BAYER

# Banol®

*Preventive & Curative*

**Protection Against Pythium**

# Preventive & Curative

## Protection Against Pythium

Science for a **better life**

Banol®

Banol Turf and Ornamental Systemic Fungicide delivers preventative and curative protection for *Pythium* spp.

Because of its multi-site mode of action, it presents a very low potential for fungicide resistance development.

There has never been a documented case of resistance in 20 years of use.

| KEY FEATURES OF BANOL | KEY BENEFITS OF BANOL |
|---|---|
| // Proven control on all Pythium diseases in turf | // A trusted tool for highly effective control and protection against Pythium |
| // Effective across a wide spectrum of the Pythium disease cycle, including mycelium, sporangia and spores | // Comprehensive control no matter what stage of the disease cycle is present |
| // True acropetal (upward) systemic activity | // Able to provide whole-plant protection against both root and foliage infection |
| // Multi-site mode of action (low potential for resistance development) with no documented field resistance with over 20 years of commercial use | // A valuable tool for managing resistance to other MOA chemistry such as Etridiazole, Cyazofamid, Metalaxyl-M and QoIs |
| // Excellent turf safety | // Flexible use application across established turf and in the seedling establishment phase for protection against Pythium damping-off |
| // Water soluble formulation | // Easy to mix and apply (Banol is completely soluble in water) |

## Application rates

**Recreational turf:** 45-65 mL/100 $m^2$ (4.5 - 6.5 L/ha) applied in an adequate volume of water.

## How to Use Banol

// Apply Banol as part of an integrated management program. Apply when conditions are favourable for Pythium development.

// Apply Banol in 500-800 L/ha water for leaf/crown target applications or 800-1000 L/ha for applications targeting the root system. Lightly water-in Banol applications to increase fungicide and root contact for optimal Pythium root rot control. North Carolina State University suggests that Banol and Signature *XTRA* Stressgard® should be part of a rotation program to control Pythium root dysfunction caused by *Pythium volutum* which causes a root rot that is most associated with newly established creeping Bentgrass greens. (http://www.turffiles.ncsu.edu/diseases/Pythium_Root_Dysfunction.aspx)

## Pythium root rot

### // The problem

Pythium root rot (PRR) is a major problem on all turf species and can be caused by over 20 different Pythium species that vary widely with host, geography and optimum temperature for infection and pathogenicity. Pythium root rot is regularly diagnosed in turf in mid-summer during periods of extended moisture and high heat. Pythium root rot is a complex disease of roots and crowns that result in a general decline of turfgrass stands. Pythium species are natural inhabitants of the soil. It is not unusual for the organism to be present at low levels without causing disease. Once diagnosed on a specific turf area, PRR will likely be a perennial problem unless renovation or other invasive measures are taken. Though preventative control is always more effective than curative control, curative control may be needed during unusual weather conditions or the first time PRR is diagnosed on a golf course.

### // Biology

> Many species of Pythium cause diseases of roots, crowns and/or foliage that result in a general decline of turfgrass stands.

> The Pythium fungus overwinters in soil and plant debris. Damage is most severe at higher temperatures.

> Warmer soils require shorter periods of soil saturation for infection and damage.

> Research has shown that PRR starts infecting turfgrass in the spring at 5 cm depth soil temps of 16°C, but symptoms may not be present until warmer soils and extended saturation occur. Periods of plant wilt or heat stress following extended periods of soil saturation can quickly aggravate symptoms, especially when soil temperatures are 21-26°C.

> Research has shown that younger creeping Bentgrass putting greens diagnosed with Pythium root dysfunction (*P. volutum*) will often develop PRR as the greens mature.

### // What to look for

> Pythium can be found in almost all turf soils, so an accurate and definite diagnosis is difficult. Usually when Pythium oospores or sporangia are found in the youngest, 2 to 3-week-old roots, diagnosticians can confirm PRR as the primary disease.

> PRR affected turf can show irregular chlorotic, yellow to orange patches or streaks, or thinned areas of turf.

> No foliar mycelium is visible, but roots may appear water-soaked and rotted or show a significant reduction in mass or root hair production.

> Microscopic examination of infected tissue typically reveals oospores (survival structures) and/or sporangia (spore-bearing structures) and zoospores (motile spores). Turf managers suspecting PRR should send samples from the perimeter of both damaged areas and healthy areas to Diagnostic Labs for preliminary diagnosis.

# Pythium blight

## // The problem

Among turfgrass diseases, Pythium blight receives considerable attention because it spreads very quickly, affects leaves, and crowns, and kills plants, resulting in extensive loss of the turf stand. Pythium blight outbreaks are especially damaging to creeping Bentgrass, *Poa annua* and Perennial Ryegrass. Outbreaks often are first observed in low areas or swales, where more soil moisture is maintained, and dew begins to form early in the evening and remains through the morning. Late afternoon rain during these hot, humid periods further favour disease development and may be responsible for rapid spread of the pathogen.

## // Biology

> Pythium blight occurs during the most uncomfortable days of summer, when climatic conditions lead to extended periods of dew presence (greater than 14 hours) and night temperatures exceed 18°C in cool-season turf (10°C for warm-season turf).

