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RESEARCH PAPER

Pruning effects on vegetative growth and fruit quality of 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' sweet cherry trees (*Prunus avium*)

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Abstract

M. Villasante, S. Godoy, J.P. Zoffoli, and M. Ayala. 2012. Pruning effects on growth and fruit quality of 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' sweet cherry trees (*Prunus avium*). Cien. Inv. Agr. 39(1): 117-126. Annual pruning is one of the most efficient ways to regulate crop load and renew fruiting wood in highly productive sweet cherry (*Prunus avium* L.) combinations. Although Chilean growers did not previously prune cherry trees of more vigorous combinations, in recent years, the adoption of more dwarfing rootstocks and self-fertile cultivars has led to the inclusion of annual pruning as a practice in modern orchards. At first, this alteration in orchard management practices was not considered by growers, and thus, many of the initially established cherry orchards were not pruned as intensively as they should have been. As a consequence, many trees showed a reduction in fruit quality after 4 or 5 years of being planted, as they became overcropped and, consequently, registered reductions in their vegetative growth. There are only a few studies related to the effect of corrective pruning on dwarfing combinations that display an imbalance between reproductive and vegetative growth due to a reduction in the leaf area to fruit ratio of the tree. For this reason, the objective of this research was to study the effect of pruning in an orchard consisting of the dwarfing combinations 'Bing'/'Gisela®5' ('Bing'/'GI®5') and 'Bing'/'Gisela®6' ('Bing'/'GI®6'), which shown a reduction in vigor, fruit quality and yield. Trees of both combinations were treated with a medium intensity pruning in late winter (early September). Several vegetative (shoot length, leaf area of spurs and shoots, trunk cross sectional area) and reproductive (total yield per tree, fruit growth and quality) parameters were evaluated after pruning. One of the most important effects of pruning for both combinations was an increase in the total current season shoot (CSS) growth, which was 112.5 and 125.6% for 'Bing'/'GI®5' and 'Bing'/'GI®6', respectively. Additionally, the average shoot length increased by 820.0 and 325.4% for 'Bing'/'GI®5' and 'Bing'/'GI®6', respectively. Furthermore, CSSs developed a higher leaf number in the pruned trees. There was no change in leaf number for reproductive spurs, but these had bigger leaves in the pruned trees, demonstrating increased total leaf area per spur. Additionally, pruning allowed crop load regulation and increased fruit size by 8.5 and 6.1% for 'Bing'/'GI®5' and 'Bing'/'GI®6', respectively. However, fruits from pruned trees showed a higher susceptibility to mechanical damage compared with unpruned trees of both combinations.

Key words: Crop load regulation, dwarfing rootstocks, fruit quality, Gisela®5, Gisela®6, pitting, pruning, sweet cherry, vegetative growth.

Introduction

The annual pruning of sweet cherry (*Prunus avium* L.) in Chile was a disregarded horticultural practice in orchards planted with vigorous combinations of low productivity. This was mainly because pruning induces a delay in spur formation and a decrease in yield by indirectly eliminating crop load, in addition to producing an increased risk of wood diseases, such as bacterial canker and silver leaf (*Pseudomonas syringae* pv. *syringaey* and *Chondrostereum purpureum)* (Webster and Looney, 1996).

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At present, however, with the adoption of more productive cultivars and dwarfing rootstocks that promote a greater precocity, annual pruning has become a useful tool to regulate crop load, maintain fruit quality, renovate aged reproductive structures and promote vigor. Lang (2005) indicated that one of the main objectives of pruning in sweet cherry is to control vigor, which can be manipulated according to the type, date and intensity of the pruning used.

In highly productive sweet cherry combinations, pruning is performed primarily in winter and essentially consists of three steps: a) the removal of weak wood and pendant or overlapping branches, as these branches tend to produce small fruits; b) a short pruning, leaving structures between 7 to 12 cm to renovate aged productive branches; and c) a topping of 1-year-old wood to encourage growth of side shoots and regulate crop load (Long, 2006; Long, 2007). In general, productive pruning should remove weak and shaded wood, reproductive spurs over 3 years old and aged fruiting wood to renew reproductive structures. Fruitful and vigorous spurs located in well-developed branches should not be removed (Agustí, 2004).

