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Blossom and Ripening Periods of Blackberry Varieties in Brazil

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Abstract

In the State of Minas Gerais, Brazil, fruticulture has been increasing and diversifying for the past several years. Blackberry appeared to be a viable crop to growers, however there were no experimental data. The objective of this work was to evaluate phenological phases of the blackberry varieties on Poços de Caldas' Plateau. This work was carried out on the Epamig Experimental Farm in Caldas (MG) during 1997/1998 and 1998/1999. Phenophases of 7 varieties (Brazos, Comanche, Ébano, Caingangue, Guarani, Tupy and Cherokee) and one selection (97) were evaluated. Following conclusion were drawn: 'Brazos' and 'Comanche' were the earliest cultivars; the beginning of blackberry harvest in Poços de Caldas took place about one month before the production of Rio Grande do Sul State, the largest Brazilian producer; the earliest varieties Comanche and Brazos blossomed between late August and early September.

Topographical features of Poços de Caldas' Plateau town, in the State of Minas Gerais (Brazil) limit the use of agricultural mechanization, indispensable to grain production. Alternatively the small farm systems of the region are highly suited to fruit production. The climate of the region is classified as a rainy temperate (mesothermic), also called altitude subtropical, presenting the mean temperature of the coldest month below 18 °C and mean of the hottest month around 22 °C. Air humidity reaches 80 to 90% of relative humidity from Dec-Feb. Frosts normally occur from May to August, corresponding to the dormancy period (rest time) of temperate fruit crops. Annual rainfall 12 to 16 cm.

Due to the farmers low remuneration and purchasing, from Poços de Caldas Plateau, originating from the milk and grain production it has been necessary to identify alternatives that may, at the same time improve the farmers' way of living generate jobs and increase the district collection. The fruit activity is perfectly identified with the profile of the small farms and region characteristics. Another important characteristic of the region is to be near the consumer markets of the country. The region is about 330 km from São Paulo (the largest distributor and consumer center in Brazil), 450 km from Rio de Janeiro and 480 from Belo Horizonte (capital of Minas Gerais state) (Figure 1).

In the search for alternatives for farmers, blackberry appears as a potential crop of high market value. Several studies have been conducted on blackberry crops in the Rio Grande do Sul, Santa Catarina and São Paulo States, concerning the adaptation and propagation of this species, however have been no studies of blackberry in the southern state of Minas Gerais. These are particularly critical, as phenological data may vary from year to year depending mainly on satisfaction of its cold requirement (7). In the State of Rio Grande do Sul,

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the Ebano variety starts blooming on the second fortnight of October, extending up to early November, and the harvest season goes from mid-December to early November (1, 2, 8, 4). Full blooming of the 'Caingangue,' occurs on the first ten days of October in Pelotas town, Rio Grande do Sul State, conditions. The harvest season extends from the second ten days of November through the second ten days of December, with an average yield of 3.45Kg/plant and an average weight of 5.6g/fruit (10).

Blossoming of the 'Tupy' in Rio Grande do Sul takes places by from the end of August to mid September. Harvest is by the third ten days of November through the second of December (11). 'Guarani' blooms during the whole month of September until the first ten days of October, with harvest season lasting through the month of December (11).

Peruzzo, Dal Bó and Piccoli (9) reported at Videira, Santa Catarina State, that 'Brazos' started blossoming during the second ten days of September and 'Caingangue' began ten days later, while 'Tupy,' 'Çomanche,' 'Guarani,' 'Cherokee' and 'Ébano' spread throughout the month of October. The production extended from the second ten days of November to the end of January.

The objective of this work was to evaluate the phenophases aspects of blackberry varieties on Poços de Caldas Plateau, during the vegetative cycles of 1997/1998 and 1998/1999.

Materials and Methods

This work was conducted at the EPAMIG Experimental Farm in Caldas, Minas Gerais State (Brazil) during the agricultural years of 1997/1998 and 1998/1999.

The varieties studied were: Comanche, Ébano, Caingangue, Cherokee, Guarani, Tupy e Brazos, and a selection named 97. The evaluations were undertaken, on five plants per variety, planted with a double trellis system. Climatic conditions during this work period can be observed in Figure 2A and 2B.

Due to lack of information on the methodology of phenology evaluation literature for blackberry, some criteria were proposed and grades 0 to 9 were assigned, as follows: 0 – Closed blossom; 1 – Open button; 2 – Open blossom; 3 – Petal fall; 4 – Fruits swelling with floral remains; 5 – Fruits swelling without floral remains; 6 – Change of fruit color from green to reddish; 7 – Fully red berries; 8 – initiation of black; and 9 – Fully black berries.

