Kent County Crop and Pest Report - February, 2000

Following is the February issue of the Kent County Crop and Pest Report. I have tried to put together information on a number of issues that should concern you as Kent County Crop Producers. As always, any feedback on these reports would be appreciated.

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Gordon Johnson
Extension Agriculture Agent, Kent County
Hessian Fly - A "New" "Old" Pest in Wheat to Watch Out For This Spring

Reports out of several North Carolina counties have indicated that Hessian Fly has caused significant damage to wheat by weakening or killing tillers, thus reducing stands this winter. Here on Delmarva, Hessian Fly has been on the increase in the last several years and, due to the mild fall and early winter, there is concern that some fields may be affected this spring. The life cycle of the Hessian Fly is shown in the diagram below.

The Hessian fly is a small mosquito-like fly, about 1/8-inch long. Adult females live 1 to 2 days and lay reddish-colored eggs in grooves on the upper side of wheat leaves. Each adult female can lay 250 to 300 eggs. The maggots (larvae) hatch from the eggs after 3 to 10 days. Hessian fly maggots cannot live in the open, so they crawl down to their preferred feeding site, at the base of a leaf sheath, between the sheath and the stem. In the fall, the maggots crawl down to the crown of the plant. As the wheat stem elongates, maggots are usually found just above a leaf node. Infestations of Hessian fly tend to be found further up the plant as the stem elongates, because females prefer to lay eggs on newly emerged leaves.

Newly hatched maggots are reddish brown and about 1/50-inch long. As they grow, they become white, then greenish white, and grow to be about 3/16-inch long. The maggots feed by scraping the stem, then sucking up the sap that oozes out of the wound. The maggots feed for 14 to 30 days.

The last stage of the maggot is spent inside the flaxseed. The flaxseed is a shiny, brown protective case about 1/8-inch long. It is built from the insects skin, and named for its resemblance to a seed from the flax plant. If weather conditions are favorable (between 40 to 80°F), the Hessian flies will pupate (transform into adults) inside the flaxseed. Adults then emerge and start a new generation. If it is too hot or cold, Hessian flies remain as maggots inside the flaxseed until the weather moderates. It is not uncommon to find Hessian fly maggots or flaxseeds stacked up one behind the other, particularly in heavy infestations.

In the midwest there are commonly 2 generations, in the south there are 4 to 6 generations. On Delmarva we generally have 2 generations. However, if winters are mild, we can also have additional generations. The entire life cycle requires about 35 days at 70°F, longer at cool temperatures. Generations tend to overlap. The pest oversummers as flaxseeds in wheat stubble. The first generation in September is generally on volunteer wheat or on wild grass hosts. Then there may be one or two more generations in the fall and early winter if the weather is mild. Maggots continue feeding as long as temperatures are above 40°F. In spring, adults emerge, become active when temperatures reach between 50 to 60°F, and start a new generation. There is usually one spring generation on Delmarva although two may be possible.
Feeding by Hessian fly maggots permanently stunts vegetative tillers and can kill seedlings. Stunted vegetative tillers are dark green. Leaves on infested tillers are wider and shorter than normal. Infested tillers usually die after the Hessian fly pupates. Therefore, fall infestations affect yield by reducing the number of live tillers per unit area. Unusually large numbers of dead tillers at the base of the wheat plant may signal a Hessian fly problem.

If fall infested tillers do produce grain heads, these heads are small and the stems are stunted. Spring infested plants have weakened stalks, which can lead to stem breakage and lodging. These plants also have poorly filled, smaller grain heads. Hessian fly reduces forage production of winter wheat, but does not greatly affect wheat forage quality. On Delmarva it is the spring infestations that have caused the most damage to wheat in the past.

Barley and rye will support populations of Hessian Fly but at lower levels and yield effects are also much less in these two crops. However, they can be an important source for infesting nearby wheat plantings, especially when planted early (in September). Oats seems to be a very poor host for Hessian Fly.

Management Of Hessian Fly.

Once a Hessian Fly infestation occurs in a field in the fall, no remedial actions are available to kill the maggots. Decisions on Hessian Fly need to be made before or at planting, and at the time fertilizer is applied in the spring. It is possible to manage Hessian fly through a combination of cultural and chemical controls. Biological control agents are also present that help keep Hessian fly under control.

The most reliable management strategy in the South and Midwest in the past has been to plant varieties of wheat that are resistant to Hessian fly. In the south, Wheat varieties with the H7H8 gene provided protection against most of the strains of Hessian fly. Unfortunately, the Hessian fly can overcome host plant resistance mechanisms, resulting in the formation of new strains, called biotypes (As strains are discovered, they are named with letters). For example, in recent years, Biotype L increased for which there were no commercially available resistant varieties initially. Hessian fly biotypes look identical to each other, but differ in the varieties they can develop and reproduce on.

Plant breeders try to stay ahead of the biotypes by producing wheat varieties with different resistance genes. These resistance genes are usually given a letters and numbers, for example, the H6 gene, the H7H8 gene, etc. Biotype L survives on all commercially available varieties, including those with the H7H8 gene. However, there are some good southern-adapted breeding lines, involving genes H9, H13, and H21, with resistance to Biotype L. A few varieties with resistance to Biotype L reportedly are under development for southern areas.

On Delmarva, what biotype do we have and are there resistant varieties? We also have seen an increase in Biotype L since the late 80's. Currently 90% or more of the Hessian Flies on Delmarva are of this Biotype L. Work is underway at this time in a 3 state area to look at resistant varieties adapted to this area. All of the varieties that had resistance to the southern strains of Hessian Fly (such as Hickory, Andy, Pioneer 2555, Madison, Gore, Coker 9835, Saluda, etc.) do not have resistance to Biotype L. Initial research has shown that the public variety Roane has shown some resistance to Hessian Fly in Delaware. A handful of other varieties have shown some promise but cannot be recommended at this time. Small grain breeders in Maryland and Virginia are working on incorporating the H9 gene for resistance to Biotype L into varieties. Unfortunately, commercially available varieties for the Mid-Atlantic region will be several years off.

Other Practices That Reduce Numbers Of Hessian Flies

Burying wheat stubble, where Hessian flies oversummer, will reduce the emergence of Hessian fly adults. Control of volunteer wheat well before planting is recommended because Hessian flies are attracted to volunteer wheat when they emerge in September. Wildlife plantings of wheat, which are often planted early, can be a source of Hessian flies as will early planted cover crops. Crop rotation helps reduce the chance of infestation by Hessian flies, but is not infallible, because Hessian fly adults will fly up to a mile in search of host plants.

