

READ THE ENTIRE LABEL BEFORE USING THIS PRODUCT.

USE ONLY IN ACCORDANCE WITH INSTRUCTIONS.

KEEP OUT OF REACH OF CHILDREN

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## MOWPAC 22 SC EXTRA

### INGREDIENTS

Paclobutrazol (CAS no. 76738-62-0).....	22.3%
Propane-1,2-diol (CAS no. 57-55-6).....	4.6%
Other ingredients.....	6.6%
Water (CAS no. 7732-18-5).....	65.5%

MOWPAC is a plant growth regulator, primarily used as a growth retardant for turf and trees. It contains as its active ingredient, Paclobutrazol.

Turf managers use them to increase mowing cycles and improve color and stress resistance. Growth regulators have potential uses for arborists, too. Benefits include growth reduction, improved root development, improved resistance to water stress, and improved color. Potential disease resistance effects are also under study.

Trade Names Of Other Firms: Trade names for products containing Paclobutrazol include Trimmit, Profile, Cambistat and Clipper

### What is MOWPAC and how does it work?

Paclobutrazol is a chemical that has several applications for commercial arborists. It affects woody plants in several different ways. Most attention has focused on its ability to regulate shoot growth. Plants treated with paclobutrazol show a reduction in shoot growth compared with untreated trees. The chemical causes this effect by interfering with the natural production of gibberellins by the treated plant. Gibberellins are responsible for cell elongation in plants. Paclobutrazol does not inhibit the production of new cells, only the elongation of the cells once they have formed.

The secondary effects of paclobutrazol (improved drought stress, darker color, disease resistance) occur as a result of the chemical's primary effect upon gibberellin production. Gibberellins are produced as the end product of a series of

complex chemical reactions within the plant. Because paclobutrazol prevents the gibberellin assembly line from being fixed, the plant uses the intermediate chemicals for other uses.

One of the intermediate chemicals can be used to make abscisic acid. Abscisic acid regulates the opening and closing of stomates in the leaf. Stomates are important in regulating gas and water exchange between the leaf interior and exterior. Increased levels of abscisic acid result in greater stomatal closure. This reduces water losses from the leaf, potentially improving resistance to drought. Work by William Chaney at Purdue University shows that the leaves of treated plants maintain higher moisture levels for a longer time.

Therefore, treating trees in droughty situations may reduce wilting and subsequent leaf scorch due to excess water loss from the foliage. Remember, such a treatment cannot be expected to prevent scorch. Treatment may provide a cushion of a few extra days to provide the trees with water or to allow for rainfall.

Intermediates in the gibberellin pathway can be used by plants to synthesize chlorophyll. Higher chlorophyll levels can result in darker green foliage, improving appearance. Even though shoot growth is reduced, photosynthesis is not reduced. However, if other factors are limiting the production of chlorophyll (nutrient availability, compaction, water-logged soil, etc.), little benefit can be expected.

Intermediates also appear to be used by plants to produce compounds that inhibit steroid production in fungi. Fungi require steroids to form cell membranes as they grow. Plants treated with paclobutrazol may have reduced levels of fungal disease when compared with nontreated plants. Research is continuing to investigate and document these observations.

### Key Benefits of Paclobutrazol:

- Slows the vertical growth, reducing mowing and clippings
- Enhances turf quality
- Reducing scalping potential

### PRECAUTIONS

Slightly irritant to eyes.

### FIRST AID

If in eyes, immediately irrigate with eyewash solution or clean water, holding the eyelids apart, for at least 15 minutes. Obtain immediate medical attention.

If on skin, take off immediately all contaminated clothing. Wash skin immediately with water,

followed by soap and water. Such action is essential to minimize contact with skin. Contaminated clothing should be laundered before re-issue. If swallowed, seek medical advice immediately and show the container, label or this literature if possible. Do not induce vomiting. If inhaled, remove patient from exposure, keep warm and at rest. Obtain medical attention as a precaution.

**DIRECTIONS OF USE**

Purpose	Dosage per acre	Active ingredient per acre
Cool season grasses  Well maintained turf: seedhead and foliar suppression	1 – 2 pt/43 to 200 gal water	0.25 – 0.5 lb

Apply in spring after greenup and after turf has been mowed once or twice. Apply at least 1 month before onset of high temperatures. In late summer-early fall, apply at least 1 month before anticipated first killing frost. Apply with 0.5 to 0.9 lb nitrogen per 1000 sq ft of a nonburning fertilizer. Apply 0.25 in of water within 24 hr after application to remove product from foliage and onto soil surface. See label for special rates and directions for application to bentgrass, putting greens, and overseeded bermudagrass. Repeat applications within the same growing season may be made but refer to label for instructions. Do not apply more than three times annually. Do not use on areas containing greater than 70% Poa annua. Do not seed within 6 weeks prior to or 2 weeks after applications.