The beginning of bloom was identified as the stage when more than 5% of the flowers were open; full bloom occurred when 50 to 70% of the flowers were open and the end of bloom was identified when less than 10% of the flowers remained open and most had fallen.

Results and Discussion

Most of the varieties developed for a longer period of time between the close blossom phase (0) and fully black fruit (9) (Table 2), in 98/99. This may have been due to reduced sunlight which might have limited the plants' photosynthetic rate, increasing the phenological cycle. The results obtained revealed that the length blossom ranged from 77 in 'Brazos' in 97/98, to 105 days in 'Comanche' in 97/98, with a mean of 88 days.

Figure 2A shows that there was no rain in June and July of 1997, and August 1998, which is a characteristic of the region. In the year of 1997, temperature decreased from May to August (Figure 2B), while in 1998, temperature increased from July on. These variations among years in temperature, rainfall and sunlight probably influenced the behavior of the blackberry varieties.

'Brazos' (17 days), 'Ébano' (16 days) and 'Tupy' (12 days) varied the most in rate of development between 97/98 and 98/99, which could indicate that they have an adaptive plasticity in regions where average temperatures in September were equal or higher than 19°C, as happened in 1997, in Caldas. Sentelhas (12) reported that higher temperature reduces the vegetative cycle of grapes, and may be associated with the genetic background of the variety.

Table 1. Blossom period of blackberry in the crops 1997/98 and 1998/99 in Caldas – Minas Gerais State.

Varieties	Blossoming – 1997/98				Blossoming – 1998/99			
	Start (A)	Full	End (B)	A-B (days)	Start (A)	Full	End (B)	A-B (days)
Selection 97**	9/26	10/18 - 11/14	12/14	80	9/25	12/16 - 11/18	12/12	79
Brazos	9/15	9/30 - 11/2	11/30	77	9/3	9/16 - 9/30	12/5	94
Tupy	10/2	10/31 - 11/27	12/27	87	9/5	10/8 - 11/12	12/14	101
Cherokee	9/28	10/20 - 11/10	12/17	81	9/20	10/20 - 11/1	12/16	88
Caingangue	9/13	10/9 - 11/26	12/12	86	9/7	9/30 - 10/16	12/16	101
Guarani	9/16	10/10 - 11/24	12/9	85	9/9	10/3 - 11/20	12/12	95
Ébano	10/4	10/30 - 11/25	12/25	83	9/23	10/20 - 12/4	12/12	81
Comanche	8/30	10/7 - 10/29*	12/12	105	8/31	9/15 - 10/9	11/27	88
Mean				85.5				90.8

*Full blossom period (month/day), described in materials and methods.
**This is one selection of Breeding Program of EMBRAPA - Dr. Alverides Machado dos Santos responsible person.

Moore, Brown and Sistrunk (6) mention that the 'Cheyenne' variety has a greater adaptation spectrum than 'Comanche.'

Changes in blossoming period may occur depending on the chilling hours accumulation as well as on the onset of high temperatures favorable to growth (7). Temperature is one the most important climatic factors on temperate climate plants, since it plays a fundamental role in the development process (12).

Temperature is the chief regulator of plant metabolism and therefore, the growth and development process (5). Davies and Darnell (3) report that for blueberry (*Vaccinium* spp), the favorable temperature for CO_2 assimilation, and consequently for photosynthetic process, is between 25 to 30 °C what is similar to other brambles. In the present work, it was observed that there was a longer cold period (Figure 2B) in 1997, associated with a dry period in August that year, which may have reduced the blossoming period of 5.3 days relative to 1998 (90.8 days), where the rise of temperature in early July and presence of rains probably prolonged the blossom period.

