

Everything is Early in 2024... but what about Tomato Fruitworm?

Aaron Cato, Extension Specialist – Horticulture IPM

We've had an unusually quick and hot start to 2024 which led to many crops successfully ripening up much earlier than we normally expect. We got a lot of early heat and not too much impact on vegetable crops from our risky frosts that dissuade early plantings. Many of our pests have reacted in kind and are a normal occurrence on anything planted 1-2 weeks early, while others like plant bugs were able to get through a quick generation in this year's early spring heat and wreak havoc on our strawberry crop.

How does early heat impact insect pests?

My normal response would be either we don't know enough about pest ecology to fully understand the impact of an early start, and we should just expect that pests be the same or potentially worse. But is that the case for all pests? Every year seems to be a bit different when considering tomato fruitworm, *Helicoverpa zea*, and a lot of that should be contributed to the journey it takes to tomato and sweet corn. Many of the moths we see in Arkansas are due to migration from crops and alternate hosts, primarily corn, clovers, and several wild hosts, from states south of us. The other factor that plays a big role in movement are weather systems that help blow moths further distances than they would normally move. When we get large storm systems moving southeast to Northeast from Texas coinciding with emergence from alternate hosts Southwest of us, we see impactful infestations in Arkansas. Once we get into July and August we are dealing with moths that have primarily already moved through the sweet and field corn, as well as early tomatoes and many alternate weed hosts in Arkansas. You can generally count 30-35 days from peak flowering for corn in Arkansas and expect a large spike in egg lay in Arkansas.



Picture 1 – Tomato Fruitworm Moth Trap in Lafayette County. Picture are 300+ moths caught from May 17-24 in 2023. Picture by Jerri Dew, County Extension Agent and Staff Chair, Lafayette County.

So what's a typical year for tomato fruitworm?

We generally expect an influx of moths blown in on the many storms each year in late May that are in search of corn or tomatoes to lay eggs on. In 2023 we captured over 600 tomato fruit worm moths in Southern Arkansas on May 17th in Lafayette County, another 300+ in Lafayette County on May 24th, and multiple traps over 100 moths a week at many sites around Warren, Arkansas the week of the 24th (Picture 1). Without any assisted movement from storms we would still see this pest across Arkansas, as tomato fruitworm do overwinter in smaller numbers locally. However, it's really the earlier generations that have built up in high numbers in warmer regions which can bring waves of infestations early.

How does this year differ?

We observed a much earlier flight than normal at the end of April, several weeks earlier than we normally see are first 100+ moth trap catches. We caught around 100 moths per week in Bradley County and Johnson County around April 24th. This yielded eggs on plants in the beginning of May and some threshold level populations of tomato fruitworm across much of Arkansas (Picture 2). This flight yielded fruit damage around Mid-May in early plants (Picture 3) and we have had threshold populations here and there from the next generation the early flight produced throughout mid-June. This earlier increase in adult numbers was either do to a quicker generation moving in with storms, or due to early heat in Arkansas helping local worms make it through an early generation much quicker than normal.

We still got the flight we expected in late May, with our highest catch this year in Faulkner County with over 300 moths caught in a week on May 29th. That flight did translate to threshold level infestations in tomato and impacted sweet corn across the state. However, the flights let up after this and we haven't seen 100 moths in a trap since the end of May, although I have yet to see sweet corn that wasn't heavily infested.

What should we expect in the months to come?

I think tomato fruitworm was a bit out of sync in the early portions of the year. Moths only live 2-3 weeks so a shift in emergence due to heat can impact when they encounter normal hosts. Although moths coming out of central and Northern Texas and Louisiana were ahead of last year, they were a bit out of sync with tomato and sweet corn that wasn't planted much earlier than normal, and we saw eggs on plants that weren't even flowering in South Arkansas, although the early ones did have flowers and small fruit. The reality is that this added a small jab in late April, and likely lessened our first normal blow in late May. However, I don't think it will reduce the flights we expect to see in the coming weeks. We have seen residual moths throughout May and June from our expected flight in late May and from the small early flight we got in April that we normally miss. We should still expect big time numbers in tomato and later sweet corn plantings in the next 2 weeks. We expect 35 or so days from the flights in late May to our next big moth flights, which is the time it takes to yield the next generation moving around the state looking for hosts. We haven't seen too many rain systems moving from the southwest in June, which has also contributed to a lighter year overall, but I would argue that caterpillar pressure from continuous small flights of tomato fruitworm, excessive yellow-striped armyworm and cabbage loopers, and overbearing thrips and mites already in areas that have missed every rain this year, has made it an overall heavy year so far for tomato pests.

