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 compared to trees that received no fall N. The blocking factor was 2015 yield/light interception. On Oct 20, 2015 and 2016, fertilizer nitrogen was applied at the rate of 0, 30 or 60 lbs N/acre to 11 tree sections of four separate rows of Nonpareil trees either by injection through micro-sprinklers or as dry material applied under the micro-sprinkers. On the same date, 0 or 30 lbs N/acre rates were applied to Aldrich trees in the same orchard. Trees received 190 lbs N (as UN32) in both 2016 and 2017 in 3-5 applications between April and mid-June. Leaf samples were taken in the spring and summer of 2016, but not taken in 2017.

Thanks to Stan Cutter, Ubaldo Salud, and Gerry Hernandez

Ammonium sulfate at a rate of 30 lbs N/acre under Aldrich trees. Sept 14, 2017.

Ammonium sulfate at a rate of 30 lbs N/acre under a Nonpareil tree. Sept 14, 2017.

Treatment (5 reps per treatment)	2016 NP Yield (kernel lbs/acre)	NP Yield difference from 2015 to 2016 (kernel lbs/acre)	2017 NP Yield (kernel lbs/acre)	NP Yield difference from 2016 to 2017 (kernel lbs/acre)
0 lbs N	2568 a	- 482 a	2952 a	+384 a
30 lbs N	2465 a	- 384 a	2895 a	+429 a
60 lbs N	2570 a	- 496 a	3161 a	+591 a

Results and Discussion

In both 2016 and 2017, fall N application the previous year did not affect total almond yield or the yield difference between previous and current year on the same trees (Table 1). Aldrich 2017 yield was not influenced by fall N fertilization in 2016 (p=0.41). In addition, leaf N concentrations in 2016 were not significantly different between the three treatments (data not shown)

This study will be continued in 2018 season. Fall treatments were established o NP (Sept 14 and Oct 27) and Aldrich (Sept 14) at 0 or 30 lbs N/acre. All treatments were applied as ammonium sulfate once the sprinklers were started.