

Can fall nitrogen fertilization improve almond yield?

Franz Niederholzer, UCCE Farm Advisor, Colusa/Sutter/Yuba Counties

Introduction

Current nitrogen (N) management program developed by UC researchers recommends the following fertilizer N application timings/amounts:

- Feb –Mar 20% of the annual N budget
- April- May 30% of annual N budget
- May-June 30% of annual N budget
- Postharvest 20% of annual N budget.

However, if some fertilizer N remains in the roots zone, winter rain fall can leach it down out of the root zone and into groundwater; wasting grower money and harming groundwater.

How important is a post-hull split nitrogen application for successful almond production? We are unaware of any research results directly supporting a yield benefit from post-hull split N applications in almond. [Fall N application did not improve peach yield the following year in UC research conducted by Drs. DeJong and Weinbaum in the 1990's.] Because of the leaching risk, post-hull split N application in almond may be more environmentally risky than spring applications. If post-hull split N application has no yield benefit the following spring, this practice may need to be reconsidered. If it has significant benefit, this needs to be documented in light of the nitrate leaching risk and steps taken to minimize potential leaching loss. Identifying indicators of benefit/risk of fall N application is important to sustainable almond production.

Methods

The study block is a mature orchard, 50% Nonpareil with Monterey, Carmel and Aldrich pollinators. Trees are on Lovell rootstock and irrigated with micro-sprinklers. Average yields ranges from 2500-3000 pounds/acre in the last several years.

In fall, 2015, a randomized complete block design experiment was set up to test the hypothesis that post-harvest nitrogen fertilization improves almond yield the following year. The blocking factor was 2015 yield/light interception. On Oct 20, 2015, UN32 at the rate of 0, 30 or 60 lbs N/acre as UN32 was applied to 11 tree sections of four separate rows of Nonpareil trees using a ground-drive sprayer (see photo in upper right of poster). Trees received 190 lbs N (as UN32) in 2016 in three applications between April and June. Leaf samples from each group of 11 trees were taken in April and again in July.



Banding UN32 ahead of irrigation. October 20, 2015

Table 1. Spring and summer (2016) leaf N concentrations (% dw) and Nonpareil kernel yield (lbs/acre) for three N treatments applied on Oct 20, 2015 to a mature almond orchard in Colusa County.

Treatment	Spring (UC ESP) leaf N levels (% dw)	Summer leaf N levels (% dw)	Yield (kernel lbs/acre)	Yield difference from 2015 to 2016 (kernel lbs/acre)
0 lbs N	3.28 a	2.56 a	2568 a	- 482 a
30 lbs N	3.33 a	2.60 a	2465 a	- 384 a
60 lbs N	3.37 a	2.69 a	2570 a	- 496 a

Results

Fall N application did not affect total almond yield the following year or the difference between 2015 and 2016 yield on the same trees (Table 1). In addition, leaf N concentrations the following year were not significantly different between the three treatments (Table 1). The biggest factor affecting the change in yield from 2015 to 2016 was the size of the 2015 crop, with the bigger 2015 yields leading to larger drops in 2016 yield ($p=0.00$; $r^2=0.9$). This study will be continued in 2017 season.

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