Mature sweet cherry trees grafted on dwarfing Gisela®-type rootstocks are more precocious; however, these trees, if not properly managed, tend to overcrop, which results in low-quality fruit when trees come into full production. The magnitude of this overcropping and the subsequent aging of the trees will depend on the ability to manage their leaf area to fruit (LA/F) ratios (Ayala, 2008). Currently, there is not an ideal pruning strategy for highly productive sweet cherry combinations, but there have been efforts to find more appropriate pruning alternatives to achieve an adequate balance between crop load and vigor (Lang, 2001; Whiting and Lang, 2004). Andersen *et al.* (1999) demonstrated that sweet cherry combinations using dwarfing rootstocks require a more severe pruning than trees grafted on vigorous rootstocks to maintain a balance between the vegetative growth of the tree (vigor) and the reproductive growth (fruit).

One factor that has not yet been clearly defined is the time when pruning should take place in Chilean orchards. Long (2006) indicated that the most appropriate time for this practice in highly productive dwarfing combinations would be at the end of winter, because summer pruning is debilitating and may promote excessive yield with small fruit. Andersen *et al.* (1999) suggested pruning by topping during the winter, beginning as soon as one year after full production. In Chile, winter pruning may promote increased susceptibility to wood diseases (Latorre, 2004); thus, a good alternative is to delay pruning until late winter or early spring to achieve better healing of pruning cuts. Another potential option would be to conduct the pruning after harvest; however, this would decrease the reserve accumulation of the trees, reducing the availability of resources for those trees for the next season's growth (Lang, 2005).

The use of new strategies for pruning highly productive sweet cherry combinations, either in summer or winter, has not been studied in depth in Chile. However, the adoption of productive and dwarfing combinations has forced growers to use pruning as a way to regulate crop load, increase vegetative growth, and renew reproductive structures. The ultimate goal for growers is to produce high-quality fruit for export.

Given the lack of experience in pruning dwarfing cherry combinations in Chile, this research considered the hypothesis that a pruning conducted in late winter in the Central Valley would have the positive effect of improving fruit quality and invigorating aged sweet cherry trees of 'Bing'/'GI®5' and 'Bing'/'GI®6' combinations. The objective of the study was to evaluate the reproductive and vegetative response of the cultivar 'Bing' on the rootstocks 'GI®5' and 'GI® 6' during the growing season until the commercial harvest. The orchard chosen for the study had never been pruned since its establishment, resulting in an evident imbalance between reproductive (excess load with small fruit) and vegetative growth (reduced vigor and leaf area, LA).

Materials and methods

Plant material

The study was conducted during the 2007-2008 growing season in a sweet cherry orchard planted with 'Bing'/'GI®5' and 'Bing'/'GI®6' semidwarfing combinations, which were established in 1999 at a planting distance of 2.5 x 5.0 m. The orchard was located in Santa Cruz, VI Region, Chile (34° 19' W and 71° 39' S). The local climate was warm and temperate, with winter rainfall and a long dry season. The annual average temperature was 13° C, with an average annual rainfall of 650 mm. The soil type was fine-loamy with good porosity. The orchard had never been pruned nor subjected to crop load regulation since its establishment. Therefore, trees of both combinations had three widespread problems at the time of pruning: a) a high percentage of reproductive buds were dead (≥30%); b) a reduction in yield and fruit quality (reduction in size and soluble solids content, SSC) in the previous two seasons; and c) a reduction in vegetative growth, represented mainly by lower shoot length and reduced LA.

Treatments

At the beginning of the season, both combinations were subjected to one of two pruning treatments (PTs): PT1= unpruned trees or PT2= pruned trees. PTs were performed during the first week of September (15 days before full bloom, DBFB) to avoid the risk of rain and reduce the incidence of wood infections. Pruning consisted of thick cuts to remove very old wood (wood ≥3- years- old), sick branches, weak or thin branches (diameter ≤8 mm), pendant twigs and misplaced branches. Additionally, topping of ~1/3 of current season shoots (CSSs) was performed. Pruning cuts were treated with fungicide (ultra Podexal, BASF, triforine, 1000 ppm). Due to excessive crop load during the season, fruit thinning was performed at the beginning of phase II of fruit development, 30 days after full bloom (DAFB), leaving an average of 2 to 3 fruits spur^{-1}.

