

# Fertilizing Non-Bearing Almond Trees

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## Problem and Significance:

Growers have realized the benefits of increased fertilizer rates and applications to first leaf trees. These include increased vegetative growth, shorter time to first harvest, and larger crop loads on young trees. Most growers within the area have indicated that their current first leaf nutrient fertilizer programs include either the application of one ounce of nitrogen every three to four weeks applied through irrigation water, or 4-6 ozs (30-45 lbs/acre) of granular fertilizer blend totaling one ounce of nitrogen applied once a month from mid-March through September. It is unknown if these rates are adequate or excessive.

There is also interest in the use of controlled release fertilizers for young trees. Since the root system is small and has a limited ability for nutrient uptake, controlled release fertilizers may keep more nutrients within the rootzone. This may increase tree growth or reduce the amount of applied fertilizer due to an increase in nutrient use efficiency. If effective, it may replace conventional fertilizer use as it will save labor due to a reduction in the number of fertilizer applications. Research needs to determine if controlled release fertilizers are as effective as conventional blends, and if they are worth the extra expense.

## Objectives:

1. To determine the nitrogen rate needed to maximize growth of first year almond trees.
2. To compare the effect on first year almond tree growth of controlled release and conventional fertilizers.

## Methods 2012:

Nitrogen was applied around the base of almond trees using a granular 21%-7%-14% conventional fertilizer. Six applications were made to each treatment, totaling 0, 7.5, 15, 30, and 45 lbs of total nitrogen/acre. Applications began in early April, and continued on one month intervals through September. Fertilizers were lightly incorporated after application.

Two controlled release blends (120 day and 180 day) with the same fertilizer analysis (21%-7%-14%) was applied around the base of almond trees for growth comparisons to the conventional blend. Three rates were applied, totaling 15, 30, and 45 lbs of total nitrogen/acre. A single application was made in early April. Fertilizers were lightly incorporated after application.

Each treatment contained four replicate trees within each block, with a total of four blocks. The orchard is located on a loamy-sand classified soil, and is irrigated using solid-set sprinklers.

## Methods 2013:

### First Leaf:

- Nitrogen was applied to the base of the almond tree monthly for six months totaling 0, 1, 2, 4, and 6 ounces of actual N
- 5 blocks of 8 trees, totaling 40 trees per treatment
- Treatments began in early April
- Clay Loam Soil, Flood Irrigated from a well

### Second Leaf:

- Nitrogen was applied to the base of an almond tree totaling 0, 4, 8, and 12 oz of actual N
- 5 blocks of 4 trees, totaling 40 trees per treatment
- Treatments were applied in April using a controlled release product
- Loamy Sand Soil, Irrigated using MID Water and solid set sprinklers

All preliminary trunk measurements were taken at knee height prior to leaf-out. Final measurements for the season were taken in November.

## 2012:

Table 1: Probability of error and squared residuals of the linear and polynomial regression for the three fertilizer types.

Fertilizer Type	Term	Prob<(t)	Squared Residuals
Conventional	Applied Nitrogen	0.029	0.081
	(Applied Nitrogen) <sup>2</sup>	0.002	0.132
120 Day Controlled Release	Applied Nitrogen	0.05	0.071
	(Applied Nitrogen) <sup>2</sup>	0.003	0.178
180 Day Controlled Release	Applied Nitrogen	0.56	NS
	(Applied Nitrogen) <sup>2</sup>	0.102	NS

