



**Applications** of Raynox were made on an app. 10 year old block of Honeycrisp apples, 0.85 acre in total size. Five individual rows were divided into four treatment sections, two were an UnTreated Control (UTC, no Raynox) and two were Raynox treated (RNX). Thus, half the block was treated with Raynox (RNX), half was left as an UnTreated Control (UTC), however, treatments were randomized throughout the block and rows were sprayed such that there was no drift of the RNX treatment into the UTC treatment. The Tree Row Volume (TRV) of this block was app. 175 gallons per acre, and treatments were applied in 62.5 gallons of water per acre (app. 3X). Raynox was applied at a rates of 2 to 2.5 gallons per acre, in a total of five application timings (all in the morning):

1. Monday, July 6, 2015, 2.5 gal per acre
2. Friday, July 10, 2015, 2 gallons per acre
3. Sunday, July 19, 2015, 2 gallons per acre
4. Tuesday, July 28, 2015, 2 gallons per acre
5. Monday, August 17, 2015, 2 gallons per acre, however, only west side of trees sprayed

**Environmental data** (temperature and solar radiation) along with dates of Raynox application(s) are presented in Figs. 1 and 2.

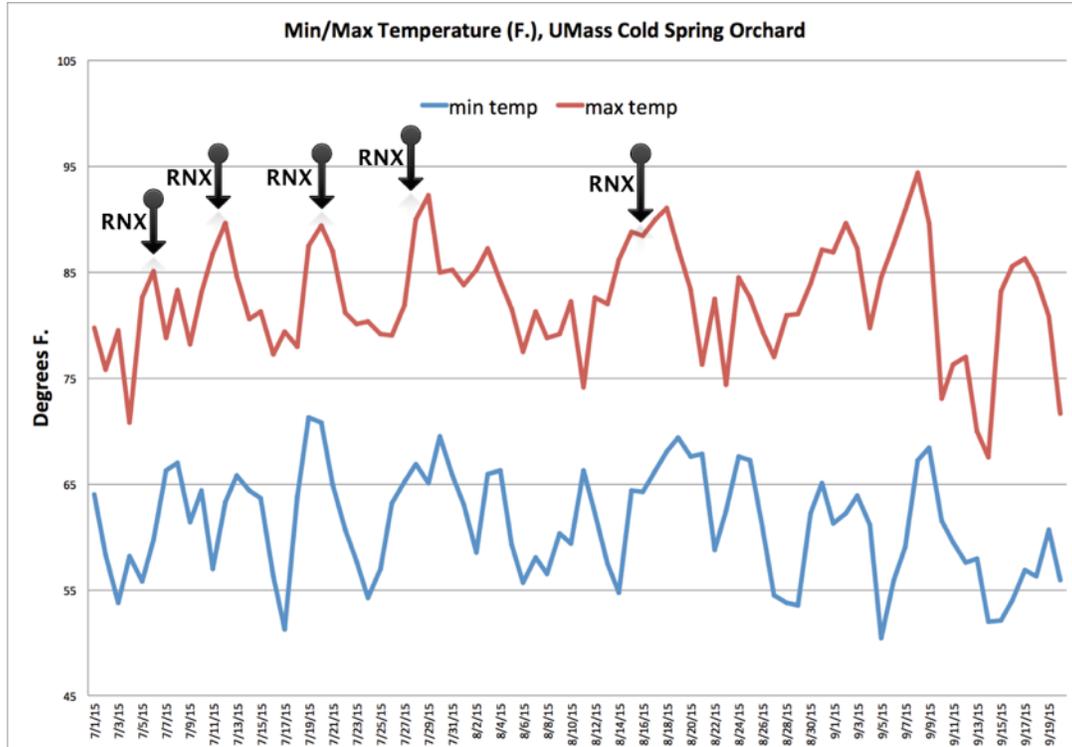


Fig 1. — Daily minimum and maximum temperature, UMass Cold Spring Orchard

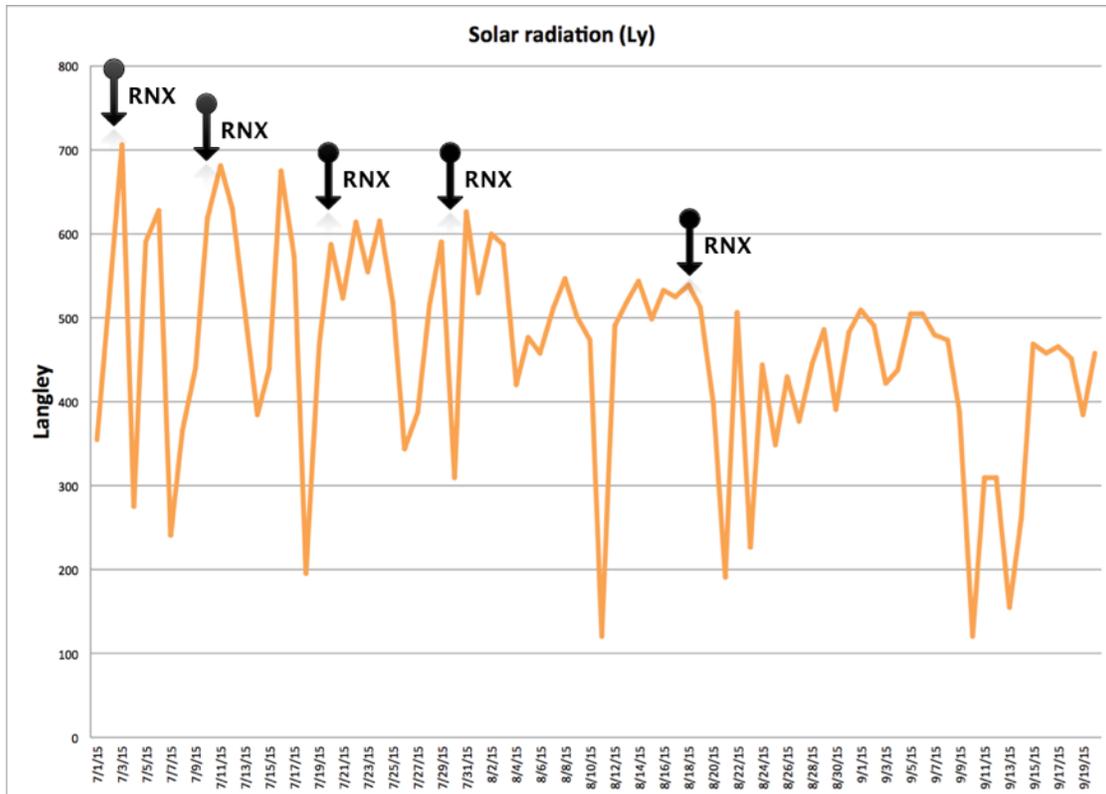


Fig. 2 — Daily solar radiation, UMass Cold Spring Orchard

