2012 Agrow Award for Most Innovative Chemistry.

TECHNICAL BULLETIN:

DuPont™ Lumisena™

fungicide seed treatment

DuPont™ Lumisena™ fungicide seed treatment.

Best in Class Downy Mildew Control for Sunflowers.

Lumisena™. A Step Change in Downy Mildew Control.

Downy mildew is responsible for a significantly high percentage of sunflower crop loss each year. "When young sunflower plants are infected with downy mildew they will nearly always die. In wet spots in fields, yield loss to downy mildew can be 100%," according Sam Markell, Ph.D. Extension Plant Pathologist and Associate Professor, NDSU. This devastating disease can cause root rot, stunt growth and completely eradicate sunflower seeds and seedlings.

Oxathiapiprolin, the DuPont-discovered active ingredient in Lumisena™ fungicide seed treatment, will be the most advanced seed-applied technology to control downy mildew in sunflowers since the introduction of mefenoxam and metalaxyl. In external research trials with leading university experts, sunflower seed treated with oxathiapiprolin resulted in a significantly lower incidence of downy mildew in comparison to existing fungicide seed treatments. In DuPont Seed Treatment Enterprise research trials, Lumisena™ reduced the incidence of downy mildew by 50% compared to unprotected seedlings – *with no cross resistance to existing fungicides*.

Lumisena™. The Benefit Is In How It Works.

Research studies show oxathiapiprolin provides outstanding protection for sunflower seeds and young plants against downy mildew, which is caused by soil-borne *Plasmopara halstedii* oomycete pathogens. This unique mode of action works to control oomycete infestation during multiple stages of the pathogen's life cycle resulting in healthier plants and greater crop efficiency.

Lumisena™ is a highly effective fungicide seed treatment that is systemically taken up in the plant from the moment the seed begins to grow. Lumisena™ provides extremely effective control of downy mildew in sunflowers to protect root growth, helps provide healthy emergence and early stand establishment, and ultimately helps maximize yield.

ag.ndsc.edu

Downy mildew infected leaf with white-cottony sporulation on underside of leaf.

Downy Mildew. Devastating to Sunflowers. Costly to Growers.

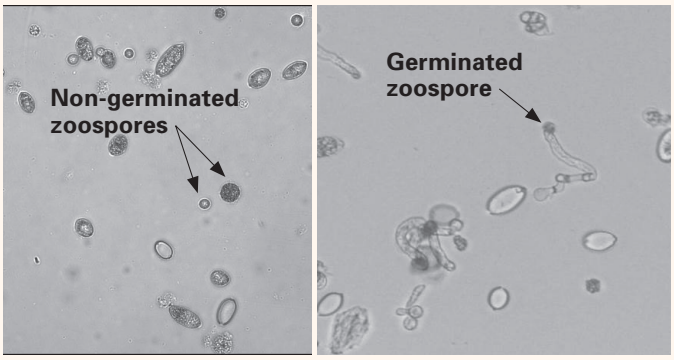
Downy mildew is a soil borne disease in sunflowers that is caused by *Plasmopara halstedii*, an oomycete pathogen. Cool, wet conditions that accompany earlier planting are ideal for downy mildew infection. When overwintered oomycete spores germinate they enter the roots of sunflowers and systemically attack and infect the roots and young seedlings. These oospores can survive in cold – even freezing – temperatures and can remain in the soil for up to ten years.

Downy mildew can display symptoms varying from delayed or lack of emergence to severe stunting to seedling death. Sunflower plants that do survive are underdeveloped, exhibit yellowed and "wrinkled" leaves with a fleecy white matter on the leaf undersides, and will reduce both seed yield and oleic acid concentration in the oil.

Downy mildew can develop in every U.S. state where sunflowers are grown. Aside from an effective seed treatment fungicide, growers can reduce the prevalence of downy mildew with crop rotation and planting later into warmer soils. However, once leaf symptoms are visible, control of downy mildew is no longer possible. The only preventative measure is an effective fungicide seed treatment coupled with genetic resistance.

Oxathiapiprolin Controls Downy Mildew Before It Has a Chance to Damage Sunflower Plants.

Oxathiapiprolin is active at every stage of the fungal life cycle. In the early stages it keeps spores from producing and, as is evidenced below, it has preventative activity that inhibits zoospore release and prevents zoospore germination at very low concentrations.



Oxathiapiprolin 0.001 ppm **Untreated Control**

Photos taken 24 hours after harvesting sporangia of *Phytophthora infestans* in 4° C water to stimulate zoospore release.

50% of seed planted in the untreated check had systemic infections of downy mildew. The Lumisena™ plot (on right) displayed consistent stand and healthy, vigorous plants.

Untreated Control - 50% incidence **Lumisena™ - 0.0093 mg ai/seed**

Lumisena™ fungicide seed treatment. Fargo Trial. Jul. 2014. Late vegetative stage

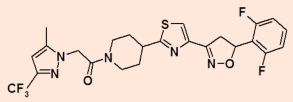
Proposed Lumisena™ Sunflower Use Rate

Crop	Pathogen/Disease	Use rate mg ai/seed
Sunflower	*Plasmopara halstedii*; downy mildew.	0.0094 to 0.0188

DuPont™ Lumisena™ Fungicide Seed Treatment. Advanced Technology for Downy Mildew Control In Sunflowers.

Field Trials Demonstrate:

- Effective control against oomycete pathogens that cause downy mildew
- Activity on multiple stages of the pathogen's life cycle resulting in healthier plants and greater crop efficiency
- Significantly lower incidence of downy mildew versus existing commercial seed-applied fungicides
- Systemic control improves root and plant health
- Increased emergence and healthier stand establishment to help maximize yields
- Highly effective at very low active ingredient use rates
- No cross-resistance to any existing fungicide
- Favorable environmental profile

LUMISENA™ TECHNICAL PROFILE:	
General Information	
Company Development Code:	DPX-QGU42
Chemical Class:	Piperidinyl thiazole isoxazoline
Common Chemical Name:	oxathiapiprolin 2012 Agrow Award for most innovative chemistry
Molecular Formula:	$C_{24}H_{22}F_5N_5O_2S$
Chemical Structure:	
CAS Number:	1003318-67-9
Disease Spectrum:	Controls diseases caused by oomycete pathogens
Commercial Name:	DuPont™ Lumisena™ fungicide seed treatment

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