An economic analysis of sunburn and fruit split for alternative pomegranate varieties for a representative California pomegranate orchard: preliminary results

Daniel R. Burghart,[a] John Chater,[b] and Jonathan D. Kaplan[a*]

[a] *Department of Economics, California State University, Sacramento*
[b] *Department of Horticultural Sciences, University of Florida*

May 15, 2025

Research Note 2025-2

SACRAMENTO STATE

Issue

Commercial production of pomegranates has been an important specialty crop industry in California and has emerged as an alternative specialty crop in Florida in recent years. California farmers have been switching to drought-tolerant crops like pomegranate because of water restrictions and costs. Florida grower interest in pomegranates was prompted by unprecedented challenges from citrus greening and fierce competition for berries from other countries.

Currently, pomegranate is largely a monoculture in the United States, which is a major vulnerability to long-term production. Wonderful Orchards, Inc., produces the Wonderful variety, which represents the vast majority of the crop grown nationwide. However, Wonderful pomegranates are susceptible to sunburn and fruit split given the structure of its canopy and the late ripening of the fruit. Other pomegranate varieties have alternative canopy structures and ripen earlier and thus could provide better economic opportunities relative to the Wonderful variety for growers facing challenges growing other perennial crops.

The two left panels in Figure 1 illustrate how split can affect crop losses when the outer husk of the pomegranate opens and exposes the fruit to the environment resulting in spoilage. The right panels of Figure 1 show damage that can occur from sunburn. Damage from sunburn is principally cosmetic, which thereby reduces the value of the fruit because it can only by used for juice and not for the fresh fruit market where a significantly higher price can be earned.

In this research note, we examine the effects of sunburn and fruit split on the yields and profits when producing Wonderful and other pomegranate varieties. We compare the profits of each variety to Wonderful to illustrate which pomegranate varieties may provide greater economic returns than Wonderful, when considering the effects of sunburn and fruit split.

*Corresponding author: kaplanj@csus.edu

Figure 1: Sunburn and Split

Study Methods

We use a budget approach to estimate the effects of sunburn and fruit split on pomegranate yields for representative California groves for Wonderful pomegranates and the alternative varieties. Field trials at the University of California, Riverside provide estimates for sunburn and fruit split. Data from UCCE cost and returns studies (Day et al. 2010) and California County Agricultural Commissioner Reports (USDA-NASS 2023) are used to derive costs, prices, and yield conditions for pomegranate production for a representative newly planted grove in southern California. Prices and yields were extracted for Fresno, Riverside, and Tulare counties, the largest reported producers of pomegranates in the state. Table 1 provides the prices per ton and maximum boxes per acre used in the analysis. Production cultural costs are from (Day et al. 2010).

To estimate healthy yield in each year for each scenario, we use a weighted-average of the yield per acre with data from the California County Agricultural Commissioner Reports (USDA-NASS 2023) as the average maximum yield per acre[1] shown in Table 1 along with the age-yield profile reported in the UCCE cost and returns studies (Day et al. 2010). The healthy age-yield profiles can be seen in Figure 2. For the sunburn and fruit split yield, the healthy yield in a given year is reduced by the sunburn losses noted in Table 2 and by a standard 7% reduction for fruit split. The sunburn and fruit split age yield profiles are shown in Figure 3. Table 2 shows the amount of sunburn loss by cultivar type. Wonderful pomegranates, an industry staple, exhibit relatively high sunburn losses at 56.7%. In contrast, cultivars better adapted to arid climates, such as Desertnyi and Parfianca, exhibit only 16.3% and 14.8% sunburn

For the each pomegranate variety, we estimate profits over A 25-year period, following the lifespan denoted in Day et al. (2010). We then evaluate and compare cumulative discounted profits (based on a 3% discount rate).

Table 1: Pomegranate Production, Pricing, and Value in California

	Bearing Acres	**Tons/Acre**	**Price/Ton**	**Total Value ($)**
Fresno	4,430	7.27	848	27,306,000
Riverside	5	7.60	1,000	38,000
Tulare	2,550	5.76	1,790	26,313,000
Sum of Others	11,900	–	–	77,029,000
State Total	18,885	6.72	1,143	130,686,000

[1]This underestimates the yield when a grove is established since the values shown in Table 1 contains yields for all bearing acres, both young and old.

