THE CONCEPT OF SOYBEAN PLANT HEALTH

Martin A. Draper [1/]

One of the greatest challenges producers and researchers alike have had to address is protecting the yield potential of the soybean crop. Soybeans abort a large percentage of their blossoms, giving up yield. Why does this happen and how can that loss be reduced? Perhaps what needs to be addressed is the overall health of the plant. Plant health is a wholesome concept. Who could be opposed to such an idea? Perhaps the more important questions are, "What is plant health and who can define what is?"

Without a doubt, most people would agree that a healthy plant is likely to be more productive. What we don't understand is, what plant health is! What affects the health of a biological organism? Certainly the absence of infectious disease is a component in this definition. However, infectious disease is not the only cause of yield loss. Nutritional disorders and deficient macro- and micronutrients are significant causes of plant stress that can limit productivity as well. Environmental factors such as timeliness of rainfall and the temperatures range relative to the optimum for plant growth can also effect production. On a smaller scale, each of the factors above can influence physiological processes that relate to yield. Most of us don't want to look inside the molecular processes of the plant, but that is really where yield is being built. What if something as simple as high temperature stress at the wrong stage of crop development shut down a physiological process that diverted energy to be stored in seed, limiting yield? How can these stresses that limit yield be managed?

In recent years, claims have been made that fungicides can increase yield in the absence of disease. Some fungicide chemistries appear to provide this response with greater frequency. This response appears to be difficult to predict, but likely is a response to a number of factors, including suppression of apparent and unapparent diseases and the alteration of the crop plant's physiology. Various plant growth conditions and environmental stresses are likely associated with this phenomenon of enhanced yield.

In a recent comparison of fungicide trials across the northern soybean production region, responses of zero to nearly 19 bushels per acre have been achieved, a yield increase of more than 40% in that instance. Strobilurin and strobilurin-triazole premixes appear to provide the most frequent favorable responses. Economically favorable yield responses, statistically valid increases of 4 bushels per acre or greater, occur about 30-35% of the time with strobilurin fungicides. Triazole products only result in economically favorable yield responses in 10-12% of the instances in which they are used. Data are not available from all sites, but it appears that when measurable reductions in leaf disease are documented, there is a greater likelihood of seeing a response.

Efforts are being made to identify risk factors that may increase the frequency of observing a favorable response to fungicide applications, but at this point most soybean pathologists hesitate to recommend a prophylactic treatment in the absence of a disease risk. As soybean rust becomes a more established disease concern, fungicide applications will be come more commonplace. What we learn about the response to application of these fungicides now will improve our chances of seeing favorable responses in future years.

[1/] Extension Plant Pathologist, South Dakota State Univ., Brookings, SD.