contents are two times higher than that of the Brasília cultivar.



Paula Cochrane



Warley Miranda

Manioc

Cultivar BRS Jari displays good characteristics as staple food and can help increase vitamin A consumption, because of the high total carotenoids and beta carotene contents of its roots. After a maximum cooking time of 25 minutes, it became a mass of intense yellow color and plastic consistency, with no fibers. Productivity varies from 15 to 32 ton/ha and its average starch content is 27%.

Mixed açaí drink

Process for producing a mixed drink based on açaí juice clarified by micro filtration, guarana and banana (nanica variety) with good sensory acceptance, stable taste after conservation in cold storage, relevant contents of bioactive compounds, and antioxidant activity. The product is ready for consumption and, therefore, practical for modern life.

A flour mix of rice and baru

Process that uses the pulp and nut of baru (Dipteryx alata Vog.), a native Cerrado species, mixed with rice flour and submitted to extrusion in order to obtain instant mixed flour with high fiber and sugar contents, superior to traditional flours.

Nanoparticles in packaging

Production of hydroxypropyl methylcellulose (HPMC) films with the addition of quitosane nanoparticles that significantly improve the mechanical properties of the films used in food packaging.

ENVIRONMENTAL SAFETY

Agrossuíno

Composting, dehydration and granulation process for use, enrichment with phosphorous and transformation of swine wastes as organomineral granulated fertilizer, nutritionally balanced and adapted to common planters and direct drillers. The process was developed in 2009, in partnership with the University of Rio Verde and the Perdigão company. The fertilizer is being submitted to a tree-year agronomic evaluation after which EMBRAPA will request approval from the Ministry of Agriculture, Livestock and Food Supply.

Sugarcane

Agroenvironmental diagnosis shows a diminishing trend in sugarcane production in foothills in the State of Pernambuco due to environmental restrictions (steep slopes, degraded land, straw fires), while in the State of Sergipe sugarcane production is expanding beyond the coastal plains, as a result of technological upgrading and expansion into new areas, according to the criteria of the Sugarcane Agro-Environmental Zoning (ZAEcana, in Portuguese). The planning of the new enterprises calls for the intensive use of the areas, selection of appropriate genotypes and care of natural resources.

Organic corn

Indication of the varieties BRS Caimbé, Sintético 1 X and AL Piratininga for organic production systems, with yields identical to that of double-hybrid BRS 2020 and higher than that of the BR 106 variety.

Control of whitefly nymphs on bean plants with Neem oil

The susceptibility of the nymphal state of the whitefly (Bemicia tabaci biotype B) to Neem (Azadirachta indica A. Juss.) oil applied to the bean plants was determined, together with the time of application and the lethal concentration. On the basis of the information obtained, it was ascertained that 1% Neem oil solutions efficiently reduce whitefly populations in the nymphal stage.

Impact of transgenic plants

The method used to measure the impact of transgenic plants – Impactos-PGM – was created by adapting the previous software that measures environmental impacts from all sources (Impactos). The new methodology enables the insertion of specific indicators and, thus, a case-by-case analysis, a premise of biosafety.

Ana Luiza B. Viegas

Protected grapevine cultivation

The cultivation of grapevines under protective covers can be used to diminish the incidence of fungal diseases in regions with excessive rainfall during the maturation period. The use of plastic sheets over the vine rows causes changes in the micro climate surrounding the grapevines, which provides conditions that favor growth and yield increases.

