DEMONSTRATION STUDY OF TILE DRAIN DEPTH IN CRANBERRY BEDS

In 2013, a replicated demonstration of tile drain depth in a cranberry bog renovation was established. Tiles were set at two depths, 8" and 12" from the bed surface to the base on the tile. During 2014, we noted that soil tension reading in this bed indicated a consistently wet status. The bed is a renovation of an old peat-based bog, with the underlying peat left in place. In 2015, we installed recording tensiometers in that peat bed (in areas with each of the tile depths) and in a nearby upland bed that was constructed at about the same time that the peat bed was renovated. We recorded soil tension during the growing season and both crop yield and percent fruit rot at the 2015 harvest. Figure 1 shows the bed locations and their appearance before and after renovation/construction.

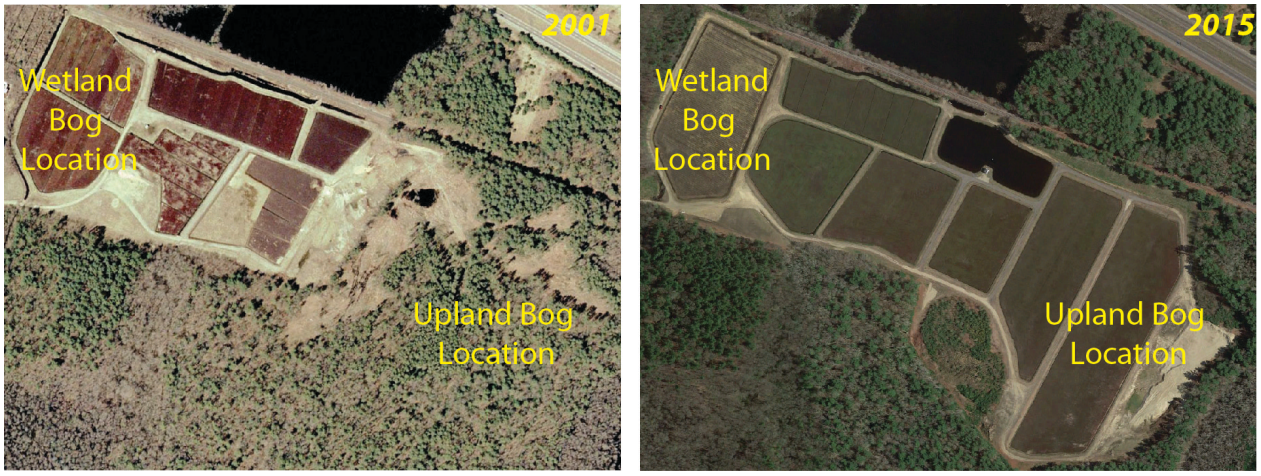

Figure 1. Historical aerial imagery of the study site in 2001 (left) and 2015 (right), including locations wetland and upland bogs.

During the summer of 2015, mean soil tension was uniformly -1.1 kPa across the peat bed, not varying with drain depth (Figure 2). By comparison, the upland soils were about three times drier than the wetland soils, with a mean soil tension of -3.2 kPa (Figures 2 and 3).

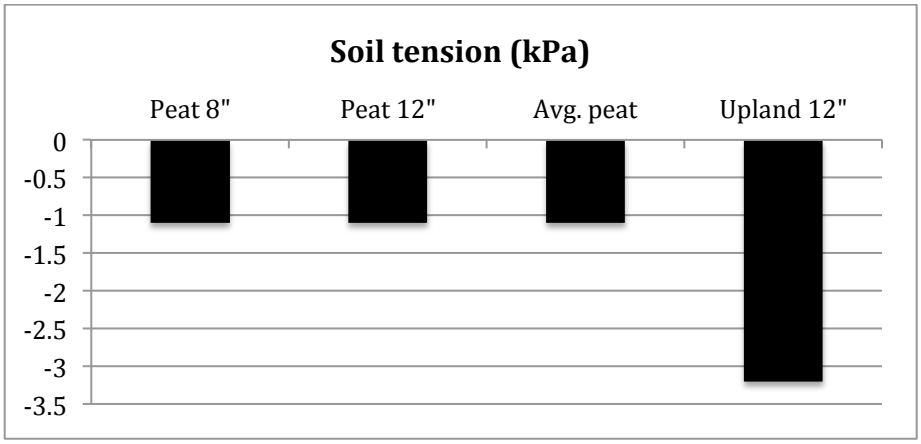

Figure 2. Soil tension in a renovated peat bed with two tile drain depths and in a nearly upland, newly constructed bed with drains.