Assessments

The fresh pruned material from each tree was weighed, using a floor scale (UWE, ABM-60, Taipei Hsien Taiwan). During the growing period, the fruit diameter (mm) and CSS length (individual and total per tree, in cm and m, respectively) for PT1 and PT2 trees were measured weekly. Four fruits tree^{-1} and four CSS tree^{-1} were marked to track the observed increase in size, one for each cardinal point of exposure. In January 2008 (140 DAFB), four branches of each combination and treatment were sampled, measuring LA (cm^2) of CSSs and spurs using a leaf area meter (LI-COR LI-3100, Nebraska, USA). Additionally, leaf numbers of each structure were quantified.

At the time of commercial harvest (76 DAFB), the total production of each tree was weighed with a standing balance (UWE, ABM-60, Taipei Hsien, Taiwan). Subsequently, a sample of 25 fruits tree^{-1} was taken to measure the following indicators of quality: equatorial diameter (mm), fresh weight (g), SSC (%) and firmness (N). To quantify the equatorial diameter, a digital electronic caliper with a range of 0 - 200 mm (Veto, Santiago, Chile) was used. The fruit fresh weight was quantified using an analytical balance (GRAM, Labtech 1500, Ontario, Canada). The SSC values of each fruit were obtained using a refractometer with a 0 - 32% range (RHB-32ATC, Tokyo, Japan). The firmness of each fruit was measured by a digital firmness tester on a scale of 0 - 100 Durofel units (AGRO TECHNOLOGIE, DFT100 model, Forges Les Eaux, France). Durofel values were converted to Newtons (N = 9.8 {exp [(Durofel value - 59.32) 14.89^{-1}]}) (Polenta *et al*., 2005). To determine the mechanical damage to the fruit, a sample of 100 fruits $tree^{-1}$ was taken at harvest.

Design and statistical analysis

The treatments were distributed according to a completely random model. Sixteen trees were pruned and fourtrees were kept unpruned for both cultivar combinations tested. The results were subjected to analysis of variance (ANOVA) using the computer program STATGRAPHICS Plus 4.0 (Statpoint Technologies, Inc., Virginia, USA). Prior to analysis, the percentage values of SSC and the distribution of fruit damage were normalized using the arcsine transformation. However, the untransformed values are presented.

Results and discussion

Vegetative growth

The pruning weight in the combination 'Bing'/'GI®6' was 48% higher than it was in the combination 'Bing'/'GI®5' (Figure 1). This difference was related to the greater tree height and volume of the 'Bing'/'GI®6' trees compared with those of the 'Bing'/'GI®5' combination. This is consistent with Lang (2000), who indicated that a larger cherry tree is generated by the 'GI®6' rootstock than by the 'GI®5' rootstock, which explains the larger amount of wood removed from the 'Bing'/'GI®6' combination during pruning.

Pruning increased the average length of the CSS (Table 1). In both combinations, the CSS average growth was significantly higher in the pruned trees (P≤0.05). For the combination 'Bing'/'GI®5', the average PT2 final CSS length reached 23.0 cm, whereas in PT1 of the same combination, the CSS values did not exceed 2.5 cm in length. Most of these short CSSs formed a terminal reproductive spur. A similar trend was

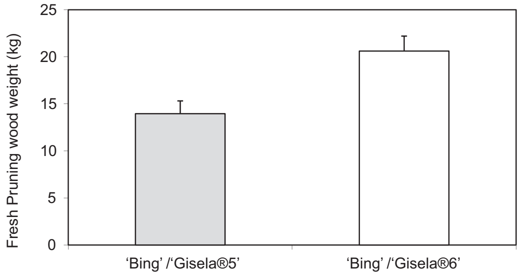

Figure 1. Pruning fresh weight per tree for sweet cherry (*Prunus avium* L.) combinations 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6'. The trees were pruned 15 days before full bloom during the 2007-2008 growing season. The bars indicate the standard error of the four-tree mean.

Table 1. Final averages for individual and total current season shoot length for sweet cherry (*Prunus avium* L.) combinations 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' under two pruning treatments (PT1=unpruned trees and PT2=pruned trees) soon after winter (2007-2008 growing season).

		Current season shoot (CSS)	
Combination	Treatment	Individual length (cm)	Total length (m)
	PT1	2.5 ± 0.5 b[1]	24.1 ± 4.7 b
'Bing'/ 'Gisela®5'	PT2	23.0 ± 3.9 a	51.4 ± 5.2 a
	p-Value	0.0019	0.0103
	PT1	7.1 ± 2.6 b	38.8 ± 7.5 b
'Bing'/ 'Gisela®6'	PT2	30.2 ± 5.2 a	87.8 ± 4.7 a
	p-Value	0.0074	0.0001

[1]Different lower case letters in the same column indicate significant differences between the means according to ANDEVA, P≤0.05, n= 4 for PT1 and 12 for PT2.

observed for the combination 'Bing'/'GI®6', for which the CSSs reached a length of 30.2 and 7.1 cm in PT2 and PT1, respectively.

