

Optimal pollination important

- Bee prices and other inputs are going up
- Almond prices going down
- Almond yield is a numbers game:
 - More fertilized flowers = more nuts = more yield
= more \$\$

“Modern” almond orchards involve tighter tree spacings



- Tight spacings down the row tend to produce a “floral wall”.
- Can decrease cross-row bee activity
 - Bees tend to fly to nearest tree / blossoms
 - May show some preference for similar variety

Alternating varieties down the same row
vs.
Standard planting of solid variety rows

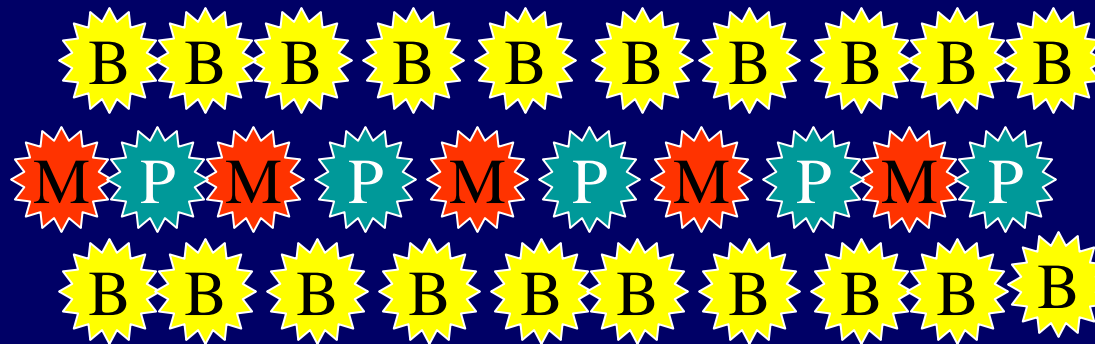
- Trial planted in 1989 in Colusa County (Nickels Estate)
- Compared alternating Padre and Mission down rows vs. solid rows of Padre & Mission

Nickels Estate Trial

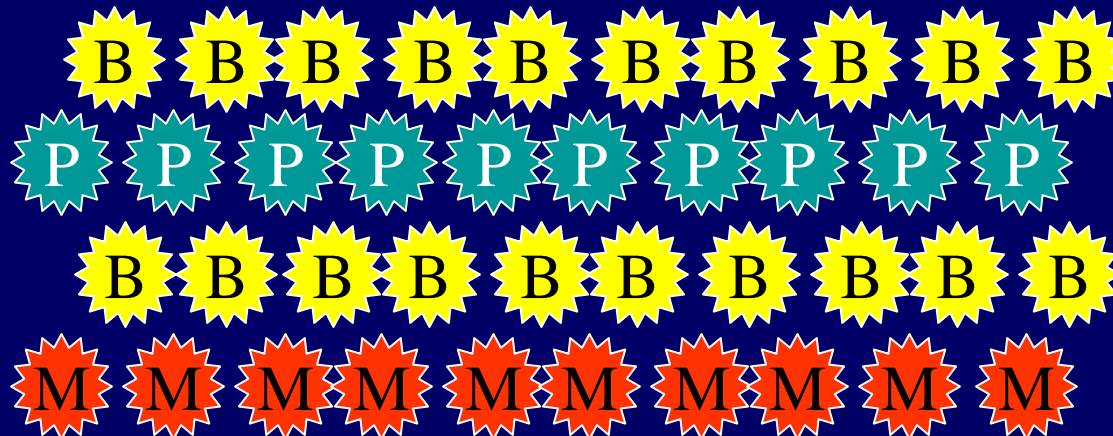
Planted 1989

15' x 20'

Dual
rows



Solid
rows



Yield Comparison of Padre & Mission Planted in Solid Rows vs. Alternating Varieties Down the Row

	1993	1994	1995	1996	1997	1998
	5 th leaf	6 th leaf	7 th leaf	8 th leaf	9 th leaf	10 th leaf
Solid rows	1831	1776	1705	1843	2227	2164
Alt down row	1921	1948	1916	2000	2235	2180
	+ 5%	+10%	+12%	+8.5%	0.4%	0.7%

Results Summary

- Alternating Padre and Mission down the row resulted in a 9% increase in yield over the first four harvests (5th – 8th leaf).
- No difference in 9th & 10th leaf harvests
- 6% increase over all

Results Summary

- Padre benefitted the most from alternating down the row
- Mission showed no yield benefit
 - Don't know why
- Advantage of dual rows greatest during years with poor weather during bloom
- Increase production in "off" years when prices may be higher

Genetic Testing Shows Bee Flight Pattern

- In solid variety rows, 30% of the Padre nuts were pollinated by Mission and 65% were pollinated by Butte.
- In dual variety rows, 55% of the Padre nuts were pollinated by Mission and 40% were pollinated by Butte.
- In either case, 3rd variety (Butte) contributed to pollination

- Three almond varieties:



may offer better pollination

- better bloom overlap
- diversification



require a third harvest operation



are problematic for small growers who hire contractors to harvest their crop

Can alternating two varieties down
the same row produce yields
similar to standard planted
arrangements of three varieties?

