CROP LOAD MANAGEMENT OF NEWLY PLANTED PINOT GRIS GROWN IN WARM CLIMATE OF CALIFORNIA

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Abstract:

Context and purpose of the study – San Joaquin Valley accounts for 68% of Pinot gris acreage and produces 83% of Pinot gris wine in California. Strong demand for Pinot gris has prompted growers to restrict the nonbearing period to less than two years, if possible. This requires permanent vine structure establishment the first year with a crop expected in the second year. Precocious cropping raises the risk of overcropping with possible carry-over effects in subsequent years. To identify the optimum crop level and economic threshold for newly planted Pinot gris vines, a field trial was initiated in a commercial vineyard in 2016.

Materials and methods – Bench grafted Pinot gris vines with Freedom rootstocks were planted in February of 2015. Quadrilateral cordons were established in the same year aiming for the first crop in 2016. Randomized complete block design was set up with four levels of inflorescence thinning in the spring of 2016, and each treatment was replicated in 5 times. Inflorescences were hand thinned approximately 3 weeks pre-bloom. No thinning was applied after 2016, but data were still collected to study the potential carry-over effect in 2017 and 2018. Four treatments included: 1) all fruit removed (0 cluster per shoot); 2) one cluster per two shoots; 3) one cluster per shoot; 4) no fruit removed. Five vines in each block were labeled as data vines and yield components, pruning weight and fruit chemistry were collected in 2016, 2017 and 2018.

Results – inflorescence removal increased fruit set, average berry weight, and soluble solids in 2016. Increased cluster compaction on thinned vines did not cause excessive bunch rot, but did partially compensate for the potential yield loss associated with inflorescence removal. Yield in 2016 was reduced by 6%, 28% and 100% with the severity of inflorescence removal. No thinning was performed in 2017 and 2018, but yield, fruit chemistry, and pruning weight were still measured. The Ravaz Index (RI) from treatment of one inflorescence per two shoots was 8.3 in 2016 and vines in that treatment had the highest accumulated yield across 2016 and 2017. Vines with RI > 12 showed significant delayed sugar accumulation in 2016 and reduced yields in 2017. Thus, newly planted vines with an RI> 12 in their first crop year were overcropped and will likely see reduced yields the following year, whereas vines with RI of approximate 10 provide maximum yield without affecting fruit chemistry and the following year's crop. In 2018, yield and fruit chemistry were monitored as well, however no difference has been found across various treatments.

Key words: Pinot gris, Crop load, Carry-over, Newly planted vine

1. Introduction.

Crop Load Management of Newly Planted Pinot Gris in the San Joaquin Valley of California

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Abstract

In order to target an optimum crop load and sustain the long term production for newly planted Pinot Gris, a field trial was conducted in a commercial vineyard in Fresno, CA. Three levels of inflorescences were retained 3 weeks before bloom at 0, 1/2, and 1 inflorescence per shoot and unthinned vines were used as control. Yield was reduced by 100%, 28% and 6% from the thinning. Yield compensation was associated with the greater fruit set and berry mass without rot issues. Total soluble solids (TSS) at harvest was significantly lower in the control vines. Based on our results in 2016, 4.3 kg/m of row and 0.45 kg/m of row are believed to be the yield level and pruning weight for the newly planted Pinot Gris vines under the quadrilateral cordon spur pruning system to achieve the RI of 10-12. RI > 12 in 2016 resuted in significant carry-over effect on the following year's bud fruitfulness and per vine yield, however no further carry-over effect was found after 2017. Our results from this pilot study provide evidence RI of 10-12 can give the winegrape growers the maximum yield without affecting the fruit quality and the following year's bud fruitfulness and yield.