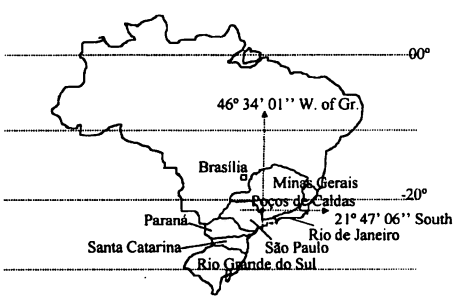
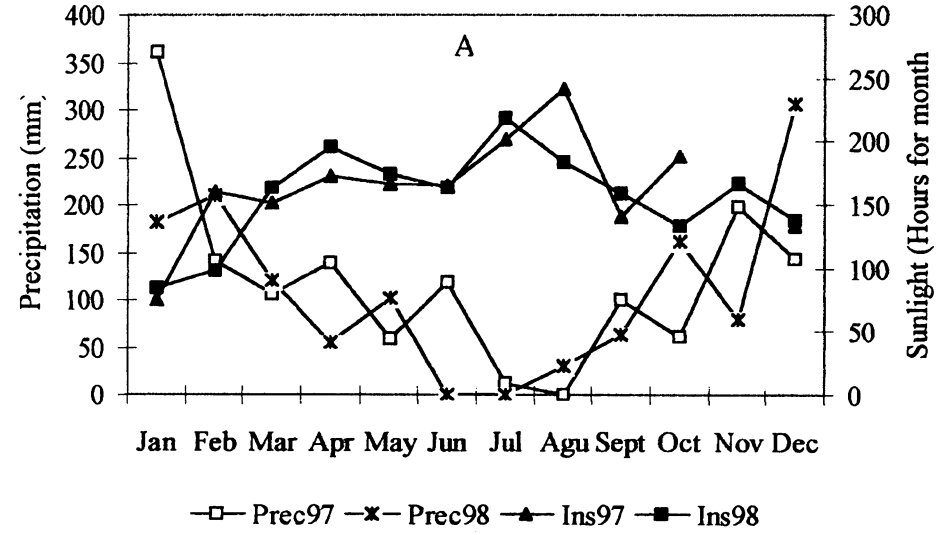


Figure 1: Map of Brazil with localization of Poços de Caldas City.

Blossom period (Table 1) occurred from August to December, with 'Comanche' as the earliest (August 20-30), and followed by 'Caingangue,' 'Brazos,' 'Guarani' and 'Tupy' (September 1-10 - 98/99).

The other varieties initiated bloom during September 20 – October 1, and ending Dec 10-20, similar to the blossom period of Brazil's southern region (9). In contrast, Santa Catarina State, has a greater number of cold hours, increasing the rest period of plants resulting in a late bloom. Conversely, more rapid increase in temperature, as early as in the months of July to August in Minas Gerais, speeds up an anticipation of the plant cycle.

Beginning the production on the third ten days October, 'Brazos' and 'Comanche' were considered the earliest ones in 1997/98 and, in 1998/99 were followed by 'Tupy' and 'Caingangue' (Table 3). Excepting for the earliest cultivars, the other ones continued up to the month of February, on the two agricultural evaluated years (Table 3). As well as in the blossom period, the average duration in the production period was 6.6 days superior in 1998 (92.8 days) in relation to 1997 (86.2 days).



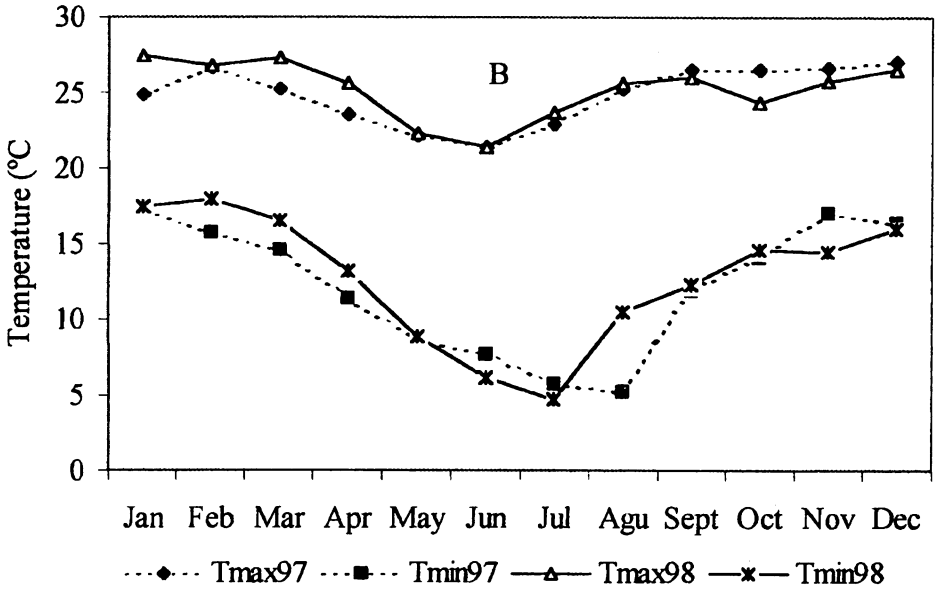


Figure 2. Precipitation and hours of sunlight (hours for month) (A) and means of maximum and minimum temperature (B) during the year of 1997 and 1998 in Caldas-Minas Gerais State.

Table 2. Number of days between phenophase 0 and 9 in blackberry in the crops 1997/98 and 1998/99 in Caldas – Minas Gerais State.

