More and more research is pointing to root health as the key to increasing crop productivity in the future. Why? Healthy roots lead to:

- Protection against yield-robbing insects and diseases below the soil surface
- More efficient water and nutrient uptake
- The development of stronger stems and foliage that better withstand environmental stress
- Protection of the crop’s genetic potential

Roots are responsible for several important jobs, including anchoring and supporting the plant in the ground. They also hold soil in place, break up soil to create pathways for better water filtration, and absorb water and nutrients.

Syngenta Offers Cereal Growers Strong Fungicide Seed Treatment Solutions That Also Boost Rooting Power and Enhance Disease Protection

Ongoing research and a firm commitment to root health and pest defense has led Syngenta to develop sedaxane, its first active ingredient created specifically as a seed treatment. A member of the SDHI class of fungicides, sedaxane, found in the VIBRANCE™ fungicide family of cereals seed treatments, delivers longer-lasting protection against yield-robbing diseases and aids in the development of stronger, healthier root systems that lead to increased crop productivity and consistently better yields. The built-in Rooting Power™ of VIBRANCE brands helps develop robust root systems that more efficiently absorb and utilize water and nutrients. As a result, stems and foliage are healthier and can better withstand environmental stresses, which leads to enhanced and consistent yield performance.

Syngenta’s offers CruiserMaxx® Vibrance Cereals seed treatment insecticide-fungicide.

Vibration® Extreme

- Stimulates quality root systems that deliver better emergence, stands, nutrient uptake and stress resistance for enhanced Rooting Power
- Combines sedaxane with difenoconazole and mefenoxam to deliver systemic protection against a broad spectrum of disease
- Helps ensure a healthier start to deliver better yields under a wide range of environmental conditions
- Offers excellent seed safety for optimal seedling development and root growth
- Produces healthier, stronger stems and foliage that can better withstand stresses from weather, diseases and insects
- Contains the optimal combination of systemic action and soil mobility for enhanced disease protection and root health

CruiserMaxx® Vibrance® Cereals

- Provides unparalleled protection against a wide range of insects and diseases, including beat-in-class Rhizoctonia activity, to help boost Rooting Power
- Features sedaxane with difenoconazole, mefenoxam and difenoconazole in a convenient formulation effective at a single use rate
- Offers consistent yield performance and stability under a wide range of growing conditions through an enhanced formulation
- Provides a residual management tool as it adds another seed treatment mode of action from the SDHI class of fungicides to the Syngenta Seedcare portfolio
- Delivers the Cruiser® Vigor Effect through the thiamethoxam component to help enhance germination, increase vigor, improve stand establishment and deliver better yield potential
- Contains higher rates of fungicides and insecticide
- Combines sedaxane with difenoconazole and mefenoxam + difenoconazole to raise the level of performance against Pythium and wireworms vs. the closest competitor
- Offers ideal systemic and soil mobility which creates a “halo of protection” around the seed and root system

Key Pests Impacting Root Health in Cereal Crops

Underground diseases and insects are the prominent threats to the development of a strong, healthy root system. Key pests to watch for in wheat and barley include:

- **Pythium**
  - is one of the most prevalent soilborne pathogens attacking cereal crops and often measured as winter injury, poor soil fertility or toxicity from crop residue. Pythium feeds on the root system and results in spongy plants with whitened and discolored leaves, fewer tillers and smaller heads. Pythium is difficult to control once it has begun, and rapid death of crops occurs once infection occurs. Delayed emergence and poor plant development are common symptoms of Pythium.

- **Fusarium**
  - attacks the outside of the seed and the seedling in wheat and many other crops. These infections points act as inoculum for a new round of infection in the next crop’s conditions and can serve as the immediate threat. If infected, the seed may die, germinate poorly or encounter seedling blight and root rot.

- **Common root rot**
  - causes stunting and sometimes wilting of infected wheat, barley and oat seedlings. Later, these plants turn yellow and die. Roots of diseased seedlings are rotted, red-brown or pink, and the seed material exposed to control once rot has begun, and rapid death of crops occurs once infection occurs. Delayed emergence and poor plant development are common symptoms of Pythium.

- **Winterflax**
  - is the saprophytic fungi feeding on the root system and results in anemia or brown decay.

- **Wireworms**
  - feed on roots and underground shoots of small grains, especially those planted on land previously in sod. They attack as soon as the seed is planted in the soil. The injury and young seedlings, which then suffer stunting, weakening the plant.

- **Pythium**
  - infects the entire root system and is quickly established as one of the most prominent soilborne pathogens afflicting U.S. cereal growers. Pythium is capable of causing 20 to 40 percent yield loss. This fungus can cause prematurity or postemergence damping-off of seedlings, as well as plant wilting. Infected stems often break in the lessened area, and roots may die from a firm, dry brown or red-brown decay.

“Root health means that plants can live up to their full genetic potential, and can utilize water and nutrients in the most efficient way. Root health means that growers can get the best economic return on their inputs, and can use the most sustainable practices with the least environmental impacts.”

Tim Paulitz, Ph.D.,
research plant pathologist, USDA-ARS
Washington State University

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