Introduction

San Joaquin Valley (SJV) has 68% of Pinot Gris acreage and the majority of Pinot Gris crush volume (83%) in California. Acreage increased by 21% in Fresno from 2015 to 2016. Yield of Pinot Gris in the SJV ranges from 8-12 tons/acre under the mature vines. The strong demand for this cultivar has promoted growers to advance the time frame from planting to production in less than two years. To do so would require the permanent vine structures to be established in the first year with the first crop expected in the second year. Cropping in the second year raises the risk of overcropping with the possible carry-over effects in the subsequent years. In order to identify the optimum crop level and the economic threshold for newly planted Pinot Gris vines, a field trial was conducted in a commercial vineyard in Fresno, CA.

Method

- Dormant bench grafted Pinot Gris (FPS clone 04) vines with Freedom rootstocks were established at west of Fresno on fine sandy loam soil on February 15, 2015. Fresno is classified as the Region V with >4000 GDD (based 50 °F).
- Trunk and cordon training were applied at the first year of 2015 and the first crop is expected at the second year of 2016.
- Vines were trained in quadrilateral cordon trellis with a 18" crossarm and row x vine spacing is 11'x5' with the east-west row.
- Randomized complete block design (RCBD) was applied with five replicates per treatment and five vines were used per replicate.
- Three levels of pre-bloom inflorescence thinning were applied by hand (Figure 1) at the shoot growth of 12" to 15" in 2016: 1) 0 cluster/shoot; 2) ½ cluster/shoot; 3) 1 cluster/shoot; 4) no thinning as control.
- Yield components, canopy size, berry ripening and harvest berry chemistry were recoreded for three years of 2016, 2017 and 2018 to monitor the carry-over effect (Figure 2).

Figure 2. Canopy growth: the control (left) and 0 cluster/shoot (right) at veraison

Results

- ½ cluster/shoot resulting in yield:4.3 kg/m of row (equivalent to 6 tons/acre) and pruning weight:0.45 kg/m of row achieves the most economic and balanced crop across three years (Table 1 and 2).
- Yield compensation occurs when inflorescence thinning is applied pre-bloom: 1) greater fruit set; 2) greater berry mass, without rot issues.
- Crop load is critical for newly planted Pinot Gris to maintain vine balance: RI <12.
- Overcropped (RI >12) vines delay berry ripening and reduce yield in the following season due to low bud fruitfulness (Figure 3 and 4).
- Restricted leaf area from overcropping limits the CHO supply to ripen fruit and promote inflorescence initiation.

Figure 1. Inflorescences were thinned by hand three weeks pre-bloom

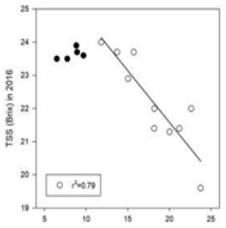

Figure 3. 2016 RI >12 Reduced 2016 Harvest Brix

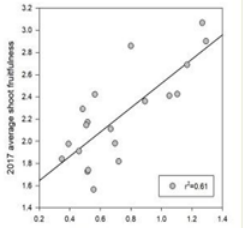

Figure 4. 2016 Pruning Weight vs 2017 Bud Fruitfulness

Table 1. Three Years' Harvest Yield Components of Pinot Gris when the average Brix reaches 22

Treatment	Yield (ton/acre)			Cluster no./vine			Pruning weight (kg/vine)		
	2016	2017	2018	2016	2017	2018	2016	2017	2018
0 cluster/shoot	N/A	16.6 ab	10.0	N/A	224 a	115	1.18 a	0.81	0.65
½ cluster/shoot	5.0 b	19.0 a	8.8	56 c	186 b	105	0.75 b	0.82	0.67
1 cluster/shoot	6.6 ab	13.9 b	8.5	85 b	162 b	101	0.52 c	0.69	0.66
Control	7.0 a	13.3 b	8.7	113 a	169 b	101	0.46 c	0.66	0.61

Table 2. 2016 Ravaz Index, Three Years' Yield and Net Income of Pinot Gris

Treatment	2016 RI (kg/kg)	Yied Summary (ton/acre)	Net Income ($)
0 cluster/shoot	N/A	26.6	10,240
½ cluster/shoot	8.3 a	32.8	12,420
1 cluster/shoot	16.1 b	29.0	10,900
Control	19.9 c	29.0	11,300

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