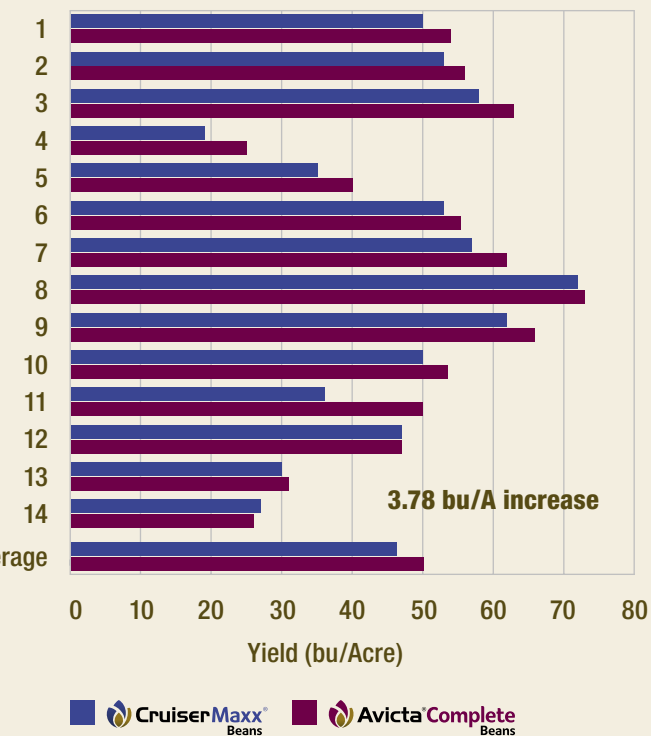
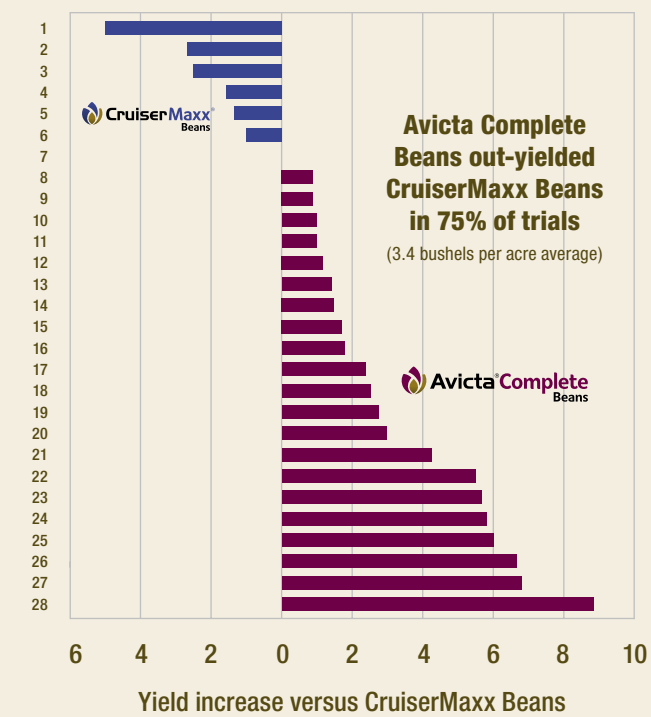


EFFICACY OF AVICTA COMPLETE BEANS ON ROOT-KNOT NEMATODE (2008-2009) – AR, LA, MS, NC



EFFICACY OF AVICTA COMPLETE BEANS ON SOYBEAN CYST NEMATODE IN THE SOUTH (AR-NC)



28 trials (2005- 2009)
Avicta Complete Beans was applied to known SCN resistant varieties

Lance nematodes feed on the outside of the root, but they eventually embed themselves either partially or completely within the root system. Typically, only moderate damage is caused by infestations of this species. Symptoms may include stunting, yellowing of the leaves, darkened roots and uneven growth in the field row. Roots usually bunch together near the soil surface and exhibit a hairy or fibrous appearance. With lance nematodes, root development and nodule development also may be poor.

