

AN APPLE A DAY DOES NOT KEEP ARSENIC AWAY

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INTRODUCTION

Arsenic is a naturally occurring metalloid commonly found in water, air, and soil. It is also been found in man made products including pesticides. Lead arsenate was introduced in the 1890's to help eradicate the invasive gypsy moth heavily impacting apple orchards. This pesticide was used into the 1980's when it became evident that this pesticide had harmful health risks. Over the past decade, arsenic has become more prevalent in drinking water wells across Connecticut and other areas of New England yet the relationship between current concentrations of arsenic in water and potential sources of historical pesticides has not been considered. Therefore, the objective of this study was to evaluate this potential relationship by evaluating the locations of historical orchards to water quality and soil quality data in Eastford and Pomfret, Connecticut.

METHODOLOGY

- ❖ A handheld x-ray fluorescence spectrometer was used to analyze a random distribution of soil samples across Eastford and Pomfret. This method reported the number of counts or points of which the scanned soil reflected back the specific element analyzed.
- ❖ Historical imagery from 1934 and 1965 of Pomfret and Eastford were obtained from the Connecticut State Library Collection and georeferenced into a geographic information systems.
- ❖ Aerial imagery from 1934 and 1965 was closely examined to identify possible locations of orchards which were marked in the geographic information system (saved as individual shapefiles).
- ❖ Locations of historical orchards were compared to field screened soil samples and water quality data previously obtained.

RESULTS

As shown in **Figure 1A**, there were a substantial amount of orchards throughout both towns in the 1930's. By 1965, the amount of orchards had decreased to just a few in Eastford and Pomfret. Two historic orchards included one in Eastford (**Figure 1B**), which once encompassed 1.6 million ft² at a high elevation of 740 ft, and another in Pomfret (**Figure 1C**), which encompassed 2.0 million ft² and at a slightly lower elevation of 540 ft.

Figure 2A shows that arsenic levels found in the soils of the historic Eastford orchard property ranged from 0 to 15 counts (can be assumed to be equivalent to parts per million). **Figure 2B** shows that arsenic concentrations found in the well water in this area of Eastford were a consistently below 3 ppb and safe for consumption.

At the historical orchard in Pomfret, **Figure 3A**, arsenic levels in the soil ranged from 15 to 19 counts (or parts per million) which was slightly higher levels of arsenic. Arsenic concentrations in water were also above 3 ppb (**Figure 3B**). The northwestern portion of the orchard was above 10 ppb, exceeding the drinking water standard for arsenic.

RESULTS

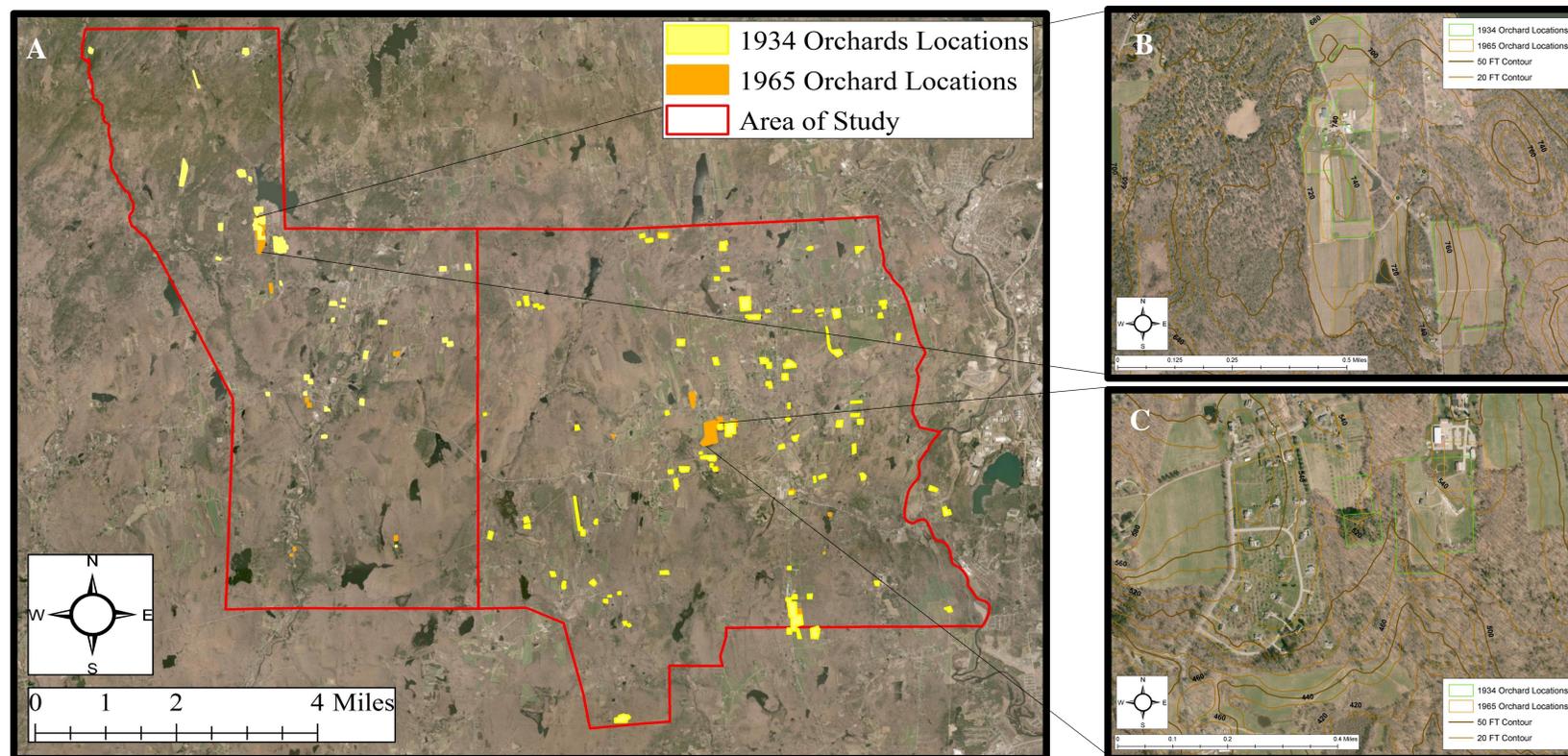


Figure 1. Identification of historical orchards located in Eastford and Pomfret for both 1934 and 1965 (A) and topographic contours for orchard located at 83 Crystal Pond Road, Eastford (B) and 81 Babbitt Hill Road, Pomfret (C).



Figure 2. The concentration of arsenic in the soil (A) and in the well water (B) in Eastford.

Figure 3. The concentration of arsenic in the soil (A) and in the well water (B) in Pomfret.

CONCLUSIONS

In conclusion, the findings of this study cannot justify that the historic orchards of Eastford and Pomfret contributed to arsenic concentrations previously and currently observed in water and soil as orchards studied here did not contribute significant amounts of arsenic to the water and soil. Over the past sixty years, the arsenic contaminated soil may be diluted and migrated towards areas of lower elevations. The presence of arsenic within these areas may be naturally occurring. Despite the lack of evidence, orchards cannot be dismissed as one of the causes to observed arsenic concentrations in other areas as the arsenic may remain in the soil but dependent on other factors. Further analyses must be conducted to see if a relationship exists.

ACKNOWLEDGEMENTS

We would like to express our sincerest gratitude towards Dr. Meredith Metcalf and Mark Higgins for their expertise on the subject and encouragement within the field. A special thank you goes out to all the residents who granted permission to test the quality of the soil and water within their property. Without their valued assistance, this project could not have been successfully completed.