Over-summering and September reproduction circumstances greatly influence how many flies are available to infest seedling wheat. No-tillage into wheat stubble improves these circumstances by increasing survival of over-summering puparia on the straw and underground stems, and increasing the abundance of volunteer wheat plants in September (early fall hosts). Therefore, the great increase of no-till soybeans into harvested wheat fields over the years and the resurgence of Hessian Flies that may be of different biotypes than in the past may be increasing the level of Hessian Fly overall.

To prevent or avoid fall infestation, planting after the fly free date (October 8 in Kent County) has been the major way we have dealt with Hessian Fly in the past. We are uncertain if a single fly free date works as well in years with mild fall temperatures where they may be flying later, or a second fall generation may occur. Research is underway on Delmarva to develop a more accurate system of determining fly free dates using Hessian Fly development information and temperature levels (similar to degree days). We will provide farmers with this information when it is developed (it will take several years).

At-planting, Di-Syston applied in-furrow can provide fall protection against Hessian flies. During the past 10 years, research in the Piedmont and Coastal Plain regions of Georgia has shown that use of at-planting insecticides will pay off.
74% of the time if a susceptible wheat variety is grown, and 23% of the time when a resistant variety is grown. The seed treatment Gaucho, at 4 fluid ounces per 100 cwt seed, provides some control of Hessian flies. Cost may be prohibitive.

Suggested Insecticides For Chemical Control Of Hessian Fly.

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<tr>
<th>Insecticide</th>
<th>Rate</th>
<th>Comments</th>
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<tbody>
<tr>
<td>disulfoton 1 lb ai/A</td>
<td>6.7 lb</td>
<td>Apply in-furrow at planting. This is a restricted use pesticide. A 75-day interval is required before grazing can be allowed, and a 48-hour re-entry period is required for workers.</td>
</tr>
<tr>
<td>DI-SYSTON 15G</td>
<td></td>
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<tr>
<td>imidacloprid</td>
<td>4 fl oz/100 lb seed</td>
<td>Use as a seed treatment. Not available as a hopper box treatment. Observe a 45-day interval between planting and grazing. Rotations are restricted - consult with your seedsmen on rotational</td>
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Late Winter Scouting For Hessian Flies

Growers, planting Hessian fly susceptible varieties, should inspect their wheat before making their customary nitrogen applications in late winter. Tillers, especially dead tillers and stunted tillers, should be examined by peeling the leaf sheaths back carefully to look for Hessian fly maggots or pupae. Puparia will be found below the soil line and within the tillers (it is necessary to dig the plants and unroll tillers to see most of the puparia). Some healthy looking wheat surveyed may also show low to moderate levels of puparia in infested fields.

If 20% of the tillers are infested with Hessian fly maggots or pupae at this time, significant yield losses can be expected and the money spent on nitrogen may not produce the desired yield response. In fields where wheat tiller damage (death) is severe enough it may warrant abandoning the crop (especially before more money is spent). Seriously damaged wheat will have low living tiller counts, signs of dead or dying tillers, be stunted and probably with lots of yellowing, and have lots of fly puparia (flax seeds).

In North Carolina this year, they have seen significant infestation in all cultural conditions and planting dates. However, there does seem to be a trend; wheat following wheat being most affected along with wheat next to 99 wheat. Wheat isolated from 99 wheat was less affected. There was also an overriding influence of planting date. Early planted fields are more heavily infested than later planted fields.

If Hessian Fly is suspected, it is suggested that growers begin looking for infestations in the earliest planted wheat fields planted without rotation, or next to 99 wheat fields, or in fields that had volunteer wheat, especially if thin stands are present.

Are insecticides practical for spring generation control? We are uncertain at this time. In the past, it has been assumed that foliar applications of insecticides such as Warrior would be ineffective due to the difficulties in timing, extended fly emergence, and getting the chemical to where the pupae are. Post emergence insecticide has a research record of poor performance, in the past using Disyston applied as a spray or in N solution. However, in North Carolina this year, they will be trying Warrior to see if it will have an effect in infested fields.

The University of Delaware does not currently recommend foliar applications of Insecticides (such as Warrior) for Hessian Fly Control at this time. However, we will keep growers and crop advisors informed of any changes in this recommendation as the season progresses. Joanne Whalen will be conducting research using Warrior on infested fields this spring. We will keep you informed of the results of these trials as they progress.

In North Carolina, due to the seriousness of the problem this year, they are going to try Warrior treatment in heavily infested areas at first sign of egg laying. Their hope is that Warrior will provide long enough residual life to control a meaningful proportion of flies, eggs, and larvae with one or two applications. In North Carolina, puparia are prepared to hatch as soon as temperatures are favorable and there will be at least two spring generations. Insecticidal control will have an uphill battle since eggs are laid on newer foliage and hatching larvae move down into the tiller whorl and deep into the developing tiller. Plant growth may have a serious dilution effect on Warrior and reduce performance. However, the thought is that dew and rain will pick-up Warrior residues and saturate the layers within the tillers and kill larvae; adults will hopefully be killed directly. In a nutshell, they are going to try it but don't know if it will work!

Extracted from ANR-1069, Biology and Management of Hessian Fly in Wheat. Nov 1997. Kathy L. Flanders, Extension Entomologist, Assistant Professor, Entomology, Auburn University; G. David Buntin, Entomology, University of Georgia; and Paul L. Mask, Extension Agronomist, Associate Professor, Agronomy, Auburn and from communication with J. VanDuyne, Extension Entomologist with North Carolina State University and personal communication with Joanne Whalen, UDE IPM Extension Specialist
Being an Informed Agricultural “Consumer”

Have you ever been sold a production input that did not pay off? Have you bought inputs in your operation that were a waste of money? Have you ever paid more for an input than you needed to? Have you bought something for your farming business on impulse? If the answer is yes to any of these questions, then your profits may have suffered. Over the years I have made the observation that growers are exposed to the same pitfalls as consumers when it comes to making purchases.

Before purchasing production inputs, it is wise to do extensive homework and planning. Know what you need and what the options are to provide those needs including realistic alternatives. Use multiple sources of information. Your salesmen have a wealth of information on the products they sell and many, in addition, are qualified crop advisors. However, the wise farmer/ “consumer” will view the salesman as only one source of information and will incorporate many independent sources of information before buying anything. This would include other farmers in the region, Cooperative Extension and University sources, independent crop consultants, respected trade publications (farm magazines, news letters, journals, etc.), company technical representatives, and electronic information sources (internet, web, for-pay information services).