Control of capim-annoni-2

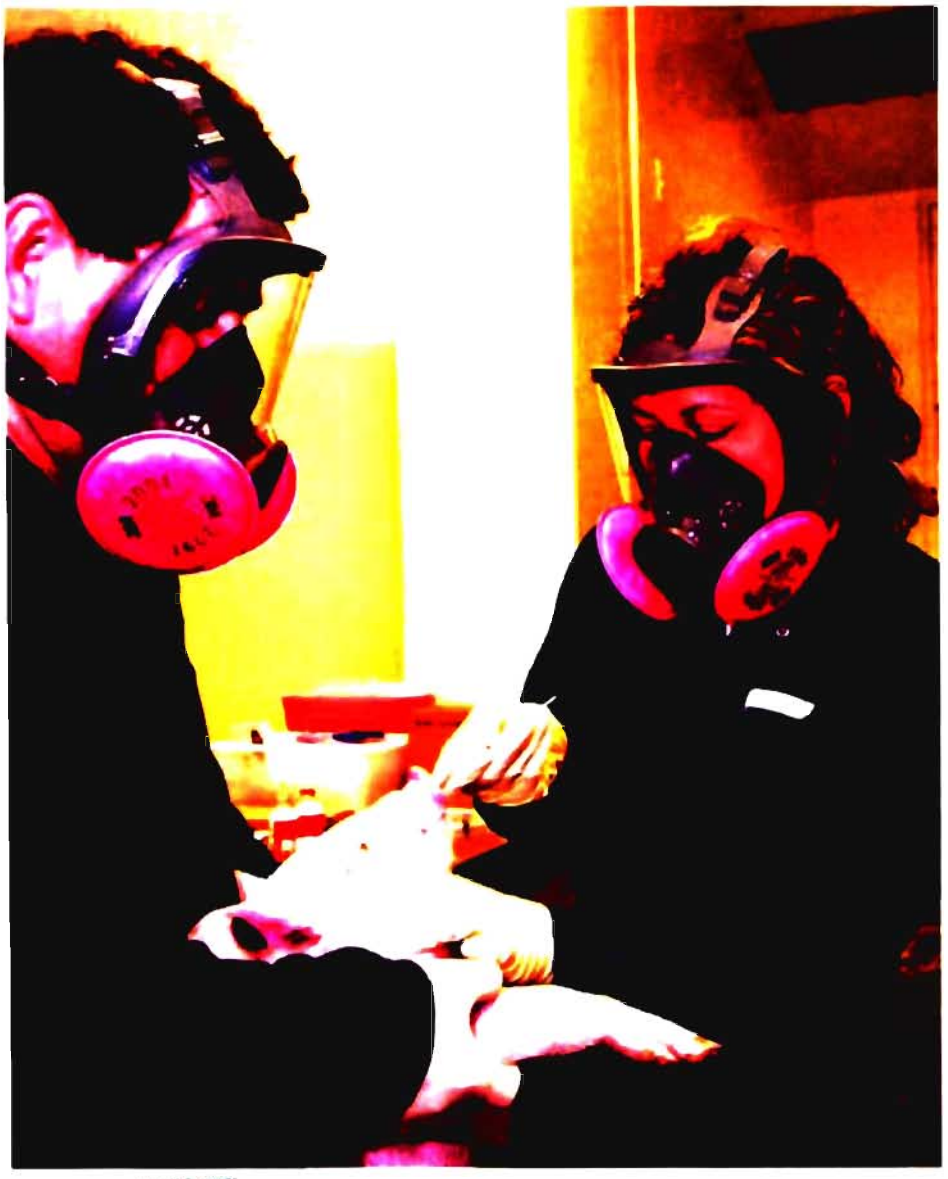
Tests indicate that pre-emergence herbicides have more pronounced effects on the control of a weed grass invader of pastures called capim-annoni-2 (Eragrostis plana Ness) when associated with technical fires and low cutting.

Reclamation of degraded areas

Evaluation has proven the great potential of native species of yellow ipê (Tabebuia sp.), jatobá (Hymenaea courbaril var. reticulata), sobrasil (Colubrina glandulosa), and açaí (Euterpe sp.) in reclaiming soils altered by livestock grazing in the Amazon Region from the very beginning of plantlet establishment. Those soils usually have low organic matter and phosphorous (P) contents and high aluminum (Al) contents. These species are found in different types of soils. They grow fast and produce large amounts of tree biomass from the initial stage.

International partnerships

Labex USA was very active in 2009. Researcher Ladislau Martin from EMBRAPA Agricultural Instrumentation succeded Félix França as project coordinator and will work on Climatic Changes. In addition, researcher Alfredo Alves, an expert in manioc genetics, has been assigned as EMBRAPA's representative in the Genetic Resources Program of the National Center for Genetic Resources Preservation of the Agricultural Research Service, in Fort Collins, Colorado.



