

# AMTicide® Coconut

Patent Pending: Application Number 62/139,908

## Technical Data Sheet

### BACKGROUND

Active Micro Technologies drives innovation in the development of effective, natural products that provide skin and hair conditioning benefits, along with providing natural antimicrobial activity. As our original Leucidal® product line continues to flourish, we still had the need for an antifungal product to round out our portfolio. This need left us with a long road of trial and error, in efforts to develop a marketable, yet effective antifungal booster. **AMTicide® Coconut** was developed to be used in conjunction with our antimicrobials, however it can be used alongside any preservative package for protection against yeast and mold.

### SCIENCE

Active Micro Technologies began investigating the known antimicrobial effects of medium chain triglycerides (MCT's). MCT's, including lauric acid, have natural antifungal activity and work by disrupting the cellular structures of fungus, thus essentially destroying them before they can wreak havoc. Coconut oil is rich in MCT's, particularly lauric acid, which comprises ~50% of its total fatty acid content. Coconut oil has been an important component of the Ayurveda tradition, popular among people of the tropics and currently at the center of a health craze in the U.S. First, it was coconut water for hydration, then coconut oil for health and now coconut is popping up in just about every industry.

Coconut oil was traditionally used to treat skin disorders, yeast infections, ringworm and even athlete's foot - skin issues that are all a type of yeast infection. Yeast and mold are types of fungus that can be inconspicuous because of their small size and structure and can flourish in our favorite skin care and cosmetic products. This can lead to not only destruction of cosmetics, but it can also create a health hazard. Natural antimicrobial products are similar to synthetic preservatives systems, in that they are effective against bacteria, however not as effective against fungus, specifically yeast and mold.

**Code Number:** M14003

**INCI Nomenclature:** Lactobacillus & Cocos Nucifera (Coconut) Fruit Extract

**INCI Status:** Approved

**REACH Status:** Fully Compliant

**CAS Number:** 68333-16-4 & 8001-31-8

**EINECS Number:** 232-282-8

**Origin:** Biotechnology/Botanical:

*Lactobacillus & Cocos nucifera*

**Processing:**

GMO Free

No Ethoxylation

No Irradiation

No Sulphonation

No Ethylene Oxide treatment

No Hydrogenation

**Additives:** None

-Preservatives: None

-Antioxidants: None

**Other additives:** None

**Solvents used:** Water

**Appearance:** Clear to Slightly Hazy Liquid

**Soluble/Miscible:** Water

**Suggested Use Levels:** 2.0 - 4.0%

**Suggested Applications:**

Moisturization, Skin/Scalp Conditioning, Antifungal



# AMTicide® Coconut

Patent Pending: Application Number 62/139,908

**AMTicide® Coconut** is developed by fermenting *Cocos nucifera* (Coconut) fruit with *Lactobacillus* to deliver a non-irritating, effective and multifunctional product. Fermentation is an important process that can increase the bioavailability of natural phytochemicals, which can uncover wide array of benefits. This highly marketable product can provide moisturizing and conditioning benefits in hair and skin care applications. In addition, it is effective at preventing the growth of fungus, specifically yeast and mold, making it the perfect addition to any formulation.

## BENEFITS

An *in-vivo* skin moisturization study was performed using an untreated control, generic cream base, and an experimental with the same cream base containing 2.0% **AMTicide® Coconut** to evaluate **AMTicide® Coconut's** ability to increase moisture levels. Ten (M/F) subjects between the ages of 23 - 45 participated in the study. A DermaLab Corneometer was used to measure the moisture levels on the subject's volar forearms. The Corneometer is an instrument that measures the amount of water within the skin. Baseline measurements were taken on day one of the study. Following initial measurements, all subjects were to apply 2.0 mg of the test materials to the denoted area on their respective forearms, twice a day for four weeks. The average increase in moisturization is shown in Figure 1 below.