Stubby-root nematodes feed on the external portion of the growing root tip. Stubby-root nematodes do not usually kill soybean plants, but the severe stunting they cause can lead to considerable yield loss. Symptoms vary but can include stunting, poor stand and reduced feeder roots. After swelling, roots may appear abbreviated or “stubby” looking, preventing them from acquiring adequate water and nutrients for the soybean plant. Stubby-root nematodes usually thrive in sandy soil environments.

More ectoparasitic nematode species are **stunt** nematodes than any other type. Most soybean fields have at least a small population of stunt nematodes.

Sting nematodes inject a toxic enzyme into the roots of their host while feeding, resulting in significant damage, yield loss and even plant death. They are found almost exclusively in soils with sand content of 80 percent or higher and thrive best in irrigated cropland where there is a constant supply of moisture. Sting nematodes do not enter plant roots to feed.

Soybean cyst nematodes complete their life cycle, under optimum conditions, in 24 to 30 days. After penetrating the roots, juveniles feed on plant tissue and secretions, modifying root cells and establishing specialized feeding sites. The nematodes swell during feeding, with females becoming large enough to break through the root

tissue and become visible on the surface. Once the entire body cavity of the female is filled with eggs, she dies. The egg-filled body, or the cyst, becomes dislodged in the soil until hatching occurs. Symptoms vary by nematode population, soil type, and fertility and environmental conditions but can include suppression of root and shoot growth, chlorosis of the leaves in a circular pattern, reduced nodulation, loss of seed yield, dark and sparse roots, and tiny white or yellow cysts on the roots.

INSECT PROTECTION

Containing the active ingredient found in the market-leading seed treatment insecticide Cruiser®, Avicta Complete Beans helps ensure effective and consistent early-season insect protection. Compared to the competition, Cruiser helps establish a healthy foundation and a strong early-season stand. Avicta Complete Beans protects soybean plants from a variety of insects, specifically:

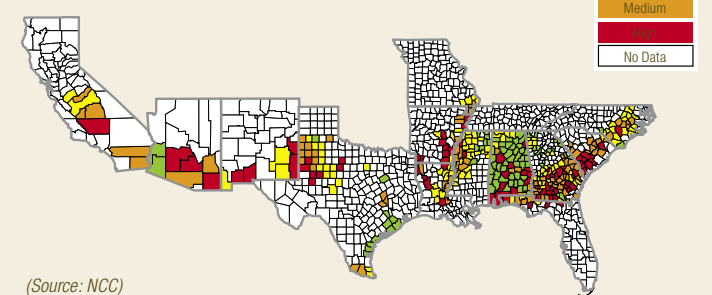
- Thrips
- Threecornered alfalfa hopper
- Grape colaspis
- Leafhopper
- White grub
- Soybean aphid
- Bean leaf beetle
- Seedcorn maggot
- Wireworm

DISEASE PROTECTION

Avicta Complete Beans contains the active ingredients found in the market-leading ApronMaxx® seed treatment fungicide to protect soybean plants from harmful diseases that hinder emergence and growth, potentially leading to reduced stand, vigor and yield. Avicta Complete Beans protects against the following disease pathogens:

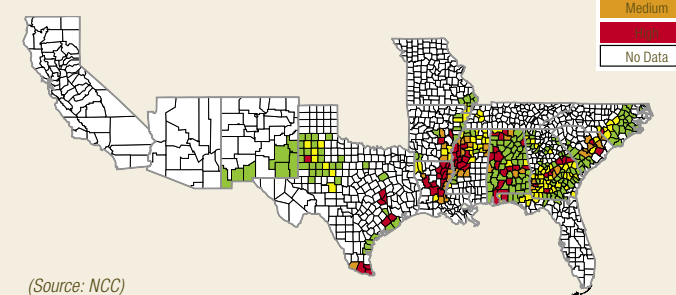
- Early-season *Phytophthora*
- *Pythium*
- *Rhizoctonia*
- *Fusarium*
- *Sclerotinia* (white mold)
- *Phomopsis*
- General seed rots

ROOT-KNOT NEMATODE DISTRIBUTION IN THE U.S.



