North Florida has a significant acreage of watermelon production, and planting usually begins in February in areas south of Gainesville, and into March in areas north of Gainesville to the state line. It seems that each spring, watermelon and other vegetable growers are “caught off guard” by high crop water use levels. Although they know to expect it, it often takes visible wilting to remind them that water use has greatly increased. Crop water requirements depend on crop type, stage of growth, and evaporative demand (ET), or the current weather. ET varies for the spring growing season in North Florida from about 0.12 inches per day in March, to about 0.18 inches per day in June, although it reaches 0.25 inches per day on excessively warm days with low humidity. Simply put, as the crop season progresses, evaporative demand from weather increases. Crop water use is related to the current weather by a crop coefficient; or a value which represents the stage of growth. The crop coefficient for watermelon ranges from an estimated 0.3 or 30% as small plants, to 0.8 or 80% at maturity and harvest. This indicates that in March, average daily water use is about 30% of 0.12 inches, or .04 inches per day while water use in June is 80% of 0.18 inches, or 0.14 inches per day. So water use increases 3-4x during the season. This is all elementary to most irrigators, but nevertheless, as water use increases on a daily basis some unknowingly get behind until a wilted crop offers a “wake-up call.”

Each season growers have an option, 1) to overwater, and prevent stress, while wasting valuable diesel fuel, and leaching out expensive Nitrogen and Potash fertilizers below the root zone, or 2) be more conservative, and try to match increasing water use to increasing water application rates. In the Suwannee Basin, we have worked with a group of Demonstration Farms showcasing the Water Quality BMPs, which includes irrigation management. This has included the use of soil moisture sensors and keeping irrigation and fertilizer records.

So, getting to the heart of the matter, each of the past three seasons, the watermelon grower who has worked with the Demo program has begun planting on March 7th, which is customary for his operation. Looking back on those soil moisture and irrigation records may help to “predict” the water use that lies ahead. When one looks at a projected water use graph based on historical data, and crop coefficients (Figure 1) it is apparent that water use rapidly increases throughout the early growing season. If we consider a watermelon crop on 8 foot spaced, plastic mulched bed,
using a typical 24g/100ft/hr drip tape, this “textbook data” would indicate that the crop needs about 1.5 hrs irrigation on April 1, 2.0 hrs on April 15, and 3.0 hrs per day on May 1. These irrigation times assume 85% application efficiency. However, when we use split irrigations, it is likely that recharge periods for the driptape require exceeding these “textbook” values. When comparing those irrigation records from the Demo Farm, it appears that in each year, the last week of April is the time that water use has increased faster than the amount of water applied. However, use of soil moisture equipment is adding a layer of information measuring the increased water demand. In all cases, this producer has used at least 4 hours of irrigation (split into 1 hour cycles) to meet water use demands during peak water use, and irrigation run times as much as 5-6 hours (1 hour cycles) have been required to “refill” the soil profile when irrigation has fallen behind. In this case, it has taken several more 1 hour irrigation cycles to meet peak water demand than historical ET rates and crop coefficients would suggest. Of course factors such as irrigation deficit and rainfall (or lack of) have also been important. We have found the use of soil moisture sensors, to be very effective indicators of soil moisture content, and an effective tool to determine the suitability of irrigation rates.

Figure 1. Predicted water demand for early planted watermelons in North Florida.