James M. Fosse/ARS

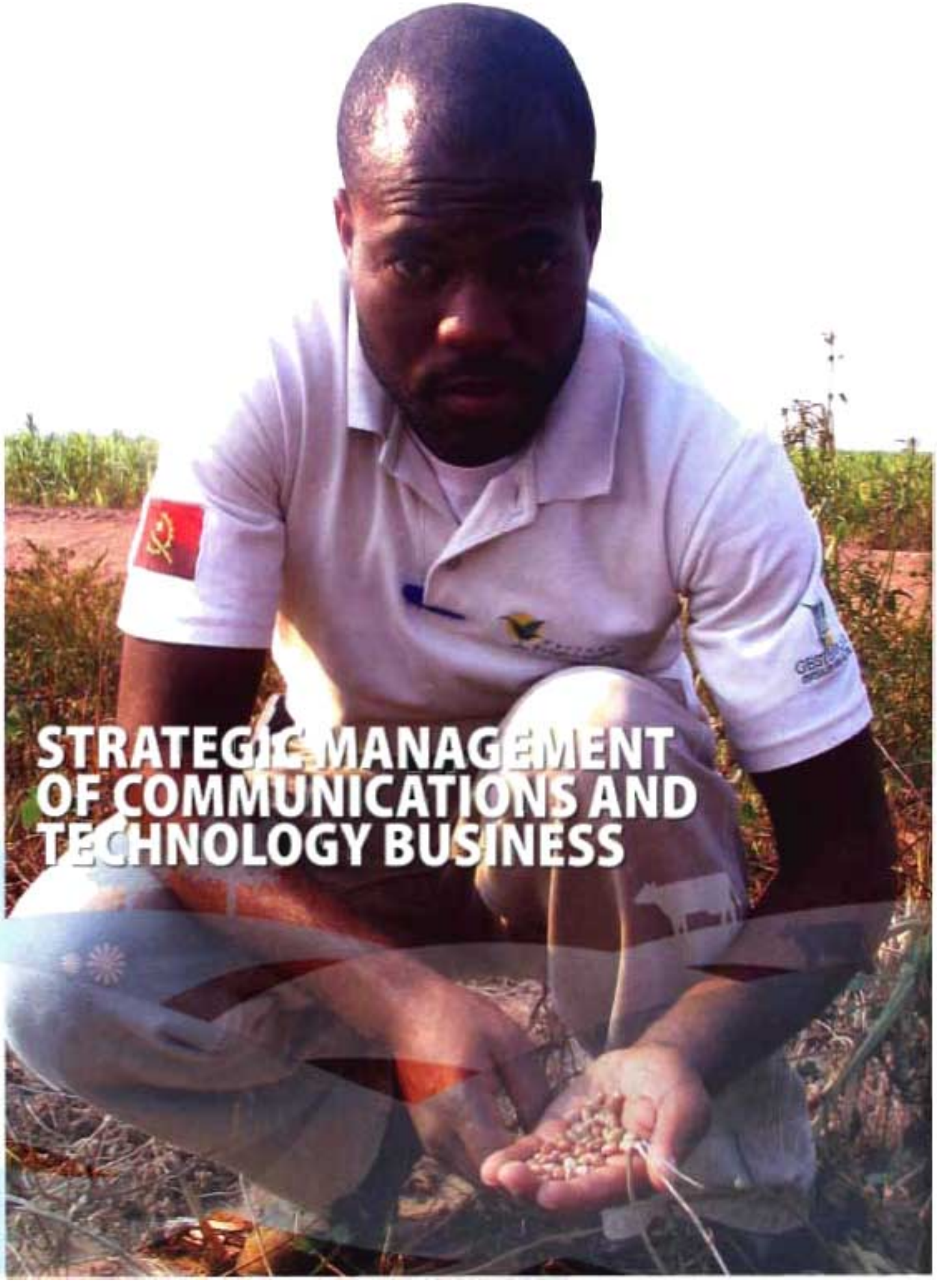
In addition to the fields of research of Ladislau Martin and Alfredo Alves Labex USA worked with animal health, agroenergy and forest management, making up five priority research areas in 2009. The goals of the Agrofuturo project for Labex USA were achieved with the approval of 21 project by June 2009 and complemented by another 12 projects included by the end of the year.

Among the articulation and research actions of Labex USA, it is necessary to highlight the monitoring of a disease called sugarcane orange rust, caused by the Puccinia kuehnii fungus, and warning of its possible progression to Brazilian plantations, which was later confirmed by the Ministry of Agriculture, Livestock and Food Supply on the basis of a report by the Canavialis company.

Labex USA promoted the participation of American specialists Gayl Wissler, Ryan Moore, Jack Comstock, and William White in videoconferences and technical visits to leading Brazilian researchers and research institutions that work with sugarcane, as well as the design of a research program concentrating on the control of the sugarcane orange rust in Brazil. Labex USA also submitted to MAPA, for approval, alternative control measures using fungicides already being used in the USA.