Varieties	Source	Year 1997-98	Year 1998-99	Difference between years (days)
Selection 97*	Brazil (Embrapa/Pelotas)	52	56	4
Brazos	USA (Texas)	37	54	17
Tupy	Brazil (Embrapa/Pelotas)	40	52	12
Cherokee	USA (Arkansas)	50	52	2
Caingangue	Brazil (Embrapa/Pelotas)	55	52	–3
Guarani	Brazil (Embrapa/Pelotas)	58	56	–2
Ébano	Brazil (Embrapa/Pelotas)	40	56	16
Comanche	USA (Arkansas)	55	59	4
Mean		48.4	54.6	6.2

*This is one selection of Breeding Program of EMBRAPA - Dr. Alverides Machado dos Santos responsible person.

Table 3. Harvest period of blackberry in the crops 1997/98 and 1998/99 in Caldas – Minas Gerais State.

	Harvest – 1997/98				Harvest – 1998/99			
Varieties	Start (A)	Full	Final (B)	A-B (days)	Start (A)	Full	Final (B)	A-B (days)
Selection 97	11/17	12/9 - 1/5	2/5	81	11/20	12/16 - 1/18	2/8	81
Brazos	10/22	11/6 - 12/9	1/5	76	10/27	11/6 - 12/25	1/29	95
Tupy	11/11	12/9 - 1/5	2/5	87	10/27	11/30 - 1/4	2/5	102
Cherokee	11/17	12/9 - 12/30	2/5	81	11/11	12/11 - 1/8	2/8	90
Caingangue	11/6	12/1 - 1/20	2/5	92	10/29	11/20 - 12/28	2/8	103
Guarani	11/14	12/9 - 1/20	2/5	84	11/3	11/27 - 1/15	2/8	98
Ébano	11/14	12/9 - 1/20	2/5	84	11/18	12/21 - 1/29	2/8	83
Comanche	10/24	12/1 - 12/ 23	2/5	105	10/27	11/13 - 12/7	1/25	91
Mean				86.2				92.8

The blackberry production evaluated in this work began almost one month before the traditional region in this kind of Rosaceae production. This anticipated production, in the moth of October, already gives to the producer an excellent business opportunely, since it's one of the best price consumer market period. Cultivars as 'Brazos,' 'Comanche,' 'Tupy' and 'Guarani' may be explored with large success in the south of Minas Gerais state, due to its adaptation and productivity in answer to the proposed conditions in this work. Based on the data obtained in Caldas, the blackberry due to its hardiness has great possibilities to reach the table fruit market, regardings the absence of use of agrochemicals during its production phase and its peculiar qualities.

Conclusion

The beginning of blackberry harvest took place about one month before the production of Rio Grande do Sul State, the largest Brazilian blackberry producer. The earliest varieties Comanche and Brazos blossomed between late August and early September in Poços de Caldas' Plateau.

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'Don Agustín,' 'TropicSnow' and 'Fla. 1-8' Peaches for Central Argentina[1]

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Abstract

The central peach growing region of Argentina, which includes the northeastern part of Buenos Aires and southern part of Santa Fe provinces, mainly supplies the domestic market from late October to early February. Cultivars are the cornerstone of the peach industry and testing new genotypes is necessary to replace or supplement the existing cultivars in the industry.

'Don Agustín,' was released in 1999 for trial plantings in this region. 'TropicSnow' and Fla. 1-8, have also received good evaluations. 'Don Agustín' ripens in 'Springcrest' season with superior fruit size and productivity. 'TropicSnow' ripens with 'June Gold' and is the season's first freestone, white flesh peach. It has large fruit size, attractive skin color and high flavor. Fla. 1-8 ripens in 'Flordaking' season with large fruit size, attractive skin, and good firmness in spite of irregular annual productivity.

Peach and nectarine production is mainly concentrated in the Argentina provinces of Mendoza, Buenos Aires, Santa Fe, Río Negro and Córdoba. National peach production is mostly distributed between the provinces of Mendoza (32%), mainly for canning, and Buenos Aires (28%), for fresh market (1, 2, 3, 4). The central peach growing region of Argentina includes the northeastern part of Buenos Aires province and southern part of Santa Fe province. Approximately 10,500 ha of stone fruit are grown in this area (near 34° S and 60° W). This production area has adequate annual rainfall for peaches (no irrigation) and winter chilling averages 500 hours below 7°C. In addition, there are about 150 nurseries, representing almost 750 ha, producing fruit, forestry and ornamental trees (1).

The fruit production areas primarily supply the domestic market from late October to early February. Cultivar develop-

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