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11-1390000-002419-01

The Proceedings of
2009 Korea and Brazil Partnering Symposium

Enhancing Cooperation to Tackle New Challenges



May 12-15, 2009
RDA, Suwon, Korea



Rural Development Administration, KOREA

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Brazilian Agricultural Research Corporation, BRAZIL

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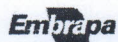
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- Session V -
Agricultural Engineering

Development of machines for small farmers in Brazil

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Embrapa Agricultural Instrumentation, São Carlos - SP, Brazil

Abstract

Brazil has 350 million of hectares used up five million of agricultural production unity distributed. Half of total farms have less than ten hectares but those farms use only two percent of agricultural area. Eighty percent of total area is occupied by farms that have more than hundred hectares. 50% of total area is used by livestock, 30% by forestry and 20% by crops. Most of large area units produce cattle and small units produce varied crops. So Brazil has a large variety of production model systems, climate and agricultural products, including tropical plants. This reflects for machine market and its use.

The Brazilian fleet of agricultural tractors is estimated at 361 thousand units. Those tractors are manufactured mainly by tree corporations: AGCO, CNH and John Deere. Those companies work with global projects and just few are developed locally. At 2009 the companies sold 600 tractors with above 200 hp at local market; 17 thousand tractors between 100 hp to 199 hp; 23 thousand tractors between 50 hp to 99 hp. The small tractor (below 49 hp) was sold 1.1 thousand. Micro tractor or cultivator sold 1.8 thousand units. It means that most of considered small farms in Brazil (less than ten hectares) do not work with tractor or mechanization. The implement manufacturers are majority local production. They use conventional mechanical technology for machinery and the use of electronics technology on their products is very few. The low rate of machines used in small properties shows that the technical solutions adopted in that equipment do not adequately meet the needs of this type of production system.

Some local production system like coffee, acai, babacu, cashew nut and sisal will be presented to discuss appropriate technology for then.

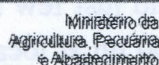
Key Words : small farm, mechanization, tropical agricultural products

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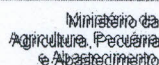
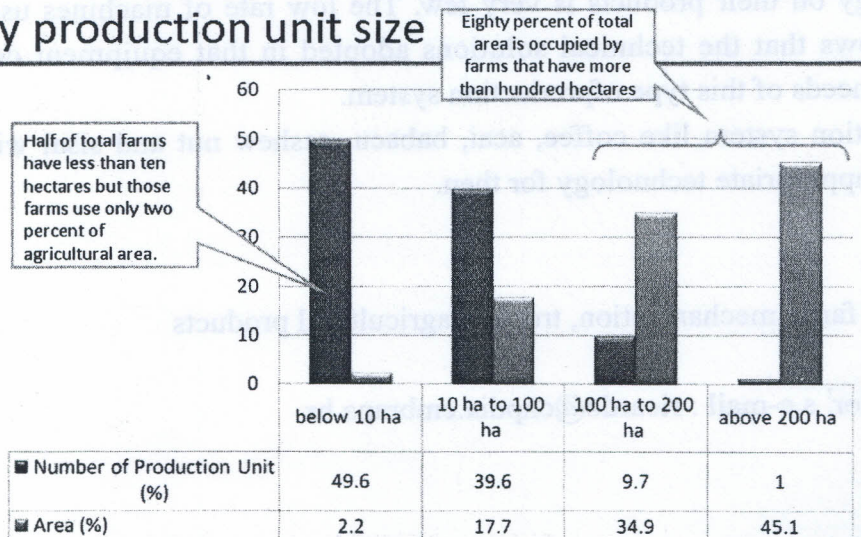
Agricultural Engineering: Development of machines for small farmers

