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Kansas Insect Newsletter

For Agribusinesses, Applicators, Consultants, and Extension Personnel

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March 17, 2006 No. 1

Corn Planting and Insect Management:

A number of insect-related issues should be considered while producers make preparations for corn planting this spring. Think about the characteristics of the fields you are going to plant, your equipment options, and the insects themselves – things like life cycles, where/when they occur, the effects of various cultural practices including rotations, whether the field has a history of problems, and so on. Many of these traits are intertwined and can have an effect on pest management decision-making.

Anticipating Corn Insect Occurrence

For the most part, much of Kansas experienced an unusually mild winter. What does this mean for corn insect pests in 2006? Populations of most below-ground insects, like wireworms and white grubs, were probably not greatly affected.

Cutworms fly into Kansas as egg-laying adults from other more southern regions so local problems in Kansas depend on whether a large source population invades the state. Even then, females still must find conditions suitable for egg laying and survival of young larvae. Weed cover at/before planting has the potential to encourage an increase in cutworms in some locations because of their attractiveness to egg-laying female cutworm moths. But remember, moths must actually move through the area and find the field before eggs will be laid on those sites. If this happens and large numbers of cutworms start feeding on the weeds, problems in the crop could develop particularly if a tillage operation or a burn-down herbicide eliminates their weedy food source before they have finished feeding.

Flea beetle adults overwinter in grassy or brushy areas. Survival depends on winter conditions including prevailing temperatures so watch for these insects, paying particular attention to the earliest emerging corn in the area. However, unusually high densities of flea beetles were not present last fall when they were moving into protected overwintering sites.

Spider mites overwinter in vegetation, brome, sometimes in alfalfa and other cover crops. A mild winter could mean larger numbers at the start of the season but many factors can interfere with the development of economically important populations several weeks or months later. Seasonal conditions and mite predators will help determine the seriousness of future populations.

European corn borers overwintered as large larvae inside stalks of non-Bt corn. A great deal of field-to-field movement and mixing of the population takes place after adults emerge. It is possible that storms during mating and egg laying may influence significance of future problems more than their relative success in surviving the winter.

One possible issue involves southwestern corn borer (SWCB) in NC/NE Kansas. Traditionally, this pest is much more of a problem in the sandy country south of Great Bend and in some southwestern counties. However, reports last fall and winter indicated that good numbers had, in fact, been present in some non-Bt corn fields (including some refuge and white corn sites) growing within Clay, Jewell, Osborne, Republic, and Marshall Counties. Close inspection of lodged corn plants revealed that non-Bt cornstalks had been extensively tunneled in a few locations. This might be a year to keep an eye on this pest in the NC and NE part of the state. Now is a good time to evaluate whether the winter was harsh enough to kill SWCB larvae that tried to overwinter outside their traditional range. Split a number of stalk bases from plants that had been girdled and determine if the large whitish larva inside survived the winter. Even if the SWCB larvae are still alive and eventually produce adult moths, they may or may not develop into a problem within nearby fields during mid-summer. If, as in most years following a fall problem in the north, the local larvae do not survive, the species will need to reinvade northern counties to be an economically important problem for corn growers.

In addition to being concerned about what happened to some pest species, it is important to realize that beneficial insects probably survived the winter in higher numbers than is typical. This is something that we do not talk about very often, but in terms of pest suppression it can be a very important factor.

Cultural practices such as rotations can also influence the complex of insect pest problems that are expected to be of concern in this year’s corn fields. If corn is planted after a non-corn crop, rootworms should not be a problem but other groups of pests still can be of concern. Rootworms lay eggs in soil during late summer/ fall, and in Kansas they prefer to lay their eggs in existing corn fields. When a grower rotates to another crop, rootworm larvae emerging from eggs laid in last year’s corn ground should starve because suitable food sources are unavailable. Fortunately, Kansas does not have the variant that preferentially lays a large proportion of eggs in nearby soybean or other non-corn fields. That problem occurs in some eastern and northern U.S. corn production regions and growers there may be treating for rootworms every year, regardless of their rotation scheme. Wireworms and grubs seem to be more of a problem when corn follows some type of grass or sod.

Where corn after corn planting is practiced, rootworm protection of some type may be justified unless – (1) the field was scouted last year and low levels of rootworm adults were present in the field which means there was low egg laying potential and that sub-economic populations of larvae will be present. (2) Moderate to high adult populations existed last year but timely adult control treatment(s) were applied to

suppress egg laying and frequent sampling through the end of the egg laying period showed the population did not rebound through immigration from surrounding fields. Again, the inference is that not enough eggs were laid in the field to justify the need for some type of rootworm control measure during the upcoming season.