> Severe Pythium blight epidemics in cool-season turf are commonly observed the morning after a late afternoon or early evening thunderstorm in the summer. Daytime temperatures above 28°C also encourage Pythium blight development in turf due to increased stress. Excessive soil moisture and succulent foliar growth also favour disease development.

## // What to look for

> Symptoms may appear as water-soaked, dark, oily looking patches (“grease spot”). Spots may also be bronze or tan and are generally less than 100 mm in diameter, but these can expand rapidly, and large areas may be affected.

> Blighting may also appear in streaks that follow the movement of water or machinery.

> When humidity is high, especially at night, the collapsed leaves may be covered with a fluffy, white mass of mycelium (“cottony blight”). Spots may coalesce to form large, irregularly shaped areas of dead turf, especially in areas of poor drainage.

# Pythium damping-off

## // The problem

Damping-off affects turfgrass seedlings, negatively affecting establishment of a wide variety of plants. In situations where areas are seeded to recover from disease or abiotic damage, damping-off can hinder recovery. Damping-off is most prevalent in water-saturated areas under either high heat or heavily shaded conditions. Pythium is the most common pathogen involved in damping-off, especially for cool-season turf species, but Rhizoctonia and Fusarium species may also cause disease. Killed seedlings result in poor stand establishment and Pythium blight can also develop in affected areas as seedlings become established. Seedlings affected by damping-off diseases rarely recover and damaged areas often require reseeding.

## // Biology

> Pythium is the most common pathogen involved in damping-off, especially for cool-season turf species, but Rhizoctonia and Fusarium species may also cause disease.

> Pythium damping-off of cool-season turf is most likely to occur in wet areas when minimum temperatures exceed 20$^0$C at night, while Rhizoctonia and Fusarium may be more common when seeding is performed in cool, wet conditions.

## // What to look for

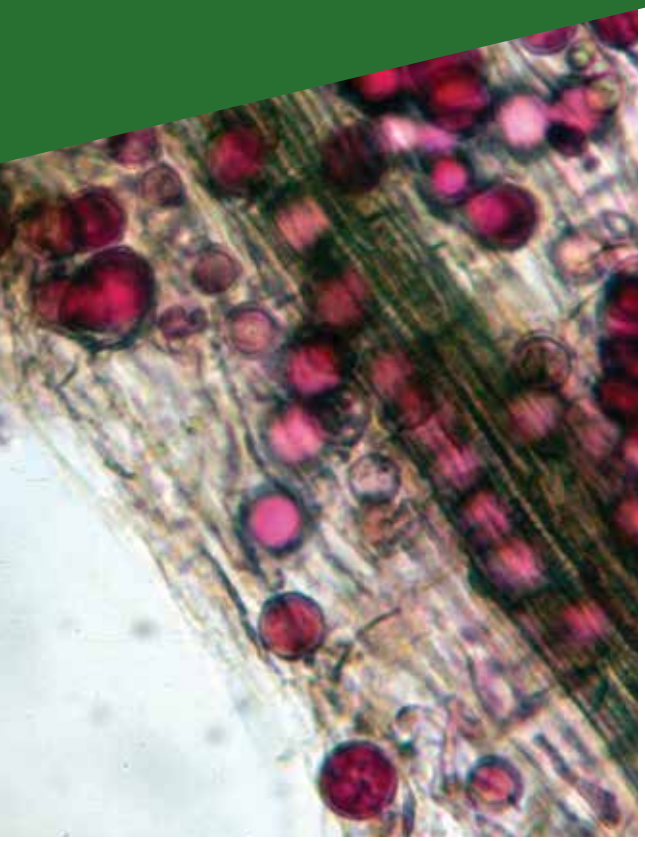
> Symptoms are mostly seen as poor stand establishment in seeded areas, often giving them a ‘patchy’ look. Since the plants are highly vulnerable after germination, just a little damage can kill the plant.

> Seedlings become blighted, then collapse and die, forming circular or irregular patches. Affected areas sometimes appear as streaks on sloped land or in drainage swales.

> Inspection of seedlings from affected areas will show necrosis and death of newly emerged roots and shoots.

> Aerial mycelia may not be evident in affected areas, but incubation of samples overnight in a moist chamber may reveal mycelial production from Pythium or Rhizoctonia.

> Microscopic examination may reveal the presence of spores and other fungal bodies involved in damping-off.



## Pythium root rot

// **Preventative control –** Preventative Banol® applications should start when 5 cm soil temperatures reach 16°C in the spring. Banol® applications should be made at a 3 to 4-week interval to provide strong protection against and knockdown of any developing sporangia and zoospores.

// Signature *XTRA* Stressgard® applications at regular intervals will enhance plant defenses against disease development and various biotic and abiotic stresses on the turfgrass. Shorten application intervals or increase application rates through the heat of the summer and widen application rates or reduce application rates in the autumn when air and soil temperatures cool.

// **Curative control –** Apply Banol® immediately after observing symptoms at a rate of 6.5 L/ha in 800-1000 L/ha water, lightly irrigate to achieve contact with roots. This will work quickly inside and out to reduce disease activity.