The total growth of CSSs of the whole tree was significantly higher in PT2 than in PT1 for both combinations (P≤0.05). PT2 in the combination 'Bing'/'GI®5' reached an average CSS growth of 51.4 m, 112.5% higher than the average CSS growth observed in PT1 of the same combination. In the combination 'Bing'/'GI®6', PT2 registered a total CSS length of 87.8 m, whereas PT1 developed only 38.8 m of the total CSS length. Clearly, PT1 showed a reduction in CSS number and vigor, a visible sign of aging aerial structures. This observation coincides with reports in previously published studies of unpruned sweet cherry trees (Joublan and Claverie, 2004; Ayala, 2008). The results obtained agreed with the work of Webster (1998), who reported that winter pruning in cherry trees results in increased vegetative growth in the following season. In this case, although pruning was performed in late winter, there was a stimulation of buds located near and below the sites where the cuts were made, promoting growth of a greater number of lateral CSSs. This result is consistent with the work of Mika (1986), who reported that pruning promotes vegetative growth and renews fruiting structures by increasing the amount of photosynthetic area of a plant.

There were significant differences in both CSSs and spurs between PT1 and PT2 with respect to tree LA development (P≤0.05). The CSS foliar area of pruned trees was 93.6 % and 129.6% higher than non-pruned trees in the 'Bing'/'GI®5' and 'Bing'/'GI®6' combinations, respectively (Table 2). This increase in LA was evidenced by an increase in both the number and size of CSS leaves (P≤0.05) (Table 2). Spur LA was significantly increased by pruning for both combinations (Table 2 Spurs of PT1 developed smaller LA for both combinations. No significant differences in the number of leaves per spur were observed between PT1 and PT2 for both combinations. This LA increase in response to pruning has been previously observed in peaches (Li *et al*., 1994; Sharma and Chauhan, 2004).

The increase in vegetative growth as a result of pruning was evident. The pruning allowed the renewal of the fruitwood for the following season. This increase coincides with the vegetative growth indicated by Webster (1998) and results in a greater LA and CSS number for pruned trees, which is particularly important in dwarfing combinations because it promotes a greater

Table 2. The leaf number and average leaf area of reproductive spurs and current season shoots of sweet cherry (*Prunus avium* L.) combinations 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' under two pruning treatments (PT1=unpruned trees and PT2=pruned trees) soon after winter (2007-2008 growing season).

		Reproductive spur		Current season shoot (CSS)	
Combination	Treatment	Leaf number	Leaf area spur^{-1} (cm^2)	Leaf number	Leaf area shoot^{-1} (cm^2)
	PT1	6.2 ± 0.3 a1	140.6 ± 12.8 b	8.3 ± 1.1 b	375.0 ± 45.2 b
'Bing'/'Gisela®5'	PT2	7.1 ± 0.4 a	200.3 ±14.9 a	14.6 ± 0.5 a	726.2 ± 16.6 a
	p-Value	0.1284	0.0229	0.0016	0.0003
	PT1	5.8 ± 0.4 a	111.3 ± 18.8 b	9.6 ± 0.6 b	407.5 ± 47.4 b
'Bing'/'Gisela®6'	PT2	7.1 ± 0.8 a	222.6 ± 34.3 a	15.2 ± 1.4 a	936.9 ± 132.3 a
	p-Value	0.2062	0.0294	0.0092	0.0093

[1]Different small caps in the same column indicate significant differences between the means according to ANDEVA, P≤0.05, n= 4 for PT1 and 12 for PT2.

production of carbohydrates (CH_2O) during the growing season (Long, 2007). Additionally, pruning redirects CH_2O and nitrogen (N) to the permanent and growing structures of the tree (Lang, 2005), resulting in a higher quality fruit. Recent studies in sweet cherry have demonstrated that both spurs and CSS leaves generate a significant contribution of CH_2O to fruit development, especially during rapid fruit growth (Gutzwiler and Lang, 2001; Ayala, 2004). A higher LA in these dwarfing combinations leads to greater photoassimilate availability, inducing an increase in fruit yield and quality.