Working topics for the RDA-Embrapa Joint Symposium
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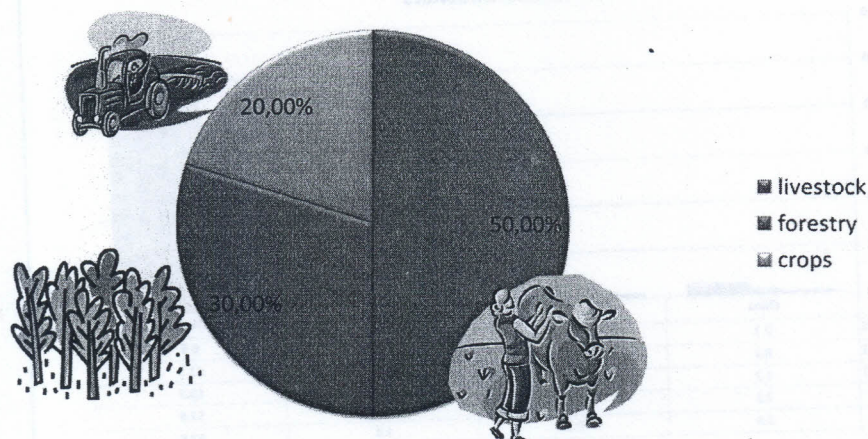
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Distribution of Brazilian agricultural system by production unit size



Area distribution for agriculture

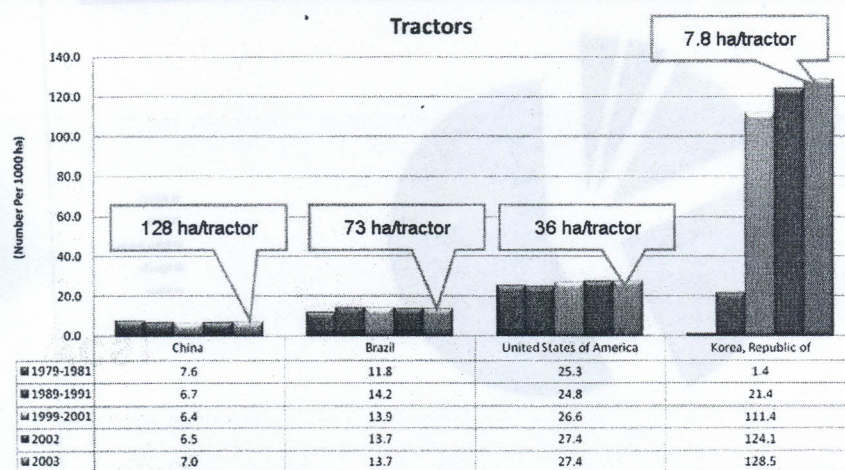


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Tractors per 1000 ha



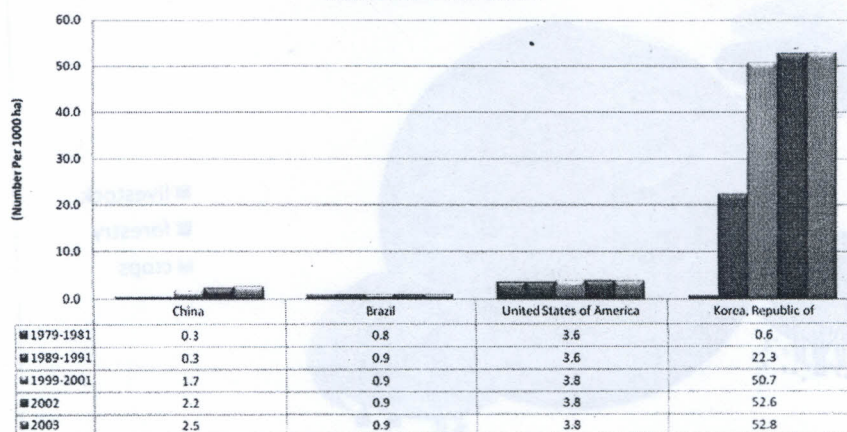
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Harvesters per 1000 ha

Harvesters-threshers



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Brazilian tractor market by manufacturer

