EDN (ETHANEDINITRILE) EMMISSION FROM SHANK AND DRIP APPLICATIONS UNDER TIF

Husein Ajwa*[1], David Sullivan[2], Jennifer Guerrero[1], Richard Xuan[1], Kade McConville[3], Michael Stanghellini[4]

[1]University of California, Davis, CA
[2]Sullivan Environmental Consulting, Inc., Alexandria, VA
[3]Draslovka Services Pty Ltd. North Melbourne, Australia
[4]TriCal, Inc., Gilroy, CA

EDN (ethanedinitrile; C_2N_2) is a viable preplant soil fumigant that can be used to control soilborne pests of agricultural crops. EDN dissipation into the atmosphere may be reduced significantly through the use of totally impermeable film (TIF). The main goal of this study was to evaluate EDN air emissions under drip fumigation and shallow broadcast shank injection under TIF (VaporSafe^{TM}). The two fields (shank field ~ 0.78 ha and drip field ~0.89 ha) were established in close proximity to each other to ensure that meteorological conditions, soil type, and soil temperature were similar at each field. Air monitoring was conducted concurrently at each field starting with the beginning of application and continuing for 13 days.

EDN emission rates from each field were determined by measuring air concentrations surrounding the fields and back-calculating the flux by comparing AERMOD predictions to measured off-field fumigant concentrations (also known as 'off-field', 'ambient' or 'back-calculation' method). Air concentration sampling intervals were approximately every 6 hours for the first 48 hours during and after application, followed by intervals of every 12 hours for the duration of the study.

Field emissions (atmospheric flux) of C_2N_2 plus HCN from the shank injection and drip fumigation fields were small (Figures 1 and 2). The total percent mass loss from the shank injection was 13.1% and from the drip fumigation was 15.6% of the amount applied. A maximum C_2N_2 plus HCN air concentration of 32 ppb was measured at 14 m from the edge of the shank applied bed during application. The results of this study demonstrated that peak and total emissions of EDN applied via shank and drip fumigation under TIF were very low.

