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LUNA® FUNGICIDES FROM BAYER

USA Technical Brochure

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LUNA® FUNGICIDES

Luna® is a family of three powerful new fungicides based on the active ingredient fluopyram. Developed by Bayer, Luna fungicides represent a unique solution for managing crop diseases. Luna provides long-lasting, systemic, and broad-spectrum protection for most economically impacting diseases. With two modes of action built in, Luna also brings an effective approach to resistance management. The consistent performance of Luna will help you maximize yields and offer the highest quality produce to the market.

BENEFITS OF LUNA

• Efficacy, Vigor and Yields
  An exceptional, broad-spectrum product; consistently a top-yielding treatment

• Bioavailability and Systemicity
  Continuous stem and leaf diffusion followed by upward movement throughout the plant system results in protection of unsprayed tissues; protection of flower buds in early opening stages broadens spray-timing flexibility

• Produce Quality and Storability
  Optional early season, mid-season and pre-harvest uses that will help maximize produce quality and reduce crop losses at harvest and later in transit and storage

• Multi-year Tree Health
  Reduces overwintering inoculum for less disease carryover in perennial crops; helps keep foliage on trees longer, setting up for a stronger spring flush

• Unique Chemistry
  Effective where other SDHI products are failing due to resistance

BIOAVAILABILITY AND SYSTEMICITY

Luna has unique chemical properties that lead to durable, long-lasting disease control. The active ingredient in Luna is nonvolatile, UV-stable and has a low water solubility that improves rainfast properties. Furthermore, Luna continues to penetrate closed bud, stem, leaf and fruit surfaces to protect from within. This continuous uptake through stems and leaves improves disease control by giving long-term protection to unsprayed tissues.

EXPANDED LABEL WITH THREE PRODUCTS THAT COVER MOST CROPS

There are three Luna® products that cover most annual and perennial horticultural crop needs. With any horticultural crop, growers on the west coast face a very different set of disease problems than growers on the east coast. Because of these differences, along with different resistance patterns by geography, Bayer has elected to offer two product choices for some crops. (Please see product labels for directions for use.)

Tree nuts, pome fruit, stone fruit, citrus, strawberries, carrots, leafy, brassica, tomato and cucurbit vegetables

• Signal word: Caution
• Application: Ground, Air and Chemigation
• REI: 12 hours
• Active Ingredients (MOA): Fluopyram (SDHI, 7), Trifloxystrobin (QoI, 11)
• Packaging: 8 x 32 oz./case (use rate – 5 to 7.6 oz.)

Grapes, tree nuts, cucurbit vegetables and hops

• Signal word: Caution
• Application: Ground, Air and Chemigation
• REI: 12 hours (except wine grapes)
• Active Ingredients (MOA): Fluopyram (SDHI, 7), Tebuconazole (DMI, 3)
• Packaging: 8 x 32 oz./case (use rate – 8 to 10 oz.)

Potatoes, bulb crops, tomatoes, pome fruit, strawberries and canebberries/bushberries

• Signal word: Caution
• Application: Ground, Air and Chemigation
• REI: 12 hours
• Active Ingredients (MOA): Fluopyram (SDHI, 7), Pyrimethanil (AP, 9)
• Packaging: 2 x 2.5 gallons/case (use rate – 12 to 16 oz.)
PRODUCE QUALITY AND STORABILITY

EARLY AND MID-SEASON USES
Some storage rots are most efficiently controlled directly through early and mid-season timings – even as early as bloom and/or fruit development. Targeted uses at select timings in a spray season are only a minimal additional cost to growers, since they are already treating for other typical foliar and fruit diseases.

Many crop losses are caused by latent pathogens. The open flower, white bud and senescent flower stages are most susceptible to infection, whereas flowers at the green bud stage are relatively resistant. If not protected, latent infections established at flowering can result in serious disease once fruit starts ripening.

Fruit and vegetables are bought with the eyes – produce is selected according to how good it looks. Bayer has been working with researchers and pest control advisors across the country to identify the most effective application timings to help maximize the quality improvements Luna® provides.

• Higher quality fruit at harvest
• Reducedrusseting
• Superior fruit finish ratings
• Higher firmness
• Improved stem, fruit color and sweetness
• Reduced shatter
• Increased harvest flexibility

HIGH PRODUCE QUALITY AT HARVEST
Luna programs in crops such as pome and stone fruit have had a low incidence of fruit finish diseases and rots when compared with the current premium standard fungicides. Fruit finish and firmness ratings are significantly improved over standards.

The two apples on the tree were protected with Luna® vs. untreated apple on the right.

CLEANER FRUIT GOING INTO STORAGE
Applications at standard mid-season timings reduce disease long after harvest. Cleaner, healthier fruit going into storage can reduce losses later. Luna is active on a wide range of storage rot pathogens. Example: In strawberries, Botrytis and Rhizopus rots developed in this trial in storage.

