

Product Data Sheet

Product Name: Paclobutrazol

Cat. No.: GC47854

Chemical Properties

Cas. No. 76738-62-0

SMILES C1C=CC=C(C[C@]([C@@H](O)C(C)(C)C)([H])N2N=CN=C2)C=C1

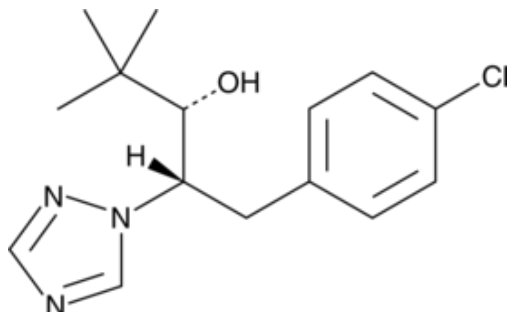
Formula C₁₅H₂₀ClN₃O M.Wt 293.8

Solubility DMF: 10 mg/ml, DMSO: 10 mg/ml, Ethanol: 10 mg/ml, Ethanol: PBS (pH 7.2) (1:1): 0.5 mg/ml
Storage Store at -20°C

General tips For obtaining a higher solubility, please warm the tube at 37 °C and shake it in the ultrasonic bath for a while. Stock solution can be stored below -20°C for several months.

Shipping Condition Evaluation sample solution: ship with blue ice. All other available sizes: ship with RT, or blue ice upon request.

Structure



Protocol

Cell experiment [1]:

Cell lines HepaRG hepatocytes

Caution: Product has not been fully validated for medical applications. For research use only.

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Preparation Method HepaRG cells were seeded on 96-well plates at a density of 8×10^4 cells/well and cultured in RPMI 1640 medium supplemented with 10% fetal bovine serum and 1% penicillin-streptomycin under a humidified atmosphere containing 5% CO₂ at 37°C until they reached the logarithmic growth phase. Paclobutrazol (90, 180, and 360μM) was dissolved in DMSO and incubated in FBS-free complete medium for 72h.

Reaction Conditions 90, 180, and 360μM; 72h

Applications Paclobutrazol inhibited cell viability in a dose-dependent manner, induced apoptosis, and impaired autophagy via the AMPK/mTOR signaling pathway.

Animal experiment [2]:

Animal models Sprague-Dawley rats

Preparation Method Rats were randomly divided into five groups (n = 16) and exposed to Paclobutrazol via gavage for 28 days. The doses were designed based on previous studies and were equal to 1/5 and 1/40 of the LD50 of Paclobutrazol. For paclobutrazol, both male and female rats were exposed to low dose of 32.5mg/kg (Paclobutrazol) and high dose of 260mg/kg (H-Paclobutrazol). The control group received 0.5% CMC-Na solution (2ml/200g).

Dosage form 32.5mg/kg (low dose) and 260mg/kg (high dose); via gavage.

Applications Paclobutrazol significantly reduced the levels of thyroid hormone T4 in rat serum, increased thyroid follicular cell inflammation and follicular deformation, and disrupted the function of the thyroid endocrine system.

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References:

- [1] Luo Y, Lu S, Sun X, et al. Paclobutrazol exposure induces apoptosis and impairs autophagy in hepatocytes via the AMPK/mTOR signaling pathway. J Biochem Mol Toxicol. 2021 Oct;35(10):e22874.
- [2] Liu H, Xu Y, Wang Y, et al. Study on endocrine disruption effect of paclobutrazol and uniconazole on the thyroid of male and female rats based on lipidomics. Ecotoxicol Environ Saf. 2022 Apr 1;234:113386.

Background

Paclobutrazol is a highly efficient plant growth regulator that functions by inhibiting the biosynthesis of gibberellins, which are plant hormones responsible for stem elongation and other growth processes^[1]. Paclobutrazol can be absorbed by plant roots and transported to the stem, making it an important tool for modulating plant structure and enhancing agricultural productivity^[2]. Studies have shown that the inhibitory effect of Paclobutrazol on gibberellin production varies among different plant species but generally lies in the low micromolar range^[3]. Additionally, Paclobutrazol has been found to cause embryotoxicity in zebrafish^[4].

In vitro, pre-treatment of HepaRG hepatocytes with Paclobutrazol (90–360 μ M) for 72 hours significantly reduced cell viability, increased oxidative stress levels, and elevated the apoptosis rate. Moreover, Paclobutrazol impaired autophagy by inhibiting the AMPK/mTOR signaling pathway, thereby exacerbating apoptosis^[5]. Pre-treatment of free endosperm cells from *Cucurbita maxima* with Paclobutrazol (9.5nM) significantly inhibited the activity of ent-kaurene oxidase. Additionally, the azido derivative of Paclobutrazol (AZP) bound to cytochrome P450 in *Cucurbita maxima* microsomes and induced a Type II spectral change, with an apparent binding constant of 0.24 $\pm$ 0.04 μ M^[6].

In vivo, exposure of zebrafish (*Danio rerio*) to Paclobutrazol (10mg/L) for 14 days significantly induced oxidative stress, increased the levels of malondialdehyde (MDA) and protein carbonyl (PC), and decreased the activities of superoxide dismutase (SOD) and catalase (CAT). Paclobutrazol also exhibited neurotoxicity in zebrafish^[7]. Paclobutrazol (32.5mg/kg and 260mg/kg) was administered via gavage to 6–8-week-old Sprague-Dawley rats for 28 days. Paclobutrazol significantly reduced the levels of thyroid hormone T4 in rat serum, increased thyroid follicular cell inflammation and follicular

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deformation, and disrupted the function of the thyroid endocrine system^[8].

References:

- [1] Xu Y, Zhu Y, Wang X, et al. PACLOBUTRAZOL-RESISTANCE4 positively regulates cell expansion to promote tendril elongation in cucumber. *Plant Physiol.* 2023 Aug 3;192(4):2756-2767.
- [2] Urfan M, Hakla HR, Sharma S, et al. Paclobutrazol improves surface water use efficiency by regulating allometric trait behavior in maize. *Chemosphere.* 2022 Nov;307(Pt 3):135958.
- [3] Zhang Y, He Z, Xing P, et al. Effects of paclobutrazol seed priming on seedling quality, photosynthesis, and physiological characteristics of fragrant rice. *BMC Plant Biol.* 2024 Jan 17;24(1):53.
- [4] Hussain A, Audira G, Siregar P, et al. Waterborne Exposure of Paclobutrazol at Environmental Relevant Concentration Induce Locomotion Hyperactivity in Larvae and Anxiolytic Exploratory Behavior in Adult Zebrafish.
- [5] Luo Y, Lu S, Sun X, et al. Paclobutrazol exposure induces apoptosis and impairs autophagy in hepatocytes via the AMPK/mTOR signaling pathway. *J Biochem Mol Toxicol.* 2021 Oct;35(10):e22874.
- [6] Hallahan DL, Heasman AP, Grossel MC, et al. Synthesis and biological activity of an azido derivative of paclobutrazol, an inhibitor of gibberellin biosynthesis. *Plant Physiol.* 1988 Dec;88(4):1425-9.
- [7] Guo D, Luo L, Kong Y, et al. Enantioselective neurotoxicity and oxidative stress effects of paclobutrazol in zebrafish (*Danio rerio*). *Pestic Biochem Physiol.* 2022 Jul;185:105136.
- [8] Liu H, Xu Y, Wang Y, et al. Study on endocrine disruption effect of paclobutrazol and uniconazole on the thyroid of male and female rats based on lipidomics. *Ecotoxicol Environ Saf.* 2022 Apr 1;234:113386.

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