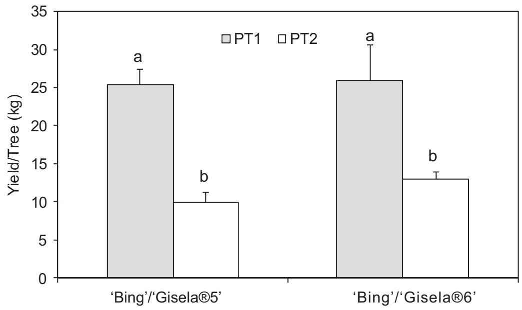

Figure 2 Average yield per sweet cherry (Prunus avium L.) tree of combinations 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' under two pruning treatments (PT1=unpruned trees and PT2=pruned trees) soon after winter (2007-2008 growing season). PT1= unpruned trees and PT2= pruned trees.
[1]Different small caps in the same bar indicate significant differences between the means according to ANDEVA, $P \leq 0.05$, n= 4 for PT1 and 12 for PT2.

Production and fruit quality

The PT1 trees in both combinations had a higher average yield per tree compared to the PT2 trees ($P \leq 0.05$). The PT1 trees of the 'Bing'/'GI®5' combination produced a yield of 25.4 kg tree^{-1}, whereas the PT2 trees of the same combination produced 9.9 kg tree^{-1}. A similar response occurred in the PT1 trees of the 'Bing'/'GI®6' combination', which obtained an average yield of 25.9 kg tree^{-1}, whereas the PT2 trees reached an average yield of 12.9 kg tree^{-1} (Figure 2).

This result is consistent with those of Long (2007), who indicated that a major objective of pruning is to reduce the crop load. A smaller crop load would improve the distribution of photoassimilates available during the growing season for fruit and shoot growth, which would promote an adequate balance between the amount of fruit and vegetative growth. The cultivar 'Bing' grafted on Gisela® rootstocks tends to have a greater crop load, which has led to the use of pruning to maintain an adequate LA/F ratio over the productive years of this combination (Whiting and Lang, 2004). In such semi-dwarfing combinations, once trees have entered production, if the crop load is not reduced in some way, a reduction in the fruit size occurs due to a deficiency in the number of leaves available to support the growth of the individual fruit (Gutzwiler and Lang 2001; Ayala, 2008). Whiting and Lang (2004) demonstrated that the LA/F ratio in such combinations should not be less than 244 cm^2 fruit^{-1} to ensure that growth is not limited by the supply of photoassimilates.

In relation to fruit size, significant differences ($P \leq 0.05$) between PT1 and PT2 in both combinations were found (Table 3). Pruning had a positive effect on fruit size, as PT2 of the 'Bing'/'GI®5' combination had an average fruit diameter of 25.6 mm, which was 2 mm more than the PT1 fruits of the same combination. In the case of the combination 'Bing'/'GI®6', the PT2 and PT1 fruits achieved an average diameter of 26.1 and 24.6 mm, respectively. This is consistent with Ayala (2008), who described that reduced vegetative growth or a decreased LA/F ratio in more dwarfing sweet cherry combinations, as occurs with unpruned trees, would result in inadequate availability of the CH_2O required for normal fruit development and thus produce a reduced fruit size. In the case of the PT2 trees, the larger photosynthetically active surface resulting from greater CSS numbers and larger leaves in spurs and CSSs was beneficial in optimizing the balance between the supply and demand of CH_2O during fruit development, a critical factor for ensuring high fruit quality (Whiting, 2005, Whiting and Lang, 2004).

As for the fruit weight (Table 3), a significant pruning effect (P≤0.05) was only observed for the combination 'Bing'/'GI®6', for which the average weight of PT2 fruit was 25% higher than that observed in PT1. This coincides with Roper and Wayne (1987), who suggested that an increased LA is associated with an increased fruit size.

Regarding SSC (Table 3), a positive pruning effect on the combination 'Bing'/'GI®5' was observed, in which PT2 reached average values of 27.2% at commercial harvest. In the case of the 'Bing'/'GI®6', no significant differences (P≤0.05) between PT1 and PT2 were observed, reaching an average value of 25.0% for both treatments (Table 3). 'Bing'/'GI®5' demonstrated results consistent with the statement made by Lenahan *et al*. (2006), who reported a higher SSC in Gisela® dwarfing rootstock that were managed to reduce crop load.