So, what's the prognosis?

Ultimately, we are back to what I said was my normal response with years that start out with early warm temps, insect pests are likely to be the same or worse. Insects are a function of heat and many of our major pests like tomato fruitworm go through so many alternate hosts that they will build up in numbers early and generally be worse later in the year due to an early start. However, if we get early droughts that hold out through the spring and dry up alternate hosts, which we absolutely didn't see with the deluge of rain in many areas this year, we could see a disruption that yields lower pressure later. I'm sure we could also run into a situation where flights get out of sync entirely with field corn down the line, which would remove a major host and ultimately decrease numbers. We've seen very light years in the past, and it is likely due to crop and insect cycles not lining up, drought, and possible even very late heavy frosts impacted alternate hosts. However, tomato fruitworm will also move to Arkansas in storms moving Southwest from Kansas, Oklahoma, etc. after they move through a generation there in May as well, in addition to our natural buildup within the state. Basically once we get into warmer parts of the summer the numbers generally increase with a bit of ebbs and flows, although the greatest risk of serious infestations come from migration events from where tomato fruitworm stays in much larger numbers, which is from warmer climates.

With an incoming flight of tomato fruitworm, I recommend everyone get out and scout. We haven't caught much to end June, so you can likely breathe easy through the holiday and focus on shooting fireworks and the grill. Any moths caught in the next 7 days will lay eggs that take 3 or so days to hatch and a few more days to get into fruit after feeding on foliage. See more information about current moth flight numbers with our interactive map at this link www.uaex.uada.edu/hort-ipm. We are continuing to scout tomatoes in our trials and on grower operations for tomato fruitworm activity and will post updates on [Facebook](#) and the pest page linked above.



Picture 2 – Tomato Fruitworm eggs on tomatoes in Hope, AR on May 1st 2024.



Picture 3 – Tomato damaged by tomato fruit worm in Hope, AR on May 10th 2024. Frass can be seen by a feeding hole in the fruit. Picture taken by Taunya Ernst.

Scouting for Tomato Fruitworm

As the name suggests, people usually see fruitworm once they already have some size to them and are feeding on the fruit they hope to sell. However, the trick to managing this pest with minimal losses is to try to target it when it is most vulnerable and before it begins feeding on fruit. As with most caterpillar pests we deal with, this means trying to control the larvae just as they hatch.

Tomato fruitworm generally lays its eggs on the tops of leaves or other plant structures near the top of tomato plants. These eggs are spherical or domed in shape and are about half a millimeter in diameter and height (Picture 2 and 4). Fruitworm eggs take about 3-4 days to hatch before 1st instar larvae will begin to feed on small amounts of leaf material and move inward towards the center of plants. These larvae generally feed on minimal amounts of leaf material before they molt to their 3rd instar and move to flowers and fruit (Picture 3 and 5). Finding fruitworm eggs is relatively easy compared to looking for larvae or feeding damage on plants. Larvae are near impossible to find after they hatch and before they start feeding on large amounts of leaf material or reproductive parts in their 3rd instar. They become much easier to find when they burrow into fruit, but that is after large economic losses are already incurring. Begin scouting weekly for eggs once plants begin to take off all the way through harvest. Fruit samples should also be checked for escaped worms after applications, but also in initial scouting to ensure you aren't missing worms.



Picture 4 – Tomato Fruitworm eggs present in large amounts on tomato leaves.



Picture 5 – A 3rd instar tomato fruitworm still feeding on tomato leaves (left) and feeding damage from tomato fruitworm on unopened flowers (right).

Tomato Fruitworm Threshold

Insecticide applications for tomato fruitworm should not be automatic (Figure 1), as not all growers will see enough pressure to warrant applications throughout the season. Thresholds for control are based on egg counts and the number of escaped worms found in fruit or on plants (Pictures 3, 4, and 6). Initiate an insecticide spray if you are finding 1 egg per 10 plants. I would recommend you thoroughly check 10 plants in multiple places throughout your plantings, as moths often will lay many eggs in a small area. Continue to scout for eggs after you make an insecticide application to determine if you need additional applications. Growers should also check fruit for escaped worms that were either initially missed during egg scouting or were not controlled by the insecticide application. Make additional applications if 3 escaped worms are found per 100 cut fruit (Pictures 3 and 6).



Picture 6 – Escaped worm feeding on tomato fruit.

