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Virginia Soybean Update

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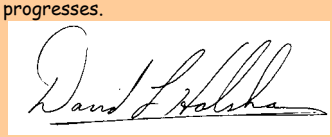
Dear Reader,

Fungicide and insecticide seed treatments are the focus of this newsletter. The value of fungicide seed treatments have always been know. In cool soils and early plantings, they have proven their worth. Less is know about the benefit of the new soil insecticides. In fields with insect problems, they might show an advantage. But, like fungicides, these insecticides should not be your first line of defense. Good agronomic practices and rotation can be your best defense.

Planting will soon be upon us. Prices are still good. It looks as the Midwest and Delta states will dramatically increase their corn acreage. So the sharp reduction in bean acres should keep the price up; at least until Brazil responds.

We will again carry out the Virginia Soybean Aphid and Rust Monitoring Program. We feel confident that we can detect either pest early and yield losses should not occur.

As always, be safe as the season progresses.



Extension Soybean Specialist

In This Issue

Seed Treatments Have a Place in Soybean Production

Planting soybean into cool and wet soils is a recipe for seedling disease problems. Sometimes, one may never notice that there is a problem. Other times, certain areas of the field could be almost wiped out. Or, the field in general is just not growing the way it should.

Some of our most notable seeding diseases include: fusarium root rot, phytophthora rot, pythium damping-off and root rot, and rhizoctonia damping off and root rot. Of these, fusarium and rhizoctonia are the most common in Virginia. Some can be managed with fungicide seed treatments; some cannot.

Certain insect pests can also cause problems to seedling soybeans. Thrips or leafhoppers can stunt growth when in high numbers on drought-stressed plants. Bean leaf beetle seem to feed on young plants every year, and can transmit viruses. Some companies are promoting insecticide seed treatments to help manage soybean aphid. Other soil insect problems include seed-corn maggot, wireworm, grub, and slugs.

Seed treatments are becoming more and more popular in all crops. And there are good reasons such as lower use rates, less direct contact with toxic chemicals, and ease of use versus soil treatments. Fungicide seed treatments are sold under various brand names, but usually include one or more of the following active ingredients: captan, thiram, thiabendazole, carboxin, PCNB, metalaxyl, mefenoxam, fludioxonil, oxadixyl, cloroneb, or azoxystrobin. What are relatively new to the market are insecticide seed treatments. Currently there are basically two active ingredients available: thiamethoxam (Cruiser) and imidacloprid (Gaucho).

In this issue, we'll be exploring some of the disease and insect pests that could be causing early-season problems in soybeans. We'll start with an overview of individual pests and describe their potential damage. Then later, we'll talk about the potential benefits, if there are any, to applying one of the seed treatments currently available. First, let's review the seedling diseases.

Fungal Seedling Diseases

David Holshouser, Extension Agronomist Pat Phipps, Extension Plant Pathologist;

Rhizoctonia Damping Off and Root Rot. Rhizoctonia root rot is probably the most common soilborne disease in Virginia soybeans. Even if other diseases pre-dominate in a diseased plant, rhizoctonia could easily be a component of the problem.

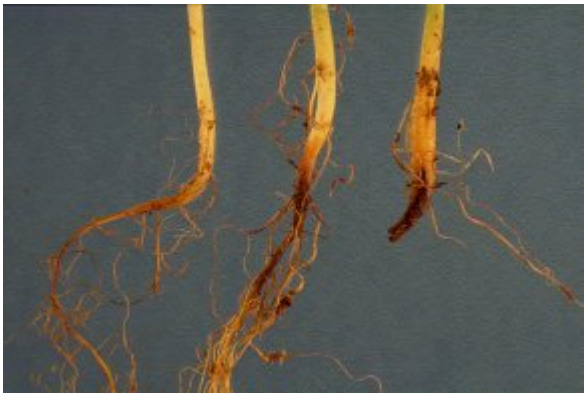
Preemergence symptoms are typical of common seed rots, but are not usually recognized just because these plants never emerge. More recognizable is the damping off that occurs in the seedling stage. This will usually occur before the first trifoliate leaf develops. Infected plants will have a reddish brown lesion on the emerged shoot at the soil line. This lesion is most visible after the seedling is removed from the soil.