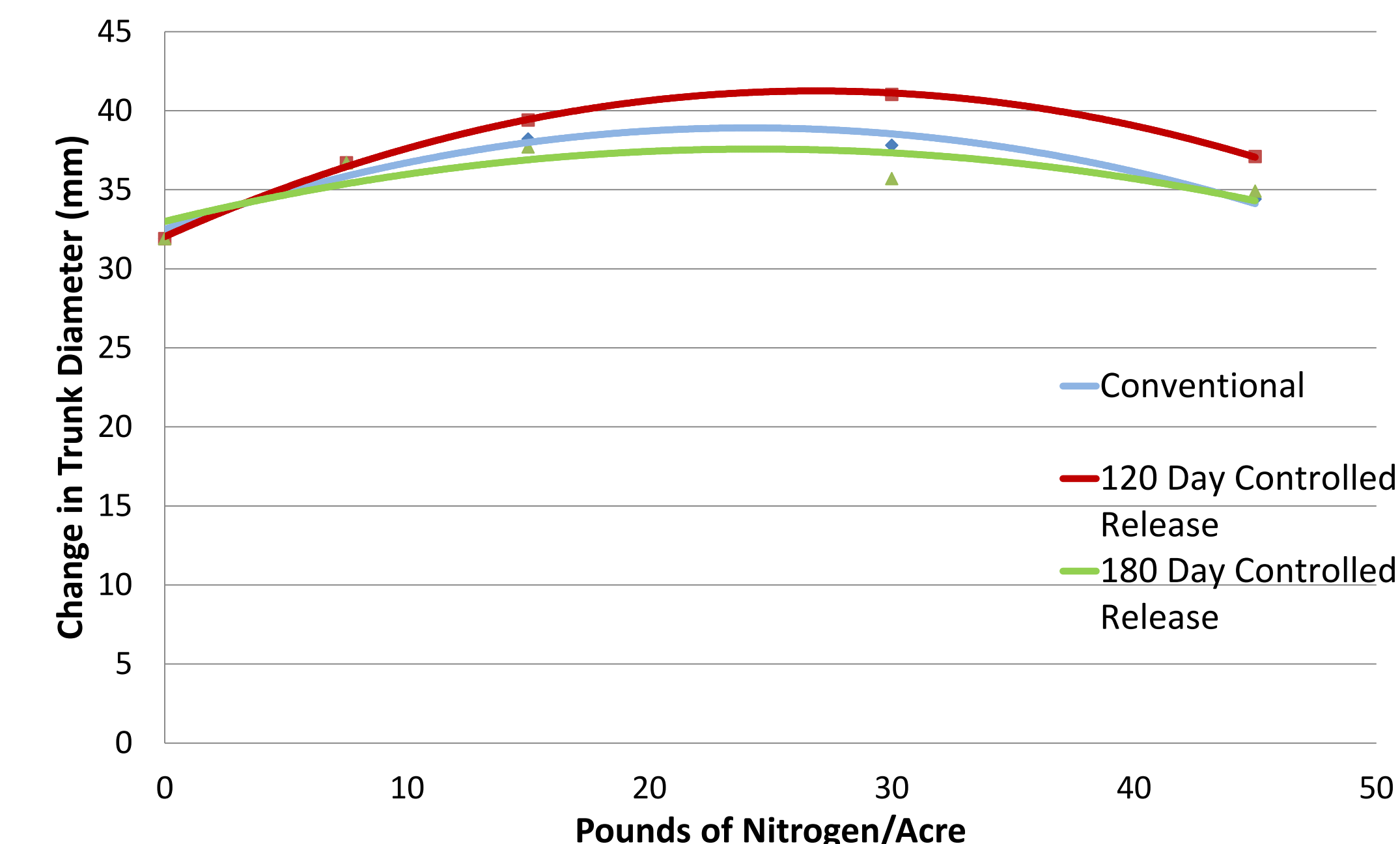


Figure 1: Polynomial regressions of the relationship between change in trunk diameter and nitrogen applied for the three fertilizer types.