Don’t buy what you don’t need: consider if the input will have a significant impact on the bottom line. If the impact is marginal or uncertain, don’t invest significant money in it. Never buy on impulse and don’t go for gimmicks. Always analyze the information presented to you before buying, don’t buy on the spot. Ask the right questions - including price, effectiveness, service, and guarantees. Control the purchasing process by having your needs planned out and not accepting “extras” or undesirable alternatives.

Have a cost objective in mind and then obtain multiple price quotes from different suppliers for all inputs. Consider non-traditional sources for obtaining input bids (direct from the company or off of the internet for example). Beware of attempts to “compare apples with oranges”. In evaluating alternative programs (such as herbicides) be aware of the strengths and weaknesses of each program and what you are really being offered. There will also be more and more offers in the future that bundle inputs (seed and chemicals for example) and promise significant discounts if they are purchased from one source. Again, ask yourself will these bundled inputs do the job I need done, what are the weaknesses or limitations to the bundled programs, and are you paying for products that you don’t need? There will be opportunities to buy “generic” or “off brand” products vs. “name brand” products, especially off-patent chemicals (glyphosate for example). Again make sure that you check for quality, effectiveness, and guarantees when considering these products.

Although product quality should always be considered, premium products may not always be the most profitable for you. As an example, I always say don’t skimp on genetics. However, the most expensive seed is not necessarily the one that will be most profitable for you. In the case of genetics, know what varieties work for you in your area and your cultural practices, choose those varieties, and then negotiate for the best price. This applies to all inputs. Substitute lower cost products when they will do the same job but make sure that the substitution doesn’t have hidden costs (higher application costs for example).

Again, don’t buy what you don’t need. Over the years I have seen many “consumer traps” in agriculture. Some notable examples include:

- micronutrient packages. Don’t apply micronutrients unless tests or field history indicates deficiencies or the crop is know to need elevated levels.
- pop-up fertilizers, foliar solutions, liquid feeds, spray-on growth promoters, etc. Again, don’t add nutrients unless there is an economic response. Just because a plant looks “greener” doesn’t mean it will yield any more. Also, these products often deliver nutrients to plants at a much higher cost than more standard fertilizer materials. In addition, the vast majority of spray-on growth promoters just don’t work.
- excess starter fertilizer. If soils are warm and phosphorus levels are high then phosphorus starter fertilizers will not give an economic response. Even in cooler soil conditions, starter phosphorus does not consistently give a response. Starter potassium is also unnecessary in high K soils. However, small amounts of starter nitrogen are beneficial for corn production in many cases.
- nitrogen fertilizer preplant or at plant on soybeans. With rare exceptions, nitrogen on soybeans just does not give any yield benefits, and may actually depress yields in some cases.
- Unnecessary applications of fungicides and insecticides to crops. You should only treat crops if insect and disease thresholds have been reached. You should also only treat for a pest if it is present or at high risk of
Selling Money on Soil Insecticides

Since there are no rescue treatments for many soil insect pest in field corn, a review of the factors that favor soil insect problems in combination with knowledge of a pest problem in a particular field can help in making a treatment decision.

**Rootworms**: In continuous corn situations, the decision to treat for rootworms can be based on a number of factors. **Scouting needs to be done the year before in fields that will be corn after corn.** Contact the extension office to learn how to scout for rootworm adults. If fields were scouted the previous season and adult beetle counts are available, you can use this information to make a treatment decision. In Delaware, adult beetle counts in 1999 were at a low to moderate level. There are 2 types of corn rootworms: Western, Northern, and Southern in order of importance (Western does the most damage) so you need to know your types to know how serious the problem is. If scouting data is not available, the following factors are known to favor rootworm problems and can be used to decide if an at-planting soil insecticide is needed: Continuous corn planted on heavier soil types, especially if you are in your second to fifth year of continuous corn; or rotated corn planted on heavier soils following soybeans in 1998 where heavy populations of rootworm beetles were observed, and/or there were heavy infestations of volunteer corn or weeds. A variant of the Western corn rootworm that survives in Soybeans then attacks corn in the rotation has been on the increase in the eastern cornbelt (Ohio). We need to be aware that this variant may make its way to the east coast in the next several years. Rotation is currently the best tool for controlling corn rootworm; however, if the new variant of the Western corn rootworm arrives, rotation will not work as well. If chemical treatment is found to be necessary, Counter, Force, Fortress, Lorsban, or Regent all provide rootworm control. If Regent is used, fields cannot be planted to leafy vegetables for one month, root crops for five months, or small grains and other rotational crops for 12 months following application. Adequate control can be achieved when soil insecticides are placed either in-furrow or T-banded. The use of Furadan 4F at side-dressing has worked in some areas, especially where no soil insecticide was used at planting and economic levels were encountered. Effective control with this strategy may only be obtained where applications are precisely timed, weather conditions are favorable (i.e., adequate moisture), and fields are scouted accurately for larvae.

**Wireworms**: High organic matter content, sod covers, and heavy grass pressure the previous season favor wireworm populations. In addition, continuous corn fields with one or more of the above conditions are very susceptible to wireworm problems. Since wireworm larvae spend multiple years in the larval stage and their movement in the soil is easily affected by moisture gradients, good control is often difficult to achieve. Counter, Force and Regent have provided wireworm control; however, the materials should be used at the higher end of the labeled rates and placed in-furrow to achieve economical control. **Wireworms can be scouted for by using bait stations.** At least three weeks ahead of corn planting, take one handful each of untreated corn and wheat grain, mix them, and bury the mixture 6 inches deep in the corn field. Do this at a minimum of 5 sites in each field. After 2 weeks, examine each station and if one or more reddish-orange hard shelled wireworms are found on the average, then a soil insecticide should be applied.

**White Grubs**: Populations of white grubs are favored by a number of factors including planting into double crop or season soybean stubble as well as planting into old sod, hay, pasture or set-aside acreage. Larvae are also affected by moisture gradients in fields and are most commonly found on sandy knolls. If conditions remain cool and wet after corn is planted, damage can be very severe since plants are unable to grow ahead of the damage. Under these conditions, larvae stay in the larval stage longer resulting in an extended feeding period. Soil insecticides must also be placed in-furrow to achieve effective control. **Mild winter conditions will result in grubs overwintering closer to the soil surface. Fields can be sampled for grubs before planting but it should be done before a field is tilled.** The most accurate results are obtained when soil temperatures at 6-inches deep are at least 45 degrees. At each site, sample one square foot of soil six inches deep. At least one sample, preferably two, should be taken for every 10 acres with no less than 10 samples per field. A treatment is recommended if you find 1-2 grubs per square foot in heavy soil or 0.5 – 1 grub per square foot in sandy soil. Counter, Force or Fortress will provide control. The highest labeled rate should be used if populations are heavy.