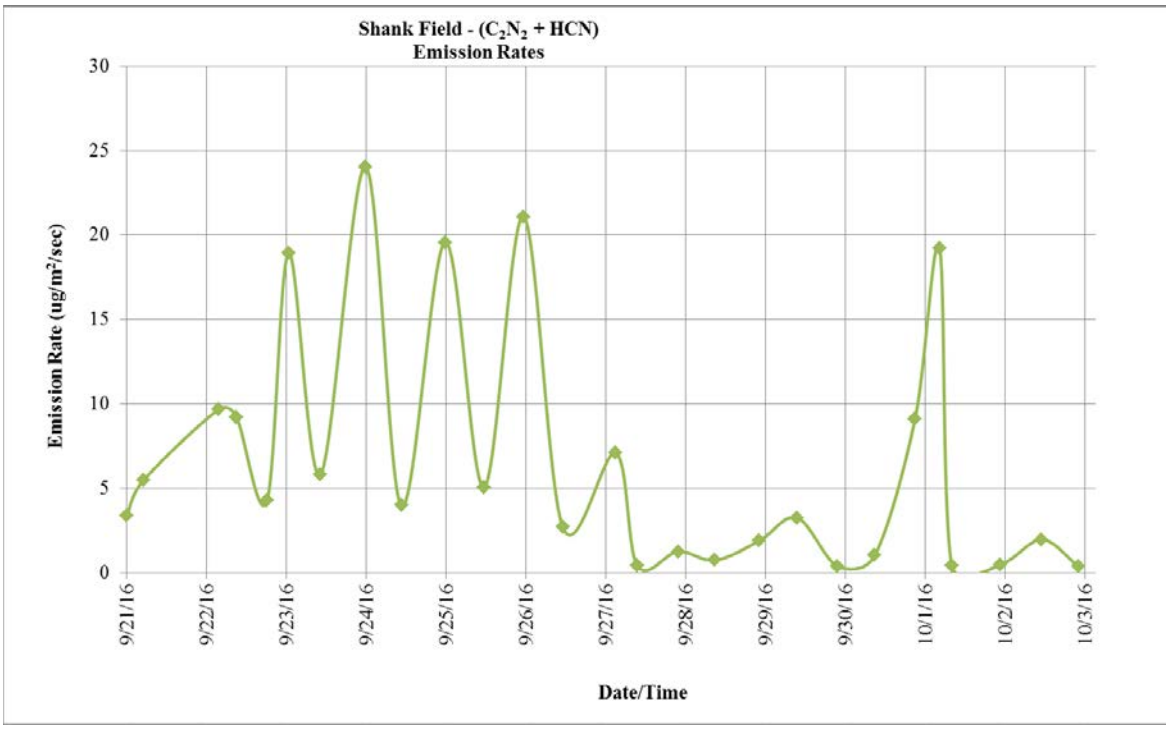

Figure 1. EDN emission rates from the broadcast shank fumigated field under TIF

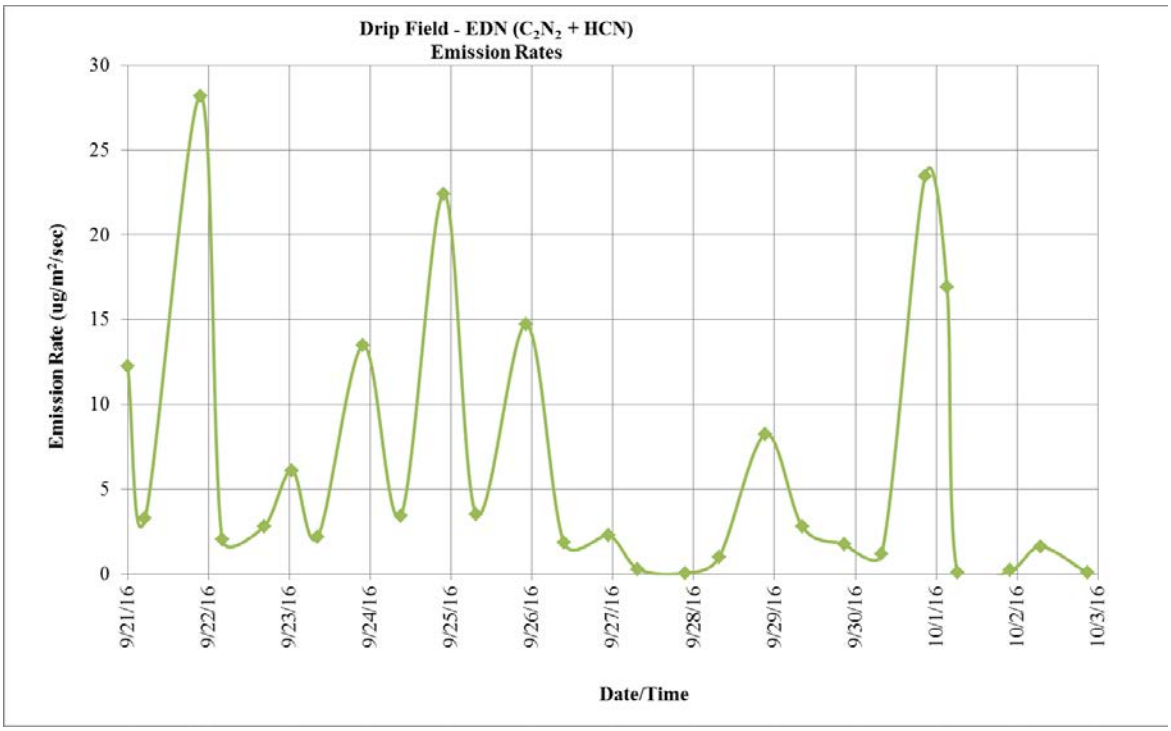

Figure 2. EDN emission rates from the drip fumigated field under TIF.