Figure 2: Estimated Age-Year Profile based on Field Trial Data

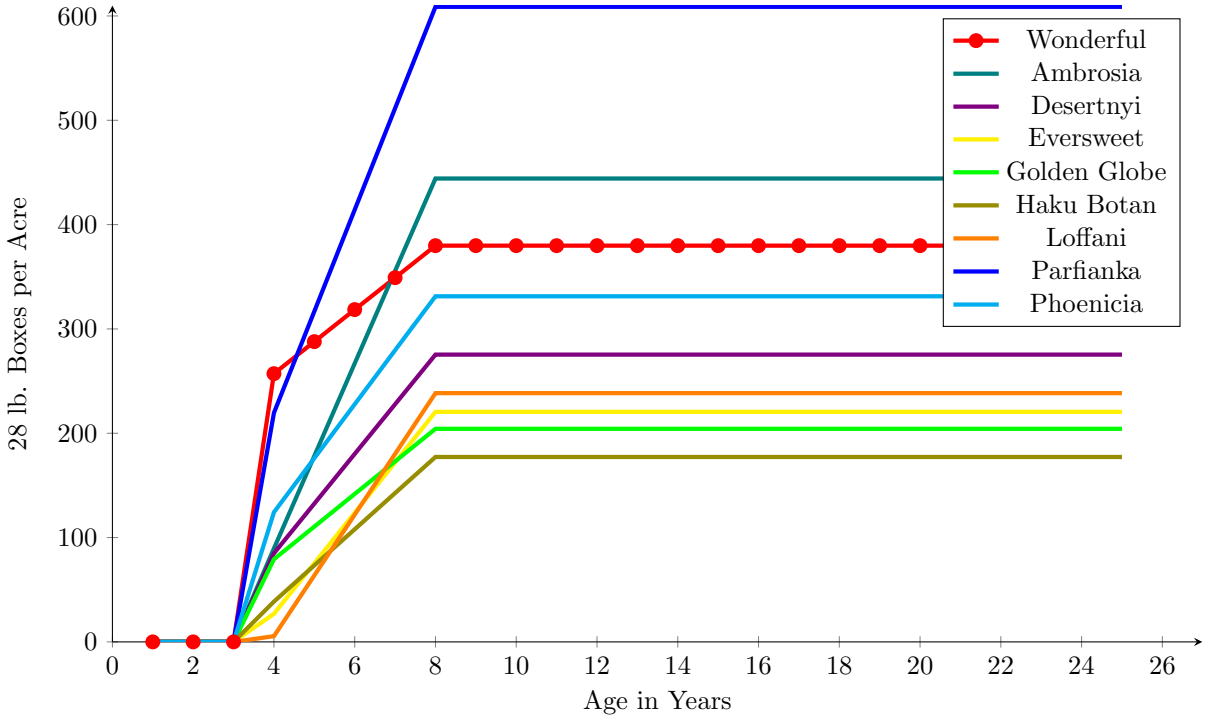

Figure 3: Estimated Age-Year Profile with Sunburn and Split Conditions

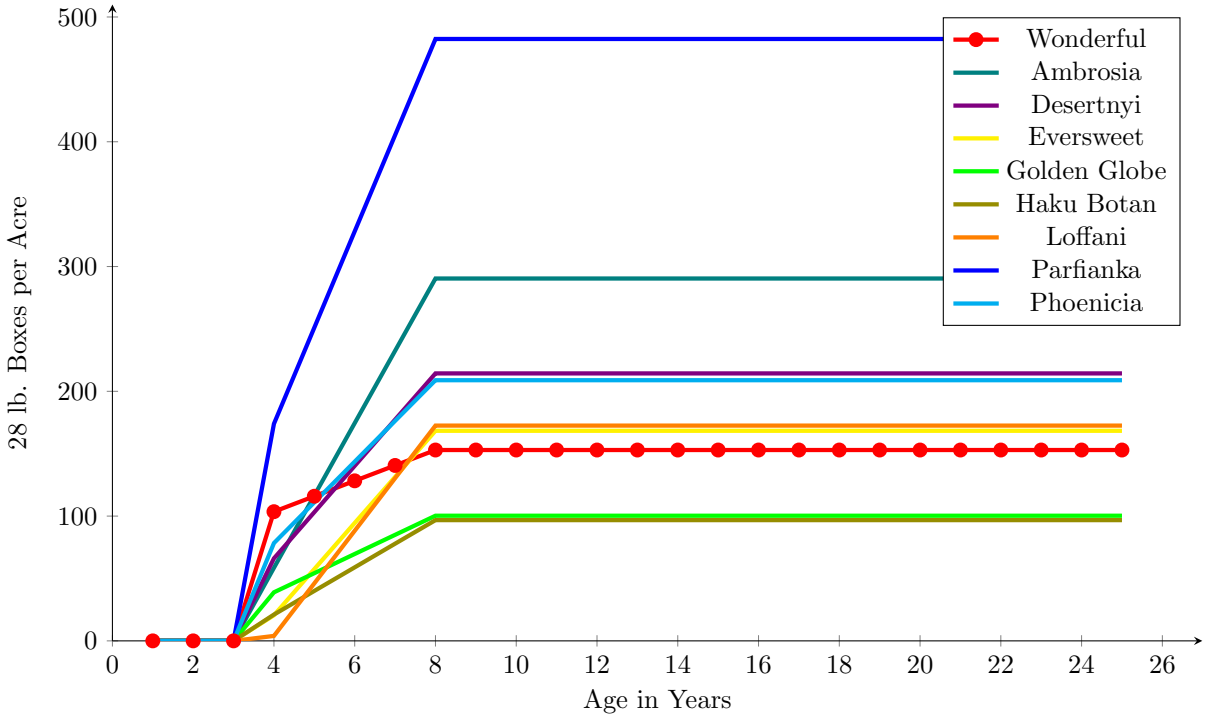

Table 2: Losses Due to Sunburn by Cultivar

Cultivar	Loss to Sunburn (%)
Wonderful	56.7
Ambrosia	29.7
Desertnyi	16.3
Eversweet	17.9
Golden Globe	47.2
Haku Botan	41.3
Loffani	22.2
Parfianca	14.8
Phoenicia	32.2

Insights and Findings

The differences in sunburn and fruit split, seen in the data, suggest that many alternative pomegranate cultivars provide greater yields and potential profits than the Wonderful variety. However, these results are based on field trials and limited economic information and may not be the same for groves with different soil, environmental, climatic, and economic conditions than those for the trials and values used in the simulations.

Table 3: Results From Constant Returns Model

Cultivar	Returns per Acre ($)	Discounted Returns ($)	Relative Returns ($)
Wonderful	54,989	36,035	–
Ambrosia	98,551	63,366	27,331
Desertnyi	73,741	47,610	11,575
Eversweet	56,568	36,247	212
Golden Globe	34,830	22,569	-13,466
Haku Botan	32,905	21,172	-14,863
Loffani	57,240	36,517	482
Parfianca	166,949	108,060	72,025
Phoenicia	72,428	46,907	10,872

Acknowledgements

This research was supported with funds from a California Department of Food and Agriculture grant (19-1043-001-SF).

References

Day, K., H. Andris, K. Klonsky, and R. De Moura (2010). Sample costs to establish and produce pomegranates. *University of California Cooperative Extension*, 1–20. https://coststudyfiles.ucdavis.edu/uploads/cs_public/d5/bd/d5bdaad2-b874-4b99-a3c2-cc7a89cfc72d/pomegranatevs2010.pdf.

USDA-NASS (2023). *County Agricultural Commissioner Annual Report*. USDA-NASS. https://www.nass.usda.gov/Statistics_by_State/California/Publications/AgComm/index.php/.