In the area of animal health, Janice Zanella, who was admitted to the BSL-3Ag laboratory unit that works with virus and prion (mad cow) diseases, located in Ames, Iowa, worked with the experimental inoculation of the new pandemic virus of A/H1N1 influenza to check its degree of pathogenicity and propagation, as well as to test vaccines.

Working in Lincoln, Nebraska, at the grain, forage and bioenergy research unit, César Miranda was able to establish that elephant grass, Brachiaria and other Brazilian forage plants can produce up to 11,000 liters of lignocellulosic ethanol per hectare, or second generation ethanol, by processing the whole plant rather than only a part, as in the case of sugarcane. The Brazilian and American researchers are also optimistic about the use of fluctuating islands of biomass, such as the camalotes of the Pantanal, where Eichhornia crassipes (Mart.) Solms is the dominant macrophyte).



STRATEGIC MANAGEMENT OF COMMUNICATIONS AND TECHNOLOGY BUSINESS

The immediate purpose of EMBRAPA's Communications and Technology Business actions is to publicize the available technologies and knowledge among users, as well as facilitate their access to the technology tools in order to help them decide whether to adopt them.

Another objective is to create awareness about the fundamental role played by technological knowledge as a tool in solving conflicts typical of the economic growth and social development processes. To that end, EMBRAPA devotes much time, thought and work to its communications actions.

The EMBRAPA & School Project is essential to achieve that objective, since not only does it take information to the classroom, but also brings students to the stage where scientific and technological development takes place.

In 2009, the company mobilized 1,520 schools, at the primary, secondary and tertiary educational levels, with 2,552 conferences in the classroom and 1,546 visits to experimental fields. Overall, 102,506 primary, 30,699 secondary and 1,693 tertiary education students, as well as 1,915 teachers, participated in the program.

In order to inform public opinion at large, the effort to interact with both the specialized and non-specialized media resulted in more than 25,000 articles in newspapers, magazines, websites, and blogs, in addition to more than 480 stories in the open and cable television networks.

An even greater effort is made to organize information so that it reaches immediately and directly the users interested in the application of the knowledge, which characterizes technology transfer. To that end, the company allocated over R$ 25 million.

EMBRAPA issued 61 new technical and scientific publications – books, manuals, magazines, and bulletins – which added up to 224,000 copies and reprinted nearly 100,000 copies of 66 titles already known to the rural productive sector.

Many of those publications are in the mini-libraries that reached 1,350 rural schools and communities in 2009. There are publications geared to students, teachers and scientists, such as an agricultural policy magazine (Revista de Política Agrícola) and the periodical PAB – Pesquisa Agropecuária Brasileira (Brazilian Agricultural Research- PAB). The electronic version of the twelve numbers of the latter publication was accessed more than two million times, mostly by foreign readers from 100 different countries.

EMBRAPA's weekly radio program Prosa Rural (Rural Talk) has four different formats, each tailored to one of the four Brazilian physiogeographic regions. Thus, EMBRAPA produced 192 different editions in 2009. Rural Talk was broadcast by 1,090 partner radio stations in the North (109), Northeast (531), South (109), Center-West, and Southeast (342) regions of the country.

For television, the company produced 44 editions of the program Dia de Campo na TV (Field Day on TV) ,

aired by Canal Rural; NET and SKY cable networks; TV EBC (parabolic antenna reception); TV Educativa (São Paulo); TVE São Carlos; Canal Agromix (Mato Grosso do Sul); TV Sete Lagoas (Minas Gerais); and TV Itabaré (Paraíba).

The main stories, available at the EMBRAPA Portal, were accessed 40,000 times. The EMBRAPA Digital Video Library, launched in 2008 and available through the Canal EMBRAPA in the YouTube and Google platforms, comprises 316 videos

In addition, the research centers and service units participated in more than 2,200 agricultural and scientific fairs and expos throughout the country, such as Expointer, in Esteio (Rio Grande do Sul); Agrishow, in Ribeirão Preto (São Paulo), Semi-Arido Show, in Petrolina (Pernambuco); Agrotins, in Palmas (Tocantins); and the SPPC Congress, in Manaus (Amazonas).

Support to government programs

Every year EMBRAPA provides producers more than 1,300 field days, almost 30,000 course hours, over 4,000 technical lectures, and sets up close to 5,000 demonstration or observation units throughout the country. In 2009, that effort was not diminished and a lot of emphasis was given to concentrate the focus of the activities.

