Agronomy Newsletter

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<u>Corn Pollination and Kernel Retention</u>

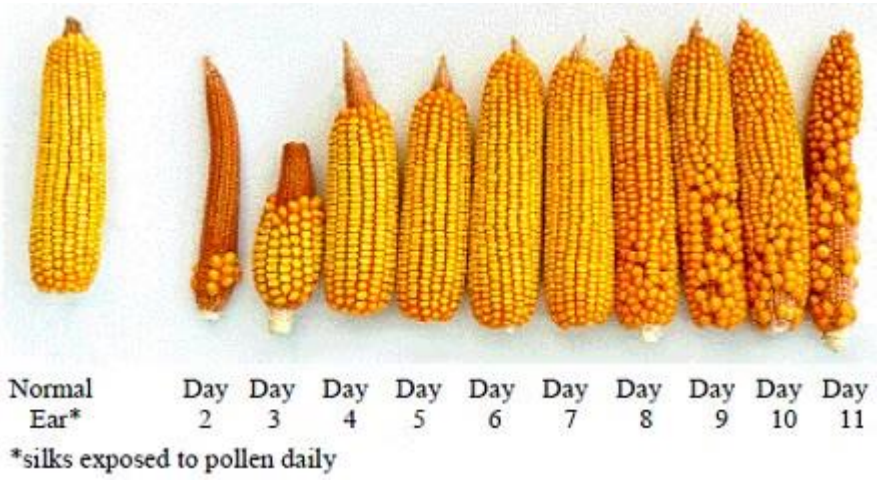
Each year we invest countless hours and dollars in our corn crop, only for the success of the entire growing season to come down to a few crucial days in the middle of the summer. While there are several key stages in corn growth and development that determine yield potential, pollination is the make-or-break step of the whole process. If it is that crucial, why don't we lose sleep each year when tassels start to pop out, wondering whether this year's crop will be a failure or not? It turns out that our corn plants are extremely resilient. Through several safeguards built into the plant, and some selective breeding techniques in our modern hybrids, we have very little to stress about when pollination time rolls around.

From our perspective, corn pollination seems pretty simple. Silks emerge from a newly formed ear, tassels open on top of the plant, and lots and lots of pollen falls. A few days later the corn is pollinated. That sounds easy enough right? When we examine the process closer, there are some quite remarkable steps that must be completed for our corn crop to reach its potential. Here is the step by step process, and some interesting facts about corn pollination.

- Each kernel on each ear has a dedicated silk that is responsible for fertilizing that specific kernel. Silks emerge starting from the base of the ear and work their way up the ear. In ideal conditions, silks are viable for around 10 days, but they are most receptive in the first 5 days after emergence.
- Modern hybrids have been selected for silks to emerge slightly before pollen begins shedding. This is a major improvement over older genetics which could have issues with pollen shed beginning before silk emergence under drought or heat stress.
- Corn silks are about 80-90% water. Severe drought and heat can make the silks unreceptive, or cause them to shrivel up before fertilization occurs.
- The tassel is generally composed of a main spike and several lateral branches. Each of these contain hundreds or thousands of anthers which hold the individual pollen grains.
- The main spike is the first to shed pollen, with the branches following after that. Each individual anther holds anywhere from 2,000 to 7,000 pollen grains, and an individual plant can produce 2-5 million grains of pollen. That is about 3,000-8,000 grains of pollen for each kernel. Anthers will only shed pollen when they are dry, often late morning or early afternoon (anyone who has hand pollinated corn will

remember the precise timing involved here). Due to general variability within the field, pollen shed typically occurs over a 10-14 day period.

- Pollen will remain viable in good conditions for several hours, but high temperatures greatly reduce that time. A single pollen grain can travel as far as a half mile in just minutes.
- After a viable pollen grain lands on a receptive silk, the pollen grain can germinate within minutes, typically less than 15 minutes. After germination, a pollen tube will elongate down the silk to reach the unfertilized kernel. The pollen tube then transfers the male genetic material from the pollen to the female part of the plant in the ovule (soon to be kernel). The time from germination to fertilization is typically about 24 hours.
- After successful fertilization, the silk will detach from the kernel and begin to dry out.
- In most years nearly every kernel is pollinated, with most of the kernel loss due to stress following pollination. Kernel abortion occurs when the plant senses it cannot support all the developing kernels due to external stress like heat or drought. The tip of the ear, usually the last kernels fertilized, is where kernel abortion starts.



