

## **Avocado production chain in the state of São Paulo (Brazil)**

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The aim of this study was to gather information on the production of avocado in the State of Sao Paulo and on the volume of exports of this fruit. Data were obtained from the Coordination for Integral Technical Assistance (CATI) and from the Secretary of Foreign Commerce (SECEX). Domestic avocado production is concentrated in the southeast and the State of São Paulo is the main producer, with 70,810 tons, or 54% of the national total. Between 2003 and 2008, the planted area of avocado decreased by 16.6%, but there was an increase of 67% in the number of plants. The varieties with highest output in the State of São Paulo, in decreasing order are, respectively, 'Fortuna', 'Geada', 'Quintal' and 'Margarida'. Brazilian exports of the 'Hass' variety grew from 100 tons in 2004 to 1,690 tons in 2009.

## **La cadena de producción de aguacate en el estado de São Paulo (Brazil)**

Este estudio tuvo como objetivo reunir información sobre la producción de aguacate en el Estado de Sao Paulo y sobre el volumen de las exportaciones de esta fruta. Los datos fueron obtenidos de la Coordinación de Asistencia Técnica Integral (CATI) y de la Oficina de Comercio Exterior (SECEX). La producción nacional de aguacate se concentra en el sureste y el Estado de São Paulo es el principal productor, con 70.810 toneladas, o el 54% del total nacional. Entre 2003 y 2008 hubo una reducción de la superficie plantada con aguacate de 16.6%, pero hubo un aumento del 67% en el número de plantas. Las variedades con mayor producción en el Estado de São Paulo, en orden decreciente, respectivamente, son 'Fortuna', 'Geada', 'Quintal' y 'Margarida'. Las exportaciones brasileñas de 'Hass' pasaron de 100 toneladas en 2004 a 1.690 toneladas en 2009.

## **INTRODUCTION**

According to Agriannual (2010), world avocado production was 3.3 million tons in 2007. From 2000 to 2007 production of this fruit substantially increased by about 20% while the global area planted in the same period increased by 12%. Brazilian production is concentrated in the Southeast region, followed by the South and Northeast. Sao Paulo State is the largest producer state with a production volume in 2007, of 70,810 tons (54% of the national total), followed by Minas Gerais (33,436 tons) and Paraná (20,425 tons). Avocado growers are found throughout the whole of Sao Paulo State. The seasonality of the volumes of some of the main varieties commercialized at CEAGESP in 2008 can be separated according to origin of production, i.e., Sao Paulo, Minas Gerais and Paraná. This provides the market with important information about the fruit. The outlook for the international market and Brazil's position as an exporter of avocado are also of great importance. The Brazilian market has significantly evolved, and even includes the adoption of certification and traceability programs that are required by the most demanding markets. However, there is still a lack of information in Brazil for business people who need to make decisions regarding various segments of the supply chain. This aim of this study is to gather information on the production and commercialization of avocados in Sao Paulo State and on the volume of exports of this fruit.

## **MATERIAL AND METHODS**

To evaluate the avocado production areas in Sao Paulo State, data from the most recent Census of Agricultural Production Units (LUPA 2007/08) were used. This census was carried out by the Coordination for Integral Technical Assistance (CATI, 2008) at the Secretariat of Agriculture and Food Supply of Sao Paulo State (SAA/SP). Data regarding the area of production and municipality were tabulated and compared with data from the LUPA census 1998/2003.

Data from the Sao Paulo General Warehousing and Centers Company (CEAGESP) were tabulated in order to assess the commercialization volume for each variety.

To assess avocado export volumes, data from the Secretary of Foreign Commerce (SECEX, 2009) were used as well as information provided by JAGUACY BRASIL, the leading avocado export company.