**Direct observations** of both treatments (UTC and RNX) beginning after the first RNX treatment date of July 6 were consistently made and no observable sunburn/heat injury was found within both treatments until well after the last treatment and roughly coinciding with harvest in early-mid September. Note that the highest temperature of the season (app. 95 F.) was recorded on 8-September (Fig. 1), however, by then solar radiation was reduced (Fig. 2). Although some minor sunburn symptoms were observed in September just before or at harvest, it was only on a minimal number of fruit, and there was no observable or discernible differences between treatments. It was concluded that sunburn did not present any kind of significant fruit quality problem throughout the block at harvest, regardless of Raynox treatment or not.

**Fruit surface temperature** measurements were made beginning on 18-August, and although some readings were as high as 111, most were in the 100 to 105 degree range on that date (Figs. 3 and 4). Fruit surface temperatures on 8-September, when the hottest daily high temperature of 95 F. was recorded, were in the 117 to 118 degree range, however, mostly temperatures were in the low teens above 100 degrees (Figs. 5 and 6.) Note the literature suggests a fruit surface temperature of 115 F. or above may be necessary to initiate sunburn.

It was observed on September 3, and after several Raynox applications, that foliage/leaves on the Raynox treated trees took on a significantly different (silvery) appearance (Fig. 7).