## 2013:

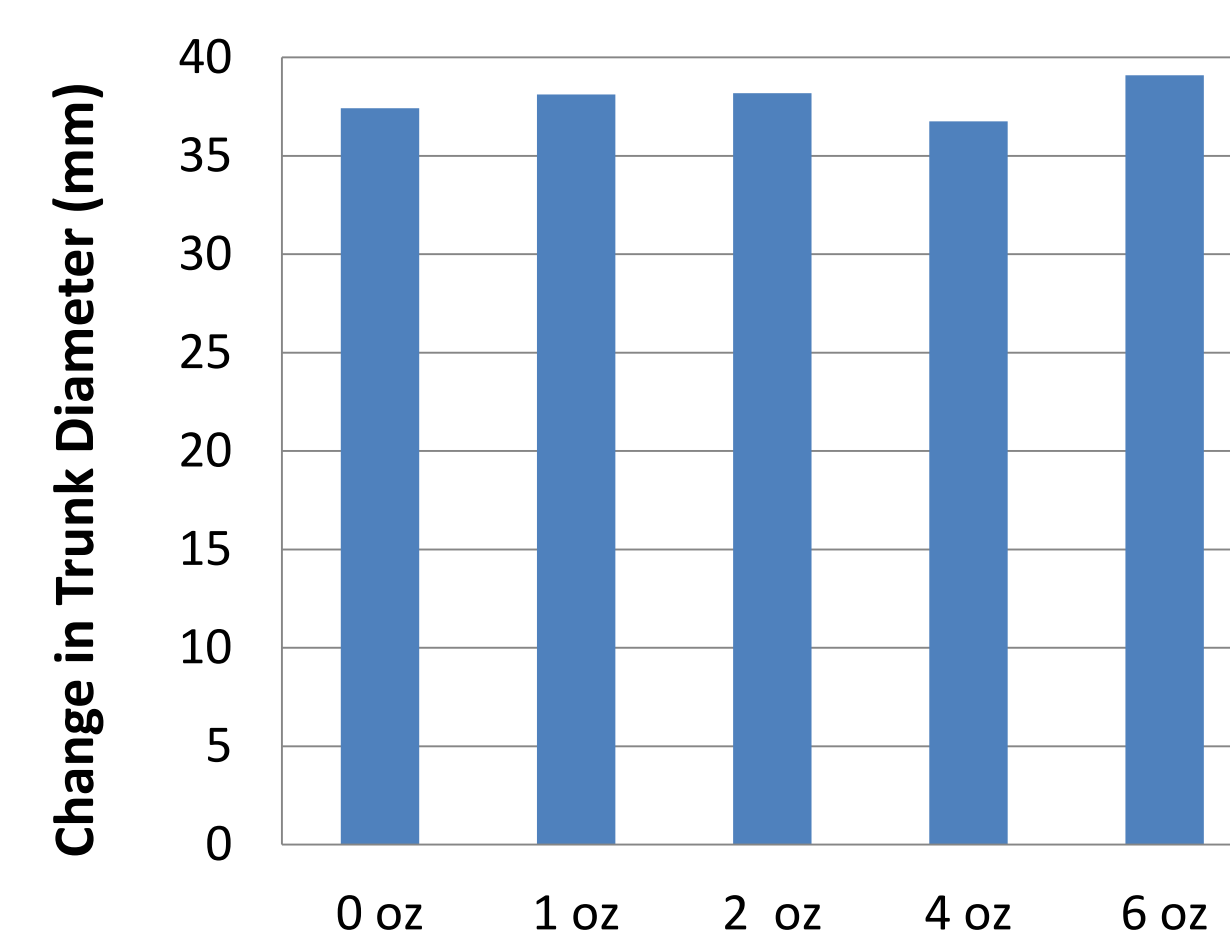


Figure 2: Conventional fertilizer on first leaf trees.