Insecticide Options for Tomato Fruitworm

There are many options for controlling tomato fruitworm, but only a few that work very well. Most growers rely heavily on pyrethroids such as Warrior II or bifenthrin for suppression, but fruitworm resistance to these products is well established and is known to lead to escaped worms. We've assessed the effectiveness of pyrethroids for three years in research trials at Hope and always see inadequate suppression, sometimes even when sprayed weekly (Figure 1). Additionally, these are broad spectrum insecticides that can flare both mites and aphids. We think the uptick in mite issues across southern Arkansas are directly correlated with reliance on these broad-spectrum insecticides. More selective alternatives such as the diamide products, Coragen, Shenzi, Harvanta, or Exirel, are less likely to flare secondary pests, have long residuals, and have no known resistance.

We have trialed the diamides vs. pyrethroids for 4 years now and have observed impressive results (Figure 1). When targeting insecticide applications based on the egg threshold mentioned above using diamides, we saw half as much damaged fruit compared to pyrethroids sprayed on threshold or even sprayed every week in 2021. In 2022 pressure was higher and we still did not see a significant difference in our weekly sprays vs. 2 shots of Coragen. One thing to consider when using diamide products like Coragen or Shenzi is the residual activity you can expect. We think you should expect 21 days of activity when using a mid-high rate of those products.

Other alternatives to pyrethroids include proclaim, spinetoram products and some effective biologicals. Take a look at the [Southeast Vegetable Handbook](#) for additional recommendations and efficacy data. One product that likely isn't in the handbook yet is [Shenzi](#). This is a new generic version of Vantacor (row-crop version of Chlorantraniliprole, previously known as Prevathon) but also has many specialty crops on the label. Shenzi is likely to be much more easily available in Arkansas since it has the row crop label, and also should be at a row crop price. Be sure to check rates before mixing up, Shenzi,

Coragen, and Vantacor all contain different amounts of chlorantraniliprole and have different use rates. We trialed all of these products in 2023 and you can see the data below in Figure 2.

As always, give me a call at 479-249-7352 if you have any questions at all. We are trialing a number of additional products this year for this pest and the results will be posted this winter.

