

What is an Aphid-Day?

Commonly, when we put out insecticide trial plots, we count the target insect before and several dates after treatment application - looking at mortality. “How successful was the application at killing the aphid?”

Aphid-Days are based on the “Insect-Day” concept used since the 1980s in the applied entomology literature ([Ruppel R.F. 1983. Cumulative insect-days as an index of crop protection. *Journal of Economic Entomology* 76, 375-377](#)). Here we still count aphids before and several times after treatment, but in those aphid counts each week, we are measuring both the Intensity and Duration of the remaining aphid population.

With **Aphid-Days** each week and **Cumulative Aphid-Days** from week to week, we are not simply quantifying “What was the kill rate?”, but rather “what is the effect of the continued stress of the population REMAINING on the plant after treatment?”.

Here are the formulas (they are already entered into the Excel spreadsheet separately attached to this email):

Aphid-Day = (mean aphids/plant + mean aphids/plant
last week this week) ÷ 2 * days between sample dates

Cumulative Aphid-Days = adds up Aphid-Days from last week plus this week, for each sample date to obtain a running, cumulative total.

You can see in the attached Excel sheet protocol that Cumulative Aphid-Days are expected to correlate loosely with crop phenology. These treatments are likely to be applied late vegetative, bloom (R1/R2), pod set (R3/R4), and pod fill-maturity (R5/R6). However, aphids develop at a speed according to temperature, humidity, predator and parasitoid impacts and even soybean variety as we are starting to find. Treating at **Cumulative Aphid-Days** allows us to apply treatments at the same stress point on the plant (i.e. 2,000; 4,000; 8,000 and 16,000 Cumulative Aphid-Days respectively) across all locations.

Cumulative Aphid-Day timings can be converted back to Mean Aphids/Plant. We can compare the aphids/plant at which the target Cumulative Aphid-Days were reached for each treatment and look at yield data. This enables us to validate the 250 Aphids/Plant threshold over a wide variety of soybean cultivars, weather conditions, and infestation patterns throughout the Midwest this summer.