Matt Montgomery, Sangamon-Menard Extension

Resistance to rhizoctonia is not available; variations in variety tolerance have been reported though. Stresses such as herbicide injury, poor soils, insect damage, and feeding by soybean cyst nematode will increase damage. Fungicide seed treatments are effective.

Fusarium Root Rot. Fusarium is another common disease in Virginia. It is one of the diseases that has been implicated in "Essex Syndrome" that we continue to battle in some parts of Virginia. There are several species of fusarium and each can cause a different plant reaction and/or disease.

Two of the species, *F. oxysporum* and *F. solani* can cause root rot. The root rot caused by *F. oxysporum* usually develops on seedlings and young plants during cool weather (<60^{o} soil temperatures). Older plants are generally less susceptible than younger ones. Seedlings will emerge very slow and the resulting seedlings are stunted and generally unhealthy. Symptoms are usually found confined to the roots and lower stems.



F. solani causes preemergence damping-off and root rot. Damping off after the seedlings emerge is less of a problem, but can occur. Lesions are generally on the roots and are dark brown to reddish brown to black. Lesions can also occur on the young stem.

This disease is common in nematode-infested fields. Soybean cyst, root knot, and sting nematodes will predispose seedlings. Soybeans growing in soybean cyst nematode-infested fields will frequently develop fusarium symptoms. This is less likely in root knot infested fields because the injury to the plant from root knot nematode is limited to the root tip. In contrast, larvae of soybean cyst nematode migrate within the cells and cause more wounding. In addition, *F. oxysporum* often interacts with rhizoctonia.

There is some variety resistance to the disease, but this information is not always published in the company literature. Warm soils that are well-drained are helpful in managing the disease. Good soil fertility should be maintained and soil compaction avoided. Fungicide seed treatments provide some, but limited control.

Pythium Damping-Off and Root Rot. There are many different species of pythium and the dominant species that is present will vary from geographical region to region, usually depending on temperature. Pythium will cause pre- and postemergence damping-off during the young seedling stages. It can also cause a root rot in later vegetative stages. Seedlings may fail to emerge and will have a short, discolored root. After emergence, symptoms can resemble those of other seedling diseases, especially fusarium and phytophthora. The disease begins as water-soaked lesions on the young stem or on the cotyledons (seed leaves), and then followed by brown soft rot.

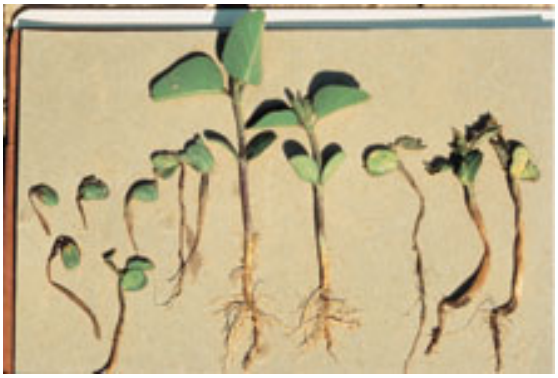
Variety resistance to pythium is not available, but fungicide seed treatments containing metalaxyl, mefenoxam, or oxadixyl will control the disease. The best way to avoid the disease is to avoid planting into cool soils (<60^{o}F).

Phytophthora Root Rot. Of all the seedling disease that you may have heard about, phytophthora is probably the one that you hear and read about most. It is a serious problem in the Midwest and affects young seedlings and older plants. Many of our varieties that we grow in Virginia have varying levels of resistance to multiple races of phytophthora. Yet, most of you have probably never had the disease. Why is that?