Aaron Cato

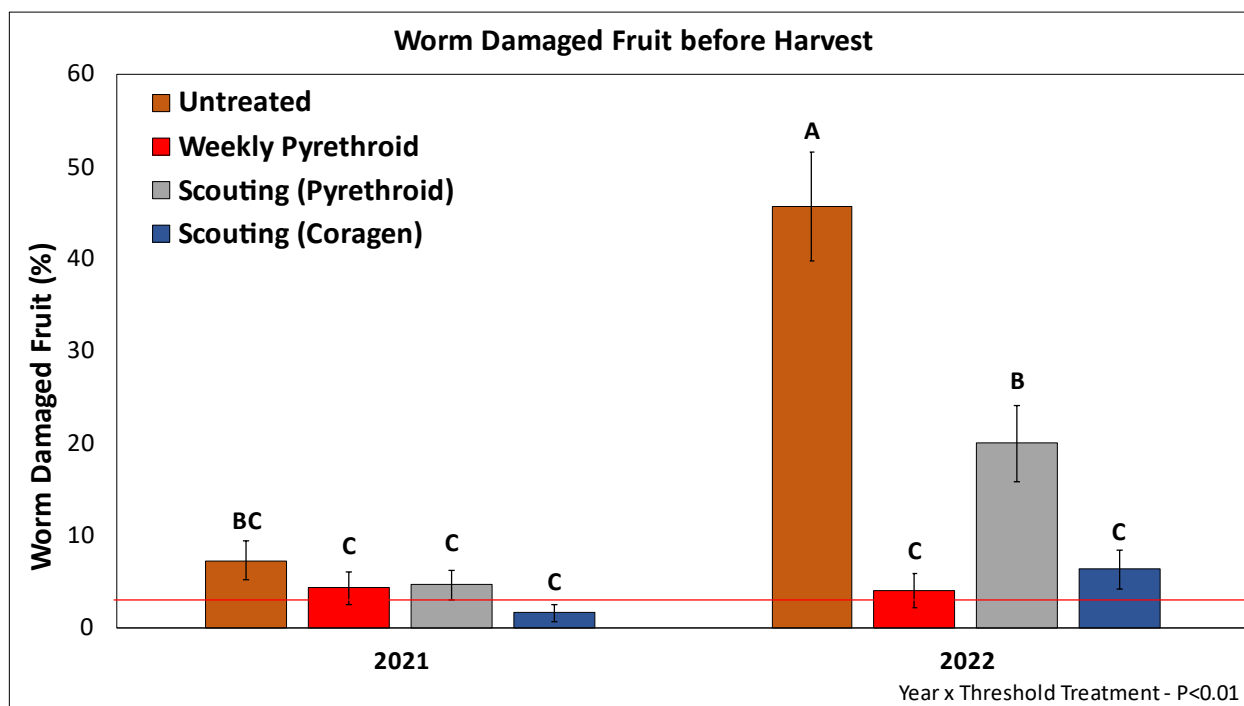


Figure 1 – 2021 and 2022 insecticide threshold data for tomato fruitworm at Hope, AR. Weekly pyrethroid plots were sprayed each week during fruiting (5-6 apps) while only 1 and 2 applications were made in 2021 and 2022 respectively for scouting based sprays. Scouting-based sprays were made at a threshold of 1 egg per 10 plants. The red line indicates a 3% fruit damage threshold that would warrant additional applications and is a good metric for economic losses. Based on these data, applying weekly pesticide applications for tomato fruitworm is not necessary and not sustainable. 1 to 2 well timed applications of a diamide (coragen) performed as good or better than weekly pyrethroid sprays. Pyrethroid resistance is present in Arkansas but may vary in impact from year-to-year. Pyrethroid-based thresholds are not likely to be effective and weekly sprays are likely to still yield unacceptable levels of escaped worms and fruit damage, while flaring other pests

Tomato Efficacy Trial in 2023 – Hope, AR

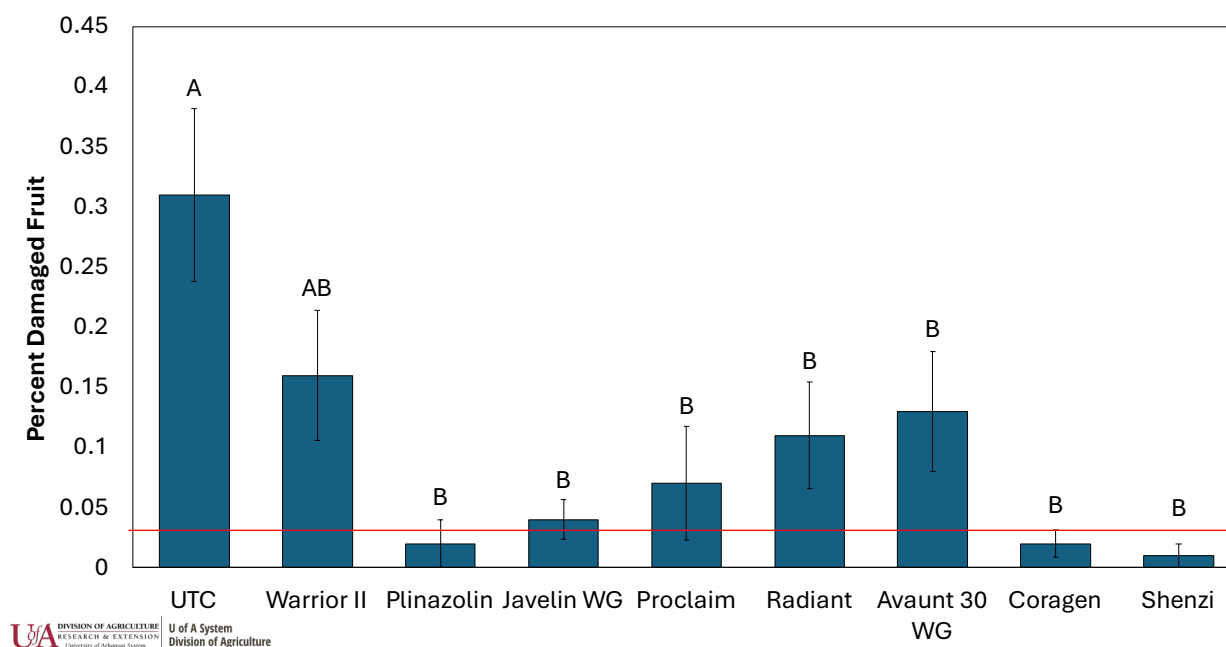


Figure 2 – Tomato insecticide efficacy trial in 2023 at Hope, AR. Eight insecticides were trialed and all products were applied at the same time once threshold levels of tomato fruitworm eggs were observed. Javelin was applied every week for 4 weeks due to extremely low residual with *Bt* products. Plinazolin is not currently labelled for use in tomato and cannot be purchased as of 2024. All insecticides with under 3% fruit damage were considered excellent products (**Coragen, Shenzi, and Plinazolin**) while Proclaim and Javelin (weekly apps) would be considered very good. Rates were as follows: Warrior II – 1.92 fl oz, Plinazolin – 5.13 fl oz, Javelin WG – 1 lb (4 times), Proclaim – 4.8oz, Radiant – 7 fl oz, Avaunt – 3.5 oz, Coragen – 5 fl oz, and Shenzi 2.5 fl oz.