

For many years farmers have known that hollow cones often enable fungicide sprays to cover the canopy more effectively than other spray nozzles. Many farmers use regular flat fans for fungicide sprays as well. Dr. Shew and I, along with Drew Hare (technician in the Department of Crop and Soil Sciences) have been evaluating performance of season-long fungicide programs when different nozzles are used. In 2017 we only compared AI and TTI nozzles. Leaf spot control, measured as canopy defoliation at the end of the season, was the same for both and was excellent. This was surprising. The non-treated control was almost completely defoliated (we conducted the trial 5 times across 3 research stations.) The fungicide program had chlorothalonil on the front and back ends in most trials but we used fungicides with more systemic activity in the middle. In 2018 we decided to include regular flat fans and hollow cones with the AI and TTI nozzles. Right now we have 5 trials across the same 3 research stations.

Are we re-inventing the wheel? I certainly hope not. The reason we are interested in looking at performance of nozzles is to see what happens with AI and especially TTI nozzles. I helped Drs. York and Everman in a minor way the past two years with the auxin stewardship training (NC Cooperative Extension and NCDA&CS joint effort.) I was either reminded of practices that encourage drift (or maybe I learned them for the first time) while helping with the training. While the fungicides we use (and insecticides and herbicides) in peanut pose little threat from a volatility standpoint, all three categories of pesticides have the capacity to move physically from the intended target through particle drift. If issues continue to exist with auxin technology in cotton and soybean, will other pesticides be scrutinized more closely? If we can document that AI or TTI nozzles perform as well as regular flat fan or hollow cone nozzles will we be better off and will we be better stewards of pesticide use? We still have work to do. My colleague Dr. Eric Prostko and his group have demonstrated that Palmer amaranth control over the season with multiple herbicides is not compromised by nozzle selection. But they did see a modest reduction in grass control (see *Peanut Science* for more details: O.W. Carter, E.P. Prostko, J.W. Davis, *The Influence of Nozzle Type on Peanut Weed Control Programs*. *Peanut Science* (2017) 44:93–99). Others have shown that glufosinate, a contact herbicide with limited translocation, is less effective with spray nozzles that deliver larger droplets are used. Conversely, droplet size has minimal impact on glyphosate performance (a systemic herbicide.)

Last week, while Drew and Nick sprayed, I tried to take images of the droplets on peanut foliage (upper part of the canopy). When the sun was right I could also see the spray solution for hollow cones moving gently out of the target plot, while on the other extreme the AI and TTI nozzles kept the spray within the boom width.

Here are some images from the sprays. Later this summer we plan to place cards in the canopy and perhaps on the sides of plots to demonstrate the impact of spray movement. The key is what is going on in the lower part of the canopy where the epidemic begins. I'll have to do better on the images next time. Take these with a grain of salt.

While the newer formulations of dicamba and 2,4-D are indeed new technology, the discussion and principles associated with physical drift have been known for a very long time. Moving forward we need to know how effective the pesticides we use in peanut are in delivery systems that minimize movement.

TTI nozzles using 30 psi in 15 GPA.



AI nozzles using 30 psi in 15 GPA.



Regular flat fans nozzles using 30 psi at 15 GPA.



Hollow cone nozzles using 32 psi in 15 GPA (this image does not seem representative of the hollow cones, but note coverage on leaves on the right side of the image.)