## RESULTS AND DISCUSSION

The avocado production areas in Sao Paulo State in the Lupa 2007/08 census were estimated at 966 Agricultural Production Units (UPAs), occupying 5,425 hectares, a total of 1,068,229 avocado trees, with a mean crop density of 196 plants/ha, distributed throughout 216 municipalities. Compared with data from surveys conducted from 1998 to 2003 by CATI (2003), which totaled 1,316 UPAs in 6,503 hectares planted with 716,000 avocado trees at a planting density of 110 plants/ha in 280 municipalities, there is a considerable reduction in area, but a higher density of planting, resulting in a 67% increase in the number of plants in the State (Table 1). For the classification of avocado production areas, Jardinópolis is ranked in first position with 78 UPAs and an area of 408 hectares located in the EDR of Ribeirão Preto, and the second position is the EDR of Mogi Mirim municipality with 230 hectares distributed among 47 UPAs. One important statistic from the LUPA 2007/08 census, is the decrease of UPAs for the entire State and the significant increase of area in some municipalities, for example, Altinópolis and Bernardino de Campos have a smaller number of producers per unit of area.

Table 1. Data from Lupa 1998/2003 and 2007/2008 presenting the ranking of avocado per municipality, classified per planted area.

Ranking of avocado per municipality classified by planted area 1998/2003 (CATI, 2003)				Ranking of avocado per municipality classified by planted area 2007/2008 (CATI, 2003)			
Ranking	Municipality	No. of UPAs	Area (hectare)	Ranking	Municipality	No. of UPAs	Area (hectare)
1º.	Mogi-Mirim	55	495.10	1º.	Jardinópolis	78	408.50
2º.	Jardinópolis	90	454.80	2º.	Aguai	40	259.60
3º.	Bauru	12	237.10	3º.	Altinópolis	10	256.30
4º.	Santo A. de Posse	30	232.10	4º.	Mogi-Mirim	47	230.20
5º.	Tupã	19	221.90	5º.	Bauru	7	216.50
6º.	Araras	37	219.30	6º.	Tupã	17	194.50
7º.	Pat. Paulista	8	197.60	7º.	Araras	33	169.60
8º.	Iacri	5	196.00	8º.	Santo A. de Posse	27	169.50
35º.	Altinópolis	4	39.60	19º.	Bernadino de Campos	1	90.00
Others		795	2.293.50	Others		520	3.309.10
Total		1.315	6.503.00	Total		966	5.425.35

The seasonality of the varieties of avocado marketed in CEAGESP in São Paulo shows that avocado sales occur practically the whole year round, with the time of production alternating for each variety: 'Margarida' is harvested from March to December, 'Fortuna' from March to September, 'Breda' from June to December, 'Geada' from December to April, 'Quintal' from March to September and last (also in terms of volume production), the 'Hass' variety, from February to September (Table 2).

Table 2. Seasonality of avocado varieties commercialized at CEAGESP

Variety	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Geada	x	x	x	x								x
Fortuna			x	x	x	x	x	x	x			
Quintal			x	x	x	x	x	x	x			
Margarida			x	x	x	x	x	x	x	x	x	x
Breda						x	x	x	x	x	x	x
Hass		x	x	x	x	x	x	x	x			

Source: CEAGESP 2008

These varieties may be described in the following manner:

**Gead** or Barbieri – Belongs to floral group B; it harvests early, from January to February in São Paulo. The fruit weighs about 700 grams, has a pyriform shape, dark green, smooth and glossy skin; it has 80% flesh yield, with only 3.2% creamy yellow oil, with few fibers, and the flesh adheres to the elliptical stone, which is small in size.

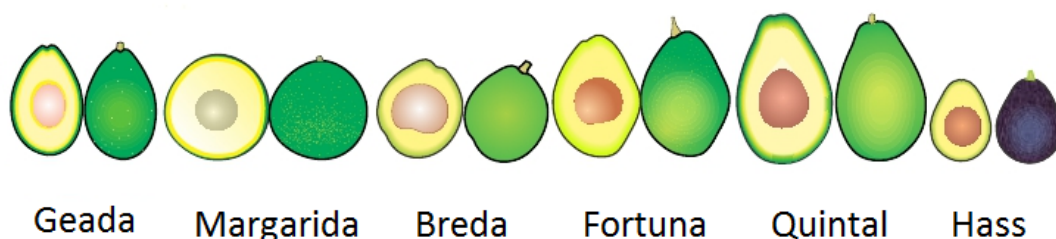
**Margarida** – This cultivar belongs to floral group B. The leaves of new shoots have a purplish brown color (a characteristic of the Guatemalan race). The fruit can be harvested from July to October, is large, weighing an average of 800 g, with a peripheral orbicular shape; the skin is thick, green and pebbly; the flesh is light green and adheres to the stone; the stone is small (10% of fruit weight) and has an oblate shape.