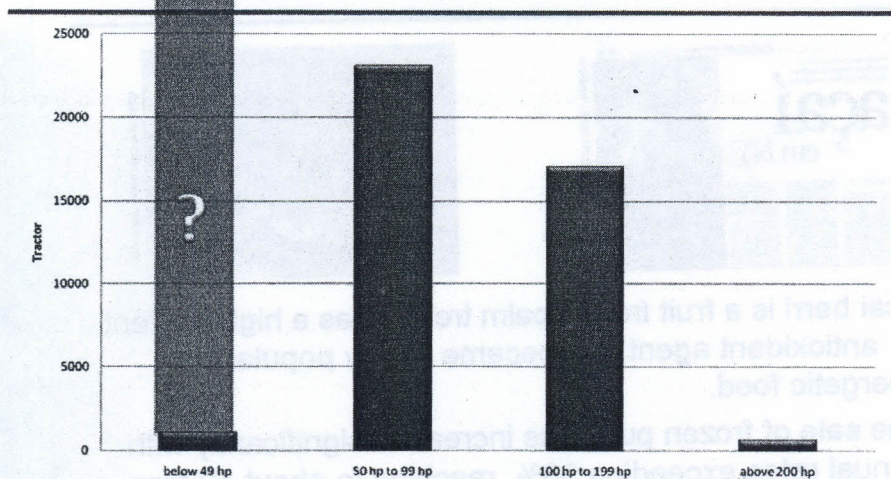


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Number of tractor sold in Brazil at 2008



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Acai

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Acai – international demand



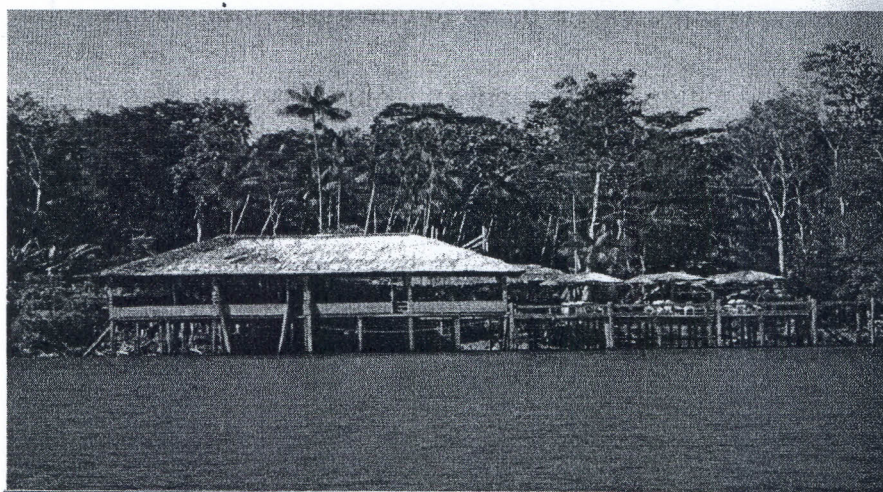
- Acai berri is a fruit from a palm tree. It has a high content of antioxidant agent and became a very popular energetic food.
- The sale of frozen pulp, has increased significantly with annual rates exceeding 30%, reaching to about 12 tons.

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Amazon area



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Agricultural process of acai.



- The harvest is a costly and difficult operation, because the stems easily reach 10 to 15 meters high, with the danger of breakage or toppling.
- One of main obstacles for this crop expansion is the harvest process. The number of native expert does not grow easily as needed.

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Acai harvester

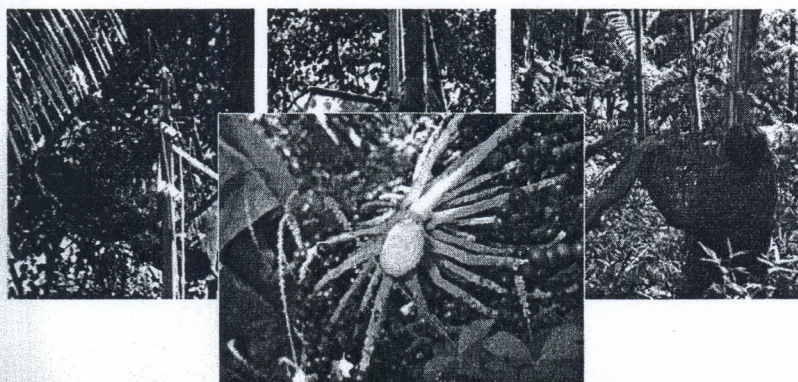


Image: Embrapa. Tests at Para - AM – Amazon Fruit.

