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2019 Corn Variety Trials Results Summary

Dr. Nicole Fiorellino, Extension Agronomist
University of Maryland, College Park

The University of Maryland offers a fee-based, corn hybrid performance testing program to local and national seed companies. The results from these replicated trials provide agronomic performance information about corn hybrids tested at five locations in Maryland considered representative of the state's geography and weather conditions. During 2019, 56 hybrids were tested using three maturity groups: early season (17 hybrids), mid-season (14 hybrids), and full season (25 hybrids). Check hybrids were included in each of the five tests.

This year's weather was welcomed compared to last year's extreme precipitation. As reported in the results document, there was much less rainfall in 2019, with precipitation at all locations very similar to the long term average for each location. We experienced some drought at the end of summer (August through September in some locations), but yields did not seem to be impacted by this. Averaged over the five locations, yield for early (17), mid (14), and full (25) season hybrids was 196 bu/ac, 199 bu/ac, and 206 bu/ac, respectively. Compared to 2018, these yields were +11%, -1%, and +5%, respectively, to those observed for early, mid, and full season hybrids this season. Average yield for all hybrids tested at all five locations was 201 bu/ac or 10 bushels shy of the record yield of 211 bu/ac in 2011. Two locations had average yield greater than 210 bu/ac (Keedysville – 220 bu/ac and Clarksville – 236 bu/ac) with Clarksville average yield surpassing the record best location yield of 232 bu/ac at attained at Wye in 2016.

A list of hybrids and their performance across the state and at each individual location is presented in the results document, which can be downloaded from the MD Crops website at psla.umd.edu/extension/md-crops. You may also request a printed copy from your local Extension office.

At-planting treatments for controlling early-season insect pests in corn

Maria Cramer, Edwin Afful, Galen Dively, and Kelly Hamby
Department of Entomology, University of Maryland

Background: Multiple insecticide options are available for early-season corn pest management, including neonicotinoid seed treatments (NSTs) and in-furrow pyrethroids such as Capture LFR®. In addition, many Bt corn hybrids provide protection against seedling foliar pests such as cutworm and armyworm. Given that almost all corn seed is treated with neonicotinoid seed treatments (NSTs), Capture LFR® may not provide any additional protection.

Methods: In this study we compared four treatments: fungicide seed treatments alone; Capture LFR® (active ingredient: bifenthrin) applied in the planting furrow with the fungicide seed treatment; Cruiser Maxx® 250, an NST (active ingredient: thiamethoxam), which includes a fungicide; and Capture LFR® + Cruiser Maxx® 250 together. We evaluated the amount of soil and foliar pest damage after emergence. Yield was measured at harvest.

Preliminary results: Our results suggest that when wireworm pressure is high, Capture LFR® and Cruiser Maxx® 250 protect against damage and significantly increase yields. Neither treatment is superior, so we recommend using only one, and only in fields where pest pressure is known to be high. As most corn seed already contains NSTs, use of Capture LFR® at planting is unlikely to be warranted.

Background: Capture LFR®, an in-furrow pyrethroid product, is marketed for control of early-season corn pests, including soil pests such as white grub and wireworm and above-ground pests such as cutworm and armyworm. However, the insect pest management systems already adopted in corn may provide sufficient protection. Most corn seeds are treated with NSTs, which provide seedlings with systemic protection from many soil and above-ground pests. Additionally, most Bt corn hybrids express proteins with efficacy against cutworm and armyworm in the seedling stage, although they do not affect soil pests. Unlike NSTs and Bt traits, pyrethroids are not systemic and do not provide protection beyond the soil area to which they are applied.

Slug feeding damage: characteristic long, thin holes made by a rasping mouthpart.

Sampling for soil and foliar pests

While in-furrow applications of bifenthrin (the active ingredient in Capture LFR®) can effectively reduce wireworm damage in potatoes[1] and provides white grub control in field corn[2,3], it does not consistently increase yield in corn[3] or soybeans[4]. Yield benefits are likely to be seen only where there is known soil pest pressure. Meanwhile, preventative applications of pyrethroids have been linked to declines in natural enemies [5,6], including carabid beetles, which are important predators of slugs.