(Source: NCC)

RENIFORM NEMATODE DISTRIBUTION IN THE U.S.



(Source: NCC)



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Nematode, Insect and Disease Protection for Soybeans





With the recent registration of an Avicta® brand seed treatment nematicide for use on soybeans, Syngenta Seedcare is introducing Avicta Complete Beans, the first triple protection seed treatment combination for soybeans. The Avicta brand nematicide is combined with the market-leading soybean seed treatment insecticide/fungicide combination CruiserMaxx® Beans, to provide soybean growers with immediate, consistent and reliable protection against early-season nematodes, insects and diseases. This first-of-its-kind seed treatment combination for soybeans starts working from day one to increase plant stand, uniformity, vigor and yield.

WHAT ARE NEMATODES?

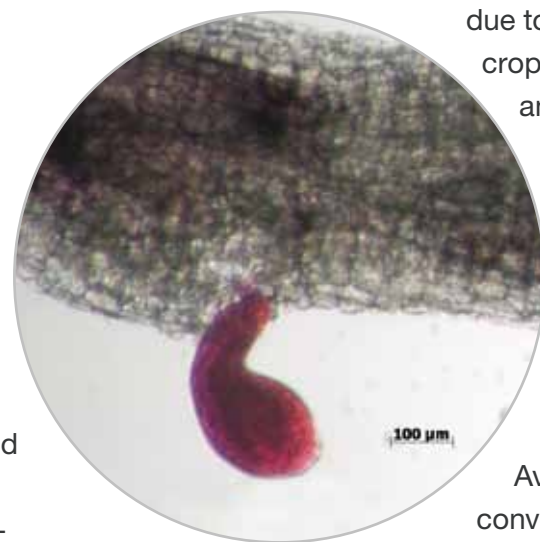
Nematodes are microscopic, thread-like, non-segmented worms that inhabit the soil and feed on plant roots. Plant parasitic nematodes are small (barely more than a millimeter long) and translucent, and therefore, often invisible to the naked eye. Approximately 4,000 known plant parasitic nematode species exist.

All plant parasitic nematodes are obligate parasites and feed through a stylet. An obligate parasite is an organism that must feed on living plants to complete its life cycle. Some have broad host ranges, while others only infect a few host species.

There are three categories of nematodes: endoparasitic, semi-endoparasitic and ectoparasitic. Each type of nematode is classified based on how it feeds on plant roots. Endoparasitic nematodes completely enter the host, feeding from the inside. Semi-endoparasitic nematodes partially enter the root, feeding from the inside and outside. Ectoparasitic nematodes only feed from the outside.

CYST AND NON-CYST FORMING NEMATODES

Most growers and researchers in the South are well aware of the different types of nematodes that affect soybeans. In general, these nematodes can be divided into two sub groups – Soybean Cyst Nematode (SCN) and non-cyst forming nematodes such as root-knot, reniform and lance nematodes. Even though most soybean varieties grown in the South have SCN resistance and can be effectively managed with crop rotation, SCN still accounts for significant yield losses across the southern United States. However, root-knot and other non-cyst forming nematodes also are considered a yield threat to southern fields. Most of the nematodes that attack rotational crops such as cotton and corn also can cause significant injury to soybeans. Since there are few rotational options and limited resistant soybean germplasm, management of these nematodes will require an effective nematicide.



