

Agronomy Newsletter: July 2023

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Thank you all for a great planting season! We appreciate partnering with each of you to help move your farm forward. We hope you all had a great Independence Day, and took some time to appreciate the freedoms we have.

Dane and Alex

Effects of Wildfire Smoke on Crops

With the recent wildfires in Canada sending thick smoke cover over the last few weeks, we have had a lot of questions about what effects it is having on our growing crops. Just like anything else in farming, this is a complex topic with many factors coming into play. The two main things to consider are the reduction of solar radiation (sunlight), and the increase in ground level ozone. I will explore how both can affect the crops, and what their potential impacts will be.

The first and most obvious thing to consider is the reduced sunlight to the crop due to the thick smoke cover. While the sky was very hazy, it is hard to actually quantify how much sunlight we were losing. A study conducted in California in 2018 showed that on average, wildfire smoke only reduced photosynthesis by about 5%. In short, smoke cover is not ideal, but this is not anything outside of the normal cloudy weather we frequently experience here in Northeast Indiana. We likely won't see any real yield losses unless the smoke persists for several weeks straight during the most critical periods of crop growth (tassel and grain fill in corn, and pod fill in beans).

The effects of ground level ozone are slightly more complex than the smoke cover. I'm sure many have heard of ozone as the layer of our atmosphere keeping out harmful UV rays. However, it can be harmful to humans and plants when in high concentrations at ground level. Ozone causes damage by entering the plant through the stomata (small openings in the leaf), and causing oxidation or burning of plant tissue. This can cause damage to the cells in the plant potentially limiting photosynthesis and making the plant more susceptible to disease.

We will continue to monitor the effects of the wildfires going forward, but unless the duration extends for a large portion of the critical growth stages, it is unlikely that we will see any noticeable yield loss.

Soybean Root Rots

Recent rains have brought on some issues in the soybean crop. While not as heavy as some rain events we saw last year, localized areas received enough rain over the last several weeks to leave some standing water and saturated soils in low lying and compacted areas. Saturated soils combined with very warm temperatures have led to some root rot issues in many soybean fields. Some areas of yellow beans that still look perky could simply be caused by poor nodulation (nitrogen deficiency) in the saturated soils. However, more severe issues are popping up, most likely caused by phytophthora or rhizoctonia root rots. I will explain both in detail below, as well as what to watch for going forward.

- **Phytophthora Root/Stem Rot:** This is a very common fungal disease that we see most often affecting seedlings. However, it can infect older plants given the right conditions. Phytophthora favors poorly drained and compacted areas that lead to saturated soil for extended periods of time, as well as warm temperatures. Tolerance to phytophthora is carried in the genes in current soybean varieties (1k, 1c, 3a, etc.). This genetic tolerance does the majority of the work early in the life of the plant and is paired with the seed treatment. The “Field Tolerance” phytophthora score is generally what carries the weight later in the growing season. Severely infected plants will look pale yellow and wilted, with the lower leaves turning brown. Eventually, the whole plant will die. Brown lesions are often found several inches up the stem of the plant. Most commonly, only small patches or individual plants will succumb to the disease, but in severe cases larger areas could be affected.
- **Rhizoctonia Root Rot:** Just like phytophthora, rhizoctonia favors saturated soil and warm temperatures. The symptomology will look very similar to phytophthora in field, with yellow, wilting leaves. One distinguishing characteristic is that with rhizoctonia, reddish-brown rusty colored lesions can appear near the base of the stem at the soil line. While this disease is not nearly as commonly seen as phytophthora, it

Figure 2. Chocolate Brown Canker Typical of Phytophthora Sojae Infection



Photo Credit: A. Dorrance, The Ohio State University

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Young plants killed by *Rhizoctonia solani*

could be a culprit of some of the struggling beans in the area. A University of Minnesota publication states that outside stresses such as Soybean Cyst Nematode or an herbicide application could weaken the plant and make it more susceptible to the disease.