Fig. 3 left. and Fig. 4 right — Honeycrisp apple surface temperatures on 18-August (air temp. app. 91 F.)



Fig. 5 left. and Fig. 6 right — Honeycrisp apple surface temperatures on 8-September (air temp. app. 95 F.)



Fig. 7 — it appeared Raynox-treated (RNX) foliage (right) had a more “silvery” appearance than UnTreated Control (UTC) on left

Some examples of the minor number of fruit with sunburn/heat injury symptoms can be seen in Figs. 8 and 9, however, damage was minimal and there were no treatment differences observed. It's felt most of this (minor amount) of injury occurred during the September heat period(s), and personal communication with Washington apple growers suggests that fruit becomes more susceptible to heat/sunburn injury with increasing fruit maturity near harvest. RNX applications may have the most benefit then.



Fig. 8 (left), severe sunburn observed on a very few Honeycrisp apples that would result in cull  
Fig. 9 (right), less significant sunburn on a few Honeycrisp apples, would not result in cull

**Conclusions** include:

- By the time of harvest, very negligible amounts of sunburn/heat injury were observed in these Honeycrisp, and there was no difference observed in the RNX vs. UTC.
- The temperature/solar radiation combination may not have been high enough all summer of 2015 to elevate apple surface temperatures to a temperature that would result in damage. The hottest temperature occurred in September, however, solar radiation was reduced; this period, which was 2-3 weeks after the last Raynox application, may have resulted in all the injury observed (which was very minimal).
- Air temperatures greater than 95 degrees, and more likely approaching 100 degrees along with high solar radiation may be required in this climate to initiate sunburn; anything less than this probably does not warrant Raynox application.
- More study could be done, because in at least one orchard in 2015, significant sunburn was observed in Honeycrisp (Fig. 10), and in past years, sunburn/heat injury has been a more significant problem in very hot summers (but not generally the summer of 2015).

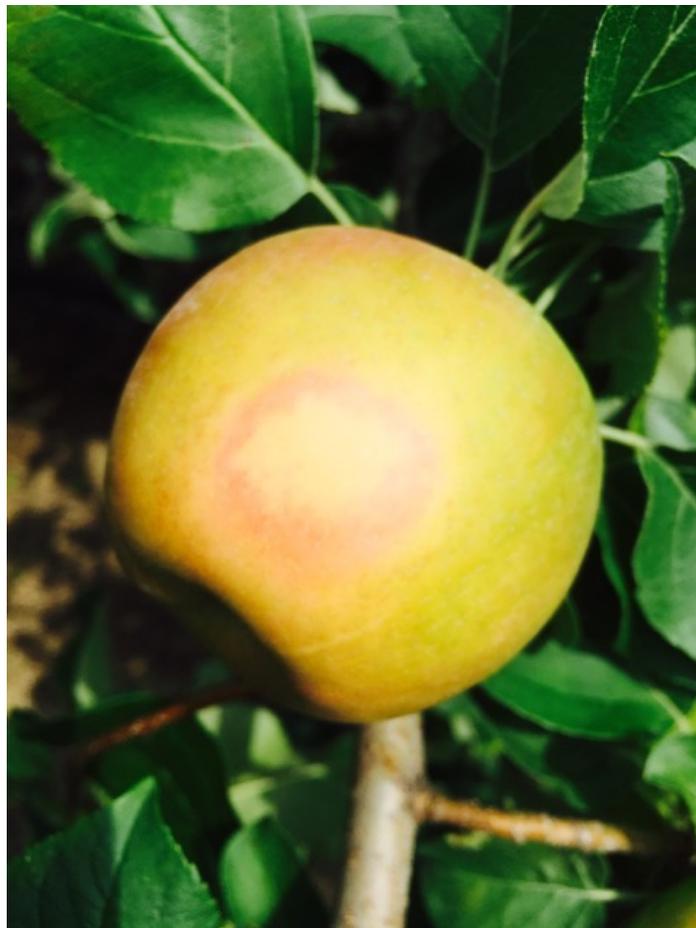


Fig. 10 — significant sunburn to Honeycrisp apple on 30-July, 2015, Amesbury, MA