Root-Knot Nematode Juvenile Entering Root

SHIFT TO SOYBEAN ACREAGE DOES NOT REDUCE NEMATODE POPULATIONS

In the southern United States, a recent shift in acreage away from cotton has left many growers looking to other crops, like corn and soybeans, to help their bottom line. However, because cotton, corn and soybeans are all host crops to several of the same nematode species, growers who have historically battled nematode damage in their cotton fields can expect to see yield loss due to nematodes in their corn and soybean crops. Because a crop rotation of cotton, corn and soybeans is not an effective method of inhibiting some nematode populations, growers need to implement a treatment program to help ensure their soybean fields are adequately protected.

COMPLETE PROTECTION FROM DAY ONE

Avicta Complete Beans offers growers a convenient seed-delivered technology that provides triple protection against damaging early-season nematodes, including SCN, insects and diseases. The combination of an Avicta brand nematicide with CruiserMaxx Beans insecticide/fungicide combination works to provide superior protection against early-season threats to help ensure each seed reaches its full genetic yield potential. Pre-applied to the seed, Avicta Complete Beans requires less product handling, making it a convenient, effective alternative to older chemical formulations. Avicta Complete Beans also helps complement the performance of root-knot nematode-resistant soybean varieties by offering an additional mode of action to protect against nematode damage.

NEMATODE DAMAGE LEADS TO YIELD LOSS

Soybean nematodes can arise in all soil environments, but damage is often more apparent in lighter, sandier soils, or under stress conditions. While symptoms vary and are not always visible, growers will notice a loss in yield. Symptoms can include premature yellowing and wilting, root galls, chlorosis of the leaves, stunting of roots and shoot, poor pod set and reduced feeder roots. Nematodes also cause significant damage to crops by facilitating bacterial and fungal infections that can lead to extensive root decay.

To clearly identify below-ground symptoms, roots should be dug and closely examined. Below- and above-ground symptoms are not always distinct enough to use as a sole basis for diagnosis, so it is best to collect soil and root samples for a laboratory analysis.



Soybean Roots Infested by Root-Knot Nematode With CruiserMaxx Beans With Avicta Complete Beans



TECHNICAL ADVANTAGES

- Helps promote healthy, vigorous seedlings from the first day of planting
- Provides instant protection against a wide variety of damaging nematode species
- Consistently protects against a broad range of early-season insects and disease pathogens
- Proven to help increase plant stand, vigor and soybean yield potential
- Convenient and reliable on-the-seed treatment
- Improves efficiency and reduces labor and replanting costs
- Delivers positive return on investment

NEMATODE PROTECTION

From day one, Avicta, the nematicide component of Avicta Complete Beans and a true nematicide, offers effective nematode protection, encouraging emergence and stronger stands, while establishing the foundation for better soybean yields. Avicta Complete Beans helps protect soybean seeds against most major yield-limiting nematode species, including:

- Root-knot
- Reniform
- Lance
- Stubby-root
- Stunt
- Sting
- Lesion
- Soybean cyst

Root-knot nematodes are the most widespread, infecting corn, cotton and soybeans. Root-knot nematodes feed on the inside of soybean roots as immature larvae. Their secretions cause plant cells at the feeding site to enlarge and produce visible galls on the roots. These galls absorb the resources of the plant and are vulnerable to other infections. They are not usually obvious until the later half of the soybean season. Oftentimes galls are confused with larger, nitrogen-fixing nodules which are also firmly attached to the roots. Unlike galls, nodules can be easily removed without destroying the root system.

Reniform nematodes are the second most widespread species and affect both cotton and soybeans, making them an increasing threat to growers. Reniform nematodes are primarily spread by cultivation. As endoparasitic nematodes, reniform nematodes partially embed themselves inside soybean roots. After infection, a permanent feeding site forms and leads to a rapid nematode build-up. Plant nutrients are absorbed, causing dark, stunted root systems with few feeder roots. Severe yield reduction can occur when nematode populations are relatively high. While soybean crops are highly susceptible to reniform nematodes, the problem is often difficult to diagnose and confused with seedling disease or potassium deficiency.