What to watch for going forward: We will be monitoring the severity of these outbreaks, and keeping an eye on how the soybeans handle it going forward. We expect that major damage will be limited to the wettest most compacted areas of fields (corners, end rows, low spots), and that many of the yellowing and off-color beans will eventually come through. They will be stunted and held back to some degree depending on how quickly they are able to push through it. If you are out digging up beans, look closely at the root tissue. White firm roots with pink nodules are a great sign, brown rotten roots with little to no nodules or root hairs are a sign of a dying or very severely injured plant.

Potassium Deficiency

With the hot and dry weather through much of June, we had several reports of potassium deficiency showing up. Most reports were in corn, but we did see it a few times in soybeans as well. As I mentioned, the majority of these were the result of dry weather. Potassium as a crop nutrient is moved into the plant through the soil solution. When there is no water moving into the plant, there is no potassium moving in either. The deficiency symptoms are shown in the picture to the right. They appear as yellowing on the margins of the lower leaves of the plant. Potassium is very mobile in the plant, which means the plant will sacrifice the potassium in the lower leaves to move it up to the new growth, resulting in the deficiency showing in the lower leaves first. Generally, minor deficiencies early in the season do not spell disaster for the crop. Recent rains should alleviate any problems as water and nutrient uptake should return to normal.



If symptoms persist, then there may be other factors contributing such as: low soil test levels, poor root development due to sidewall compaction, or tillage compaction limiting rooting depth. Potassium deficiency during grain fill can lead to increased disease susceptibility and poor stalk strength.

Soybean Herbicide Considerations

This year has been another challenging year for controlling weeds. Dry weather through May and part of June left some herbicide not activated on dry soil. Soybeans were slow growing, leaving a longer window for weed emergence before canopy. However, the fight against weeds is still not finished. A few critical steps can be taken to prevent major problems later in the season,

especially for our Plenish soybean growers. Starting last fall, we outlined a weed control program that would set a grower up for the highest chance of success.

These were the basics: fall burndown for winter annuals, spring burndown with multiple mode of action residual, early post with a Group 15 for overlapping residual. While it is too late to change most of these, it is not too late for a large portion of the beans to apply a Group 15 product to extend the residual activity on tough weeds like waterhemp. The key with this is being proactive, as it has no control on already emerged weeds. Especially in the Plenish program, Roundup resistant weeds like waterhemp must be controlled before emergence. Below are a few things to consider going forward:

- There are limited options for post emergence control of roundup resistant weeds in Plenish soybeans, and none are particularly effective especially on weeds larger than a few inches. Some options are Cobra and Flexstar, which each carry some baggage of causing leaf burning. If you are considering one of these products, the smaller the weeds the better! Use at least 15-20 gallons per acre of carrier for best results. Weeds that are small seedlings to a few inches tall can be controlled well, but larger weeds will be stunted at best and likely grow out of it.
- Group 15s (Dual, Warrant, Zidua) are effective at preventing waterhemp emergence, and should be applied before canopy and before weed emergence for best results.
- In Enlist Soybeans, waterhemp, giant ragweed, and marehail should be attacked with Enlist herbicide for best results. Liberty can be effective if you are able to get complete coverage, but in canopied beans, weeds will often grow out of it. For particularly tough weeds, a tank mix of Enlist and Liberty will be very effective.
- Even if you have a few resistant weeds emerged in your Plenish soybeans, don't scrap your plans for a Group 15 herbicide. This will still prevent many more from coming up and making an even bigger problem.

Product Spotlight: P04511AM

For those of you paying attention, you may have noticed that our spotlight hybrid has an extra number in its name. Going forward, all hybrids will have an extra number added to the end as another identifier. However, the basic structure of our hybrid numbering system is still the same.

P04511AM is a 104 day hybrid that we will have in all of our test plots this year. It will potentially fill a gap in the heart of our lineup between the 100 day hybrids, and our beloved P0720AM. Pioneer testing results are showing great potential for this hybrid to be a leader in our area. Below are a few key characteristics, as well as a bit of yield data from 2022.

- Strong stalks and roots to go along with a modest plant height
- Diverse genetics for our current lineup
- Field observations suggest it will have above average drought tolerance
- Strong tolerance to Northern Corn Leaf Blight
- **+2 bushel per acre advantage vs P0720AM in 2022 Pioneer Testing**