**Breda** – The Breda is type A, a possible hybrid of the Guatemalan x West Indian races and despite having high commercial value, has an alternating production. The fruits can be harvested from June to December, have an elliptical shape and weigh 400-600 g, with a smooth green skin and a yellow flesh without fibers.

**Fortuna** – is widely planted in Sao Paulo; it is resistant to scab disease (*Sphaceloma perseae*) and belongs to floral group A. Its harvest is from May to July, the fruits weigh 600-1000 g, are pyriform, with dark-green skin, yellow flesh, and a loose stone, that is slightly conical and oblate.

**Quintal** – Guatemalan x West Indian hybrid, belongs to floral group B. The fruit can be harvested from April to July, is large, weighing 500-800 g, pyriform shape, green skin, yellow flesh without fibers; conical stone of medium size, adherent to the pulp.

**Hass** - belongs to the Guatemalan race and floral group A. The fruit is relatively small, weighing on average 200 to 250 g, with an oval to pyriform shape, skin that is thick, pebbly and dark purple in the maturation phase; the stone is small, and the pulp is adherent to the stone, and the flesh has no fibers.



Drawing: Bertoldo Borges Filho / CQH - Centro de Qualidade em Horticultura - CEAGESP

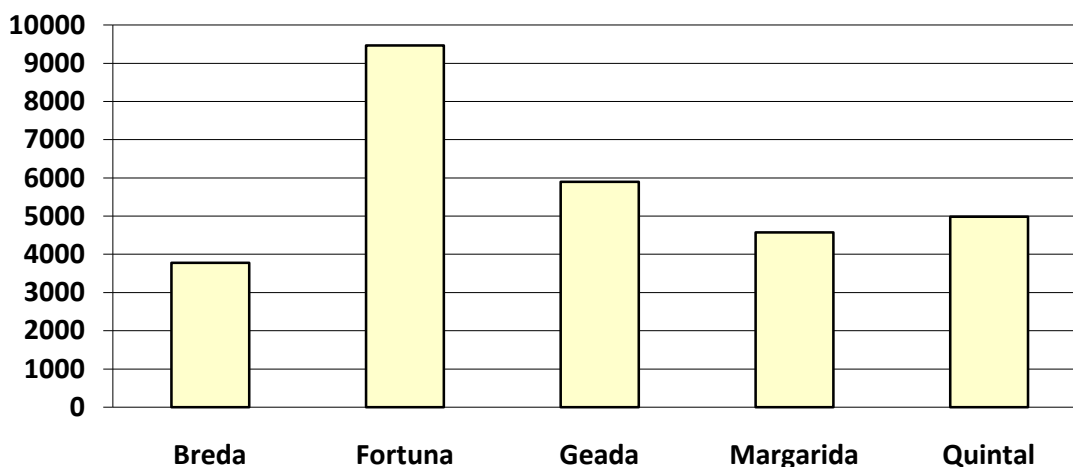
Figure 2. Comparison of avocado varieties

Table 3. Comparison of varieties of avocado

Varieties	Skin/Color/Thickness	Weight(g)	Shape	Harvest	Flesh
Gead	Smooth green/ thin	400/700	Pyriform	dec/apr	Yellow with few fibers
Margarida	Pebbly green/ thick	600/800	Spheroid	mar/dec	Yellow without fibers
Breda	Smooth Green/thin	400/600	Oval	jun/dec	Yellow without fibers
Fortuna	Dark Green/medium	600/1000	Pyriform	mar/sep	Yellow without fibers
Quintal	Smooth Green/medium	500/800	Pyriform	mar/sep	Yellow without fibers
Hass	Dark purple/pebbly/thick	200/250	Pyriform	feb/sep	Yellow without fibers