**Black Cutworm**: This insect pest is favored by late planting, broadleaf weed growth before planting into soybean stubble, poorly drained fields and reduced tillage. This is **the one soil insect pest where a rescue treatment can be applied if you are able to scout fields at least twice a week once leaf feeding is detected.** Examine 10 plants in 10 locations for small irregular holes in leaves and/or wilted and cut plants. Begin scouting at plant emergence and continue through the 5 leaf stage. Check for the presence of larvae and determine the average size. Treatment is necessary if in the 2 leaf stage, 3% cut plants or 10% leaf feeding damage are found; in the 3-4 leaf stage if 5% of plants are cut and larvae
that are present are generally less than one inch long.

If field conditions become extremely dry after planting and cutworms feed below the soil surface, it will be extremely difficult to obtain adequate control with a rescue treatment. If you are unable to scout and you plan to plant into a field with a history of cutworms and/or a number of the conditions favoring cutworms are present, a treatment may be needed at planting. One option is the combination of a pyrethroid (Ambush, Asana, Pounce or Warrior) with your pre-emergence herbicide if you are using an at-planting soil insecticide, Force, Lorsban, and Fortess are labeled for cutworm control, but they must be applied as a T-band to be effective.

From Joanne Whalen, UD IPM Specialist

Fertilizers - Where Can You Save Money in 2000

There are several ways that farmers can save money by reducing fertilizer use in 2000. Starter fertilizer is an area that we can examine for cost savings in a year with low commodity prices. This cost saving may come from not using starters or only using the nutrients that we expect to get a yield response. Generally, we do not see a yield benefit from starter fertilizer in a plowed or reduced-tillage system, unless soil phosphorus and/or potash are low. No-till systems have the greatest chance for a yield response from starter fertilizer.

Since soils tend to be cold and wet in a no-till system, it was thought that phosphorus provided the most benefit to slow developing root systems. Research has shown that nitrogen (rather than phosphorus) in a starter fertilizer is the nutrient that most consistently causes a yield response. The addition of phosphorus to a starter for no-till would be recommended in cases where soil phosphorus levels are low to medium. However, phosphorus may be left out in soils testing high. Further costs may be eliminated by not adding micronutrients (zinc, manganese, boron, etc.) or sulfur to starters where there is no field history of a deficiency in these nutrients.

Another way to cut costs is to reduce or eliminate maintenance applications of P and K in fields that have optimum or high levels of these nutrients. In manured fields or in fields with potential carryover of nitrogen (high organic matter), use of a PSNT test for soil nitrates can determine if sidedress nitrogen will be needed in corn. Eliminate any nitrogen applications preplant or at-plant in soybeans as it does not improve yields. Do not routinely add sulfur to fields unless a soil test indicates a deficiency (a 12 inch sample should be taken to determine sulfur levels since sulfur accumulates in the subsoil).

From Ohio State Corn Questions and Gordon Johnson

Late Winter/Spring Weed Control in Small Grain

Scout your small grain fields at greenup to see what annual weeds are present before targeting a herbicide program.

Winter annuals are the most common weed problems in small grains that rob yields. Some common winter annual broadleaf weeds include chickweed, henbit, dead nettle, German moss, prickly lettuce, mustard relatives (black, field and wild mustard, wild turnip), yellow rocket, shepherdspurse, and pennycress. Some winter annual grass weeds are annual ryegrass, annual bluegrass, and the annual bromegrasses (downy brome, cheat).

Several other winter annual weeds have been a challenge to control in small grains including cornflower, common vetch, wild radish, and field pansy, and annual ryegrass. These have been particular problems in certain fields.

In some small grain fields, perennial weeds will also be of concern. The 2 main perennials in small grain are Canada Thistle and wild garlic. Other perennials such as wild onion, dock, pasture grasses (orchardgrass, fescue), and other thistles may be a problem in some fields, especially in longer term no-till or following hay/pasture crops.

For late winter/spring weed control, we have 5 products available with broad application: Harmony Extra; 2,4-D Amine; 2,4-D LV Ester; Banvel and Clarity (both forms of dicamba).

Harmony Extra is effective on wild garlic, mustard, wild onion, chickweed and many other winter annual broadleaf weeds. It will suppress henbit and Canada Thistle. It can be applied any time up to flag leaf emergence. For Canada thistle control, it should be applied as late as possible. If the field is infested with winter annuals and Canada thistle, two applications may be needed. The first application will control winter annuals when they are small and more easily controlled, and then a second application after the Canada thistle has had a chance to emerge and get 2 to 6 inches of new growth. Do not apply more than 1 ounce of Harmony Extra per acre during the growing season. Harmony Extra can be combined with 1/4-3/4 pint of 2,4-D for improved control of wild radish, field pansy, wild vetch, cornflower and other hard to kill broadleaf weeds. When using Harmony Extra, attention should be payed to what surfactant levels are recommended for different circumstances. If applied in water, use 1 qt. of surfactant per 100 gallons spray solution; if applied in water+Nitrogen solution, use ½-1 pt. of surfactant per 100 gallons; if applied with nitrogen and garlic is greater than 8 inches tall, use ½ pt. of surfactant per 100 gal.; if garlic is smaller, no surfactant is necessary; if combining Harmony Extra with 2,4-D in nitrogen solution, no surfactant should be used; and if spraying Harmony Extra with 2,4-D in water, 1 pt.
of surfactant per 100 gal. water is recommended.

2. 4-D Amine (½ to 1 pint/a) is effective on a wide range of annual broadleaf weeds but is weak on chickweed and German moss and only moderately effective on henbit. 2,4-D LV Ester (½ to 1 pint/a) has the same range as the Amine formulation but gives better suppression of perennials. Banvel and Clarity (dicamba) at a rate of 1/8 to 1/4 pint per acre are effective on a wide range of winter annual broadleaf weeds but are only fair on henbit, wild mustard, and wild radish. The combination of ½ pint of 2,4-D with 1/8-1/4 pint of Banvel/Clarity will give more broad spectrum control of broadleaf weeds including chickweed and can be used on wheat or barley. In wheat, higher levels of 2,4-D can be used for hard to control weeds such as henbit, garlic, and cornflower.