Objectives: Our objectives were to determine whether in-furrow applications of Capture LFR® (bifenthrin) provided 1) protection against soil pests, 2) protection against seedling pests, and 3) yield benefits compared with fungicide alone, Cruiser Maxx® 250, or combined with Cruiser Maxx® 250.

Methods: This study was conducted in 2018 and 2019 at the University of Maryland research farm in Beltsville, MD. We planted 4 replicate plots of a standard Bt field corn hybrid, TA 758-22DP (VT Double Pro insect control) in 2018 and LC1488 VT2P (SmartStax RIB complete insect control) in 2019 at 29,999 seeds per acre. Plots were planted late in 2018 (June 18) but on time in 2019 (May 20). Standard agronomic growing practices for the region were used. We compared the following four treatments, applied at planting:

	No in-furrow application	In-furrow Capture LFR® Applied at 13.6 fl oz/ac
Fungicide seed treatment	Fungicide (F) seed treatment alone 2018: Maxim Quattro® 2019: Vibrance Cinco®	Fungicide + Capture LFR® (F + Cap)
Cruiser Maxx® 250	Cruiser Maxx® 250 (Cru)	Cruiser Maxx® 250 + Capture LFR® (Cru +Cap)

We sampled plants 24 days after planting in 2018, and 18 days after planting in 2019. In 2018, we recorded the number of stunted plants (indicating potential soil

Wireworm (left) and characteristic above-ground symptoms of wireworm feeding (right). Note wilted center leaf.

pest damage), and in 2019, we dug up stunted plants and recorded those for which soil pest damage could be confirmed. In both years, we assessed rates of above-ground feeding by pests such as cutworm and armyworm.

Results: Soil Pests. In 2018 there was no difference in the percent stunted plants between treatments (Figure 1), with less than 5% stunting in all treatments. This low level of pest damage may have been due to the late planting date, which could have avoided peak soil pest pressure. In 2019, all of the insecticide treatments had significantly lower soil pest damage than the fungicide control (Figure 1). Combining Capture LFR® with Cruiser Maxx® 250 was not more effective than Cruiser Maxx® 250 alone, but was more effective than Capture LFR® alone, suggesting that treatments involving Cruiser Maxx® 250 are somewhat more effective against the soil pests at this farm. In both years, plots were located in a field with a history of wireworms; however, damage was only observed in 2019. In a field without pest pressure, such as we saw in 2018, these treatments did not improve plant stand.

Foliar pests. In both 2018 and 2019, rates of foliar damage were extremely low (below 5% of plants) in all treatments and there were no differences between treatments.

Yield. In 2018, there were no yield differences between the treatments (Figure 2). Overall, we had low yields in 2018, likely a result of the late planting date. In 2019, all of the insecticide treatments had significantly higher yields than the fungicide control, with no differences between any of the insecticide treatments (Figure 2). Combining Capture LFR® with Cruiser Maxx® 250 did not increase yield.

Conclusions: In 2018 and 2019 we did not see sufficient foliar pest pressure to justify an insecticide application. This may be due to effective control by Bt proteins in the corn hybrids and/or low foliar pest pressure.

In a field with established wireworm pressure, all three insecticide treatments reduced soil pest damage and improved yield relative to a fungicide only control in the 2019 field season. While there were differences in pest damage levels between the different insecticide treatments, no one treatment provided superior yield benefits. Because nearly all corn seed is treated with NSTs like Cruiser Maxx® 250, additional applications of Capture LFR® may not be necessary. Preventative