More negative values for soil tension indicate a drier soil environment. Since the grower irrigated these beds simultaneously, differences in soil tension are most likely attributable to the soil base - peat vs. upland soil, since both beds had tile drain installed. These results suggest that subsurface tile drainage may enhance rapid drainage in cranberry beds, but does not represent a universal solution to poor drainage in wetland, peat-underlain, cranberry beds. This reinforces an anecdote we reported in 2014 - that installation of drains needs to be above the peat subgrade in order to maximize soil drainage and improve crop. In the experiment site, the tiles were above the subgrade, but apparently the influence of the subgrade continues to be important.

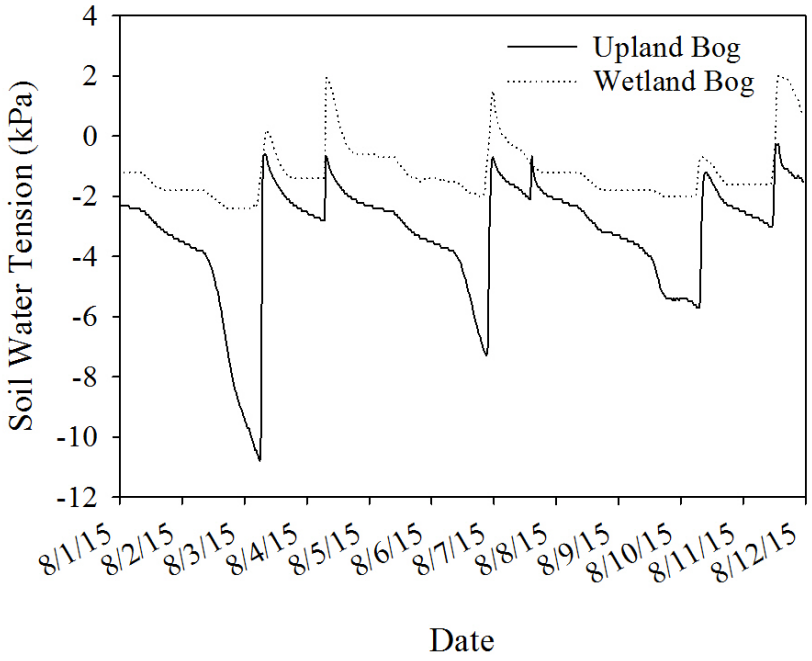

Figure 3. Continuous monitoring of soil water tension from 1-15 Aug. 2015 on the upland and wetland (peat) bogs.

At the 2015 harvest, the implications of the saturated conditions on the peat bed became apparent. Crop yield (Figure 4) was significantly reduced in the bed with wetter soil (147 vs. 362 barrels per acre - bbl/a) and was lowest in the areas of that bed with shallower drains (137 vs. 158 bbl/a). In addition, poor drainage was associated with increased incidence in fruit rot disease (Figure 5), with that greatest percent rot in the areas of the peat-based bed with shallow tiles. At delivery, a grower is penalized for fruit rot - the percent poor berries in a sample taken from the delivery is deducted from the delivered weight to calculate the weight of useable fruit. The useable fruit weight is used as the basis for payment.

This study indicates that poor drainage and consistently wet soil can lead to significant reduction in crop and loss of fruit quality due to fruit rot disease.