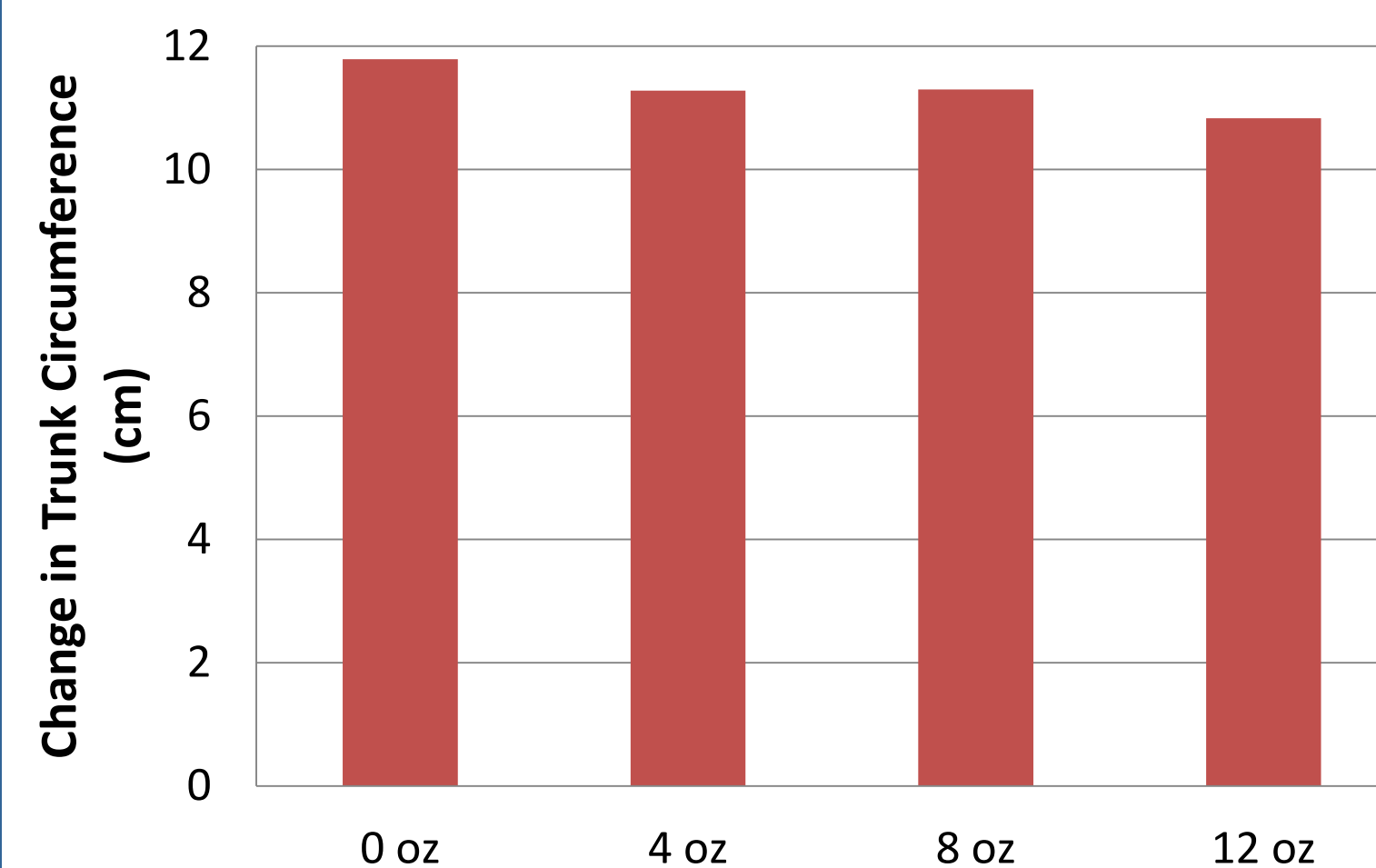


Figure 3: Controlled release fertilizer on 2nd leaf trees.

## Results and Discussion:

1. In 2012, Rate of nitrogen applied had a polynomial relationship to tree growth for the conventional and 120 day release fertilizer. There was no rate response with the 180 day release fertilizer (Fig. 1, Table 1)
2. Growth was reduced at the highest rate (Fig. 1). Optimal nitrogen rates appear to be between 15 and 30 lbs/acre
3. A single application of controlled release fertilizers is as effective as, if not more than, six applications of conventional fertilizers (Figure 1, Tables 1). Subsequently, labor costs are reduced using controlled release fertilizers due to reduced applications.
4. Leaf nitrogen content did not appear to influence tree growth in one year old almonds (data not shown, see 2012 report).
5. In 2013, There were no differences among treatments (Figures 2 and 3). Nitrate-nitrogen was detected in irrigation water at both sites throughout the season. Lack of differences were due to all trees receiving adequate nitrogen for growth from the blended nitrate containing groundwater
6. Future studies will be continued in locations with no detectable nitrate-nitrogen.

## Acknowledgements:

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