

SOYBEAN DEFOLIATION RATINGS MADE EASIER

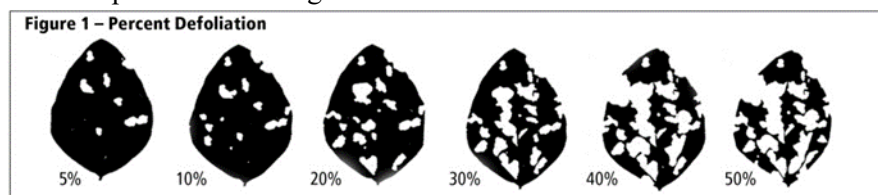
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There are many defoliators in Midwestern soybean. Their feeding gets lumped together when estimating injury to determine the need to treat. Action thresholds in the region are similar among states: 30-40% in the vegetative stage, 15% at bloom, and then 20-30% up to R6 when spraying is not needed. These thresholds are good, developed in field trials in across many states, using both natural and artificial defoliation. The thresholds seem high, but remember the measurement is not of damage to pods or beans, but simply to leaf tissue which has some ability to replace itself. Also, spend some time under a typical soybean canopy - Its shady under there. While the top leaves capture full sunlight, the lower leaves aren't working at full speed. They are extra capacity which can make up for defoliation at the top of the plant where insects like Japanese beetle, bean leaf beetle, and grasshoppers tend to feed.

Significant defoliation of soybean is fairly rare in the Midwest, compared to the southern states where insect pressure is much higher and goes for longer in the season. In fact, for three years the NCSRP, North Central Soybean Promotion Committee, funded a study to measure defoliation levels in typical fields across the Midwest. Dozens of fields were sampled in seven states. This involved walking a grid pattern, stopping at points to sample for insects and estimate % defoliation by eye, then reassessing % defoliation using image software (see below). Only one field was above threshold over the entire study. Most fields were below 5% defoliation. In Michigan, most were below 1%. Lets just say it was a very boring to spend a couple hours grid sampling an entire big field, to find virtually no defoliation. And yet it was important in order to show that this is what is fairly typical beyond the field edge!

Despite this, there is still a trend to add an insecticide in the tank when going across a field with an herbicide or fungicide. But unnecessary sprays kill beneficials insects and flare hard-to-kill secondary pests like spider mite. Insurance sprays also create resistant populations - this has already happened with soybean aphid in some part of the Midwest. And why spend to spray for no good reason? Money is money, and should be in your pocket, not unneeded residue on soybean leaves.

So, entomologist say over and over 'use thresholds to make a spray decision'! Then we give you a set of dramatic pictures of damaged leaflets...

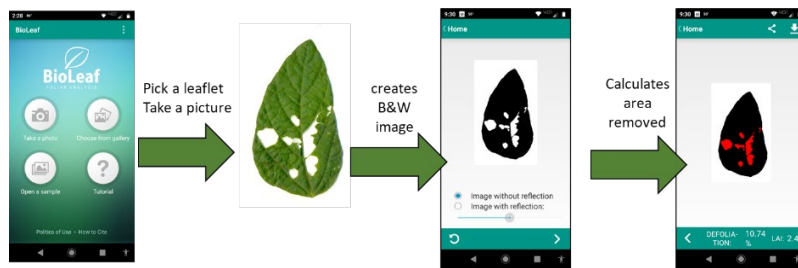


and lure you into thinking that our thresholds are based simply on finding individual leaflets with that level of injury, rather than an estimate of injury for WHOLE-PLANTS across the field. Instead, think

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about exploding a whole-plant out into its components, like the example plant below. This plant was taken from a field edge and has feeding from bean leaf beetles, Japanese beetle and grasshoppers. Defoliation was estimated in several ways:

- (1) The leaflets on the top three leaves were visually rated by volunteer who worked in soybean, and the rating were averaged (simulates using worst-case leaflets to make a decision).
- (2) The same volunteer visually rated all leaflets on the whole plant, and the ratings averaged.
- (3) Same as #2, but the Bioleaf phone app, which uses image software, was used to estimate defoliation of each leaflet:



Let's face it - no one has time for whole plant samples! Whole plant defoliation can be approximated as long as you take a good subsample of leaflets from the plant.

- 4) A quick subsample method: A top, mid, and bottom leaf were picked from the plant (circled on the example plant). For each leaf, the least- and most-defoliated leaflets (by eye) were thrown out. The remaining three leaflets were rated and averaged.

RESULTS

Average defoliation estimate:

Top leaflets, visual: 34%

Whole plant, visual: 12%

Whole plant, phone app: 7%

Subsample, top, mid, bottom = 10%

The quick subsample method gave a similar estimate as labor-intensive whole plant methods. Its good enough, and can be done fairly rapidly while moving across a field.

When sampling, avoid edge and walk a transect into the field. Sampling 40 plants (top-mid-bottom leaflet) is usually enough to tell the tale. In fact, if you are seeing virtually no defoliation, you can probably stop at fewer plants, as long as you've spaced samples out. At the same time you can check for other insect related things like soybean aphid infestation, spider mite stippling, stink bugs and their egg masses, and natural enemy populations.

In summary: Soybean has a lot of capacity to tolerate defoliation; 99.9% of Midwest soybean fields are below threshold for defoliation; don't estimate defoliation using tops of plant or field edges; use a top-mid-bottom leaflet sample; and improve your ratings by using a phone app.