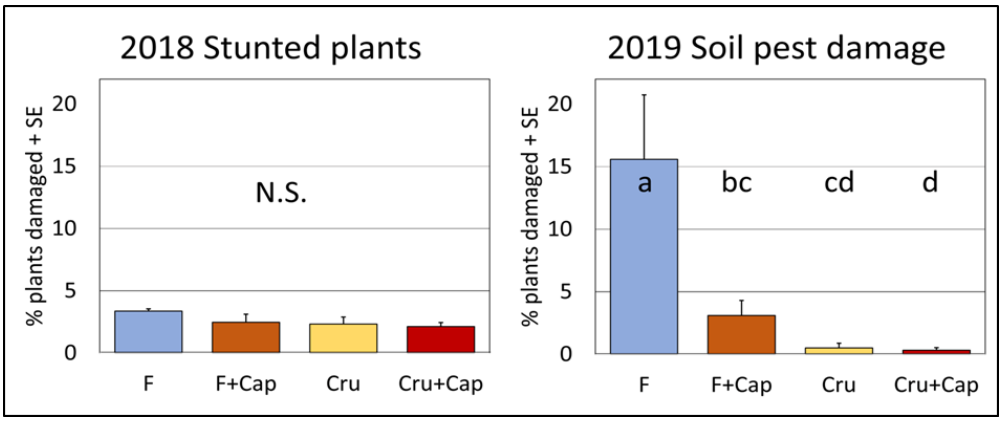

Figure 1. *2018 and 2019 soil pest pressure, Beltsville, MD. Mean percent plants damaged for four treatments: F=Fungicide, F+Cap= Fungicide + Capture LFR®, Cru=Cruiser Maxx® 250, Cru+Cap= Cruiser Maxx® 250 + Capture LFR®. In 2018, treatments did not impact stunted plants (N.S.) In 2019, all insecticide treatments significantly reduced soil pest damage (columns with different letters have significantly different mean damage).*

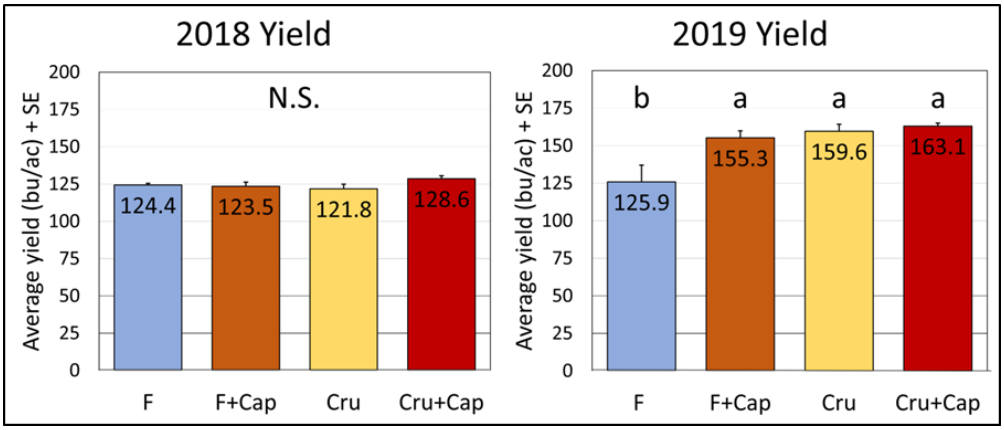

Figure 2. *2018 and 2019 yields, Beltsville, MD. Mean yield for four treatments: F=Fungicide, F+Cap= Fungicide + Capture LFR®, Cru=Cruiser Maxx® 250, Cru+Cap= Cruiser Maxx® 250 + Capture LFR®. Yields were not significantly different in 2018 (N.S). In 2019, all insecticide treatments had significantly higher yield than the fungicide only treatment (columns with different letters have significantly different mean yield).*

applications increase costs and present risks to beneficial insects without providing yield benefits. Additionally, soil pest pressure tends to be low throughout Maryland. We sampled untreated corn at five locations across Maryland in 2019 and found on average less than 3% soil pest damage. Unless a field has a known history of wireworms or white grubs, we do not recommend using at-planting insecticides.