Fruit firmness was influenced by pruning only in the combination 'Bing'/'GI®5', in which the recorded PT2 and PT1 values were 56.1 and 34.0 N, respectively (Table 3). In the case of 'Bing'/'GI®6', there was no significant pruning effect, as both PT1 and PT2 trees had an average firmness value of approximately 49.0 N. The results obtained for 'Bing'/'GI®5' were in accordance with the statement made by Lenahan *et al*. (2006), who reported greater fruit firmness for trees with lower crop loads due to the positive effect of a greater LA/F ratio.

Pruning increased the percentage of fruits with mechanical damage in both combinations (Figure 3). This observation differs from what was indicated by other authors (Facteau, 1988; Long, 2007), who concluded that overloaded trees have a higher percentage of mechanical damage at harvest or during transportation and packaging. Zoffoli *et al*. (2008) reported that the incidence of mechanical damage was significantly lower in sweet cherry trees that had a reduced fruit number after fruit thinning. Although the PT2 sample of 'Bing'/'GI®5' showed greater fruit firmness, this difference was not reflected in a lower incidence of mechanical damage, which mainly consisted of bruising and pitting (Figure 3). In fact, the 'Bing'/'GI®5' fruit showed a higher percentage of mechanical damage than was observed in fruit from the combination 'Bing'/'GI®6' (Figure 3). This finding differs from what was reported by Facteau (1988), who indicated that firm fruits have better resistance to bruising and pressure damage compared with less firm fruit. It is important, then, to conduct studies regarding the pruning effect not only on the quality of commercially harvested fruit but also on its potential shelf life and mechanical damage.

Table 3. Fruit quality parameters in the sweet cherry (*Prunus avium* L.) combinations 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' under two pruning treatments (PT1=unpruned trees and PT2=pruned trees) soon after winter (2007-2008 growing season).

Combination	Treatment	Size (mm)	Weight (g)	Soluble solids (%)	Firmness (N)
'Bing'/ 'Gisela® 5'	PT1	23.6 ± 0.4 b[1]	8.6 ± 0.5 a	22.0 ± 1.4 b	34.0 ± 4.0 b
	PT2	25.6 ± 0.2 a	9.9 ± 0.4 a	27.2 ± 0.6 a	56.1 ± 4.9 a
	p-Value	0.0011	0.0856	0.0009	0.0253
'Bing'/ 'Gisela® 6'	PT1	24.6 ± 0.3 b	8.4 ± 0.3 b	24.1 ± 1.4 a	49.3± 7.2 a
	PT2	26.1 ± 0.2 a	9.8 ± 0.2 a	25.9 ± 0.6 a	49.0 ± 5.4 a
	p-Value	0.0011	0.0030	0.1866	0.9808

[1]Different small caps in the same column indicate significant differences between the means according to ANDEVA, P≤0.05, n= 4 for PT1 and 12 for PT2.