## Increase in Moisturization

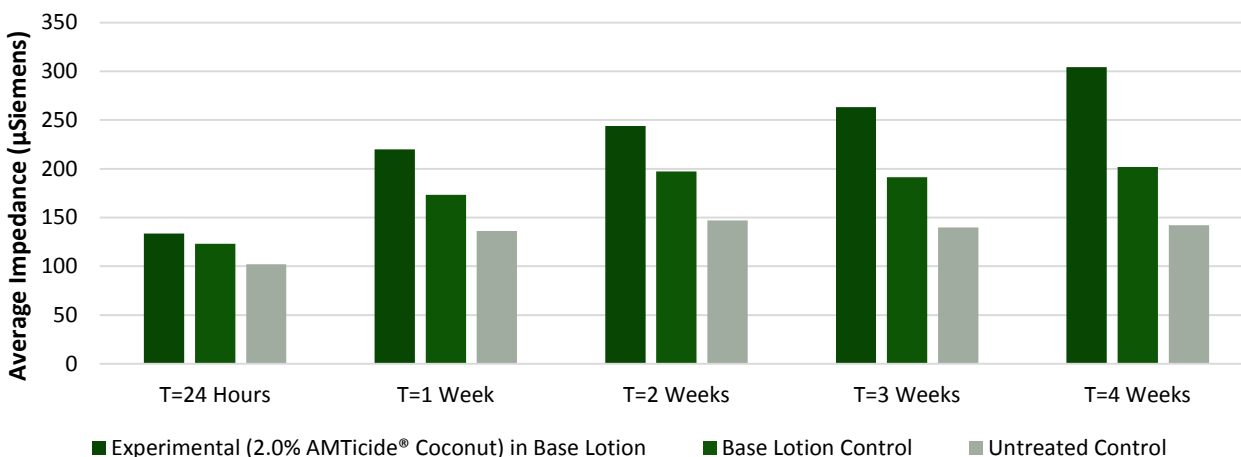


Figure 1. Increase in Moisturization for **AMTicide® Coconut**.

# AMTicide® Coconut

Patent Pending: Application Number 62/139,908

Comparative moisturization results from this study are shown in Figure 2. As demonstrated by the results of this study, the addition of 2.0% **AMTicide® Coconut** improved moisture levels by 30.88% after 24 hours and by 114.20% after four weeks when compared to the untreated control. When compared to the base cream **AMTicide® Coconut** improved moisturization by 8.95% and after 24 hours and by 50.70% after four weeks. Based on these results, adding this innovative product provides the formulator the opportunity to capitalize on both the natural antimicrobial properties of **AMTicide® Coconut**, as well as its ability to provide potent moisturizing benefits to the cosmetic formulation.

## Comparative Moisturization

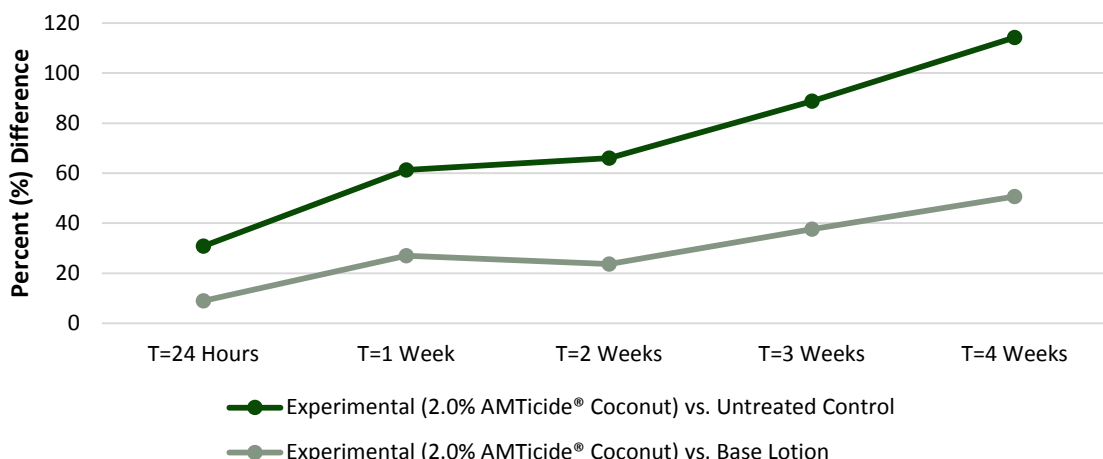


Figure 2. Percent Difference in Moisturization for **AMTicide® Coconut**.

One of the first steps in the development of this product was to determine the products potential ability to inhibit the growth of yeast and mold. Using standard serial dilution protocols in growth media, the Minimum Inhibitory Concentrations (MICs) for **AMTicide® Coconut** were determined for both yeast and mold organisms. The results of these tests are shown in Figure 3.

Microorganism Tested	MIC (%)
<i>A. brasiliensis</i>	0.50
<i>C. albicans</i>	0.50

Figure 3. MIC Data for **AMTicide® Coconut**.