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Test at farmer area.



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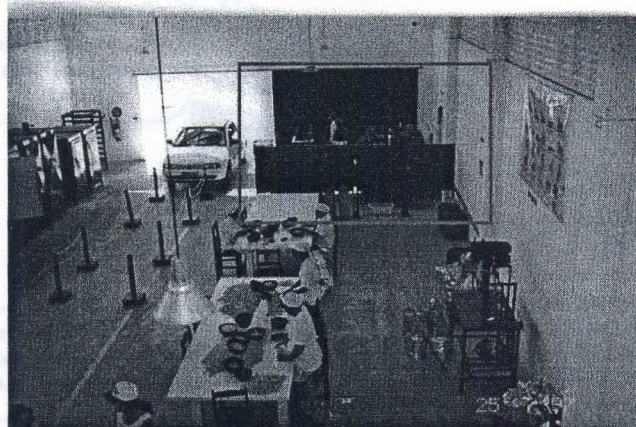
Cashew

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Cashew post harvest process

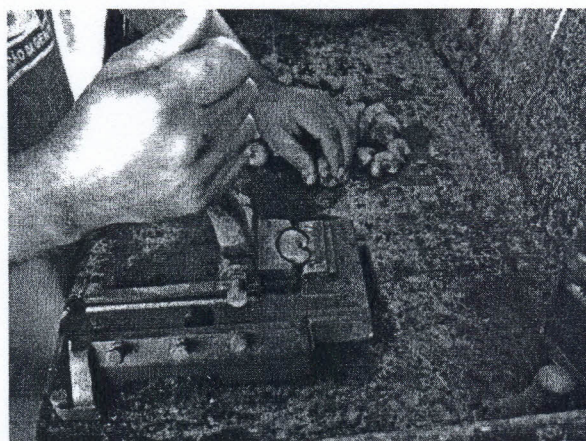


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Critical operation: shell opener.



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Critical operation: shell opener

The supporting leg must bear all the weight, because the other is doing the assessment work.



Repetitive movements of the arm to open the nut shell.

Repetitive movements of the leg to stick the blade in the shell of the nut.

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Babacu

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Babacu palm tree



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Babacu area



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Babacu palm tree



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Babacu area

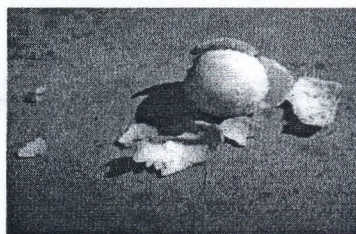
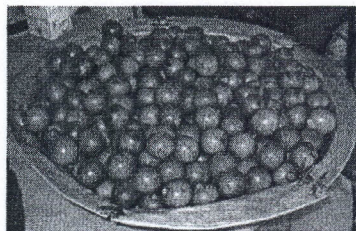
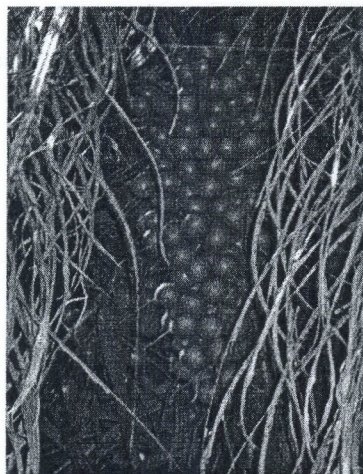
Bocaiuva

