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

<table>
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<th>Yield (bu/A)</th>
<th>0</th>
<th>10</th>
<th>20</th>
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<td>CruiseMaxx Beans</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Avicta Complete Beans in a variety of soils, specifically:</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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**DISEASE PROTECTION**

Avicta Complete Beans contains the active ingredients found in the market-leading ApronMaxx<sup>®</sup> 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 disease pathogens: 
  - Phytophthora 
  - Pythium 
  - Phacotina 
  - Fusarium 
  - Rhizoctonia 
  - Pythium 
  - Sclerotinia 
  - Phomopsis 
  - General seed rots

**RENEW® NEMATODE DISTRIBUTION IN THE U.S.**

**ROOT-KNOT NEMATODE DISTRIBUTION IN THE U.S.**

**Nematode, Insect and Disease Protection for Soybeans**

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

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. Roots usually bunch together near the soil surface and exhibit a hairy or fuzzy appearance. With lance nematodes, root development and nodulation 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 root 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 stunted nematodes than any other type. Most soybean fields have at least a small population of stunted 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 dry soil environments. Sting nematodes usually thrive in sandy soil environments.

**Soil moisture.** Sting nematodes do not enter plant roots, and tiny white or yellow cysts on the roots.

**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 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.

**Insect Protection**

Contains the active ingredients found in the market-leading seed treatment insecticide Cruiser<sup>®</sup>: 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
- Leadthopper
- Wireworm
- White grub
- Soybean aphid
- Bean leaf beetle
- Swedeom maggot

**Dispersal and Host Preference**

Root-knot nematodes are common in sandy and loamy soils with low bacterial populations. They are often found in fields that have been under continuous soybean production, or fields where leguminous plants have been grown for more than 5 years. They are also common in fields where weeds have been allowed to grow unchecked. Root-knot nematodes are more prevalent in fields with low bacterial populations. These nematodes have a wide host range, including soybeans, alfalfa, clover, and many other legumes. They are often found on legumes such as clover, alfalfa, and soybeans. Root-knot nematodes are often found in fields where legumes have been grown for more than 5 years. They are also common in fields where weeds have been allowed to grow unchecked.
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.

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 nematocide is combined with the market-leading soybean fungicide 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, uniformly, vigor and yield.

WHAT ARE NEMATODES?

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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 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.

CSTY 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, nematole 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 farmers. Most of the nematodes that attack rotational crops attack soybean roots. After infection, a permanent feeding site forms and leads to a rapid nematode build-up. Plant nutrients are absorbed, causing root decay.

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 nematocide 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 ensures more than 98% standard deviation of nematicide applied to the seed.

NEMATODE DAMAGE LEADS TO YIELD LOSSES

Soybean nematodes can arise in all soil environments, but damage is often more apparent in lighter, sandy 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 asterolar 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.

NEMATODES ARE THE MOST WIDESPREAD, INFECTION-CARRYING PESTS

There are three nematode species that attack rotational crops: Root-knot, Reniform and Soybean cyst nematodes. Most of the nematodes that attack rotational crops attack soybean roots. After infection, a permanent feeding site forms and leads to a rapid nematode build-up. Plant nutrients are absorbed, causing root decay.

Avicta Complete Beans helps protect soybean seeds against most major yield-limiting nematode species, including:

- Root-knot
- Reniform
- Soybean cyst

Nematode Protection

From day one, Avicta, the nematocide component of Avicta Complete Beans, and a true nematocide, offers effective nematode protection, encouraging emergence of 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
- Soybean cyst

Root-knot nematodes are the most widespread, infection-carrying pest. 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. Offsets galls are covered with a larger, nitrogen-fixing nodule 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 root-knot build-up. Root-knot nematodes are also spread by cultivation, like reniform nematodes, but are generally spread in dark, stunted root systems with few feeder roots. Several years of severe yield loss can occur when nematode populations are relatively high. While soybean crops are highly susceptible to reniform nematodes, the problem is more difficult to diagnose and confused with seedling disease or potassium deficiency.

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- Root-knot
- Reniform
- Soybean cyst

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

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• Helps promote healthy, vigorous seedlings from the first day of planting

• Delivers positive return on investment

• Provides immediate, consistent and reliable protection against early-season nematodes, 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.

• 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

• Helps improve efficiency and reduces labor and replanting costs

• Deliver positive return on investment

• Protects to increase plant stand, vigor and soybean yield potential

• Helps promote healthy, vigorous seedlings from the first day of planting