Population Levels and Damages of Thrips (Insecta: Thysanoptera) in Four Sweet Cherry (*Prunus avium* L.) cultivars in the Lower Valley of Chubut River (South Patagonia)

S.G. Bado and A.N. Hughes
Grupo Fruticultura
INTA - EEA Chubut
Ex- ruta 25 Km (1480)
(9100) Trelew, Chubut Province
Argentina
E-mail: sbado@chubut.inta.gov.ar

R. La Rossa
INTA IMYZA. CIVyA
C.C. 25
(1712) Castelar, Buenos Aires Province
Argentina

Keywords: thrips, sweet cherry, damages, population levels.

Abstract

Aesthetic aspects of sweet cherry fruits are important to get adequate quality parameters required by buyer countries. Fortunately, in South Patagonia usually direct pests are rarely observed in this crop, but in the last few years damages that can be associated to the presence of thrips were observed in some orchards. The objectives of this job were: take notice of the presence of this pest in the flowers, identified the species found, describe the damages that they can cause and determine population levels in the four cherry cultivars: 'Bing', 'Lapins', 'Van' and 'Sunburst'. For this, direct surveys during full bloom and at harvest moment were carried out in two orchards with different weeds management during the 2008-09 season. Ten flowers per cultivar were collected and carefully checked under stereoscopic microscope in order to get individual thrips. Individuals were mounted in slices and identified. The most abundant species was *Frankliniella australis* (Morgan) followed by *Frankliniella occidentalis* (Pergande). Other species such as *Aeolothrips fasciatipennis* Blanchard and *Dactuliopthrips kaszabi* Pelikan were also found in very low numbers. No significant differences were found in population levels between orchards and varieties in bloom period ($P \leq 0.05$). Fruit damages were classified as scabby brown scars, hollows and whitish marks. Only the percentage of fruit with whitish marks was significantly ($P \leq 0.05$) higher in 'Lapins' in one of the orchards (with weeds control but without wind barrier) probably due to its longest ripening period and the migration of this insects from the sorrounding areas.

INTRODUCTION

Sweet cherry (*Prunus avium* L.) crop is one of the principal agricultural activities in South Patagonia Region. The principal destiny of the fruit is its exportation to European countries, markets that each time becomes more exigent in quality and innocuos products.

Fortunately, in South Patagonia, direct pests are rarely observed in this crop, but in last years, fruits with important damages, which could be associated to the presence of thrips, were found in some orchards in Chubut Lower River Valley.

The objectives of this work were to take notice of the presence of this insects, identify the species in sweet cherry crop, describe, and cuantify the damages they can cause and the population levels in four cultivars in two orchards with different weeds managenement. Bloom period doesn´t differ among these cultivars being from last days of September to the middle of October approximately, but ripening period is longer in Lapins cv. finishing at the end of December, meanwhile the others mentioned on the first weeks of that month.

These studies are basic to develop IPM strategies and can be useful to determine damage economic thresholds.
In Mendoza Province, De Borbón et al. (2008) studied thrips damages in sweet cherry fruits, species were identified and the population evolution in two orchards with different weeds management, as an important focus. The authors concluded that thrips abundance in cherry flowers depends not only of this fact but also to their migration from the sorrounding areas. In Chile, *F. occidentalis* is an important pest in stone fruits and insecticides must be applied in pre bloom and pre harvest moment (http://www.tattersall.cl/revista/REV172/ganado.htm) but *F. australis* is not considered an important specie as their principal source of food is pollen (www.avancebt.com/noticias/?p=6)-.

MATERIAL Y METHODS:

Studies were held in two orchards of the Lower Chubut River Valley. Orchard 1 is located in the North of the Chubut Lower River Valley and surrounded by natural field. It is protected from winds by poplar (*Populus* sp.) and pinus (*Pinus* sp.) barriers, but there was no control of weeds during this work. Orchard 2 is in the center of the valley and bordered by other sweet cherry orchards and natural field. There has no barrier protection from winds, but weeds were controlled before and during crop development. Both crops were conducted by “tatura” system.
In order to know thrips population levels, a direct scouting (15/12/08) was held collecting 10 flowers per tree, in five of them per variety which were randomly selected. Flowers were put in polyethylene bags and carried out to laboratory where all flower structures were thoroughly checked so as to count all thrips individuals. Those left in the bags were also added. Individuals were mounted in slices and identified (Bisevac, 1997).
As soon as fruit of each cultivar reached its exact moment of maturity, 10 fruits per tree were harvested in 5 trees per cv. randomly selected. Each fruit was carefully observed in laboratory taking note of the kind of marks that can be attributed to thrips in order to make the description. Then, percentage of fruit with each different kind of damage was calculated.
Lapins, Sunburst, Van and Bing cultivars with Mahaleb rootstocks were checked in Orchard 1 meanwhile Bing and Lapins (rootstocks Mahaleb and Pontaleb), in Orchard 2.
In order to detect significant differences between population levels and each kind of damage per cv., ANOVA and tukey test ($p \leq 0,05$) were carried out.