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Sources

1. Langdon, K. W., Colee, J. & Abney, M. R. Observing the effect of soil-applied insecticides on wireworm (coleoptera: Elateridae) behavior and mortality using radiographic imaging. *J. Econ. Entomol.* **111**, 1724–1731 (2018).
2. Afful, E., Illahi, N. & Hamby, K. Agronomy News. **10**, 2–4 (2019).
3. Reisig, D. & Goldsworthy, E. Efficacy of Insecticidal Seed Treatments and Bifenthrin In-Furrow for Annual White Grub, 2016. *Arthropod Manag. Tests* **43**, 1–2 (2017).
4. Koch, R. L., Rich, W. A., Potter, B. D. & Hammond, R. B. Effects on soybean of prophylactic in-furrow application of insecticide and fertilizer in Minnesota and Ohio. *Plant Heal. Prog.* **17**, 59–63 (2016).
5. Douglas, M. R. & Tooker, J. F. Meta-analysis reveals that seed-applied neonicotinoids and pyrethroids have similar negative effects on abundance of arthropod natural enemies. *PeerJ* 1–26 (2016). doi:10.7717/peerj.2776
6. Funayama, K. Influence of pest control pressure on occurrence of ground beetles (Coleoptera: Carabidae) in apple orchards. *Appl. Entomol. Zool.* **46**, 103–110 (2011).

Interpreting Pesticide Residues in Food

CAST Issue Paper Number 66 October 2019

Interpreting Pesticide Residues in Food

While many consumers are concerned with pesticide residues on produce, the significant health benefits from eating a diet rich in produce and whole grains dramatically outweigh the miniscule risks from pesticide residues. (Photo from Monkey Business Images/Shutterstock.)

ABSTRACT

Consumers in the United States are frequently exposed to residues of pesticides in their food. The existence of pesticide residues in food raises questions regarding what consumer health risks, if any, are posed by such chemical contaminants.

This report concludes that there is no direct scientific or medical evidence indicating that typical exposure of consumers to pesticide residues poses any health risk. Pesticide residue data and exposure estimates typically demonstrate that food consumers are exposed to levels of pesticide residues that are several orders of magnitude below those of potential health concern. Human epidemiological studies, often employing biomonitoring studies of pesticide metabolites as an indicator of pesticide exposure, have suggested correlations between pesticide exposure and specific types of disease, but such studies are limited in their ability to measure both disease and pesticide exposure and have been inconsistent in their findings. As an example, results of six epidemiological studies examining the relationship between exposure to the insecticide chlorpyrifos and childhood intelligence are discussed. Two of the six studies indicated a positive correlation between chlorpyrifos exposure and reduced childhood intelligence but both focused on exposure from non-food sources (indoor pesticide use and agricultural pesticide use). Another study looking at indoor chlorpyrifos use did not identify any correlation to childhood intelligence nor did three other epidemiological studies estimating chlorpyrifos food exposure.

The judicious use of pesticides in food production also provides numerous benefits to society. Such benefits include greater productivity, availability, and affordability of food; a reduction in pest damage, food loss, and waste; and public health benefits such as control of potentially dangerous mycotoxins or fungi in our food.

Consumers are frequently advised to avoid purchasing specific conventionally produced fruits and vegetables because of contamination concerns. Researchers have demonstrated that such advice lacks scientific justification and may result in some consumers reducing their consumption of fruits and vegetables, a practice strongly associated with adverse health effects. The best thing consumers can do is to eat a diet rich in fruits,

The Council for Agricultural Science & Technology (CAST) has released a new issue paper on the pesticide residues in foods. According to its website (https://www.cast-science.org/about/), CAST was established in 1972 as a result of a 1970 meeting sponsored by the National Academy of Sciences, National Research Council. CAST is a nonprofit 501 (c)(3) organization composed of scientific societies and many individual, student, company, nonprofit, and associate society members. CAST's Board is composed of representatives of the scientific societies, commercial companies, and nonprofit or trade organizations, and a Board of Directors.

From the abstract: "Consumers in the United States are frequently exposed to residues of pesticides in their food. The existence of pesticide residues in food raises questions regarding what consumer health risks, if any, are posed by such chemical contaminants…The judicious use of pesticides in food production also provides numerous benefits to society. Such benefits include greater productivity, availability, and affordability of food; a reduction in pest damage, food loss, and waste; and public health benefits such as control of potentially dangerous mycotoxins or fungi in our food… This report concludes that there is no direct scientific or medical evidence indicating that typical exposure of consumers to pesticide residues poses any health risk."

The full report, CAST Issue Paper No. 66, and a brief summary, are available from the CAST website at: https://www.cast-science.org/wp-content/uploads/2019/10/CAST_IP66_Residues.pdf, or obtain copies from the Extension Office.