The positive MIC screening results warranted further testing to confirm its ability to provide product preservation. Double Challenge Tests were completed using 4.0% **AMTicide® Coconut** in a generic cream base formulation by itself, 2.0% **AMTicide® Coconut** with 2.0% Leucidal® Liquid in a generic cream base formulation, and 2.0% **AMTicide® Coconut** with 2.0% Leucidal® Liquid SF in a generic cream base formulation.

# AMTicide® Coconut

Patent Pending: Application Number 62/139,908

Every challenge test was performed at each pH of 3, 5, and 7. Samples were inoculated with the microorganisms *E. Coli*, *P. aeruginosa*, *S. aureus*, *A. brasiliensis*, and *C. albicans*. During the first 28-day incubation period, samples were periodically collected and tested for the presence of these fungi. After 28 days of incubation, the cream samples were then re-inoculated with the cultures and sampled over an additional 28-day period. Figure 4 shows the challenge test results for 4.0% **AMTicide® Coconut** in a generic cream formulation at pH 5.

## 4.0% AMTicide® Coconut in Cream Formula Challenge Test - pH 5

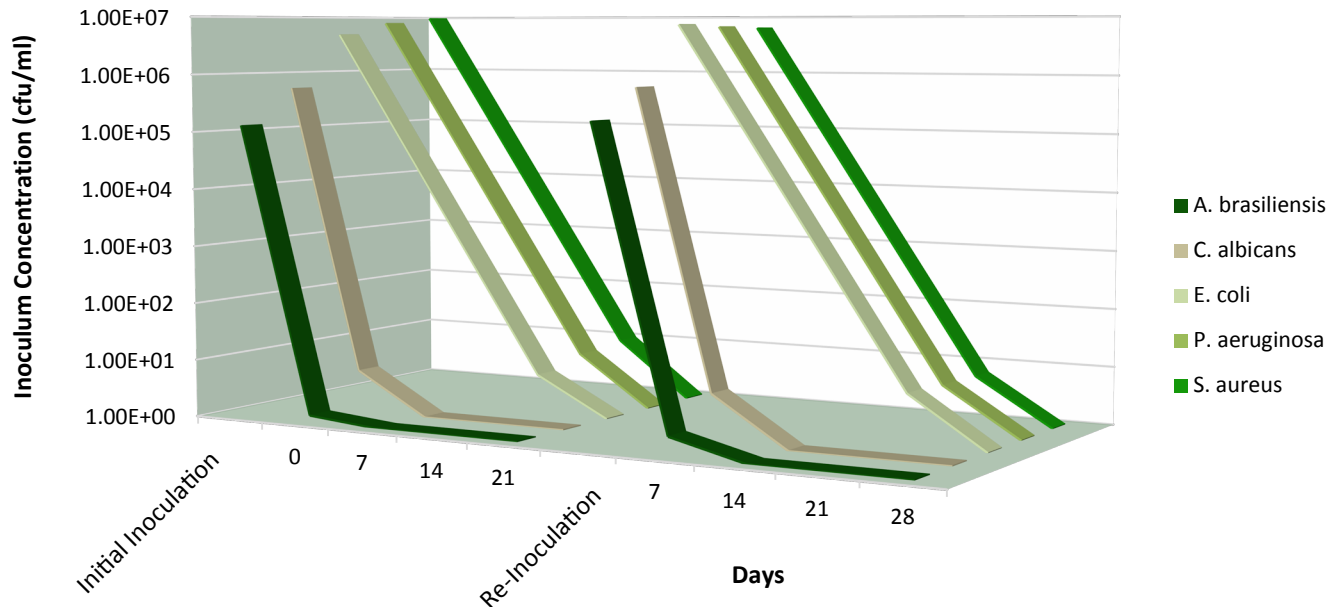


Figure 4. Challenge Test results for Generic Cream Formula pH 5 with 4.0% **AMTicide® Coconut** inoculated on Day 0 and re-inoculated on Day 28. Results show log reduction in viable organisms.

**AMTicide® Coconut** was developed to be coupled with one of our broad-spectrum antimicrobials, such as Leucidal® Liquid SF, or perhaps any preservative package that is lacking protection against yeast and mold. This added boost of antifungal activity is the natural additive that will protect your product and consumers. Figure 5 shows the positive broad-spectrum challenge test results for 2.0% **AMTicide® Coconut** with 2.0% Leucidal® Liquid SF in a generic cream formulation at pH 5.