RESULTS AND DISCUSSION:

Thrips species collected in flowers were: *Frankliniella australis* Morgan, commonly known as “Black flower thrips”, *Frankliniella occidentalis* Pergande (Thripidae) “Occidental flower thrips”, *Aeolopthrips fasciapennis* Blanchard (Aeolothripidae) which is a facultative predator (De Borbón, 2005), *Dactuliothrips kaszabi* Pelikan (Aeolothripidae). Table 1 shows the species found in each orchard and cultivar. Population levels (adults + nymphs) in bloom period did not differ significantly ($p \leq 0,05$) among cultivars and orchards, reaching a medium value of 1,08 individuals per flower (Fig. 1).
Frankliniella australis, *F. occidentalis* and *Haplothrips* sp. were also found in cherry cultives of Mendoza, but also in this province were *F. gemina* B., *F. schultzei* T., and *Thrips tabaci* L. Authors described damages as depressions with reddish halos in inmature fruits produced by oviposition in ovaries and litlle fruits (De Borbón, 2008).
In this work seen damages consisted in:

1) **Scabby brown scars**: brown and rough areas with irregular borders, caused by individuals feeding during blooming and fruit formation. These can be seen in green and in mature fruit, affecting their esthetic aspect and commercial value. Percentage of

fruit that present this kind of damage didn´t differ significatively between cultivars and orchards, being 8,5 % In Orchard 1 and 10% in Orchard 2 (Fig. 2). This marks can be very similar to damage produced by wind but usually in this case there are evidences of points of friction between fruits or with other parts of the plant or conduction structure (Baltuska & Cittadini, 2010).

2) **Hollows:** These are due to ovipositions. Although Lapins seems to present higher percentage of this kind of damage, no significative differences ($p \leq 0,05$) between cultivars were detected (Fig. 3).
3) **Whitish marks:** These are consecuence of individuals alimentation over mature fruits. There are seen as circles or semicircles areas covered with dark puntuactions usually where fruits get in touch. Percentage of fruit with this kind of damage was significant different in Lapins cv. in Orchard 2 (Fig. 4), which could have been because of its longer maturity period and a late thrips infestation. As weed control was done and winds became stronger in this month (Fig. 5), population may have been carried from surrounding areas being these an important source. The only identified specie in this cultivar was *F. occidentalis.*

This last damage was described for *F. occidentalis,* which is said to be attracted by sugar content in ripening period (http://www.tattersall.cl/revista/REV172/ganado.htm).
Another damage that can be noticed in leaves is due to alimentation of inmature instars in new buds first leaving tipical silver areas covered with dark puntuactions. These get necrotic and fall, leaving little holes and deformations which seems as *Prunus necrotic ringspot virus* syntoms. De Borbón & Cardillo (2006) found similar damages in peach trees describing it as the common stone fruit fungus disease, named “shot- hole” (*Stigmina carpophila*).

CONCLUSIONS:

This work remarks the importance of reinfestations from surrounding areas, impacting principally in the longest ripening period varieties, such as Lapins where 50% of fruits presented “whitish damages”.

ACKNOWLEDGEMENTS

To Viviana Bircher and Gustavo Silva, who kindly let us held this work in their orchards.