Help in Assessing Insecticide Performance

To help sort out insecticide performance issues, farmers are encouraged to go to K-State field days, winter schools, read our newsletters, publications, and check for updates posted on the university website. K-State field crop entomologists regularly conduct unbiased efficacy evaluations of registered and experimental products at various locations throughout Kansas. Experiments involve several insecticides, pests, and crop combinations. Reports from these trials provide valuable information on specific insecticides and include data on location of the experiment, pest population pressure, time and method of evaluation, formulations tested, and include a data table summarizing how well the products performed. Many of these reports are archived on the web and can be retrieved for review. For instance, data on corn insecticide efficacy trials have been collected against chinch bugs, rootworms, cutworms, flea beetles, grubs, wireworms, and other pest species. Go to http://www.entomology.ksu.edu , choose the Extension link on the left hand side of the screen by clicking on it, then click on the Efficacy Trials link on the menu that appears – then select the crop and pest of interest. Check out this site to see if locally collected performance information has been posted.

These are very useful experiments that give us additional credibility with our clientele. Realize, however, that it can be difficult to find the kind of insect pressure that makes for a good local test. Insects do not necessarily show up in high numbers on K-State research farms or one of our field stations where we have the ability to manage the site for research purposes. The public at large can help us identify locations where unusual pest problems are encountered. Occasionally, someone calls us with a problem that stumps them and we have the opportunity to cultivate a new cooperator who is willing and sometimes eager for us to conduct research on an insect species that has stymied him or her, sometimes for years. Examples have included billbugs, southern corn leaf beetles, even millipedes, and a host of odd problems. If the call comes in when one of our researchers is looking for a site to evaluate a range of standard or experimental products, we may be able to collect data that could help many more people during future years.

Seed Treatments and Corn Insect Pest Management

The use of a seed treatment insecticide is generally a good investment during most years. They function as relatively cheap insurance against certain soil insect pests. Recommendations have emphasized that the need is generally greater in years when cooler soils persist because germination and emergence is delayed, making the seed more vulnerable to attack from wireworms, seed corn beetles, seed corn maggots, etc. Available options include formulations that are mixed with the seed when or immediately after it is poured into the seed hopper or (more commonly) buying seed corn that has been specially treated with a commercially applied seed treatment such as Cruiser, Poncho, or Regent TS. One selling-point for the commercially applied products is that planting is not slowed down by time required to make in-field applications.

Current labels for some commercially applied products list an impressive number of below- ground and some early season above-ground pests for which control is claimed. Since only a small amount of insecticide was put on the seed, it must move or translocate in a systemic fashion to get to where above-ground pests are exposed to it. That characteristic is particularly valuable when the objective, in addition to seed protection, also involves controlling flea beetles and some other above-ground pests. I can remember viewing some of the early trials on these products with other entomologists and being amazed at the large numbers of dead flea beetles that were present around the bases of corn plants developing from seed treated with a systemic insecticide.

Some seed treatments, including Poncho and Cruiser, have 2 labeled rates – a low rate for non-rootworm pests and a high rate that is intended to help suppress damage from rootworm larvae. However, the experimental data do not show consistently high performance of seed treatments against rootworms, particularly when moderate to heavy rootworm populations develop. That distinction is important because it is difficult to predict what level of rootworm pressure will develop if frequent field scouting did not occur last year when adults were laying eggs in the field. Experiments conducted at many locations show that while the efficacy of these products against several other pests can be outstanding, the seed treatments do not seem to suppress rootworms in a consistent fashion. Then again, trials have been conducted where they occasionally provide good to excellent rootworm protection. Again, caution is advised and we are not recommending that producers rely exclusively on seed treatments for rootworm suppression where heavy pressure is expected since their performance against this pest group has not been consistently high.

Questions occasionally arise about whether yield enhancement occurs when insects are not present and seed treatments are employed. Dr. Gerald Wilde in our Department has conducted a series of trials on this subject at several sites around the state. Likewise, entomologists in several other states are pursuing a related series of trials designed to provide an unequivocal answer to this often-asked question. The data suggest that yield boosts are not consistently observed following the use of a seed treatment insecticide or, for that matter, a planting-time treatment in the absence of some type of insect pressure. The take-home message is that pesticides prevent yield loss, they do not create yield beyond the potential that exists in the hybrid's genetics.

How does BT Corn Factor In?