// Apply Signature *XTRA* Stressgard® 3-5 days later to enhance disease protection and plant strength for recovery.

// Follow up within 14 days of either Banol® or an alternative MOA to provide further knockdown of persistent PRR and move well into a preventative 14-day preventative program including Signature *XTRA* Stressgard® and Banol®.

### Preventative Pythium root rot and Pythium blight

| | Spring | | Summer | | Autumn | |
|---|---|---|---|---|---|---|
| | Signature *XTRA* Stressgard (Mid-Low application rates or wider application interval) | | Signature *XTRA* Stressgard (Mid-High application rates or shorter application interval) | | Signature *XTRA* Stressgard (Mid-Low application rates or wider application interval) | |
| | Banol | Banol | Banol | Alternative MOA | Banol | Alternative MOA |

**Note: Indicative program only** – for detailed program recommendations consult your Bayer field representative.

## Pythium blight

// **Preventative control –** Maintaining a preventive fungicide program for Pythium root rot will protect against Pythium blight.

// **Curative control –** Apply Banol® immediately when symptoms are observed at a rate of 6.5 L/ha in 500 – 800 L/Ha. This will work quickly inside and out to reduce disease activity.

// Follow up with Banol® or an alternative MOA within 14 days to further control any persistent pathogen.

// Once treated with a curative fungicide, integrate a Signature *XTRA* Stressgard® program at regular intervals to enhance plant strength and condition for future disease outbreaks.

Banol®

## Preventative Damping-off

| | | | |
|---|---|---|---|
| | Signature *XTRA* Stressgard (Mid-Low application rates or wider application interval) | | Signature *XTRA* Stressgard (Mid-High application rates or shorter application interval) |
| Pre-seeding | First leaf emergence | Multiple leaf stage | Established turf |
| Banol | Banol | Alternative MOA | Refer to Pythium preventative |

**Note: Indicative program only** – for detailed program recommendations consult your Bayer field representative.

## Pythium damping-off

- **Preventative control –** Apply Banol® as a pre-seeding treatment to control any existing Pythium and then to germinated seedlings for damping-off protection. Then rotate with Signature *XTRA* Stressgard®.
- Rhizoctonia and Fusarium can be treated effectively with Interface® Stressgard or Exteris® Stressgard and can be incorporated into a pre- and post-seeding application schedule.
- **Curative control –** Banol® and Interface® application will work quickly to reduce disease activity inside and out of the plant.
- 3-5 days later an application of Signature *XTRA* Stressgard® will aid disease protection and plant strength for recovery.
- Follow up application within 14 days of either Banol® or an alternative MOA with Exteris® Stressgard will provide further knockdown of persistent damping-off and move well into a preventative 14-day program.

| Alternative Modes of Action | FRAC Code | Group Name | Resistance Risk |
|---|---|---|---|
| Cyazofamid | 21 | Quinone inside Inhibitors (QiI) | Medium – High |
| Metalaxyl | 4 | Phenylamides | High |
| Etridiazole | 14 | Aromatic Hydrocarbons (heteroaromatics) | Low – Medium |
| Pyraclostrobin | 11 | Quinone outside Inhibitors (QoI) | High |
| Azoxystrobin | 11 | Quinone outside Inhibitors (QoI) | High |
| *FRAC Code list 2021 | | | |

# Your Success, *Our Science*

## *Banol frequently asked questions*

**Q. What products do you recommend rotating with Banol in turf situations?**

A. We recommend rotation of Banol with Signature *XTRA* Stressgard®. Signature *XTRA* Stressgard® is widely used in summer stress management programs; it has been proven to activate the defense mechanisms of various turf grass species and improve overall turf health.

**Q. What about tank mixes of Banol with other products?**

A. Banol can be tank mixed with other fungicides such as Dedicate *FORTE* Stressgard®. Banol also has confirmed compatibility with Indemnify® Turf Nematicide.

**Q. What if Pythium is present but symptoms are not visible yet?**

A. Banol will provide both preventative and curative control of Pythium in turf and because it is systemic it will also help prevent future disease outbreaks.

**Q. Can I mix a soluble fertilizer with Banol when applying as a soil drench?**

A. Generally this practice is not recommended. Some of the salts in various fertilisers can affect the efficacy of Banol.

## Product Profile

**Active Ingredient:** Propamocarb (present as mono hydrochloride)

**FRAC Code:** 28 (Carbamates)

**Systemicity:** Acropetal (upward) systemic

**Formulation:** Soluble Concentrate

**Pack sizes available:** 1 L

## Product safety

Poison schedule: 5, Caution

**Personal protective equipment.**
Wear elbow length PVC gloves when opening the container and preparing the spray.

## Regulatory information

**APVMA Approval Number:** 62826

All pesticides are regulated under the Agricultural and Veterinary Chemicals Code Act 1994 to ensure that they do not pose an unacceptable risk to human health and the environment. For information regarding pesticide regulatory process please visit the Australian Pesticides and Veterinary Medicines Authority website at www.apvma.gov.au

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ALWAYS READ THE LABEL AND PRODUCT INFORMATION BEFORE USE
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