Literature cited:

- Baltuska, N. & Cittadini, E. D. Efecto del viento sobre la calidad de fruta y el rendimiento de cerezos (*P. avium* L.). Resum. 1er. Congreso en Co-Innovación de Sistemas sostenibles de sustento rural. 295:298.
- Bisevac, L., 1997. A new method for mounting thrips (Thysanoptera) on slides. Australian Journal of Entomology 36:220.
- de Borbón, C. M., Los trips del suborden Terebrantia de la Provincia de Mendoza. Ed., INTA.38 p.
- de Borbón, C. M, & Cardillo, F. 2006. Daños en brotes de duraznero asociado a trips y su relacion con las malezas. *RIA 35* (3): 65-81. Diciembre, INTA, Argentina.
- de Borbón, C. M.; Becerra, V. Bonomo, V. Mazzitelli, E., Calvo, M. , 2008. Trips (Insecta: Thysanoptera) en montes de cerezo en Mendoza, Argentina. *Rev. FCA UN Cuyo*, tomo XL °2., 1-10.
- Hurtado, C. Los trips de California en carozos. http://www.tattersall.cl/revista/REV172/ganado.htm Acceso 5/6/07
- Cekalovic Kuschevich, T. Trips, que son? www.avancebt.com/noticias/?p=6. Acceso 4/05/09.

Tables

Table 1: Identified thrips species and percentage of each per sample tken in the two Orchards

Cultivar	Orchard 1	Orchard 2
Bing	No data	*Aeolothrips fasciatipennis* (29%) *Frankliniella australis* (57%) *Dactuliothrips kaszabi* (14%)
Lapins	*Frankliniella australis* (30 %) *Frankliniella occidentalis* (70%)	*F. occidentalis* (100%)
Sunburst	*Frankliniella australis* (80%) *Frankliniella occidentalis* (20%)	
Van	*Frankliniella australis* (100%)	

Figures

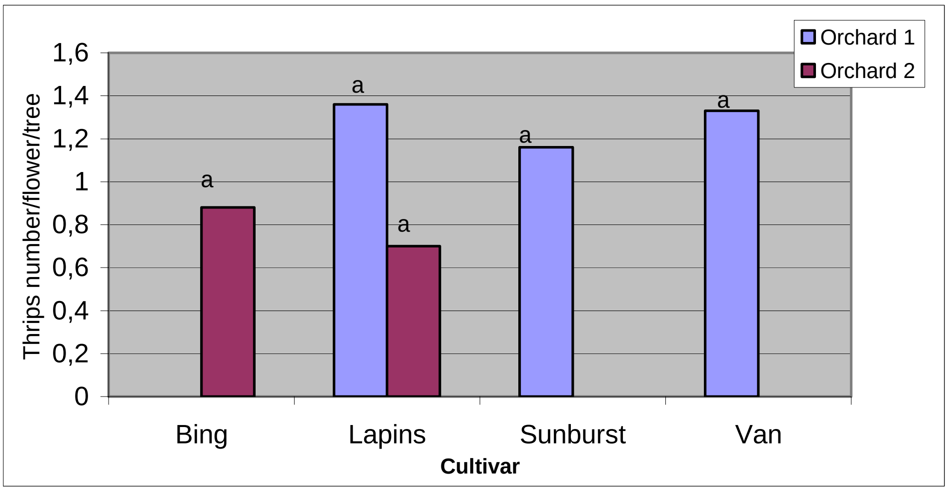


Fig. 1: Thrips per flower in four sweet cherry cultivars. Similar letters indicate no significant difference at p ≤ 0,05%.

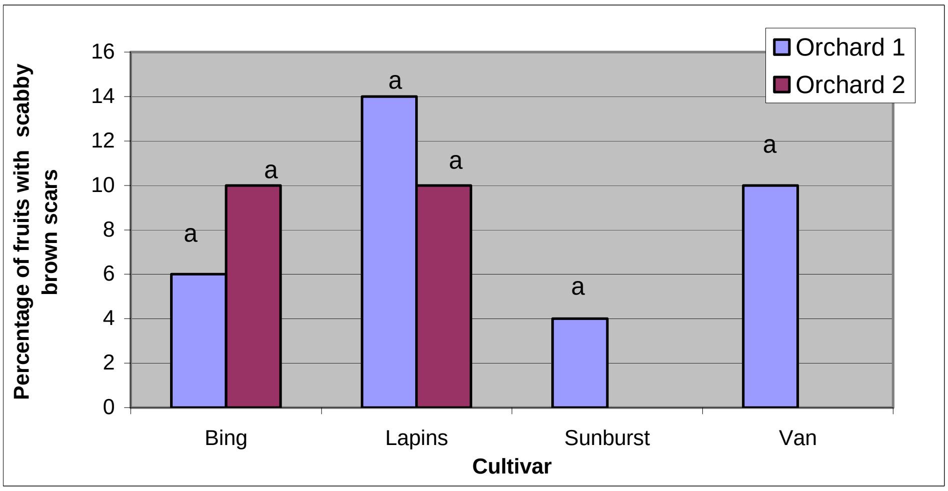


Fig. 2: Percentage of fruits with presence of "scabby brown scars". Similar letters indicate no significant difference at p ≤ 0,05%.