Phytophthora rot is most severe in poorly drained clay soils that are readily flooded. Most of our soils are sandy in nature, or if a clay, are well-drained. This doesn't mean you can't have the problem, just that it is less likely. Plant loss can occur in lighter soils or on well-drained soils if they are saturated for an extended period of time when the plants are young.

Symptoms are the typical root rot and pre- and postemergence damping off. The disease is often not diagnosed because it is confused with flooding damage.

Root and stem rots occurring later in the season will occur under similar, saturated conditions. Tolerant cultivars may escape damage. Damage does increase with reduced tillage, especially no-till, mainly because those fields absorb more rainfall and can be more easily saturated if the field is poorly drained. Like most diseases, continuous soybean will increase likelihood of infection and damage.



Race-specific varieties are used to manage this disease. So, if you have this disease, it will be necessary to know which race you have. Metalaxyl and mefenoxam can be used as a seed treatment to control the seedling phase of the disease. Fungicides are more effective when used with resistant or tolerant varieties. Interestingly, very early planting, when the soil temperatures are below 60°F, may help the soybean crop avoid the disease. But, this increases your chances of infection by another disease.

Phomopsis Seed Decay and Purple Seed Stain. These are diseases that we generally worry more about after the crop matures and at harvest. They cause seed quality deterioration. But, planting infected seed can cause damping off, slow emergence, and poor growth. Severely infected seed are of poor quality and do not provide the energy needed for adequate growth. Slow emergence will also increase the likelihood of another disease attacking the seedling. So, if you have seed you suspect of being infected with phomopsis seed decay or purple seed stain, beware.

Controlling Seedling Disease

Pat Phipps, Extension Plant Pathologist
David Holshouser, Extension Agronomist

Fungicide seed treatments can be of much value in soybean production. However, good agronomic practices are the first line of defense. Know the cool/warm germination rate for the seed and plant at the proper depth and conditions that favor rapid germination and emergence. Only when planting seed with germination below 75% or into unfavorable conditions are seed treatments the primary line of defense.

Generally, if you rotating the soybean crop regularly, using good quality seed, and are not planting early (April to mid May), you won't need a seed treatment. Many growers will ask "What is earliest date that I can plant without a seed treatment?" We will not answer that question, unless our answer begins with "It depends" and growers rarely want to hear those words. But, it does depend. We would like to say that after mid-May, a fungicide is not needed. But, some of the worst stands that we've experience (due to seedling disease) were from fields planted in late May. These fields almost always experienced a cold rain within a day or two after planting that dropped the soil temperatures to below 65°F for a few days afterwards.

Keep in mind that soybean germination and emergence will be slowed with soil temperatures are below 65°F. They will germinate and emerge, but it could take 2 to 3 weeks. Also remember that one or more of the fungal pathogens described in the previous article are in our soils. The longer a swelled or germinated seed remains in the soil un-emerged, the more likely it will be attacked by disease. Also keep in mind that non-rotated fields will have higher risk of disease than fields in rotation with other crops. So, planting good quality seed into rotated, warm soils is a primary line of defense.

Listed below are some other good management practices:

1. Check the warm germination on all seed. Seed having a warm germination level below 70% should be exchanged for better seed. Plant your best seed (85% or higher) in early plantings that may be subjected to soil temperatures below 70F, and follow with lower germ seed in plantings that are made in later full season plantings and double crop plantings when soils temperatures are warmer (75F or above). Seed with germination levels below 75% should be re-cleaned and retested with the hope of removing poor quality seed.