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Bocaiuva

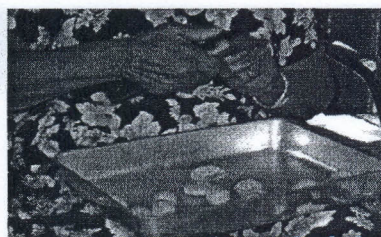


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Bocaiuva



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ISOBUS – ISO-11783

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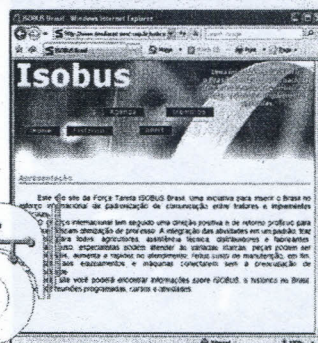
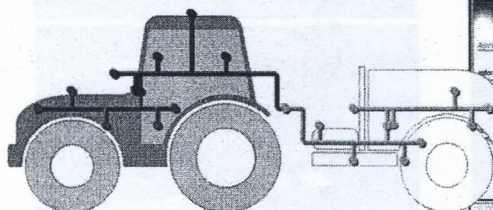
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ISOBUS at Brazil.



ABNT/CB 04 - Máquinas e Equipamentos Mecânicos
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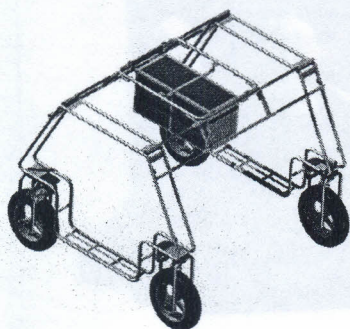
ROBOT – PRECISION AGRICULTURE

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Robot at Precision Agriculture



- ◆ Repeatability of the methodology, systematic work, ability to perform complex mathematical analysis, objectivity (lack of subjectivity), programables, accurate reading, lack of humor and constant performance.
- ◆ Sensing technology for land in agricultural environment.
- ◆ Technology of robotics, massive use of information technology, and electronic control board.

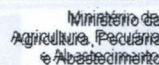
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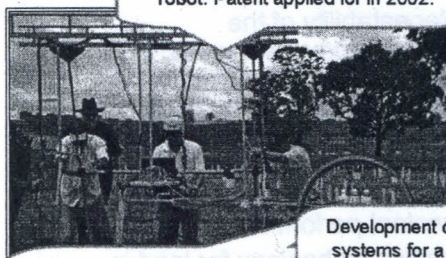
Robot at Precision Agriculture

- Requirements in industrialized countries.
 - High cost of labor.
 - Decline in rural population.
 - Increase the average age of rural workers.
 - Demand for quality of life and work with lesser effort.
 - High subsidy set for food security.
- Requirements in Brazil
 - Increased competitiveness in quality and cost.
 - Technology, logistics and information management.
 - Traceability, certification and consumer confidence.
 - Minor damage to the environment.
 - Agroenergy.



On-the-go sensor

Pioneer platform for agricultural robot. Patent applied for in 2002.

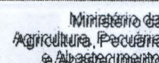


Sensor developed for nitrogen fertilizer applicator control in real time. Partnership with USDA-ARS by Embrapa USA Labex.

Development of control systems for a variable rate fertilizer application for sugarcane.

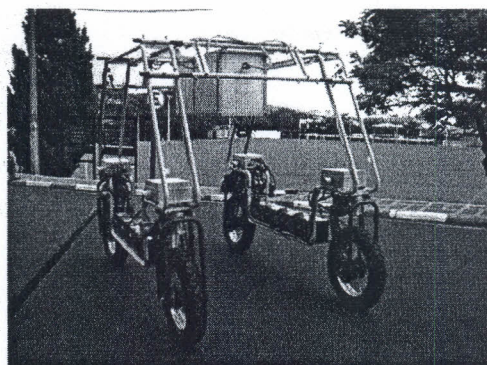


Cropcircle da Holland Scientific Foto: Embrapa



Tecnologies

- Massive use of information technology and onboard electronic control.



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