The picture to the right shows ears exposed to pollen only one time, on that specific day after silk emergence. You can see that the earliest silks are from the base of the ear, with near perfect pollination on days 5,6, and 7. As you move on from there, the silks at the base of the ear can become covered by other silks or they may be unreceptive resulting in poor pollination at the base.

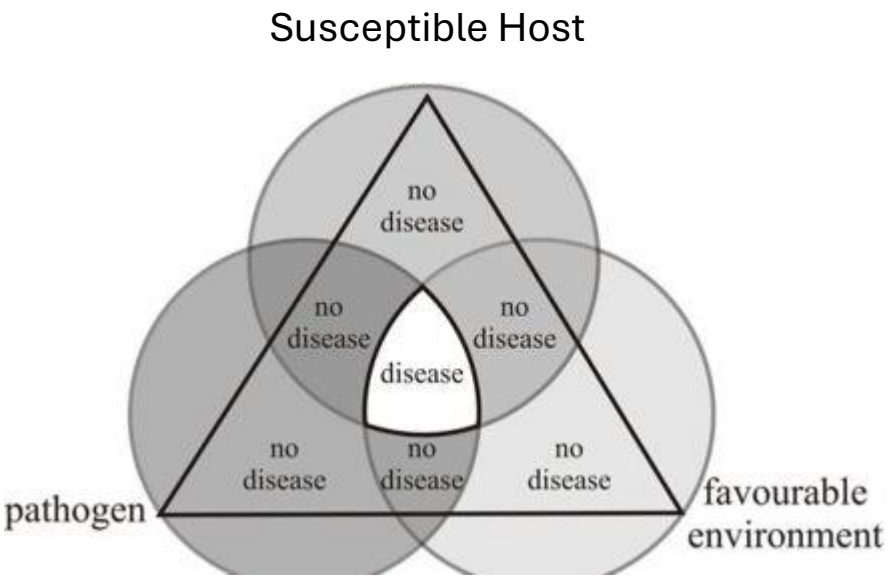
While corn pollination may seem more complicated after reading this article, the advances in selective breeding and genetics along with the inherent safeguards of the corn plant generally ensure successful pollination year over year. You can rest easy knowing your corn has it all under control.

<u>The Disease Triangle and Corn Fungicide Timing</u>

This time of year, the most asked questions usually revolve around whether we are seeing leaf diseases in our corn, and if or when we should spray fungicide. Since Tar Spot came onto the scene several years ago, this conversation has been reduced to a simple discussion of how many times we should spray and the best time to do it. Often forgotten in this debate is the simple concept of the Disease Triangle. This Plant Pathology 101

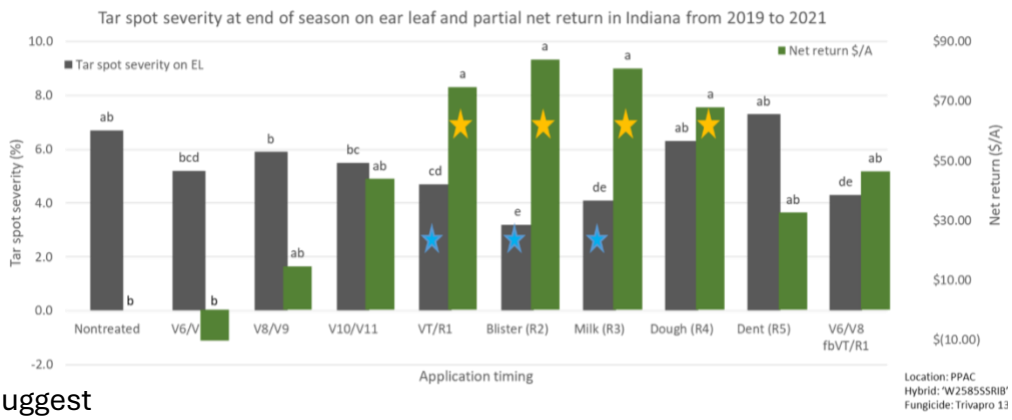
concept states that in order for a disease to cause damage there must be three things present:

- **Virulent Pathogen**: Tar Spot, Northern Corn Leaf Blight, or Grey Leaf Spot spores
- **Susceptible Host**: A corn hybrid that is both at a growth stage where it is susceptible and with insufficient tolerance to that disease
- **Conducive Environment**: Air and leaf temperature, humidity, or leaf wetness that favors colonization by that disease.