## 2.0% AMTicide® Coconut and 2.0% Leucidal® Liquid SF in Cream Formula Challenge Test - pH 5

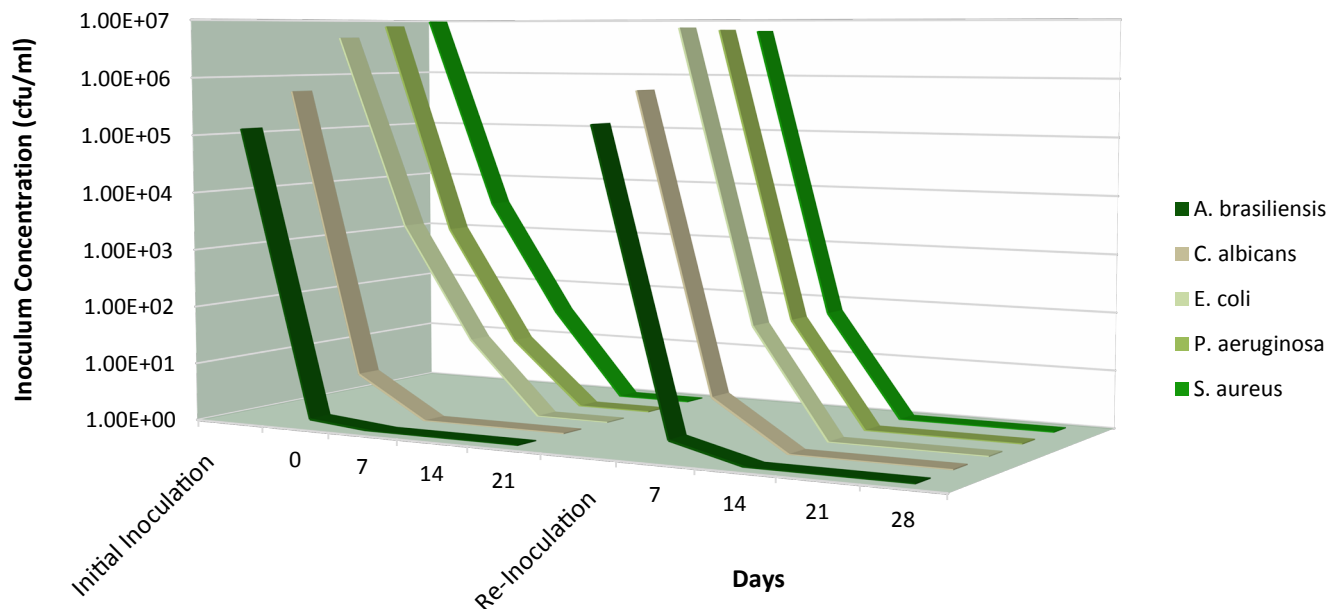


Figure 5. Challenge Test results for Generic Cream Formula pH 5 with 2.0% **AMTicide® Coconut** and 2.0% Leucidal® Liquid SF inoculated on Day 0 and re-inoculated on Day 28. Results show log reduction in viable organisms.

A Time Kill Test was performed to determine the change in population of aerobic microorganisms within a specified sampling time when tested against 4.0% **Leucidal® Liquid Complete** solution. The activity of the test material inoculated was evaluated at determine time intervals of 30 seconds, 1, 5, 10 and 30 minutes after the inoculation to determine quantitatively the number of viable microorganisms remaining after the incubation time. As shown in Figure 6, the Gram-positive and Gram-negative bacteria as well as the yeast and mold were reduced by 99.9% within 30 seconds interval of the test after the inoculation. **AMTicide® Coconut** exhibits bacteriostatic activity and fungicidal activity, meaning that **AMTicide® Coconut** is able to inhibit the growth of bacteria for a short amount of time before the bacteria is able to reproduce again. The Challenge Test evaluates a longer time of contact where the bacteria is able to get back into its reproduction stage, and **AMTicide® Coconut** is no longer effective at stopping/preventing bacterial growth. For mold and yeast, **AMTicide® Coconut** has fungicidal activity as it is able to reduce growth from time zero, and also able to inhibit the growth for the duration of the Double Challenge Test.

