Surveying sweetpotato whitefly in the Imperial Valley

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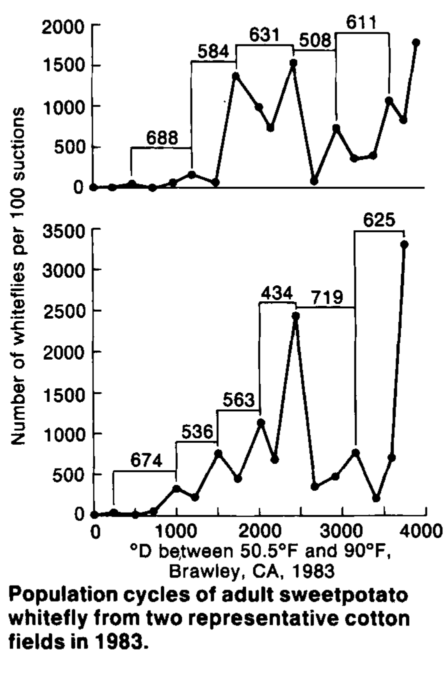
Monitoring field populations of adults would help predict peaks and improve timing of control measures

Although the sweetpotato whitefly has been reported in the desert southwest since the late 1920s, it first became a significant pest in both southern California and Arizona during 1981, when it inflicted serious damage to cotton, melon, squash, lettuce, and sugarbeet crops. Damage to cotton by this insect, *Bemisia tabaci* (Gennadius), was twofold: loss of quality caused by honeydew, a whitefly secretion that contaminates cotton lint and supports growth of sooty molds (*Alternaria* spp.), and loss of yield resulting directly from insect feeding or from the whitefly-transmitted virus disease, cotton leaf crumple. The Imperial County Agricultural Commissioner estimated that the whitefly reduced yields in the Imperial Valley by one-half bale per acre.

Sweetpotato whitefly populations were much lower in 1982 and 1983, although some lettuce, melon, and sugarbeet fields were damaged by the whitefly-transmitted disease lettuce infectious yellows. Squash crops were damaged by both lettuce infectious yellows and squash leaf curl virus.



Population cycles of adult sweetpotato whitefly from two representative cotton fields in 1983.

Developmental rates of the sweetpotato whitefly were determined by U.S. Department of Agriculture scientists in Arizona. From these figures, we were able to estimate the lower developmental threshold of 50.5°F and the upper threshold of 90°F, above which no development was observed. These thresholds and the data for developmental time at each temperature permitted us to calculate an approximate generation time of 582 ± 37 degree-days (°D).

During the spring of 1982 and again in 1983, Imperial Valley growers cooperated in the Cotton Pest Abatement District. As part of the program, populations of predator and pest species were monitored weekly in 14 cotton fields each year throughout the valley using a total sample from each field of 100 suctions (1 foot square each) with a D-vac insect vacuum. The samples were taken to a laboratory, where adult sweetpotato whiteflies were removed and counted.

Seasonal population data obtained for each field showed fairly regular cyclical fluctuations. When heat unit accumulations, using our estimated developmental thresholds, were calculated between each observed peak for the fields sampled, we found them to average 601.30°D in 1982 and 600.84°D in 1983. These results compare favorably with our estimated generation time of 582°D. Actual heat unit accumulations between observed peaks varied considerably from 427°D to 883°D (see graph). This variation was probably due to the high number of heat units accumulated between each sampling date and our inability to determine the true population peak, which might have occurred between any two given samples. In the Imperial Valley, where heat unit accumulations generally range from 30°D (cool season) to 40°D (warm season) per day within our estimated thresholds, the time required for the sweetpotato whitefly to develop from egg to adult (about 600°D) would be 15 to 20 calendar days (at 40°D to 30°D per day, respectively).

Populations appeared to cycle independently of one another from field to field. However, when the weekly samples from the valleywide survey were totaled, it became apparent that sweetpotato whitefly populations increased during each successive week. Statistical analysis showed a significant relationship between the mean number of whiteflies per 100 suctions and the accumulation of degree-days between 50.5°F and 90°F beginning on June 21, 1982, and June 22, 1983. Valleywide whitefly populations showed the same pattern of rapid growth in actual numbers of whiteflies in succeeding generations. However, this relationship could be modified by environmental, cultural, or biological factors that might adversely affect the whitefly.

Early-season whitefly populations were smaller in 1983 than in 1982, probably because of high parasitism (greater than 70 percent) of pupae by the parasitic wasp *Eretmocerus haldemani* in the fall of 1982 and because of abnormally high rainfall (about 6 inches as opposed to the normal 2 inches) in the winter of 1983. The lower early-season populations resulted in much lower whitefly levels for most of the summer until the rapid growth phase, which occurred later in the fall. Other conditions contributing to the growth pattern observed in 1983 were unusual periods of rainfall during the two middle weeks of August and lower levels of parasitism (about 30 percent) than in the previous fall.

In conclusion, it appears that monitoring sweetpotato whitefly abundance in a given field could help a grower or consultant predict when peak adult whitefly populations would occur in subsequent generations. This information could be useful in timing measures to control the insect. Knowledge of sweetpotato whitefly abundance on a valleywide basis could be used to predict the severity of an infestation, so that control measures could be initiated before populations became extremely high.

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