



# SHUTTLE™

## Miticide

TECHNICAL INFORMATION BULLETIN



Arvesta  
T&O



## INTRODUCTION

**SHUTTLE™ Miticide** is a novel and chemically unique naphthoquinone derivative being developed as an acaricide by Arvesta Corporation for use on ornamentals.

**SHUTTLE** provides excellent control of two-spotted mite, red mite, and related species. Due to its unique mode of action, **SHUTTLE** does not demonstrate cross-resistance to resistant mite species.

**SHUTTLE** has a very favorable toxicological and ecotoxicological profile and has been classified by the EPA as a reduced risk compound. Because it has no impact on numerous predacious species, it is an excellent candidate for Integrated Pest Management (IPM) programs.

CHEMICAL NAME  
AND STRUCTURE

**Chemical Name:** 3-dodecyl-1,4-dihydro-1,4-dioxo-2-naphthyl acetate

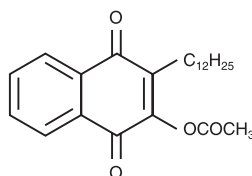
**Chemical Class:** Naphthoquinone derivative

**CAS Registry:** 57960-19-7

**Common Name:** Acequinocyl (ISO proposed)

**Trade Name:** **SHUTTLE™** (For ornamentals only)

Structural Formula:



**Molecular Formula:** C<sub>24</sub>H<sub>32</sub>O<sub>4</sub>

**Molecular Weight:** 384.5

PHYSICAL AND  
CHEMICAL  
PROPERTIES

**Appearance:** Yellowish fine powder

**Vapor Pressure:** 1.69 x 10<sup>-6</sup> Pa at 25 °C

**Melting Point:** 59.6 °C

**Solubility in Water at 25 °C:** < 10<sup>-6</sup> g/L



**FORMULATION** 15% SC (Suspension Concentrate)

**MODE OF ACTION** A major metabolite of SHUTTLE is deacetylated in mite mitochondria and binds to the Q<sub>o</sub> center of Complex III causing an inhibition of electron transfer. Existing commercial acaricides block electron transfer at Complex I, thus SHUTTLE is considered to have a unique mode of action and provides excellent control of mites resistant to existing acaricides. SHUTTLE acts primarily by contact action on various mite species and secondarily by ingestion.

**SPECTRUM OF ACTIVITY** SHUTTLE provides excellent activity against various species of mites such as *Tetranychus urticae* and *Oligonychus unuguis* (Jacobi).

**PROPOSED LABEL**

CROPS	Formulation	Application Method	Target Pests	Application Rate
Ornamentals (Except for Rose and Impatiens)	15 SC	Foliar	Two-spotted spider mite Spruce spider mite	6.4-12.8 fl oz / 100 gallons of water
Ornamentals (Rose and Impatiens)	15 SC	Foliar	Two-spotted spider mite Spruce spider mite	6.4 fl oz / 100 gallons of water

Do not use SHUTTLE on miniature roses.

**RESISTANCE MANAGEMENT**

SHUTTLE does not show cross-resistance to other acaricides because of its new and unique mode of action. To reduce selection pressure which can lead to the development of resistance, it is recommended that SHUTTLE be rotated with acaricides that belong to different chemical classes.

Always consult with your local agricultural specialist for guidance and information on area resistance management programs. In the absence of a locally coordinated program, the following IPM strategy will help to ensure the prolonged usefulness of SHUTTLE and conventional acaricides.

1. Incorporate IPM techniques into your insect/mite control program.
2. Ensure thorough spray coverage of all foliage or all plant parts to be treated.
3. Always apply SHUTTLE at the recommended rates and apply as soon as threshold infestations are observed. (Do not use less than labeled rates when applied alone or in tank mixtures.)
4. Avoid using SHUTTLE in two consecutive applications. Rotation with other acaricides having different modes of action is recommended.

**ECOLOGICAL INFORMATION**

**Eco Tox:** Aquatic Organism Toxicity  
 Carp LC<sub>50</sub>: > 96.5 mg ai/L (96hr)  
 Rainbow trout LC<sub>30</sub>: > 33.0 mg ai/L (96hr)  
 Water flea (Daphnia magna) EC<sub>50</sub>: 0.0039 mg ai/L (48hr)

**MAMMALIAN TOXICITY**

**Toxicology:** (Technical grade active ingredient)

TEST	SPECIES	Toxicology Data	Classification
Oral LD <sub>50</sub>	Rat	>5,000 mg/kg	IV
Dermal LD <sub>50</sub>	Rat	>2,000 mg/kg	III
Inhalation LC <sub>50</sub>	Rat	> 0.84 mg/L	III
Eye Irritation	Rabbit	very slight	IV
Skin Irritation	Rabbit	very slight	IV
Skin Sensitization	Guinea Pig	Negative	Not a Sensitizer

**Mutagenicity:** Negative in all tests.

**Subchronic:** Not available.

**Chronic/Carcinogenicity:** Not carcinogenic.

**Teratology:** No teratogenicity evident in any study.

**PRECAUTIONS AND FIRST AID**

**CAUTION: KEEP OUT OF REACH OF CHILDREN**

- Avoid contact with eyes, skin, or clothing. Harmful if absorbed through skin.
- In the case of an emergency, call 1-800-228-5635 Ext. 174 or 1-612-221-3999 Ext. 174.

**Statement of First Aid Measures:**

**IF INHALED:**

- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.
- Call a poison control center or doctor for further treatment advice.

**IF ON SKIN OR CLOTHING:**

- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for further treatment advice.

**IF IN EYES:**

- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for further treatment advice.

**IF SWALLOWED:**

- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by the poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment.

**FOR 24-HOUR EMERGENCY MEDICAL ASSISTANCE: CALL 1-800-228-5635, EXT. 174**

**FOR 24-HOUR CHEMICAL EMERGENCY (SPILL, LEAK, FIRE OR ACCIDENT) ASSISTANCE: CALL CHEMTREC 1-800-424-9300**

**IMPORTANT NOTICE**

Where this product has been approved or registered, it should be used in accordance with the instructions and directions on the label. **NO COMMERCIAL USE OF THIS PRODUCT SHOULD BE MADE IN ANY COUNTRY UNTIL IT HAS BEEN REGISTERED OR APPROVED FOR SUCH USE IN THAT COUNTRY.** The information and statements herein are based upon the results of tests and experiments conducted to date. Nothing herein should be construed as a warranty nor do we assume legal responsibility for liability that may arise from the use of the product.

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The instructions for the use of this product reflect the opinion of experts based on experimental use to date. They are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond our control. In addition, further experimental use may result in revisions of such instructions and the deletion of certain uses for which the product may be recommended. The user shall assume all such risks. The product must not be used commercially until proper government registrations and approvals have been obtained and then only in accordance with the label directions and instructions.

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