For postemergence control of Italian Ryegrass in wheat and certain barley varieties, apply Hoelon when the ryegrass is in the two to fiveleaf stage. Hoelon is less effective on ryegrass beyond the fiveleaf stage and does not control broadleaf weeds. When spraying wheat, crop oil concentrate may be added to the water carrier at 1 to 2 pints per acre. For postemergence applications in barley, use only a water carrier with no crop oil concentrate added. Hoelon is not readily translocated, so thorough spray coverage is important. Do not tank mix Hoelon and liquid nitrogen. Also, do not tank mix Hoelon with other herbicides. Symptoms of Hoelon on ryegrass are slow to develop and depend on how fast growth is occurring. It is not uncommon for 10-14 days to elapse before symptoms begin developing.

Wheat injury from such herbicides as 2,4-D and Banvel can occur, particularly as wheat advances in its growth. As a general rule, wheat is most tolerant to 2,4-D when plants are fully tillered and before jointing. Research results show that a 10% yield reduction occurred when 2,4-D was applied in the boot stage. Applying 2,4-D to fully tillered wheat before jointing did not result in a significant loss in grain yield. The risk of injury when applying 2,4-D after tillering may be slightly greater with the ester formulations than the amine formulations. This may explain why label directions for many of the ester formulations caution growers to apply after wheat is fully tillered (Feekes growth stage 5), but not forming a joint or node in the stem (Feekes growth stage 6). Regardless which formulation, it is especially critical to NOT apply 2,4-D when wheat plants are in the boot stage. Banvel applications MUST be made prior to jointing stage. General observations indicate that the risk of significantly reducing yield when applying after wheat develops a joint tends to be greater with Banvel than with 2,4-D.

By Gordon Johnson from Delaware weed control recommendations (Bulletin 237), Mark VanGessel, UD Extension Weed Specialist, NCState weed control recommendations, and Missouri IPM newsletter.

Alfalfa Weed Control in the Dormant Season

In alfalfa, heavy winter annual weed pressure will reduce yields the following season and have an effect on stands. While alfalfa is still dormant, there are several herbicides that can be used for winter annual weed control. Gramoxone Extra is an inexpensive and effective control for these winter annuals; however, it has no residual and you must have good weed coverage. It can be used on established stands but not first year seedings. It can be applied any time during the dormant period. Pursuit can be applied to new seedings and established stands in late winter or early spring when alfalfa is dormant. Pursuit works best on small weeds. Sencor is another material that has been used on established stands with success on winter annual weeds. However, there is potential for injury to alfalfa, especially on sandy soils and at the higher rates necessary for broad spectrum winter annual weed control. Other materials such as Sinbar, Velpar, and Karmex are labeled, but due to potential crop injury, have more limited use.

By Gordon Johnson from communication with R. Ritter, UMD Extension Weed Specialist.

Understanding Powdery Mildew

Powdery mildew on wheat is recognized by small, patches (colonies) of cottony mycelia (masses of fungal threads that make up the body of the fungus). These occur on the upper and lower surfaces of the leaves. As these patches produce spores and age, they become a dull tan color. Yellow patches may later surround the mildew colonies. As the wheat and the mildew colonies mature, the sexual stage of the fungus or cleistothecia are produced. The mildew fungus survives the summer in the absence of wheat in infested wheat debris in these cleistothecia. When the new crop develops as seedlings and fall rains occur, the cleistothecia within the infested wheat debris rupture to release spores. This process is favored by moderate fall temperatures and lush wheat growth. The mildew fungus, survives the winter on the infected wheat seedlings.

In the spring, with the return of moderate temperatures, the typical cottony mildew colonies develop and produce spores again that infect and colonize the newly developing wheat leaves. This stage of the disease cycle is favored by moderate (59 degrees to 75 degrees F) temperatures and high relative humidity. The canopy within a lush stand of wheat is an ideal environment for powdery mildew to develop. As the wheat crop matures and the temperatures rise, the mildew fungus produces the oversummering cleistothecia. Typically, the cottony colonies turn tan and are dotted with the cleistothecia.
When the crop is harvested, the cleistothecia remain attached to the infested straw.

Lesions are first noticeable as white, powdery spots on the lower leaves and stems. As the lesions mature they become darker, sometimes salmon colored with black spots (perithecia). If there is a heavy infestation, clouds of white spores can be seen as you walk through the wheat. Spores are dispersed by wind. High humidity (with or without rain) and mild temperatures (59-75 degrees F) favor disease development. The disease is markedly retarded above 77 degrees F.

Control of powdery mildew begins with the selection of well-adapted, disease resistant cultivars. Chemical control of powdery mildew is only economical in high yield situations. Maximum economic yield is obtained by more intensive management practices, especially high nitrogen fertility and narrow rows, which increases both the yield and disease potential in a small grain crop.

Use of Baytan seed treatment and/or foliar-applied fungicides under high yield management may be required to control powdery mildew and protect the higher yield potential of the crop. The use of Baytan seed treatment should be based on: a) use of high-yield management practices, especially higher nitrogen fertility levels, and b) powdery mildew susceptibility of wheat cultivar(S through MS reactions). Cultivars rated MR to MS may not respond dramatically to Baytan depending on seasonal conditions. The decision to protect yields with fungicides should be made when the expected yield is roughly greater than 70 bu/A (the cut-off depends on the cost of production and on potential market price) and when conditions are forecast to be favorable for continued disease development and stage of crop growth.

Use of foliar-applied fungicides for powdery mildew (Tilt or Quadris) should be based on the presence of the disease, how far the disease has progressed, how much mildew there is, variety susceptibility, yield potential, nitrogen fertilization level, and weather conditions.

Scouting and decision making guidelines for powdery mildew control will be given in the March Pest and Crop newsletter.

Extracted from fact sheets on powdery mildew from VPI, NC State, and the Regional Publication - Bulletin 237.

Plant Early for Best Yields in Full Season Soybeans

Farm and research experience suggests that the last week in April or first full week of May is the best time to plant soybean varieties from maturity group IV and V. Based on a 4-year project sponsored by the Delaware Soybean Board, delaying planting until the first of June reduced yield by an average of 10 to 15 bu/A depending on variety. For group III beans, the ideal planting date was mid-May. If you have some fields that are fit for soybean planting and your corn fields are still not fit to plant, switch over and plant your group IV and V soybean varieties and see how they respond to early planting.

Successful early soybean planting requires more management attention. Use high quality seed of a high performing variety. On average, Certified seed will yield 3.5 bu/A more than bin-run seed. If you choose to use bin-run seed, be certain to treat it special from the time it is planted until its harvested, and then treat it even more special during harvest and during storage. Have it cleaned of weed seeds and broken or damaged beans. Have a germination test run.