LONGER MATURE APRICOTS FROM LUNA®
Mar. prs were sprayed with LUNA® and a premium competitor. Fruits were collected at harvest, placed in plastic boxes, closed and stored at cool room temperature for one week, at which time they were assessed for disease. Control of Monilinia fruit rot, Botrytis gray mold and Rhizopus rot was superior with Luna.

PRE-HARVEST USES
Luna® can be used late in the season as a pre-harvest application to control more opportunistic pathogens that originate from wounds and the spread of inoculum during picking and storage. (Please see crop labels for crop specific pre-harvest intervals.)

• Better quality throughout transit
• Improves the consumer’s eating experience
• Extra days on shelf and with customers
• Better withstands mishandling and breaks in the cold chain
• Provides opportunity to display produce out of refrigeration
• May reduce the need for frequent rotation, thus decreasing labor costs
• Reduces need for post-harvest treatments

CONSISTENTLY BETTER STORAGE WITH LUNA®
Mature apricots from trees sprayed with Luna® and a premium competitor were collected at harvest, placed in plastic boxes, closed and stored at cool room temperature for one week, at which time they were assessed for disease. Control of Monilinia fruit rot, Botrytis gray mold and Rhizopus rot was superior with Luna.
MULTI-YEAR TREE HEALTH

REduced OVERwintering
The peach tree photos below were taken the year following a Luna® trial for peach leaf curl with severe pressure. Neither tree received any fungicide treatment in the second year when the photos were taken. Yields were also collected and were significantly greater for trees protected with Luna than for the prior year.

FEWER PRIMARY INFECTIONS
Controlling disease and reducing inoculum in the orchard can dramatically reduce primary infection the following spring.

LEAF Retention
Effective disease control can help protect long-term tree health by extending the growing season. In this photo, the almond tree on the right was effectively protected from Alternaria leaf spot with Luna and maintained its foliage longer through the season. The untreated tree on the left has experienced severe defoliation due to the disease.

HEALTHIER TREES IN THE SPRING
Luna was utilized in 2013 as a standard fungicide for controlling Cherry leaf spot on tart cherries. Disease pressure was severe and Luna provided excellent control through harvest. The Luna trees overwintered well and produced a normal amount of cherry blossoms. The untreated control trees had about 90% fewer flowers and also foliar growth was reduced in the spring. Photos taken in April 2014.

In this photo, taken in 2009, the healthy apple branch (left) was cut from a tree treated with a Luna® program in 2008. The branch on the right illustrates primary Powdery mildew. Luna programs greatly reduced the number of infected shoots the following spring.

UNIQUE CHEMISTRY WITH GREATER STRUCTURAL FLEXIBILITY
Luna® is a longer-chain, highly flexible molecule which may aid in better fitting both wild-type and mutated-target binding sites. Luna is not a carboxamide like many other SDHIs and has demonstrated control of carboxamide-resistant mutants among several pathogens. Below is an illustration of the fluopyram molecule with green arrows indicating the extra carbons that extend the length of the molecule, making the molecule more flexible and improving its ability to bind to the site. The second illustration demonstrates the nearly endless range of possible molecular configurations.

Disease spectrum
Luna, at very low use rates, is highly active on a broad range of plant diseases. It is especially effective on diseases caused by species of Botrytis, Botryosphaeria, Sclerotinia, Monilinia, Venturia, Alternaria, Colletotrichum, Corynespora and Cercospora. It controls the numerous ascomycete, zygomycete and deuteromycete pathogens that cause Powdery mildew, Shot hole, Scab, Rot, Leaf spot, Anthracnose, summer diseases and Blight. The premix partners in Luna brands add to disease control, broaden the spectrum and, in the case of trifloxystrobin in Luna Sensation®, synergize with Luna to significantly improve control. Luna provides an excellent rotational fit with other available fungicides.

Resistance management
To prolong the useful life of Luna, Bayer recommends that grower programs be initiated prior to disease onset and that Luna be used in locally designed rotational programs. Two sequential Luna applications are allowed, but growers should then alternate to other modes of action. (Please see product label for additional resistance management recommendations.)

Product chemistry
Common Name: Fluopyram (ISO)
CAS Number: 658066-35-4
Molecular Weight: 396.71
Chemical Name: (IUPAC): N-[2-[3-Chloro-5-(trifluoromethyl)pyridin-2-yl](ethyldiene)-2-(trifluoromethyl)benzamide
Chemical Class: Pyridylethylamide class
Vapor Pressure: << 4 x 10^-7 Pa at 20°C
Boiling Point: 487°C ± 50° (calculated)
Density (relative): 1.36 g/mL at 20° C
Chemical Class: Pyridyl ethylamine class
Melting Point Range: 139.1-144.5° C
Water Solubility (pH 4-9): 20° C: 15-16 mg/L
Systemicity: Xylen mobile
Partition Coefficient (pH 4–9): 2.9