2. Depth of planting is important and needs to be about 0.75 to 1 in. and into sufficient moisture for seed to swell and germinate. Sometimes 0.5 inches is deep enough for no-till soils, which generally have better at-planting soil moisture. Planting deeper is risky, especially if heavy rainfall follows and creates a hard crust that hampers seedling emergence. Quick emergence is a key to avoiding seedling disease.
3. Soybean should be planted in soils that are 65F or warmer, and the forecast calls for stable or warmer temperatures over the next 7 days. A good source of medium range forecasts can be obtained at www.weather.com. Be sure to enter your location to obtain the regional forecast for your area. More often than not, forecasts are good up to 3 days out, then accuracy of timing is off up to 10 days. Temperature forecasts are more accurate than rainfall forecasts.
4. Seed with germination levels between 70 and 85% germination may benefit from application of a seed treatment, especially if planted in soils with high moisture and temperatures below 70F during the period of 5 to 7 days before emergence. Read and follow label directions on seed treatments before planting.
5. An important factor in achieving a good stand is to plant in periods that soybeans are like to emerge quickly (i.e. warm, moist soil, and proper depth). The warm germ of seed is also an important determinant since it directly relates to the vigor of germlings in soil.

Below are recommendations for the Virginia Cooperative Extension Pest Management Guide for fungicide seed treatments.

Disease	Fungicide Common Name	Fungicide Trade Name	Remarks
Seed decay, damping-off, and seedling blights	captan thiram captan + thiabendazole	Sold under a wide variety of trade names.	Apply seed treatments as a slurry or by commercial mist method. Consult label for rates and precautions. Some formulations are sold as a pour on or planter box treatment. Do not use treated seed for food, feed, or oil.
Seed and seedling diseases including those caused by *Rhizoctonia* and *Fusarium* spp.	carboxin + thiram carboxin + captan carboxin + PCNB PCNB	Vitavax CT, etc. Vitavax DC, etc. Vitavax PCNB PCNB	Do not use treated seed for food, fee, or oil. Do not graze or feed livestock forage and hay. Consult label for rates and precautions.
Pythium spp., damping-off and early-season *Phytophthora* spp. root rot	metalaxyl	Apron 50W Allegiance	Apply as slurry treatment (0.5 to 1.0 fl oz/100 lbs of seed). May be combined with other registered seed treatment fungicides. Do not use treated seed for food, feed, or oil.
	mefenoxam	Apron XL LS	Can be applied as a planter box treatment either alone or in combination at the rate of 0.32-0.64 fl oz/100 lbs seed. Do not use treated seed for food, feed, or oil.
	Oxadixyl	Anchor FL	Apply as a seed treatment at a rate of 1.5-2.25 fl oz/100 lbs seed using a mist-type commercial seed treater.
Pythium spp., *Rhizoctonia solani*, and *Sclerotium rolfsii*	cloroneb carboxin + PCNB	Chloroneb 65W Various other Vitavax-PCNB	Apply as a planter-box treatment on seed, or with a commercial seed treater. Consult label for rates and precautions. Do not use treated seed for food, feed, or oil.
Pythium spp., *Fusarium* spp. *Rhizoctonia solani*, early-season *Phytophthora* spp.	mefenoxam + fludioxonil azoxystrobin + metalaxyl	Apron Maxx RFC Apron Maxx RTA SoyGard	RFC=”rhizobia-friendly concentrate RTA=”ready-to-apply” on-site treatment. Consult label for rates and precautions. Do not use treated seed for food, feed, or oil.