# AMTicide® Coconut

Patent Pending: Application Number 62/139,908

## 4.0% AMTicide® Coconut Time Kill Test

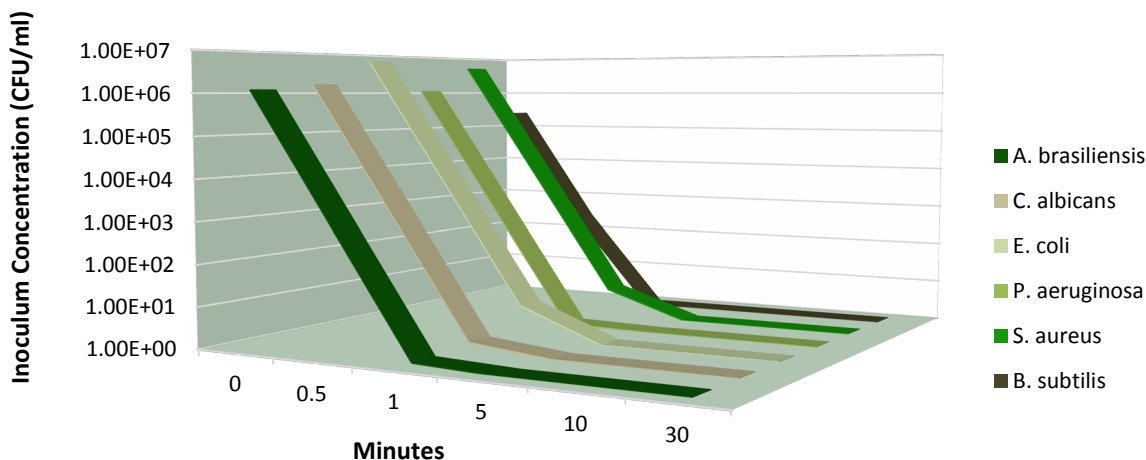


Figure 6. Time Kill Test results for 4.0% **AMTicide® Coconut**.

## USE RECOMMENDATIONS

As with all biological materials, some attention must be paid to the conditions under which **AMTicide® Coconut** is used. Based on bench-scale evaluations, as well as actual product applications, **AMTicide® Coconut** has been found to be effective over a wide range of typical cosmetic and personal care product manufacturing conditions. The product has been found to be heat stable up to 70°C and active under both acidic (pH 3) and basic conditions (pH 8).



## Inhibition Activity Data

107 Technology Drive • Lincolnton, NC 28092  
(704) 276-7100 • Fax (704) 276-7101

Product Name: AMTicide® Coconut  
Code Number: M14003  
Lot Number: 7176P  
CAS #'s: 68333-16-4 & 8001-31-8  
EINECS #'s: N/A & 232-282-8  
INCI Name: *Lactobacillus* & *Cocos Nucifera* (Coconut) Fruit Extract

Organism (ATCC #)	Minimum Inhibitory Concentration (%)
<i>C. albicans</i> #10231	0.5
<i>A. brasiliensis</i> #16404	0.5

QA Signature \_\_\_\_\_ Monica Beltran

Date \_\_\_\_\_ March 26, 2020

This is an Electronically Generated Document

This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied.  
This information is offered solely for your investigation, verification, and consideration.



## Compositional Breakdown

107 Technology Drive • Lincolnton, NC 28092  
(704) 276-7100 • Fax (704) 276-7101

---

### AMTicide® Coconut Code: M14003

Compositional Breakdown:

Ingredient	%
Lactobacillus	80.00
Cocos Nucifera (Coconut) Fruit Extract	20.00

- **To our knowledge the above material is free of the following list of heavy metals:**
  - **Heavy Metals < 20 ppm (Max.)**
  - **Lead < 10 ppm (Max.)**
  - **Antimony < 5 ppm (Max.)**
  - **Arsenic < 2 ppm (Max.)**
  - **Mercury < 1 ppm (Max.)**
  - **Cadmium < 1 ppm (Max.)**

This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied.  
This information is offered solely for your investigation, verification, and consideration.





## Compositional Breakdown

107 Technology Drive • Lincolnton, NC 28092  
(704) 276-7100 • Fax (704) 276-7101

This is to certify that AMTicide® Coconut does not contain, neither directly nor through cross contamination, any of the 26 allergenic flavors or fragrances (Gas Chromatography-Mass Spectrometer Coupled):