The EMBRAPA PAC, for example, invested almost R$ 5.8 million in specific technology transfer projects, such as increasing corn productivity in all regions of Brazil and a new prescription for the sustainable production of paddy rice in the State of Rio Grande do Sul.

Those resources also benefited one of the structuring projects whose purpose is to put together all technology, knowledge and agricultural data databases into a single online technical advisory site focusing on the public and private technical agricultural assistance networks.

The EMBRAPA PAC also financed, in partnership with the Bunge Brasil company, a technology transfer project on cropping-livestock-forestry integration, which delivered 43 mini courses and 97 field days and implemented 128 demonstration units of this technology in 2009.

In another program, the Plano Safra Mais Alimentos (Harvest More Food Plan) had a huge impact on the technological inclusion of less favored parts of the productive sector. The Ministry of Agricultural Development provided financial support and EMBRAPA invested almost R$ 13 million to make the technologies and knowledge available to family farming settlements. The program involved close to 20,000 rural extension workers and 720,000 farmers.

With the participation of the state agricultural research and rural extension organizations, EMBRAPA delivered almost 600 training courses on agricultural production systems and nearly 550 events such as technical visits, as well as implemented more than 750 demonstration units.

More than 620 mini libraries were distributed, each containing 170 publications, 40 radio programs and 77 technical videos. The purpose of the libraries is to promote an average 17% increase in the production of milk, goats, sheep, fowl, rice, manioc, corn, wheat, coffee, bean, vegetables, and soybean in family farms.

The needs of family agriculture were also met through the seed production program. With the support of the Ministry of Agricultural Development and Petrobras, 2,800 tons of certified seeds of corn, bean, castor oil plant (Ricinus communis), and sunflower were produced and distributed among 190,000 families in the states of Paraíba, Ceará, Piauí, Bahia, Alagoas, Maranhão, and Sergipe.

In addition, training in 23 rural communities in the states of Maranhão, Sergipe and Pernambuco taught small farmers how to produce certified seeds, following the technical and legal requirements of the seed market, with a view not only to meeting the needs of their own communities, but also supplying the demand of the Northeast Region.

Maria Lúcia Simeoni

EMBRAPA also began the diagnosis and planning of the activities required for the Operação Arco Verde (Operation Green Arc), whose purpose is to promote sustainable agricultural production in the 43 municipalities of the Amazon Region with the largest deforestation rates, as a way to combat intentional forest fires in that region.

EMBRAPA has already selected the sustainable agricultural management technologies to be transferred to the family farmers in the region beginning in 2010 in this effort to have them change their farming model. All the municipalities have already received mini libraries with contents appropriate to that task.

With the support of the national certified seed and seedling industry and in order to meet the commercial demand, EMBRAPA produced and sold 4,700 tons of seeds of 308 cultivars last year. The seed was produced in the company's experimental fields and used to produce certified seeds, which will enable farmers to absorb the advanced technology built into those seeds.

For the nursery companies, EMBRAPA produced and sold 2.2 million cuttings and propagules (buds for grafting, seedlings in test tubes, etc.) of 36 cultivars of 15 different types of fruit trees. The company also licensed the

production, over 300,000 ha, of the seeds of 185 cultivars of 12 different vegetable species.

Lastly, using the public-private partnership mechanism, EMBRAPA partnered with productive sector companies to develop and issue 19 new cotton, banana, potato, rye, barley, pigeon pea, Brachiaria, soybean, wheat, and grape cultivars.

Nurturing innovation

The protection of intellectual property is the cornerstone of nurturing the transference of technological innovation from the laboratories and experimental fields to the production conditions, namely, the technology transfer process. In 2009, EMBRAPA officially requested, in Brazil and abroad, 31 new patent registrations, 111 cultivar registrations, 58 cultivar protection requests, 20 brand registrations, and six software registrations.

By the end of the year, the EMBRAPA portfolio was managing 1,084 ongoing intellectual protection requests: 228 for patents in Brazil and 162 abroad; 397 cultivar, 246 brand and 51 cultivar registration requests, in addition to the 728 cultivars already registered, for a total of 1,812 intellectual property actions.