Replicated On-Farm Soybean Fungicide Seed Treatment Test Results

Year	Location	Agent Conducting Test	Seed Treatment	Yield*
2001	Essex Co.	Keith Balderson	Check	58.6 a
			Stiletto	59.5 a
2001	Middlesex Co.	David Moore	Check	54.0 a
			Stiletto	58.2 a
2002	Northumberland Co.	Bob Pitman	Check	40.0 a
			Apron	36.4 b
2002	Northumberland Co,	Bob Pitman	Check	29.3 b
			Stiletto	34.1 a
2002	Essex Co.	Keith Balderson	Check	24.5 a
			Stiletto	24.0 a
2002	Essex Co.	Keith Balderson	Check	21.8
			Apron Max	21.5
2003	Suffolk	David Holshouser	Check	43.6 b
			Bean Guard	44.7 b
			RTU-Vitavax-Thiram	43.8 b
			Stiletto	49.4 a
2003	Richmond Co.	David Holshouser	Check	47.8 b
		Bob Pitman	RTU-Vitavax-Thiram	66.4 a
			Stiletto	62.6 a
2003	Prince George Co.	Glenn Chappell	Check	35.1 a
			Bean Guard	37.1 a
			Stiletto	35.6 a
2003	Prince George	Glenn Chappell	Check	41.6 b
			Apron Maxx	47.2 ab
			Stiletto	52.9 a
2003	Middlesex Co.	David Moore	Check	43.5 a
			Bean Guard	41.1 a
			Stiletto	38.0 a
2003	Middlesex Co.	David Moore	Check	46.2 b
			Apron Maxx	48.3 ab
			Stiletto	48.8 a
2003	Essex Co.	Keith Balderson	Check	54.4 a
			Vitavax-Thiram	56.5 a
			Stiletto	55.4 a
			Apron Maxx	57.4 a

Apron = metalaxyl; Apron Maxx = mefenoxam + fludioxomil; Stiletto = thiram + carboxin + metalaxyl; Bean Guard = captan + thiram; Vitavax-Thiram = carboxin + thiram.

*Means followed by the same letter are not significantly different.

Early-Season Insect Pests

Ames Herbert, Extension Entomologist
David Holshouser, Extension Agronomist

Potato Leafhopper. This insect overwinters in gulf-coast states and migrates northward each year, typically arriving in Virginia between late April and early June. Adults and nymphs injure the plant by inserting their piercing-sucking mouthparts into plant tissue and removing liquids. High populations can result in visual injury (cupping of leaves) and under drought conditions, can stunt growth, Injury is more severe on varieties with little leaf pubescence. But, the injury will not necessarily result in yield loss. Very dry conditions will increase injury and likelihood of yield loss. The insect can be controlled with pyrethroid insecticides.

Soybean Thrips. Thrips may be the most abundant insect pest species on soybean. But, the feeding alone will not usually cause yield reduction. Under favorable environments, soybean will outgrow thrips damage. However, if high numbers of thrips coincide with droughty conditions early in the season (seedling plants), then growth can be severely stunted and yield loss might occur. Thrips feed by rupturing the cell walls of leaf cells and sucking the exudates. Leaves will take on a silvery appearance from thrips feeding. The insect can be controlled with insecticides from several chemical classes. Early-season control can be obtained with insecticide seed treatments.

Bean Leaf Beetle. Bean leaf beetle is a common pest through all soybean production areas and has become more of a concern in the Midwest in recent years. These beetles are defoliating insects, whose injury is easily recognized by small round holds between major leaflet veins. The insect can also feed on the surface of soybean pods, leaving the seed vulnerable to excess moisture and secondary pathogens. The insect can feed all year, but most concern is during the early vegetative stages. However, soybean can normally grow out of this injury, without yield loss. This insect can transmit the virus, bean pod mottle virus. However, viruses have not traditionally been a problem in soybean. There is resistance and/or tolerance in many varieties. However, we suspect that some newer varieties have less tolerance. The insect can be controlled with insecticides from several chemical classes.

Soybean Aphid. Soybean aphid is a relatively new pest, first discovered in Virginia in 2001. It feeds by sucking plant sap, which can cause leaf curling and plant stunting and pod abortion. At high levels, yield can be seriously reduced. While an early-season pest in the Great Lake states, it has never occurred in Virginia before July, and rarely before August. In addition, it only reaches threshold levels on relatively few acres in Virginia each year. We only mention this pest here because some companies are promoting early-season control of aphid with soil insecticides. Although soil insecticides may provide some control to seedling soybeans, this is not an issue in Virginia. Management of this pest depends on regular scouting and applying insecticides when threshold levels are reached (250 aphids/plant before R5).