Source: Bertoldo Borges Filho / CQH - Centro for Quality in Horticulture - CEAGESP

According to data from CEAGESP, the variety with the greatest sales volume is Fortuna, followed by Geada, Quintal and Margarida (Graph 1)



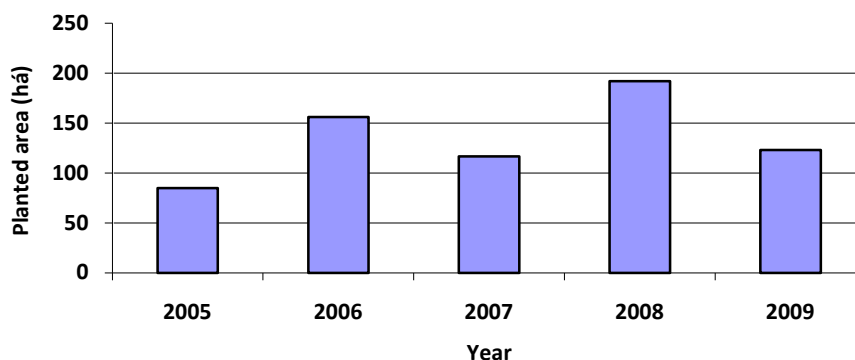
Graph 1. Commercialized volume of varieties at CEAGESP in 2008 (in tons)

The commercialization of the 'Hass' is still quite small compared to other varieties. In 2009, 90 tons of 'Hass' were sold and 39,251 tons of other varieties and in 2010, 106 tons of 'Hass' were sold and 36,426 ton of other varieties (Table 4).

Table 4. Quantity of 'Hass' and other varieties of avocado commercialized at CEAGESP for the years 2009 and 2010 (in tons).

Variety	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2009												
Hass	3	9	9	11	11	10	9	13	10	3	1	1
Others	2,758	3,332	3,745	3,475	3,313	3,142	3,444	3,345	3,363	3,500	3,104	2,731
2010												
Hass	4	8	14	14	18	13	14	8	6	0	1	6
Others	3,244	3,342	3,600	3,640	3,352	3,228	3,408	3,193	3,345	2,632	1,921	1,522

Brazilian exports grew from 100 tons in 2004 to almost 1,000 tons in 2008 (SECEX, 2009). This increase may be linked to the increase in the area planted with the 'Hass' variety, data that can be extracted from information provided by JAGUACY BRASIL (2010), the leading exporter of fruit. From 2000 to 2004, 92 hectares were planted, and from 2005 to 2009 about 800 hectares of fruit were planted, distributed throughout several regions of São Paulo State and in some regions of Minas Gerais (Graph 2). Exports of JAGUACY BRASIL in 2009 were around 1,690 tons, while in 2010 the figure was 2,185 tons, an increase of almost 30%.



Graph 2. Yearly planted area with 'Hass' in Brazil

## CONCLUSIONS

- Sao Paulo State saw a reduction in the area planted with avocado between 2003 and 2008 from 6,503 ha to 5,425 ha, but there was an increase in the number of plants due to higher density in the new plantations, which rose from 110 plants/ha to 196 plants/ha, which represents an increase of 67% in the number of plants in the State;
- Sao Paulo State provides Ceagesp with 'Margarida' avocados from March to December, 'Fortuna' from March to September, 'Breda' from June to December, 'Geada' from December to April and 'Quintal' from March to September;
- The varieties with highest production volume in São Paulo State, in decreasing order, respectively, are 'Fortuna', 'Geada', 'Quintal', and 'Margarida';
- Brazilian exports of the 'Hass' variety rose from 100 tons in 2004 to 2,185 tons in 2010.

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