Although soybean seed is not traditionally treated with a fungicide or insecticide, early planting in cooler and wetter soil conditions will make seed treatments pay. After mid-May when soils are warmer, seed treatments will not be required unless the germination percentage falls below 80 percent. Seed with a germination of 70 percent or less should not be planted. Once you purchase quality seed, remember to handle it carefully as soybean is more sensitive to rough handling than most other crop seed. Check you planters to be sure the seed coat is not being broken during planting.

A seeding depth between 1 and 1.5 inches is best for soybeans. Emergence problems can occur at seeding depths greater than 2 inches. At the deeper seeding depths, emergence is slower and can increase the chance for damage from insects and diseases.

Consider using a soybean inoculant (Bradyrhizobia) if you haven't used one in your field recently. Many new inoculants are available on the market. The inoculant organism is what supplies the soybean plant with nitrogen. Research by Dr. Jeff Fuhrman with the University of Delaware's Department of Plant and Soil Sciences has demonstrated that many of the native Bradyrhizobia bacteria in our soils are either not very effective at fixing nitrogen or actually produce a toxin that can limit soybean yields. It only takes a few minutes to treat your soybean seed with the inoculants and costs less than $2 per acre. Once planted and emerged, scout your fields to guard against early insect problems, weed breaks, and nutrient imbalances. Richard Taylor, UD Extension Agronomist.

Tips for Reducing Soybean Costs and Maximizing Returns

Soybean grain prices in 2000 are predicted to be low again which doesn't leave much profit even with good yields. There are three approaches to increase profits: A) increasing yield while holding the cost of production constant, B) reducing the

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cost of production while holding onto yield, and C) increasing the price received through better marketing. For most producers the easiest and most effective approach is to reduce the cost of production without reducing yield.

Build your production system on the following foundation: If all other inputs are adequate, planting date and row spacing will account for a large portion of the yield (up to 50%). Plant full season beans in narrow rows (15" or less) as early as soil conditions allow (late April or Early May). In double crop situations, each day of delay in planting will cause dramatic reductions in yield potential. Disease control may account for 20% of the yield, so select disease resistant varieties (soybean cyst resistant varieties for example) and treat the seed in early plantings. If all other inputs are adequate, weed control accounts for 15% of yield, design a good program for controlling weeds. If all other inputs are adequate, soil fertility and seeding rate account for 7% and 5% respectively, check the soil pH and K levels and calibrate the drill for the desired seeding rate. Seeding rates can usually be reduced if the seed is properly treated with fungicides.

Following are actions to consider in reducing cost of production:
- Reduce the amount of tillage performed or use no-till.
- Don't apply P and K fertilizer if the soil test levels are above the response level. Soil pH should be around 6.0. Don't apply nitrogen to soybeans.
- Because soybean seed is sold in 50-pound units, buy varieties with small seeds to make a unit plant more acres.
- Use public certified varieties to control seed input cost. Public varieties yield well and usually have good resistance to disease.
- Buy varieties with proven performance that have been around a couple of years rather than the newer, more expensive ones. Make sure they have yielded in the top 25% of the yield trials where they have appeared. If they have not been compared to other varieties in a University performance trial, don't take a chance on them.
- Be very selective if using Roundup Ready varieties so that they have the desired traits such as nematode resistance.
- Select varieties with as much disease resistance and tolerance as possible as a means of holding onto yield. Such varieties don't cost any more than susceptible ones.
- Reduce the seeding rate for normal varieties from 175,000-200,000 to 150,000 and use seed treatments to produce an adequate stand that is healthy. Seed treatment pays by having better germination and survival.
- High seeding rates are used to control weeds, but are not needed for yield. Reducing the seeding rate of RR varieties to 125,000 can reduce the seed cost by half, while having very little effect on yield. A few more ounces of Roundup Ultra may be needed for weed control, but you'll be many dollars ahead. Be sure to treat the seed with fungicide.
- For weed control in the normal varieties, use reduced rates of post emergence herbicides where weed pressures are moderate to low. Pay close attention to herbicide application timing.
- Don't keep your grain to use for seed. Hundreds of studies show that while saved grain is cheaper than purchased seed, yet yield losses from saved seed are almost always greater than the savings in seed cost, resulting in less profit. The quality of grain coming from many Delmarva fields was poor. Before using this for seed have it germination tested. It should be cleaned and treated before use.
- Inoculate your seed with one of the new/improved inoculation materials. In Ohio, average yield increase from 29 field trials over five years with several products in each has been 2.1 Bu/Ac generating a profit of $8 to $9 per acre.
- When prices are low, there are numerous worthless products and fast-talking sales people that make those products sound really great. If they don't show you data from several University evaluations, then don't waste your time with them.

By Jim Beuerlein, Extension Soybean Specialist, Ohio State University Crop Observation and Recommendation Network

Can You Increase Yields With the New Generation Soybean Inoculants?

During 1995 through 1998 Ohio State University conducted 22 field trials which included several inoculation materials. How do the new inoculates differ from past products? First, the new inoculates are produced on sterile media which means the desirable bacteria do not compete with other bacteria on the media mix which results in a purer product. Second, the bacteria used in the newer Asterile@ inoculates tend to infect the root system more extensively, fix more nitrogen, and may survive longer in the soil than older strains. More productive strains are being developed using gene transfer technology and will enter the market in a few years. Also listed below is research on Initiate. Initiate is a signal compound that expedites nodule formation early in the season when soils are cold, and it has increased yield during very limited testing.

The average yield increase with the new inoculants has been 3.0 bu/ac and the cost of inoculation is normally $1.00 to $2.00 per acre leaving a profit of about $13.00 per acre. The test fields were typically in a soybean-corn rotation, had good fertility, appropriate pH values and were very productive. We have had good results in both tilled and no-till fields. Many producers can expect this level of profitability from inoculating their soybean seed. The following table show the results
from 22 field trials.