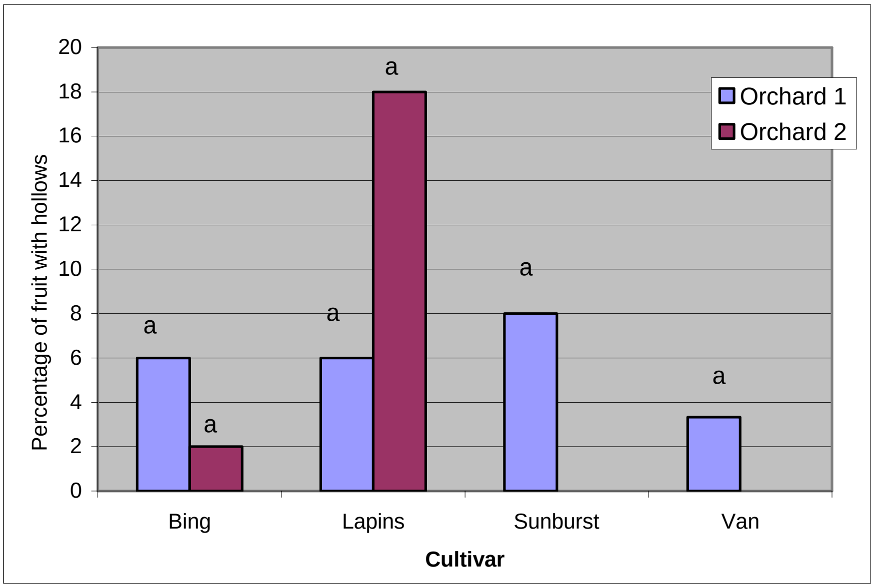


Fig. 3: Percentage of fruits with presence of hollows. Similar letters indicate no significant difference at p ≤ 0,05%.

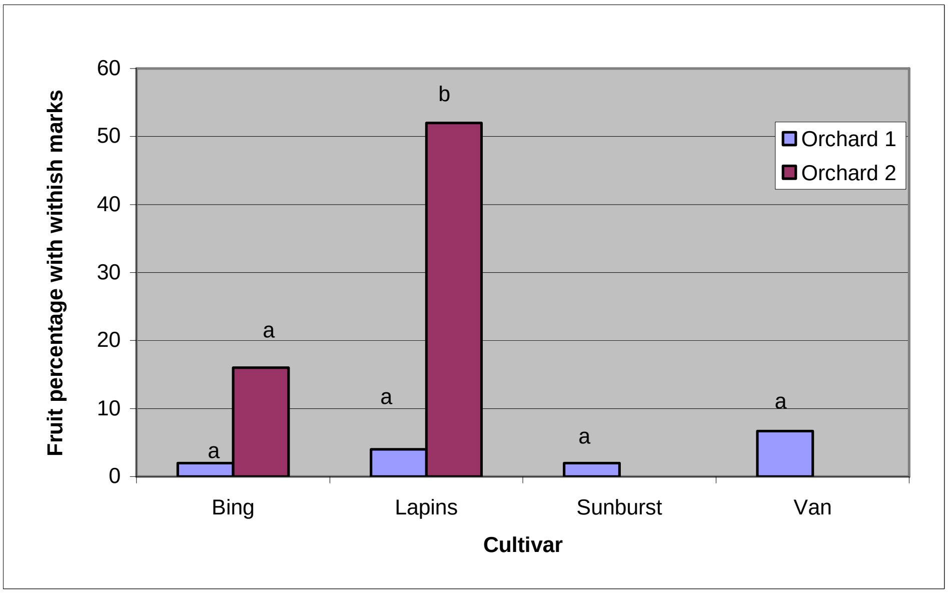


Fig. 4: Percentage of fruits with presence of "withish marks". Similar letters indicate no significant difference at p ≤ 0,05%.