What about the Bt corn borer, Bt rootworm, or stacked insect protection trait hybrids? Is the producer finished with insect management for the year if corn with one of these genetic backgrounds is planted? First of all, corn borer-active BT corn hybrids have worked outstandingly well in terms of providing protection from stalk tunneling and ear droppage caused by European and southwestern corn borer. The rootworm BT corn hybrids have worked very well thus far in terms of protecting corn roots from western corn rootworm damage in our trials. Stacks of both traits work against a combination of borers and rootworms. Realize that BT corn borer and BT rootworm corn hybrids are vulnerable to wireworms, white grubs, seed corn maggots, and flea beetles if they are not protected with a seed treatment or planting time insecticide. Check the activity spectrum of the seed treatment provided to verify that you have the protection you desire.

Corn producers who planted a BT corn hybrid effective against either corn borers or rootworms last year often ask if they can skip using control this year so that the money that would otherwise go into paying the

technology fee or purchasing a traditional insecticide could be saved? The simplest answer is that last year has little to no relation to the size of this year's corn borer problem because the adults move so much before laying eggs. While there is less information for rootworms on this question, the data that are available tend to suggest that there is still a need for rootworm protection in subsequent years in many fields planted back to corn. Remember that the rootworm-active BT corn hybrids registered for commercial sale do not kill all rootworm larvae. Plus, the available hybrids have no effect on rootworm adults that may enter the field to lay eggs. So, do not expect carryover protection that conveys a high level of rootworm benefit during the next season. To estimate next year's risk in a given field, scout for egg laying rootworm adults the year before.

Currently registered BT corn borer hybrids give some suppression of corn earworms. This can be an important benefit during years when heavy earworm flights occur. This protection is not needed every year but when many earworm moths are laying eggs on the silks at the tips of non-BT corn ears, a number of kernels at the tips of the ears of these unprotected corn hybrids can be lost. Herculex I and Herculex XTRA hybrids also protect against early season damage from black cutworm and reproductive season injury from the western bean cutworm.

BT Corn and Refuges

One of the biggest planting time considerations when growing BT corn of any type is the need to follow the legal requirements set by EPA to ensure that valid refuges are established. Refuges must be planted to non-BT corn so that a population of BT naïve insects is produced. The goal is to provide susceptible mates for resistant insects, effectively minimizing resistant x resistant mating within the pest population. This strategy should slow the increase of resistant genes in the population. The outcome should be greater likelihood that this remarkable pest control technology will remain effective for many years.

In Kansas, no more than 80% of the corn acres that a grower has can be planted to hybrids with BT technology during any year – 20% must be devoted to non-BT hybrids. Rootworm refuges must be located within the BT cornfield or immediately adjacent to it – not up to ½ mile away as is permitted with corn borer refuges. Differences in refuge design requirements reflect differences in life cycles, specifically movement and mating habits. Borers move before mating and laying eggs, whereas rootworm females are mated soon after they emerge from the soil. Remember that your neighbor's fields cannot serve as your refuge. You also cannot plant your rootworm refuge on ground that was in soybeans, sorghum, or another non-corn crop last year if you plant the BT rootworm corn on corn ground. The purpose of the refuge is to produce some rootworm adults. Placing the non-BT corn on rotated ground does not qualify as a valid refuge because that site would not produce rootworm beetles. The refuge corn should be planted at the same time as the BT corn and managed in a similar manner. These details are spelled out in the literature that should have been distributed during the purchase of the trait-enhanced hybrid and those instructions are generally repeated somewhere on the seed bag or seed tag. If a stack of rootworm and corn borer traits is employed, there are two options to consider, common or separate refuges. Refer to company literature for an explanation of differences in those refuge designs.

Everyone who takes possession of BT corn in this country must abide by the relevant resistance management rules. Draw a map and label all fields, rotation history, and distances from one another to see if

mandatory requirements will be met before planting takes place. Compliance checks are being conducted. If asked by appropriately authorized personnel you must show where your BT and refuge corn is planted as specified in the grower agreement that each company provides under EPA registration rules. Beyond all of the legal reasons that can be cited, responsible users of the technology should want to do their part to be good stewards of BT corn as a pest management tool so the benefits will remain available for many years to come.

How to Manage Rootworms in Refuges?

Options for protecting the non-BT refuge corn (without rootworm active genetics) from rootworm damage involve using a traditional planting time insecticide treatment or possibly the higher registered rates of commercially applied systemic seed treatments that claim to provide some rootworm suppression. Note that insecticide sprays that target adult beetles in the rootworm refuge corn are prohibited unless the entire field is treated. Few people would want to treat the entire field since extra money was spent to acquire trait-enhanced corn that kills rootworm larvae in order to avoid the need to use other means of suppressing rootworms on the majority of the field.