Purpose	Dosage per acre	Active ingredient per acre
Warm season grasses  Well maintained turf: seedhead and foliar suppression	2 – 3 pt/43 to 200 gal water	0.5 – 0.75 lb

Use any time when established hybrid bermudagrass and St Augustine grass are green, are actively growing and have recovered from dormancy (filled in fully following winter). Apply with 0.5 to 0.9 lb nitrogen per 1000 sq ft of a non-burning fertilizer. Apply 0.25 in of water within 24 hr after application to remove product from foliage and onto soil surface. A repeat application within the same growing season may be made, but not sooner than 8 weeks following initial application. Do not apply more than 3 times annually. Do not use on areas containing greater than 70% Poa annua. Refer to label to determine bermudagrass and St Augustine cultivar response relating to sensitivity, growth and color

response. Do not seed within 6 weeks prior to or 2 weeks after application.

Purpose	Dosage per acre	Active ingredient per acre
Annual bluegrass: suppression	6.4 – 48 oz/43 -200 gal water	0.1 – 0.75 lb

Apply on hybrid bermudagrass, bentgrass, perennial ryegrass and Kentucky bluegrass/perennial ryegrass fairways, tees and roughs. Can also be applied to bentgrass putting greens. Apply in spring after greenup or regrowth has begun and after mowing once or twice. Apply with nonburning fertilizer. Apply 0.25in of water within 24 hr after application to remove product from foliage and onto soil surface. See label for rates and other directions for applications to bentgrass putting greens and overseeded bermudagrass. Do not apply more than 3 times annually. Do not use on areas containing greater than 70% Poa annua. For bentgrass putting greens, do not apply more than 0.25 lb active ingredient per acre per application.

Purpose	Dosage per acre	Active ingredient per acre
Overseeded bluegrass: foliar suppression	6.4 – 16 oz/43 -200 gal water	0.1 – 0.25 lb

Apply any time after overseeded turf has successfully established itself. Do not apply after March 15 to avoid delay in bermudagrass green-up. Apply within 0.25 to 0.5 lb N per 1000 sq ft of a nonburning fertilizer. Apply 0.25 in of water within 24 hr after application to remove product from foliage and onto soil surface. Repeat applications can be made but do not apply more than 3 times annually. Do not use on areas containing more than 70% Poa annua. Do not seed within 6 weeks prior to or 2 weeks after application. Do not apply to "Tirdwarf" putting greens.

**DISPOSAL METHODS**

Discarded product is not a hazardous waste under RCRA, 40 CFR 261. Do not contaminate ponds, waterways or ditches with chemical or used containers. Empty container retains product residue. Observe all hazard precautions. Do not distribute or make available, furnish or reuse empty container except for storage and shipment of original product. Remove all product residue from containers by triple rinsing and puncture or otherwise destroy empty containers before disposal.

**STORAGE CONDITION**

Keep in original containers, tightly closed, out of reach of children. Keep away from food, drink and animal feeding stuffs. Protect from frost. Do not store near feed, food or within the reach of children. Avoid contact with skin and eyes.

For More Details including effects on environment email [contact@ivorychem.com](mailto:contact@ivorychem.com) with Subject "MOWPACDETAILS"

More Details:

#### TOXICOLOGICAL STUDIES

- **Acute toxicity:** Technical
  - Acute oral toxicity (rat): 1.95 g/kg (male), 1.33 g/kg (female), Toxicity Category III
  - Acute dermal toxicity (rat): Greater than 2 g/kg, Toxicity Category III
  - Primary skin irritation (rabbit): Paclobutrazol caused mild skin irritation. Toxicity Category III
  - Primary eye irritation (rabbit): Paclobutrazol caused reversible corneal opacities with irritation lasting 72 hours. Toxicity Category II
  - Dermal sensitization (guinea pig): Paclobutrazol is not a skin sensitizer.
- 50% Formulation:
  - Acute inhalation toxicity (rat): Greater than 766 mg/cu. m (male), 359-766 mg/cu. m (female), Toxicity Category II
- **Chronic toxicity:** 21-day dermal (rabbit): NOEL is 10 mg/kg/day, LEL is 100 mg/kg/day
  - 90-day feeding (rat): NOEL is 250 ppm, LEL is 1,250 ppm
  - One year feeding (dog): NOEL is 15 mg/kg/day, LEL is 75 mg/kg/day
  - Teratology (rat): NOEL (maternal toxicity) is greater than 100 mg/kg/day (highest dose tested). NOEL (fetal effects) is 10 mg/kg/day.
  - Teratology (rabbit): Within limitations of study (low fertility), NOEL (maternal toxicity) is 25 mg/kg/day. LEL is 75 mg/kg/day.
  - Mutagenicity: Paclobutrazol does not cause mutagenic effects.
  - Metabolism: Results from rat and dog studies indicate that paclobutrazol and its