Tropical Agriculture in Africa and the Americas

EMBRAPA Africa, the agreement that formally establishes technology transfer from Brazil to African countries was effectively set up in 2009. Researchers from various EMBRAPA centers carried out diagnoses and evaluations financed by EMBRAPA PAC, which invested slightly more than R$ 2.5 million in this project. EMBRAPA's evaluations showed that Brazilian agricultural technology could be transferred either through technical cooperation or technological business transactions.

The technical cooperation projects involve negotiations for joint operations by two or more government bodies and, therefore, could take more time. Technological business transactions, which focus on meeting the demands and selling technical services, could be arranged more quickly, but depend on an evaluation and ensuing decision by private sector companies of market opportunities and, therefore, could be more uncommon.

Distribution of EMBRAPA's activities in Africa

Projects, Actions, Crops, And Land

Caption

n Number of projects	**Themes**	**Crops**	**Livestock**
Actions	Conservation agriculture (Direct Seeding)	○ Cotton	■ Beef catle
© Training		● Vegetables	
G Germplasm transfer		● Fruits	■ Dairy cattle
		● Cassava	
NT Technology busines	▲ Institutional Reform	● Biofuels	■ Sheep & Goats
⬢ Machinery		● Forestry	
		● Grain	
	▲ Biotechnology	● Forage	

Concept: Renato Silva | Design: Roberta Barbosa

After missions prospecting the problems and technical cooperation opportunities in 19 of the 54 African countries, in 2008, nine projects were set up in eight countries, namely, Angola (1), Cape Verde (3), Mozambique (2), and Senegal (2), as well as Benin, Burkina Faso, Chad, and Mali, which share one project. The cost of the projects has been estimated at US$12,782,456 and will be financed by the Brazilian Cooperation Agency of the Ministry of Foreign Relations (ABC/MRE, in Portuguese).

Twenty-six projects are being negotiated, 16 of which depend only on the final technical framework: Burkina Faso (3), Ghana (4), Guinea Bissau, Mozambique (2), Nigeria (2), St. Thomas & Prince (2), and Senegal (2). The total budget for those projects is estimated at US$ 3,430,972. Ten additional projects depend on the definition of the technical parameters and an estimate of the resources to be contributed by the ABC/MRE. Those projects are located in Gabon, Kenya (3), Tanzania (3), and Zambia (3).

One of the projects already implemented and to which much expectation is attached focuses on the development of cotton growing in Benin, Burkina Faso, Chad, and Mali, which together have become known as Cotton-4. With investments of US$ 4.7 million, it is called a "structuring" project because it establishes scientific and technological cooperation as a diplomatic tool, to be used in their eventual alignment with Brazil in issues pertaining to international political disputes. The purpose of the project is to increase cotton productivity in those four countries, which would strengthen their position against government subsidies to cotton producers in the USA.

In 2009, a pilot unit of adaptive and demonstration research was set up at the Sotuba Experimental Station in Bamako, Mali's capital city. The work comprises soil management, direct tilling, plant nutrition, integrated pest control, and genetic breeding.

Ten Brazilian cotton cultivars (Buriti, Safira, Cedro, Aroeira, BRS 293, Sucupira, BRS 286, Araçá, and Jatobá) were tested in a comparison with two local varieties. BRS Aroeira and BRS 293, recommended for the western region of the State of Bahia, had remarkable vegetative development and good boll load – the colored cotton was also impressive.

In Angola, the agricultural research system is already being restructured, with an estimated investment of about

experiência de gestão da Embrapa: 13 técnicos do Ministério da Agricultura de Angola foram treinados em gestão de recursos humanos, em Brasília.

O planejamento inicial prevê a criação de quatro centros de pesquisas: de milho e feijão, em Huambo; de mandioca, batata-doce e amendoim e de caprinos e ovinos, em Malanje; e de gado de leite, em Kwanza Sul.

Dentro dos três projetos que visam ao desenvolvimento institucional da organização de pesquisa e de modernização tecnológica da caprinocultura e horticultura de Cabo Verde, quatro técnicos cabo-verdianos já foram treinados em planejamento estratégico e fortalecimento de imagem institucional e, no momento, elaboram o primeiro Plano Diretor da organização de pesquisa agrícola local. Outros dez técnicos iniciaram treinamento na implantação e operação de sistemas de produção de caprinos de leite e de hortaliças e frutas tropicais.

Para Moçambique, com o apoio do CIRAD/França, três pesquisadores já foram treinados nas técnicas de melhoramento genético de fruteiras, videiras e hortaliças e um técnico foi capacitado a desenhar projetos de instalação de unidades de melhoramento genético. No outro projeto, 15 técnicos já foram treinados em técnicas de plantio direto e manejo de recursos naturais, sobretudo solo e água.