Rootworm Management Without Transgenic Corn

Rotation, as mentioned earlier, still works very well in Kansas as a means of preventing damage to corn from rootworms. If damage to first-year corn from rootworms is suspected, contact a K-State field crop entomologist. At some point, the western corn rootworm variant that lays eggs in non-corn crops may enter the state, but to our knowledge, that has not yet happened.

Traditional planting time insecticides can be effective in controlling rootworms and other soil insects field-wide if the producer is not interested in planting a rootworm-active BT corn hybrid while continuing to plant corn after corn in areas where rootworms are a threat. Relevant management considerations include making insecticide treatments in a manner that optimizes their performance. For rootworm control, applications are frequently made as a band or T-band with some type of following incorporation tool. It is fairly straightforward to imagine a product leaching down from where it contacts the ground into the rootworm active zone as a curtain or wave that protects a significant portion of the plant root mass. If high cross winds are present during planting, it may be wise to construct some type of wind shield to prevent a banded or T-banded product from being blown off the row.

Placement can also influence how other insects are affected. For instance, control of wireworms or grubs has frequently been improved when recommended and labeled products are applied in-furrow if there are no phytotoxicity concerns that might result in crop injury if the seed and insecticide contact one another. Performance can also decline if excessively dry conditions persist or very wet soils develop after application or if corn is planted very early. Very early planting may lessen control because microbial degradation is a naturally occurring process. With excessive rainfall, it may be possible for very soluble products to leach through the area where rootworms will be feeding.

Take necessary and prudent precautions when changing products. Always recalibrate when switching

planting-time products because concentration may vary and flow rates can be quite different. The user is responsible for ensuring that label requirements are followed. Check for wear on equipment and replace worn parts. Make sure that insecticide delivery tubes are positioned correctly and are not excessively curved, plugged, or brittle.

As corn growers have moved to earlier planting dates it can become more challenging to maintain protection from rootworms with traditional planting time insecticides. When corn planting occurs in late March or early April, eight to 10 weeks may pass between the planting date and the time that rootworm egg hatch occurs. This separation can occur because rootworm egg hatch generally gets started somewhere around mid-May and continues through mid-June, though with unseasonably warm temperatures it may start earlier. Many planting-time soil insecticides provide 4 to 6 weeks or somewhat longer terms of protection against corn rootworm larvae, so early planting can result in less rootworm suppression than may be desired - but the length of protection provided depends on the situation and a variety of interacting factors. If this becomes a concern, it may cause some growers to try some of the rootworm-active BT corn hybrids that are available or will soon enter the marketplace. The gene or genes that provide protection from feeding by rootworm larvae are part of the corn plant machinery and they cause the plant to make rootworm-active toxin for an extended interval that is supposed to last through the rootworm feeding interval.

Obviously, there is a lot to consider in terms of insect management decisions as growers get further into the swing of gearing up for corn planting. Fortunately, many of these pest management tools work quite well. Refer to the K-State 2006 Corn Insect Management Recommendations and the Extension Entomology website for more information.

---- Randy Higgins

Alfalfa Weevil:

Reports and sampling during the week of 13 Mar indicate alfalfa weevil eggs are hatching and small larvae are feeding in the terminals of plants in some parts of the state. This is somewhat earlier than "normal" and is probably a result of eggs laid last fall or early winter surviving cold periods in good numbers. Evidence of feeding by these small larvae is apparent but the terminals need to be very closely inspected as the leaves will probably only show pinhole size damage. As larvae grow and feeding progresses, the damage will become even more readily apparent. When the weather warms back into the 50+ degree range alfalfa growers need to monitor these fields very closely as the surviving larvae will resume feeding and additional eggs will hatch, potentially creating a situation in which weevil feeding may continue for an extended period of time.

We do not recommend treating alfalfa weevils until the weather is projected to be +50 degrees for a few days as freezing temperatures with freezing precipitation may impact the plants and/or the alfalfa weevil populations. Thus, the situation found before the cold weather passes through the area may be totally different from what is present when warmer conditions return. But, be aware, weevils are starting to feed, at least south of Interstate 70, and will probably be hatching and feeding north of I-70 shortly after the return of warm weather.

A specialist from Oklahoma previously reported finding lots of aphids in the alfalfa of that state. Do not forget about that pest group when scouting for weevils.

For treatment thresholds and insecticide recommendations please consult your local County Extension Office or refer to the publication Alfalfa Insect Management 2006 (MF809). This document also can be retrieved electronically by searching for it at http://www.entomology.ksu.edu .

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Sincerely,

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