Modesto Junior College Orchard:

18' x 22'

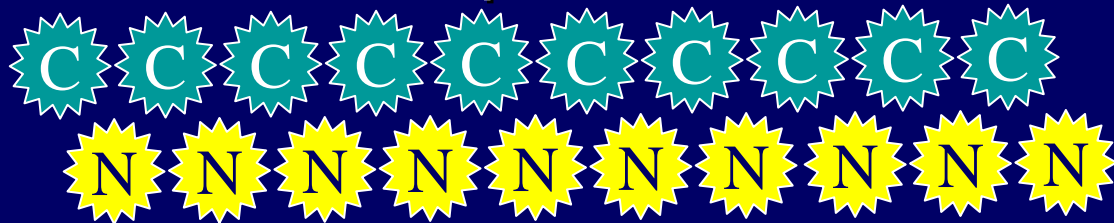
- Solid rows of Nonpareil & Carmel



Modesto Junior College Orchard:

18' x 22'

- Solid rows of Nonpareil & Carmel



- Solid rows of Nonpareil (50%), Carmel (25%), & Monterey (25%)



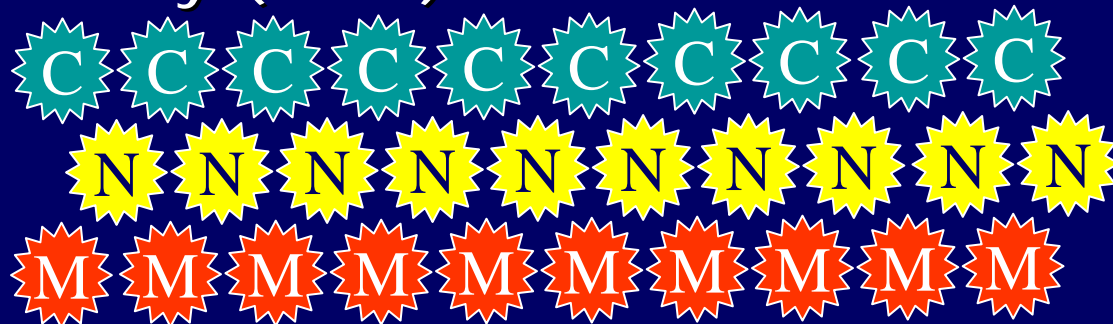
Modesto Junior College Orchard:

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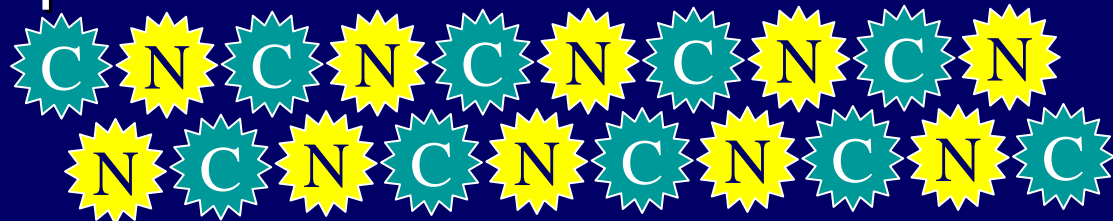
- Solid rows of Nonpareil & Carmel



- Solid rows of Nonpareil (50%), Carmel (25%), & Monterey (25%)



- Nonpareil & Carmel alternated down same row



The Influence of Variety Arrangement on Yield. MJC.

Nonpareil Yield (pounds / acre)

	2003 4 th leaf	2004 5 th leaf	2005 6 th leaf	2007 8 th leaf	2008 9 th leaf	Cum	% Diff
N:C solid rows	1210	1914	1387	4317	3546	12,374	--
N:C:M solid rows	1067 -12%	2233 +17%	1536 +12%	4568 +5.8%	4013 +13%	13,417	+8.4%
N:C alternating	1496 +24%	1980 +3.4%	1541 +11%	4348 +0.7%	3824 +7.8%	13,189	+6.6%

The Influence of Variety Arrangement on Yield. MJC.

Carmel Yield (pounds / acre)

	2003 4 th leaf	2004 5 th leaf	2005 6 th leaf	2007 8 th leaf	2008 9 th leaf	Cum	% Diff
N:C solid rows	1749	2409	2860	4730	4370	16,118	--
N:C:M solid rows	1485 -17%	2484 +3.1%	2604 -9.0%	4447 -6.0%	4112 -5.9%	15,132	- 6.1%
N:C alternating	1848 +5.7%	2792 +16%	2973 +4.0%	4264 -9.9%	4257 -2.6%	16,134	+ 0.1%

Results Summary

- Planting two pollinators (Carmel & Monterey) in solid rows increased Nonpareil yields an average of 8.4% over a five year period compared to solid rows of just Nonpareil & Carmel.
- Alternating Nonpareil & Carmel down the same rows increased Nonpareil yields an average of 6.6% (similar to Nickels study).

Results Summary

- Planting two pollinators (Carmel & Monterey) in solid rows **decreased** Nonpareil yields an average of 6.1% compared to solid rows of just Nonpareil & Carmel.
- Alternating Nonpareil & Carmel down the same rows had no yield effect on Carmel.

- If alternating varieties down the row, be careful to choose varieties that either can be mixed together (Butte & Padre) or with significantly different harvest dates to avoid penalties.

N	C	N	C	N	C	N	C	N	C
F	N	F	N	F	N	F	N	F	N
N	C	N	C	N	C	N	C	N	C
F	N	F	N	F	N	F	N	F	N