Ao final de 2009 foram concluídas as negociações de acordos tripartites, a serem assinados em 2010 pelo Governo de Moçambique e a ABC/MRE : um, com o Governo dos Estados Unidos (USAID) para o fortalecimento institucional da estrutura de pesquisa e transferência de tecnologia agrícola moçambicana, e o outro, com o Governo do Japão (JICA), para desenvolvimento agropecuário das savanas daquele país, a exemplo do que foi feito nos cerrados brasileiros.

No Senegal, especialistas da Embrapa começaram, no final de 2009, a avaliar o estágio tecnológico da produção e do processamento de hortaliças (cebola, batata, tomate, alho e outras), enquanto outro grupo de especialistas avaliava as regiões daquele país aptas ao plantio da cana. Até o momento, cinco especialistas já foram treinados quanto ao planejamento de um programa de agroenergia.

A partir dessas avaliações, serão definidos os programas de treinamento de seis agrônomos nas técnicas de produção e manejo pós-colheita de cana e de quatro técnicos em técnicas mais modernas de produção e processamento de hortaliças.

Em paralelo à programação do Embrapa África, a empresa deu continuidade a todos os projetos anteriores de cooperação técnica com países do continente, sobretudo os projetos de capacitação financiados pela agência japonesa JICA: 27 técnicos de Angola, Cabo Verde, Guiné Bissau, Moçambique e São Tomé e Príncipe foram treinados em práticas de produção sustentável de hortaliças, de frutas tropicais e de mandioca e, especificamente para Moçambique, sobre manejo e conservação de recursos hídricos.

Quanto aos negócios tecnológicos, a Embrapa participou de duas experiências-piloto com o intuito de avaliar e formatar a sua atuação nesse contexto: a assessoria técnica à Construtora Norberto Odebrecht para montagem

Last year EMBRAPA participated in two pilot-experiments for the purpose of evaluating and shaping its technology business actions. Firstly, the company provided technical advice to a Brazilian civil construction company, Construtora Norberto Odebrecht, on how to set up a technology display on grain and vegetable production, at the Pungo Andongo Farm, in Angola. The second pilot-experiment was to supply technologies for a manioc production project for Chris Quarshie, a farmer in Ghana.

Transportation logistics and the lack of legislation protecting intellectual property are problems always faced in business transactions with African companies. Most of the 37 cultivars tested in Angola suffered from the lack of rain, since the lack of logistics delayed sowing.

Despite the harvest losses, pumpkin, cabbage, egg-plant, and carrot adapted quite well and the cultivars of soybean recommended for Goias (Paraiso, Amaralina and Emgopa 313), sorghum (BRS 310), "carioquinha"-type bean (BRS Radiante and Pontal), and cowpea (Nova Era, Maratoã and Xique-xique) performed very well.

In Ghana, in the manioc project, the use of the Brazilian planter in a direct drilling system using local manioc and cowpea cultivars in association with Brazilian soybean cultivars, resulted in manioc and cowpea productivities higher than the Brazilian and Ghanaian average productivities, as well as a considerable reduction of farming costs.

In Latin America, EMBRAPA continued implementing its EMBRAPA Venezuela project, which also operates according to the "technical cooperation" and "technology business" parameters. In the first case, EMBRAPA intensified its exchange with Venezuelan technicians and institutions in order to define a work schedule and to introduce, under Venezuelan weather and soil conditions, three cotton varieties, four tropical paddy rice varieties and five highland rice varieties, three corn varieties, eight sorghum varieties, and eleven soybean varieties.

The company also signed a technology transfer contract for the following agricultural projects: "Plains of Maracaibo", on irrigated farming of vegetables, fruits and manioc, as well as milk production, over 11,000 hectares, and "José Inácio de Abreu e Lima", which contemplates the production, milling and storage of soybean produced over a 35,000 ha area. Both projects are being developed by the Odebrecht civil construction company.

In October, presidents Luiz Inácio Lula da Silva of Brazil and Hugo Chavez of Venezuela visited the projects and checked the quality of the soybean crop on the first 2,000 ha developed at the Los Tigres community.

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Our thanks to EMBRAPA's centralize and decentralized operational units

Run: 1.000 copies

Cover: Cocoa flower. Photo: Zenilton Miranda

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