metabolites are rapidly eliminated.

- Major routes of exposure: Mixers, loaders, and applicators would receive the most exposure via skin/eye contact and inhalation.

PHYSIOLOGICAL AND BIOCHEMICAL BEHAVIORAL CHARACTERISTICS  
Mechanism of pesticidal action: Paclobutrazol acts as a plant growth regulator and reduces regrowth in ornamental trees following trimming.

#### ENVIRONMENTAL CHARACTERISTICS

- Adsorption and leaching in basic soil types: Paclobutrazol could leach in sandy soils with low organic content. In other soil types, the chemical does not have a high propensity to leach.
- Loss from photodegradation: Paclobutrazol does not photodegrade after exposed to 10 days of simulated sunlight.
- Resultant average persistence: Paclobutrazol degrades aerobically in soil with half-lives of about 1-7 months depending upon soil type. Paclobutrazol is not expected to hydrolyze in the environment.

#### ECOLOGICAL CHARACTERISTICS

- Avian acute oral toxicity (Mallard): greater than 7,913 mg/kg
- Avian dietary toxicity (Bobwhite quail): greater than 5,000 ppm
- Avian dietary toxicity (Mallard): greater than 20,000 ppm
- Fish acute toxicity (Bluegill): 23.6 mg/l
- Fish acute toxicity (Rainbow trout): 27.6 mg/l
- Aquatic invertebrate toxicity (Daphnia magna): 33.2 mg/l
- Potential problems related to endangered species: Minimal hazard to endangered species is expected because of the low toxicity of paclobutrazol and proposed use (tree injection).

#### SUMMARY SCIENCE STATEMENT

The data base for paclobutrazol (non-food uses) is well developed. Results of acute inhalation (50% formulation) and eye irritation studies indicate toxicity category II. The chemical is non-mutagenic and is rapidly cleared from body tissue

(rat and dog studies). Except for sandy soils, paclobutrazol does not exhibit a tendency to leach. The chemical does not photodegrade and is not expected to hydrolyze. Hazards to aquatic and terrestrial wildlife are not anticipated because of low toxicity and low risk of exposure (tree injection system).

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## PHYSICAL PROPERTIES AND GUIDELINES

### Physical Properties:

- **Synonyms:** Beta-((4-chlorophenyl)methyl)-alpha-(1,1-dimethylethyl)-1H-1,2,4-triazole-1-ethanol, (R\*,R\*)-(+/-)-; Bonsai; Cultar; (RS,3RS)-1-(4-chlorophenyl)-4,4-dimethyl-2-(1H-1,2,4-triazol-1-yl)pentan-3-ol; (+/-)-R\*,R\*-beta-((4-chlorophenyl)methyl)-alpha-(1,1-dimethylethyl)-1H-1,2,4-triazol-1-ethanol
- **CAS No.:** 76738-62-0
- **Molecular Weight:** 293.80
- **Molecular Formula:** C<sub>15</sub>H<sub>20</sub>ClN<sub>3</sub>O
- **Physical state:** liquid
- **Color:** white
- **Odor:** not significant
- **Melting point:** 165-166 degrees C
- **Density:** 1.22g/cubic cm
- **Vapor pressure:** 1.5 x 10<sup>(-4)</sup> Pa at 50 degrees C. 8 x 10<sup>(-6)</sup> Pa at 30 degrees C. 1 x 10<sup>(-6)</sup> Pa at 20 degrees C (by extrapolation)
- **Solubility:** Water 35 ppm. Cyclohexanone 18%. Methanol 15%. Acetone 11%. Methylene dichloride 10%. Xylene 6%. Propylene glycol 5%. Hexane <1%.
- **Oxidizing properties:** Not applicable
- **Octanol/water partition coefficient:** Log P 3.2
- **Unusual handling characteristics:** None



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