White Grubs. With less tillage and more residue buildup on our soils, grubs have become more of a concern. White grub damages soybean by feeding on soybean roots, killing young plants, and reducing stands. Insecticide seed treatments have some, but limited effect on grub.

Wireworms. As the name implies, wireworms are wire-like worms that feed on soybean seed, preventing germination. This leads to poor and spotty stands when populations are high. They may also feed on the underground base of the plant. Later, they may feed on roots. To determine if wireworms are a problem, bait stations can be employed. Seed treatments are effective against wireworm.

Lesser Cornstalk Borer. Lesser cornstalk borer can be a problem on seedling soybean; problems on older soybean are infrequent. Outbreaks are more likely under hot, dry conditions and in sandy fields with weedy hosts. Larvae of this insect bore into the main stem at or just below the soil surface. Numerous seedlings can be injured by a single larva. Seedlings can be cut off at the soil surface or the tunneling can cause wilting and death. Surviving plants may lodge and be lower yielding. Insecticide seed treatments or other applications are not effective.

Insecticide seed treatment to soybean is of limited value in Virginia. Seed treatments can reduce feeding by some species of insects early on the season, for the first 3 to 4 weeks after plant germination. However, we do not typically treat for insects early, nor is there data to support the value or need. Early season insects include thrips (various species) and bean leaf beetle. We spent several years doing tests across the state trying to determine the value of treating for thrips and were never able to find a yield advantage. Bean leaf beetle can feed on seedling plant leaves, but we have never seen a yield reduction from the feeding. In the mid west and north central US, growers use seed treatments to reduce first generation soybean aphid. In Virginia, we do not see aphids until late July or August long after any seed treatment would be out of the plant system. Seed treatments may have some utility for wireworms and grubs.

Until we see some change in insect activity, or get new data, we do not recommend automatic insecticide seed treatment in soybean. Virginia Cooperative Extension Agents conducted 13 field trial in six counties over the period from 2001-2006 to determine the value of insecticide seed treatments. There was only one case where there was a significant advantage.

Replicated On-Farm Soybean Early-Season Insecticide Test Results

Year	Location	Agent Conducting Test	Seed Treatment	Yield*
2001	Middlesex Co.	David Moore	Check	43.2 a
			Adage	41.1
2001	Prince George Co.	Glenn Chappell	Check	42.1 a
			Gaucho	42.6 a
			Warrior	43.8 a
2001	Westmoreland Co	Sam Johnson	Check	52.3 a
		Keith Balderson	Orthene	53.2 a
			Asana	53.0 a
2001	Essex Co.	Ames Herbert	Check	46.7 a
		Keith Balderson	Orthene (3-rate avg.)	50.3 a
		David Moore	Karate	57.8 a
			Asana	48.8 a
2002	Westmoreland Co.	Sam Johnson	Check	59.7 b
		Keith Balderson	Gaucho	63.5 a
2002	Middlesex Co.	David Moore	Check	28.3 a
			Gaucho	28.5 a
2002	Prince George Co.	Glenn Chappell	Check	36.3 a
		Mike Parrish	Gaucho	41.6 a
2003	Lancaster	Ginny Pitman	Check	38.6 a
			Gaucho	39.8 a
2003	Essex Co.	Keith Balderson	Check	29.2 a
			Gaucho	30.2 a
2005	Westmoreland Co	Sam Johnson	Check	40.0 a
		Keith Balderson	Cruiser	41.0 a
2005	Middlesex	Ames Herbert	Apron Maxx	36.7 a
		David Moore	Apron Maxx Cruiser	35.9 a
2006	Westmoreland Co.	Sam Johnson	Check	49.9 a
		Keith Balderson	Cruiser Maxx	50.7 a
2006	Charles City Co.	Paul Davis	Check	32.0 a
			Cruiser Maxx	34.3 a

*Means followed by the same letter are not significantly different.