Sweet cherry chilling requirements are influenced by locality and cyanamide application

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ABSTRACT

Prunus avium L. is a fruit tree that grows in temperate climates, whose flowering depends on the fulfillment of determined chilling requirement. When chilling accumulation is lower than 50% of the requirement, bud break takes longer and flowering is erratic, reducing final fruit yield. To overcome the lack of cold and synchronize bud break, hydrogen cyanamide application in the field can be used. The objective of this work was to determine the chilling requirements of the sweet cherry varieties "Royal Dawn", "Bing", "Lapins", "Regina", "Santina" and "Kordia" from twoproduction fields located at O'Higgins region of Chile and compare the chilling requirements pre and post cyanamide application. Two commonly chill models were used to evaluate the chilling requirements pre and post cyanamide application in the field. Sticks of each variety harboring dormant floral buds were kept in growth chambers at 4.5 °C in darkness to accumulate cold in a controlled manner and then were taken to favorable conditions in the greenhouse (25°C, long day photoperiod) to analyze the % of bud break. It was observed that bud break increased through successive chilling hour accumulation. It was observed that "Royal Dawn" was the variety with the lowest chilling requirement while "Kordia" was the one with the highest chilling requirement. Moreover "Lapins" from the different localities evaluated presented different chilling requirements. These differences may be due to the different conditions of latitudes, altitudes and microclimates. All varieties required less cold accumulation for bud break when hydrogen cyanamide was applied.

METHODS

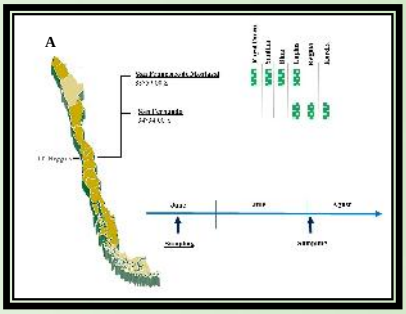

Fig.1 Forty cuttings per variety were sampled from two comercial fields located at O'Higgins region of Chile during June until August 2017. The cuttings were maintained in a cold chamber (3.0 – 4.5 °C) at different times and then transferred to favorable conditions (25 °C, long day photoperiod) until at least 50 % bud break.

RESULTS

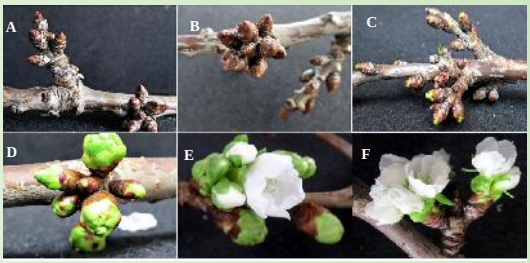

Fig 2. Phenological growth stages of sweet cherry floral buds. Endo-dormancy (A), eco-dormancy (B), bud burst (C), flower bud swelling (D), flower bud open (E), flowers (F).

Table 1. Effect of continuos acumulation Chilling hours (4 °C) in bud break, in the seasons 2017. Once the buds accumulated the chilling hours indicated in the table, three stakes per sampling point were kept in favorable conditions (25 ° C and photoperiod of 16/8 h), for the bud break.

Variety	Latitude	Region	Chilling Hours	GDH	Bud break	Categorisation
Royal Dawn	33°59'00'S	San Francisco de Mostazal	683	7308	76.02	Low moderate
Lapins	33°59'00'S	San Francisco de Mostazal	732	6225	61.41	Low-moderate
Bing	33°59'00'S	San Francisco de Mostazal	923	6218	78.09	Moderate
Santina	33°59'00'S	San Francisco de Mostazal	851	7302	62.59	Moderate
Lapins	34°34'52'S	San Fernando	694	6218	74.65	Low-moderate
Regina	34°34'52'S	San Fernando	971	5114	57.66	Moderate
Kordia	34°34'52'S	San Fernando	1307	5074	56.41	High
		post- cyanamide application				
Royal Dawn	33°59'00'S	San Francisco de Mostazal	758	0	81.61	Low-moderate
Santina	33°59'00'S	San Francisco de Mostazal	758	1259	67.2	Low moderate
Bing	33°59'00'S	San Francisco de Mostazal	758	1259	96.46	Low-moderate
Regina	34°34'52'S	San Fernando	901	1863	95.7	Moderate
Kordia	34°34'52'S	San Fernando	1213	1966	83.06	High

Table 2. Field chilling accumulation of cherry bud sticks at seven variety.

Variety	Chilling hours	Cyanamide application	04-08-2017	GDH	11-10-2017	GDH	29-10-2017	GDH
			San Francisco de Mostazal					
Royal Dawn	474	11 07 2017	50%	1474	80% Flower	3263	Fase I Growth	4723
Santina	630	25-07-2017	0%	754	20% Flower	2942	Petals fall	4000
Bing	612	24-07-2017	16.08%	754	5% Flower	2963	Beginnin Petals fall	4052
Lapins	615	24-07-2017	ND	754	5% Flower	2963	Petals fall	4052
			San Fernando					
Regina	825	28-07-2017	0%	264	Green tips	1415	30-40% Flower	2234
Kordia	825	28-07-2017	0%	264	Green tips	1415	30-40% Flower	2234
Lapins	825	28 07 2017	ND	261	Green tips	1415	80% Flower	2234

CONCLUSIONS

- All varieties evalulated required less chilling hour accumulation for bud break when hydrogen cyanamide was applied.
- Chilling requeriment for "Lapins" changed depending on the field of origin.

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