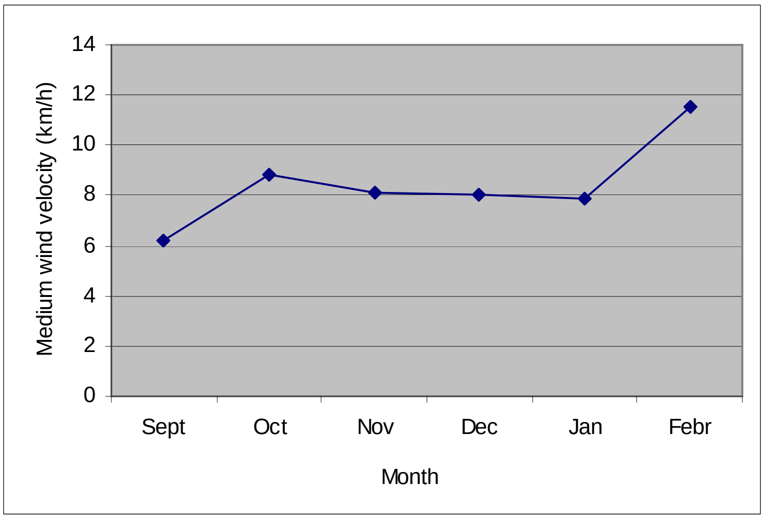
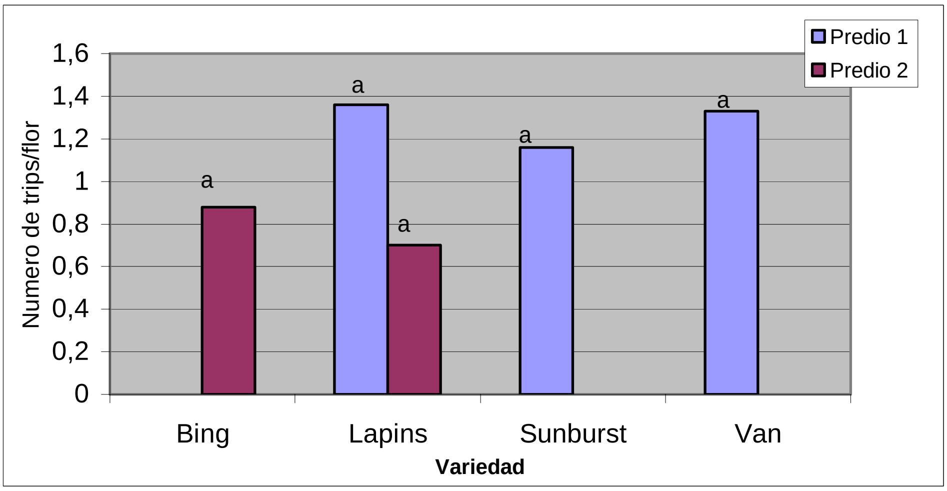
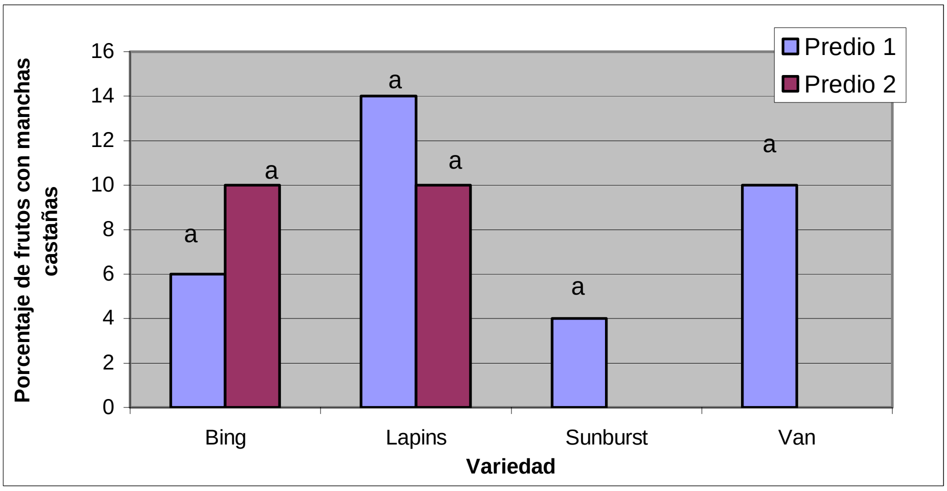
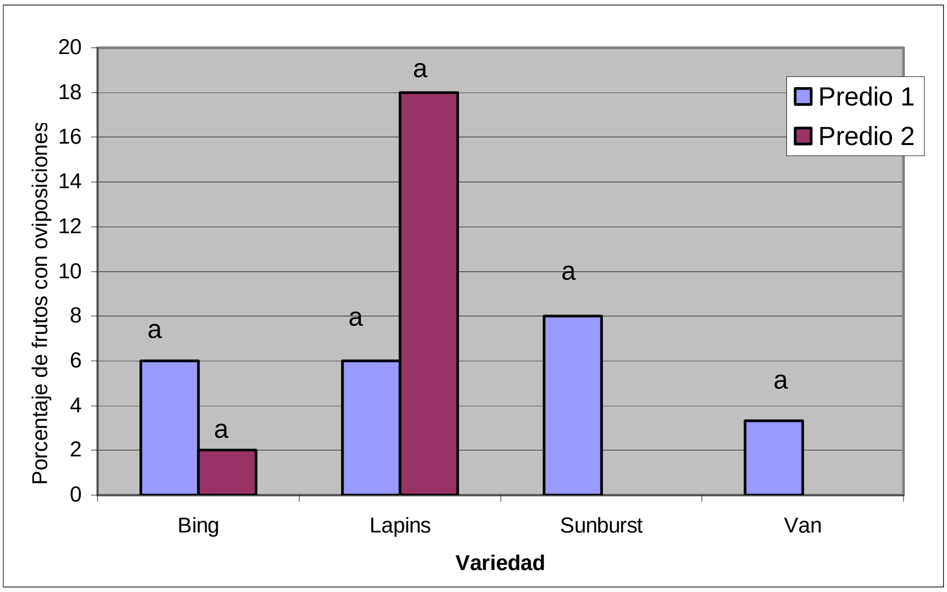
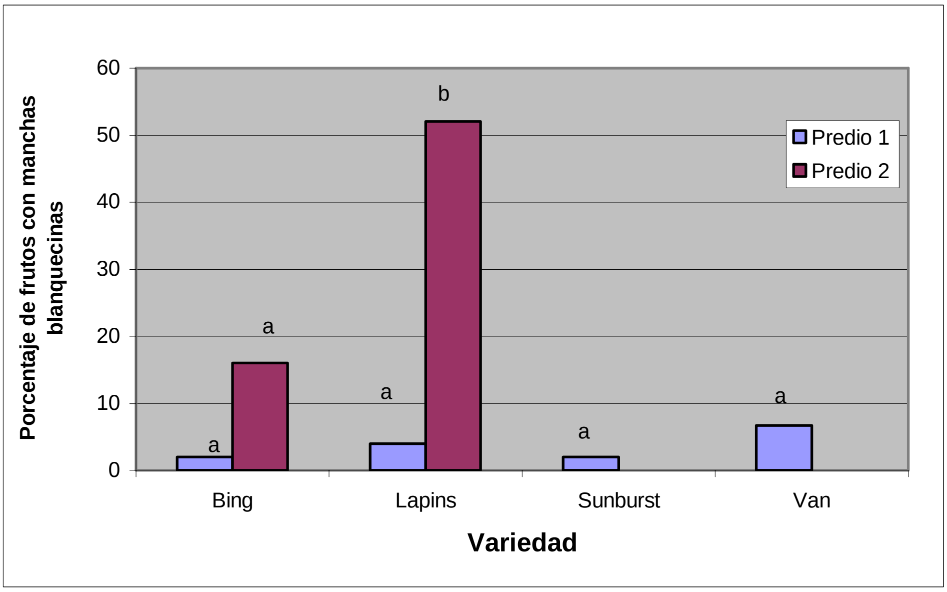


Fig 5: Medium velocity of wind by month registered in 2008/09






Porcentaje de frutos con oviposiciones
20
18
16
14
12
10
8
6
4
2
0
a
a
a
a
a
a
Predio 1
Predio 2
Bing
Lapins
Sunburst
Van
Variedad


Porcentaje de frutos con manchas blanquecinas
60
50
40
30
20
10
0
b
a
a
a
a
a
Predio 1
Predio 2
Bing
Lapins
Sunburst
Van
Variedad