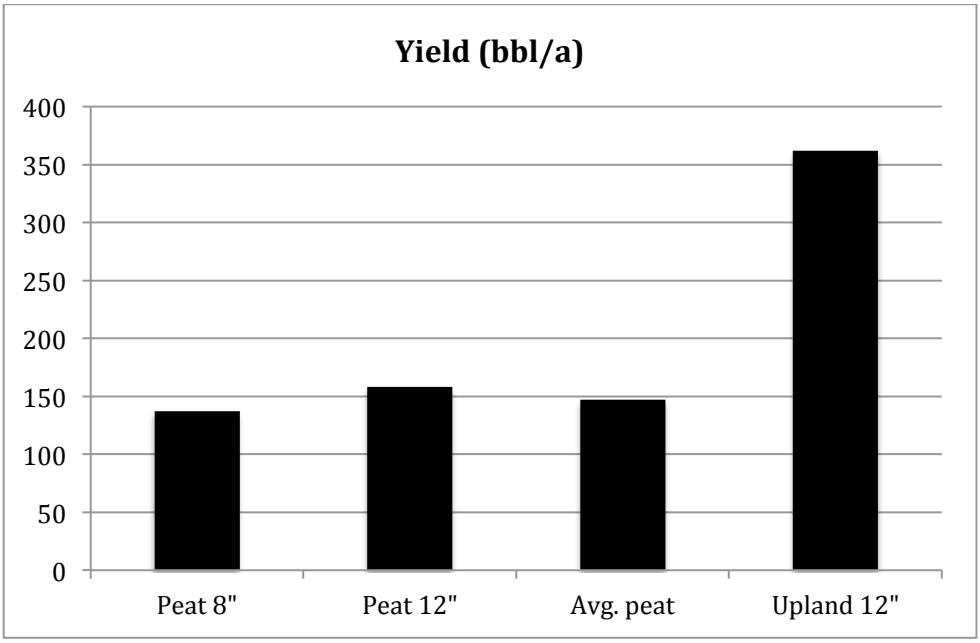

Figure 4. Crop yield (barrels per acre - 1 barrel = 100 lbs.) on a peat-based renovated cranberry bog with two tile depths and on a nearby newly constructed upland soil bed with tiles.

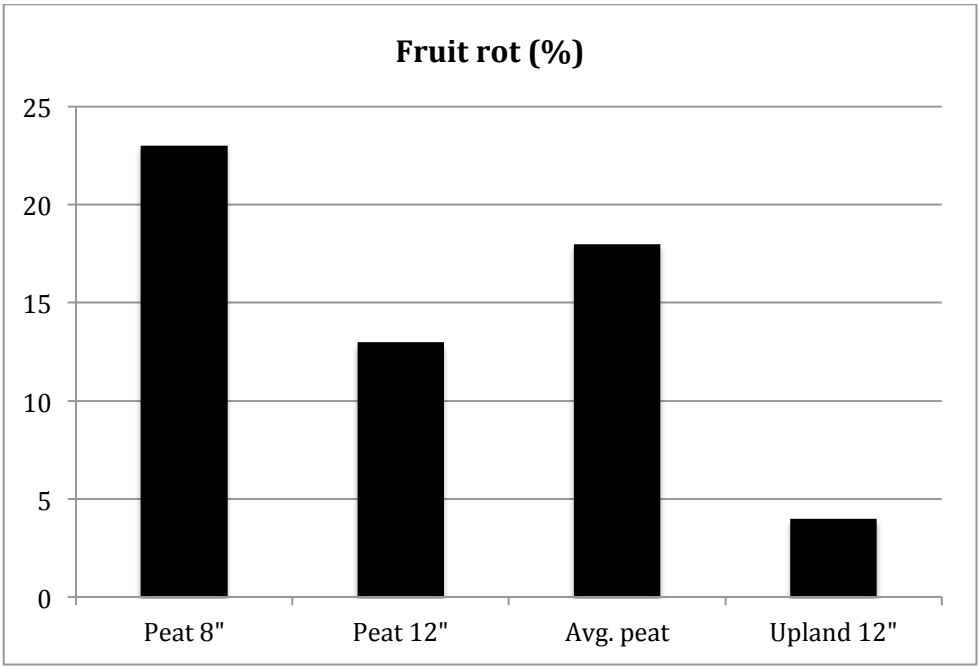

Figure 5. Percent poor berries (fruit rot disease) in harvest samples from a peat-based renovated cranberry bog with two tile depths and from a nearby newly constructed upland soil bed with tiles.