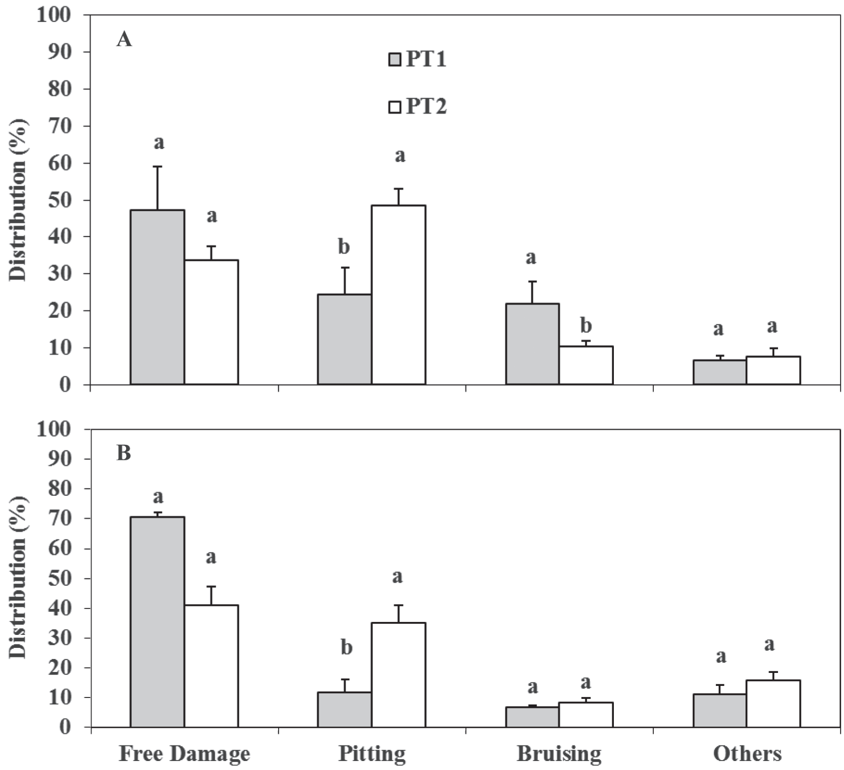

Figure 3. The relative distribution of fruit damage types in the sweet cherry (*Prunus avium* L.) combinations 'Bing'/'Gisela®5' and 'Bing'/'Gisela®6' under two pruning treatments (PT1=unpruned trees and PT2=pruned trees) soon after winter (2007-2008 growing season). [1]Different small caps in the same bar indicate significant differences between the means according to ANDEVA, P≤0.05, n= 4 for PT1 and 12 for PT2.

Resumen

M. Villasante, S. Godoy, JP. Zoffoli y M. Ayala. 2012. Efecto de la poda en el crecimiento vegetativo y la calidad de fruta en cerezo dulce (*Prunus avium*), en las combinaciones 'Bing'/'Gisela®5' y 'Bing'/'Gisela®6'. Cien. Inv. Agr. 39(1): 117-126. La poda anual es una de las formas más eficaces para regular la carga frutal y renovar la madera frutal en combinaciones de alta productividad de cerezo dulce (*Prunus avium* L.). A pesar de que los productores chilenos no estaban acostumbrados a podar los árboles de cerezo de combinaciones más vigorosas, en los últimos años, la adopción de portainjertos más enanizantes y cultivares autofértiles ha llevado a incluir la poda anual como una práctica en los huertos modernos. Este cambio en el manejo productivo no fue considerado por los productores al inicio y muchos de los huertos establecidos de cerezos inicialmente no se podaron tan intensamente como deberían. Como consecuencia, los árboles mostraron una reducción en la calidad de la fruta después de 4 o 5 años de ser plantados, ya que estos se sobrecargaron y registraron una reducción en el crecimiento vegetativo. Pocos son los estudios relacionados con el efecto de una poda correctiva en combinaciones enanizantes mostrando un desequilibrio entre el crecimiento reproductivo y vegetativo debido a una reducción en la relación hoja/fruta. Por esta razón el objetivo de esta investigación fue estudiar el efecto de la poda en un huerto con las combinaciones enanizantes 'Bing'/'Gisela®5' ('Bing'/'GI5') y 'Bing'/'Gisela®6' ('Bing'/'GI6'), que mostraron una reducción en el vigor, la calidad de la fruta y rendimiento. Los árboles de ambas combinaciones fueron tratados con una poda de intensidad media a finales del invierno (principios de septiembre). Distintos parámetros vegetativos (longitud de brotes, área foliar de dardos y brotes, área sección transversal de tronco) y reproductivos (producción total por árbol, desarrollo y calidad de fruta) fueron evaluados después de la poda. Uno de los efectos más importantes de la poda, para ambas combinaciones, se registró un aumento en el crecimiento total de brotes por árbol, en un 112,5 y 125,6% para 'Bing'/'GI5' y 'Bing'/'GI6', respectivamente. Por otro lado, el largo final promedio de los brotes aumentó en un 820 y 325,4%, para cada combinación. Además, se pudo observar un aumento en otros parámetros como el tamaño de las hojas en dardos reproductivos, número de hojas por brote y en el área foliar de dardos reproductivos y brotes de la temporada. Adicionalmente, la poda permitió regular la carga frutal y mejorar el tamaño de los frutos en un 8,5 y 6,1% para 'Bing'/'GI5' y 'Bing'/'GI6', respectivamente. Sin embargo, los frutos de los árboles podados presentaron una mayor susceptibilidad a daños mecánicos que árboles sin poda en ambas combinaciones.

Palabras clave: Calidad de fruta, cerezo dulce, crecimiento vegetativo, Gisela®5, Gisela®6, manejo de carga frutal, poda, portainjertos enanizantes, 'pitting'.

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