**Soybean Yield Increases due to Various Inoculation Materials by Year.**

<table>
<thead>
<tr>
<th>Number of location</th>
<th>5</th>
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<th>6</th>
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</thead>
<tbody>
<tr>
<td>Umtreated Check (bu/A)</td>
<td>50.1</td>
<td>50.9</td>
<td>52.4</td>
<td>58.9</td>
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<tr>
<td>Inoculation Material</td>
<td>------</td>
<td>bu/A increase over check</td>
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<td></td>
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<tr>
<td>USDA Regular Humus</td>
<td>----</td>
<td>+0.6</td>
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</tr>
<tr>
<td>New USDA Humus</td>
<td>+1.6</td>
<td>+1.1</td>
<td>+1.5</td>
<td>+5.9</td>
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<tr>
<td>New USDA Liquid In-furrow</td>
<td>----</td>
<td>+1.6</td>
<td>+1.0</td>
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</tr>
<tr>
<td>New USDA Liquid On-seed</td>
<td>+1.6</td>
<td>----</td>
<td>----</td>
<td>+3.0</td>
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<tr>
<td>Hi-Stick</td>
<td>+1.6</td>
<td>+2.4</td>
<td>+1.6</td>
<td>+7.1</td>
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<tr>
<td>Cell Tech 2000</td>
<td>----</td>
<td>----</td>
<td>+1.3</td>
<td>+2.4</td>
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<tr>
<td>USDA Experimental</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>+7.1</td>
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<tr>
<td>Affix</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>+4.3</td>
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<tr>
<td>Initiate</td>
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<td>----</td>
<td>----</td>
<td>+8.7</td>
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<tr>
<td>Affix + Initiate</td>
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</table>

Rhizobium bacterial inoculate are living biological organism. Due to this characteristic they require some care in handling to maintain their effectiveness. Without following handling suggestions, the user will not reap the potential benefits of these products. Below are some tips for handling and use of bacterial inoculates.

Inoculates should be stored in a cool place and not exposed to the sun prior to use. When exposed to heating bacteria do die. Prior to use both liquids and peat based inoculates should be stored at room temperature of 65-70 degrees. If frozen liquid product is purchased, keep frozen prior to use. Refer to product labels for specific handling recommendations.

Product labels will have stamped on them an expiration date. It is recommended to buy just enough inoculate for a single season. The safest approach is to buy fresh inoculate each year.

Once the carrier of the inoculate dries on the seed, the bacterial cell starts dying. Seed should be planted within four hours of inoculation. Bacteria cells do not remain alive on the seed longer than 12 to 24 hours.

When applying a fungicide or using fungicide treated seed, be sure the fungicide has dried before applying inoculate to the seed. Inoculate should NOT be mixed with fungicides and applied together.

When loading a drill or planter using an auger, inoculation materials (liquid or dry) should be added to the seed as it enters the auger for thorough application. When loading a drill or planter from bags, fill the seed box to a depth of three inches and scatter the appropriate amount of inoculate over the seed and mix it in thoroughly. Continue to add seed in six-inch deep layers, treating each until the seed box is filled. With some dry materials it may be desirable to slightly moisten seed to increase the adherence of inoculate. Individual seeds need no more than a three to five percent coating of dry material. Liquid materials will usually cover most of the seed.

What effects do inoculates have on seed metering? Once dry, liquids have little or no effect on the seed metering rates. Dry materials usually reduce the flow rate of seed through fluted seed metering devices (most grain drills) and may also have undesirable effects on vacuum and air metering systems. Seeding equipment should be calibrated using treated seed. Some seeding rate monitors allow a continuous check of seeding rates so adjustments can be made to the seeding rate if and when necessary.

Both fungicide seed treatments and inoculation can produce large returns relative to their cost and in most cases both should be used. Inoculates must be handled and applied properly to maintain their effectiveness. When only one can be used, the fungicide will likely be the more profitable.

*By Jim Beuerlein, Extension Soybean Specialist, Ohio State University Crop Observation and Recommendation Network*

**Uneven Stands In Corn - Some Possible Causes**

Uneven stands of corn are a common problem some years - often associated with fields where corn has been planted using reduced tillage or no-till. Fields that exhibit stand uniformity problems are characterized by tall and short corn, large within-row gaps, and groups of crowded plants. Lack of stand uniformity is a problem involving uneven seedling emergence
and within-row spacing of plants.

Variable seedbed soil moisture associated with uneven crop residue distribution and weather conditions is a major factor causing uneven corn emergence, whereas high planting speeds (in excess of 6 mph) and poor planter maintenance/adjustment are primarily responsible for uneven within-row plant spacing.

Uneven plant stands characterized by large within-row gaps of 4 to 6 feet can reduce grain yields up to 5%. About 1/4 pound of potential yield can be lost for every ear in a tight grouping of two or more plants. Uneven emergence can also have a major impact on potential yield even if within-row spacing is relatively uniform. If 1/2 or more of a stand is delayed two weeks in emerging, yield losses of 5 to 8% can be expected. If 1/2 or more of a stand is delayed in emerging three weeks or later, yield losses of 20% or more can occur.

Corn sometimes emerges unevenly because of environmental conditions beyond the control of growers. However, timely planter servicing and adjustment, as well as appropriate management practices, can help prevent many stand uniformity problems. The following are some tips for improving the uniformity of seed placement during planting.

1. Avoid excessive tillage trips and tilling wet soils.
2. Check seed depth and seed soil contact periodically during planting.
3. Distribute residues over row areas evenly.
4. Plant at speeds between 4 1/2 to 5 1/2 mph.
5. With plate-type planters, match the seed grade with the correct planter plate.
6. Planters with finger pick-ups should be checked for wear on the back plate and brush, use a feeler gauge to check tension on the fingers, then tighten them correctly.
7. Check for wear on double-disc openers and seed tubes.
8. Make sure the sprocket settings on the planter transmission are correct.
9. Check for worn chains, stiff chain links, and improper tire pressure.
10. Lubricate all chains and grease fittings.
11. Make sure seed drop tubes are clean and clear of any obstructions.
12. Clean seed tube sensors if you have a planter monitor.
13. Make sure coulters and disc openers are aligned properly.
14. With air planters, match the air pressure to the weight of the seed being planted.
15. Make sure press wheels are adjusted to close the seed slot.

By Peter Thomison, Extension Corn Specialist, Ohio State University Crop Observation and Recommendation Network

What Affects Emergence of Corn

After all of the investment that is made in land, equipment, labor and other inputs, it's frustrating when corn doesn't emerge as well as it should. Diagnosing emergence problems early helps to identify solutions and develop replanting plans. Corn should begin emerging after about 100 to 125 GDDs have accumulated following planting. This can be anywhere from one to three weeks after planting depending on the temperature. Here's a list of a few common things to look for if you encounter an emergence problem in corn this spring.