When one or more of these are not present, disease will not develop or will be significantly limited. In recent years, many in the industry have painted the picture that disease is inevitable, so we may as well just plan on spraying every acre every year. While this might fit into some farmers' management plans and budgets, it is important to consider that some still wish to make that decision based on necessity and potential for ROI. We have observed over the last several years that even though the pathogen (Tar Spot) may be present and visible on corn, the environment has not allowed it to spread to a yield or economic limiting threshold. This approach requires more active scouting and the ability to make quick decisions when necessary.

For those who build fungicide into their management plan it is still wise to make that application at the timing which has the best chance of a return on investment. Our recommendation is to make that application at the R2 growth stage (blister). Based on our experience and data from Purdue, this is the stage that results in the lowest disease severity for Tar Spot as well as the largest net return. For those wishing to wait and see if an application is necessary, we suggest holding off as long as possible, and if we make it to the R3-R4 stage without disease present, then the chances of an economic return lower drastically.



<u>Soybean Fungicide Timing:</u>

We are rapidly approaching the time for soybean fungicide applications for many of the beans in our area, and the early planted beans are likely already there. Each year we are asked what the best growth stage is for application timing. The short answer to that is the R3 growth stage, which is when the soybean plant has a pod that is at least 3/16" on one of the top four nodes with fully formed leaves. However, as the soybean plant is growing rapidly it often goes back and forth between the R2 and R3 growth stage for several weeks as the plant adds more nodes. In recent years, we have begun to make the timing recommendation with the caveat of R3 growth stage, and ideally 15-17 nodes on the plant. We recommend this to try to protect as many nodes per plant as possible. For early planted beans, this is the ideal timing. As beans are planted later the total node count may be lower, which means the fungicide may need to be applied at a lower node count.

Product Spotlight: 100 Years of Pioneer Hybrids

In 2026 Pioneer is celebrating 100 years of innovation in hybrid production. We will take a quick trip down memory lane below to highlight some of the iconic hybrids throughout the last 100 years.

1924: The average corn yield in the U.S. is about 25 bushels per acre. Henry Wallace, founder of Pioneer, developed the first commercial hybrid. It was a cross between inbreds of the Leaming yellow dent corn and the Bloody Butcher red dent corn pictured on the right. It would win the Iowa State yield contest that year.

1936: Avg yield is 18.6 bushels per acre. Pioneer introduces 307 in the middle of the Dust Bowl. While many open pollinated corns completely failed in the severe drought, 307 thrived with its improved drought tolerance, strong stalks, and deep roots. Hybrid corn adoption increased from 6% in 1935 to nearly 100% in 1942. 307 stayed in the Pioneer lineup for nearly 30 years.

1971: Avg yield is 88 bushels per acre. Pioneer introduces 3780. It became popular for its exceptional yield and quick drydown. For more than 10 consecutive years Pioneer sold over 1 million units per year of 3780. It was the top selling hybrid until 1985.

1991: Average Yield is 108 bushels per acre. Pioneer introduces 3394. 3394 dominated the competition in yield, quickly becoming the highest selling hybrid in the country. At its peak, the sales of 3394 itself would have been the second largest seed company in the U.S., only behind the rest of the Pioneer lineup. It eventually was phased out due to its Grey Leaf Spot susceptibility.

2015: Average Yield is 168 bushels per acre. Pioneer introduces P1197AM. This hybrid brought a huge advantage over competitors in yield and disease resistance. In 2019, David Hula would set the then world record corn yield at 616 bushels per acre. P1197AM is currently in its final year in the Pioneer Hybrid lineup.