ALLERGENS listed in Annex III of EU Cosmetic Regulation(EC) No. 1223/2009 amending EU Directive 2003/15/EC		
INCI NAME	CAS NUMBER	Limit (ppm)
Alpha-IsoMethyl Ionone	127-51-5	< 0.02
Amyl Cinnamal	122-40-7	< 0.10
Anise Alcohol	105-13-5	< 0.00
Benzyl Alcohol	100-51-69	< 0.01
Benzyl Benzoate	120-51-4	< 0.09
Benzyl Cinnamate	103-41-3	< 0.30
Benzyl Salicylate	118-58-1	< 0.06
Butylphenyl Methylpropional	80-54-6	< 0.50
Cinnamal	104-55-2	< 0.01
Cinnamyl Alcohol	104-54-1	< 0.30
Citral	5392-40-5	< 1.00
Citronellol	106-22-9	< 1.00
Coumarin	91-64-5	< 0.00
Eugenol	97-53-0	< 0.70
Farnesol	4602-84-0	< 0.04
Geraniol	106-24-1	< 0.08
Hexyl Cinnamal	101-86-0	< 0.40
Hydroxycitronellal	107-75-5	< 1.00
Hydroxymethylpentyl 3-Cyclohexene carboxaldehyde	31906-04-4	< 0.00
Isoeugenol	97-54-1	< 0.06
Limonene	5989-27-5	< 0.05
Linalool	78-70-6	< 0.00
Methyl 2 Octynoate	111-12-6	< 0.20
Evernia prunastri	90028-68-5	< 0.00
Evernia furfuracea	90028-67-4	< 0.00
Amylcinnamyl Alcohol	101-85-9	< 1.00

This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied.  
This information is offered solely for your investigation, verification, and consideration.



## Compositional Breakdown

107 Technology Drive • Lincolnton, NC 28092  
(704) 276-7100 • Fax (704) 276-7101

This is to certify that AMTicide® Coconut does not contain pesticide levels exceeding the following (Reverse Phase High Performance Liquid Chromatography-Mass Spectrometer Coupled):

EPA Pesticide Levels	
INCI NAME	LIMIT (mg/kg)
Alachlor	< 0.02
Aldrin and Dieldrin	< 0 .05
Azinphos-methyl	< 1. 00
Bromopropylate	< 3.0 0
Chlordane(cis and trans)	< 0.05
Chlorfenvinphos	< 0.50
Chlorpyrifos	< 0.20
Chlorpyrifos-methyl	< 0.10
Cypermethrin	< 1.00
DDT	< 1.00
Deltamethrin	< 0.50
Diazinon	< 0.50
Dichlorvos	< 1.00
Dithiocarbamates	< 2.00
Endosulfan	< 3.00
Endrin	< 0.05
Ethion	< 2.00
Fenitrothion	< 0.50
Fenvalerate	< 1.50
Fonofos	< 0.05
Heptachlor	< 0.05
Hexachlorobenzene	< 0.10
Hexachlorocyclohexane	< 0.30
Lindane	< 0.60
Malathion	< 1.00
Methidathion	< 0.20
Parathion	< 0.50

This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied.  
This information is offered solely for your investigation, verification, and consideration.



## Compositional Breakdown

107 Technology Drive • Lincolnton, NC 28092  
(704) 276-7100 • Fax (704) 276-7101

Parathion-methyl	< 0.20
Permethrin	< 1.00
Phosalone	< 0.10
Piperonyl butoxide	< 3.00
Pirimiphos-methyl	< 4.00
Pyrethrins	< 3.00
Quintozone(sum of 3 items)	< 1.00

This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied.  
This information is offered solely for your investigation, verification, and consideration.

Patent Pending: Application Number 62/139,908

## **Specification**

**Product Name:** AMTicide® Coconut  
**Code Number:** M14003  
**CAS #'s:** 68333-16-4 & 8001-31-8  
**EINECS #'s:** N/A & 232-282-8  
**INCI Name:** Lactobacillus & Cocos Nucifera (Coconut) Fruit Extract

<b>Specification</b>	<b>Parameter</b>
Appearance	Clear to Slightly Hazy Liquid
Color	5 Gardner Maximum
Odor	Characteristic
pH	7.0 – 9.0
Solids (1g-105°C-1hr)	20.0 – 25.0%
Heavy Metals	< 20 ppm
Lead	< 10 ppm
Arsenic	< 2 ppm
Cadmium	< 1 ppm
Lipopeptide Content	0.5% Minimum
Minimum Inhibitory Concentration <sup>1</sup> Organism (ATCC#)	
C. albicans (#10231)	0.25 – 2.00%
A. brasiliensis (#16404)	0.25 – 2.00%

**DO NOT FREEZE; Store at or near room temperature;  
Mix well prior to use; May Sediment upon Standing**

Product may change appearance if exposed to cold temperatures during shipment or storage.  
If this happens, please gently warm to 45-50°C and mix until normal appearance is restored.

Note:

1) Refer to Inhibition Activity Data

This information is presented in good faith but is not warranted as to accuracy of results. Also, freedom from patent infringement is not implied.  
This information is offered solely for your investigation, verification, and consideration.