1) No seed present. May be due to planter malfunction or bird or rodent damage. The latter often will leave some evidence such as digging or seed or plant parts on the ground.
2) Coleoptile (shoot) unfurled underground. Could be due to premature exposure to light in cloudy soil, planting too deep, compaction or soil crusting, extended exposure to acetanilide herbicides under cool wet conditions, or may be due to extended cool wet conditions alone.
3) Seed with poorly developed radicle (root) or coleoptile. Coleoptile tip brown or yellow. Could be seed rots or seed with low vigor.
4) Seed swelled but not sprouted. Often poor seed-to-soil contact or shallow planting- seed swelled then dried out. Check seed furrow closure in no-till. Seed may also not be viable.
5) Skips associated with discolored and malformed seedlings. May be herbicide damage. Note depth of planting and herbicides applied compared with injury symptoms such as twisted roots, club roots, or purpure plants.
6) Seeds hollowed out. Seed corn maggot or wireworm. Look for evidence of the pest to confirm.

Note the patterns of poor emergence. At times they are associated with a particular row, spray width, hybrid, field or residue that may provide some additional clues to the cause. Often two or more stress factors interact to reduce emergence where the crop would have emerged well with just one present. Also, note the population and the variability of the seed spacing. This information will be valuable in the future.

By Greg Roth, Ohio State University Crop Observation and Recommendation Network
BLACK CUTWORM
Agrotis ipsilon (Hubner)

Description:
Larvae 1/4 to 2 in. long; greyish appearance; color varies from light grey to nearly black, with coarse granules. When disturbed, the larvae will curl up. Adults have dark forewings that are pale near the tips.

Time of Attack: Emergence to June (Corn Stages VE-V8); may occur when grassy weeds die from herbicides.

Damage: Leaf feeding, irregular holes, notched and cut plants (wiltting), and death of plants. Often (not always) in grassy areas, or areas with green, winter annual weeds.

BLACK CUTWORM INSTAR GUIDE

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<th>Body Length</th>
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<td>1/4&quot; to 1&quot;</td>
<td>2</td>
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<td>1/4&quot; to 3/4&quot;</td>
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<td>6</td>
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<tr>
<td>1/4&quot; to 1/2&quot;</td>
<td>7</td>
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</tbody>
</table>

WHITE GRUBS

Description: Larvae recognized by prominent longitudinal white stripes with "purple band" around middle segments of the abdomen.

Time of Attack: Emergence to July (Corn Stages VE-V12).

Damage: Irregular leaf feeding; larvae tunnel into the stalk, causing "dead heart," wilting, and death.

See also European corn borer, hopvine borer, potato stem borer.

SEED CORN MAGGOT
Delia platura (Meigen)

Description: Pale, yellow-white maggot found in seeds. Maggots lack visible heads and legs.

Time of Attack: Planting, early June (Corn Stages VE-V2).

Damage: Reduce stands by burrowing into seeds and destroying the germ, especially in heavily manured or trashy fields.

CORN ROOTWORM
Larva

Description: The corn rootworm complex in the Northeast consists primarily of two species, the northern corn rootworm (NCR) and the western corn rootworm (WCR). WCR populations cause more damage, so it is important to distinguish between the two. A third species, the southern corn rootworm, may be noticed but is typically not economically important in northeast field corn.

Rootworm Damage Scale
Severity Ratings, 1-6

1. No feeding damage
2. Visible feeding scars present
3. At least one root chewed to within 1/16 inches of plant
4. One entire node of roots destroyed
5. Two nodes destroyed
6. Three or more nodes destroyed

CORN ROOTWORM
Adults

Northern (Diabrotica barberi Smith & Lawrence) is about 1/4 in. long, entirely green, and usually a similar shade to a corn plant. (For a short time after emergence, it may be cream or green-tan.)

Western (Diabrotica virgifera virgifera LeConte) is about 5/16 in. long, black and yellow. On the back, the female has 3 black stripes and 2-4 yellow stripes; the male is almost solid black, with yellow showing at the tail and around the outside edges.

Southern corn rootworm (Diabrotica undecimpunctata Barberi) is robust, about 3/8 in. long, yellow to green in color with 11 black spots.

Time of Attack: Larvae: early summer. Adult beetles: when corn is tasselling and in silk.

(WIREWORMS
Melanotus spp., Agrotis maurus (Say), Limonius dubitans (LeConte)

Description: Slender, hard-bodied, wire-like larvae. Yellow to brown in color. Often build up in sod and damage first-year corn.

Time of Attack: Planting to June (Corn Stages VE-V8).

Damage: Wireworms feed on the seed or seedling, resulting in wilting and sometimes death of the plant. Cause gaps in the row.
Upcoming Crops, Pest, and other Educational Opportunities From Your Extension Service

February 24 - Kent County Agronomy Day, Kent Co. Ext. Office, 8:30 AM-3:30 PM
February 24 - Kent County Crops Discussion Group, Kent Co. Extension Office, 7-9 PM
February 25 - Governors Conference on Agriculture, Dover Sheraton, 7:15 AM - 2:00 PM
February 28 - Tour to David Fink’s Hay Operation in Allentown PA. Call for Information
February 28 - What the DE Nutrient Management Law will Mean For Poultry Producers and Poultry Manure Users, Messick Community Center, Harrington 7:30 PM
February 29 - Developing a Crop Record System Using MSExcel or MSAccess, KC Ext. Office, 1-3 PM and 7-9 PM
March 2 - Introduction to the Internet for Farmers and Ag. Businesses. KC Ext. Office 1-4 PM.
March 3 - Rescheduled DE Pesticide Conference, Modern Maturity Center, Dover
March 6 - Marketing Breakfast, Harrington Area (place to be announced) 7:30 AM
March 6 - Developing a Web Site for your Farm, KC Ext. Office, 6-9 PM
March 7 - Introduction to Organic Farming, Kent Co. Ext. Office, 6-9 PM
March 8 - Managing Labor On Your Farm, Breakfast Meeting, Place to be announced
March 11 - Planter and drill clinic, place to be announced
March 13 - Principles of scouting/pest control decisions for field crop producers, KC Ext. Office, 6-9 PM
March 14 - Organic field crop production meeting, Kent Co. Ext. Office, 6-9 PM
March 18 - Sprayer calibration clinic, place to be announced
March 20 - Entrepreneurship for Farmers, KC Ext. Office, 6-9 PM
March 21 - Organic vegetable, fruit and herb production, KC Ext. Office, 6-9 PM
March 23 - Cash flow planning for your farming business, KC Ext. Office, 6-9 PM
March 28 - Organic poultry and livestock production, KC Ext. Office, 6-9 PM
March 29 - Crops discussion group, time and place to be announced
March 30 - Principles of scouting/pest control decisions for vegetable crop producers, KC Ext. Office, 6-9 PM