

DSM Food Specialties: Better Food for Everyone

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Bright Science. Brighter Living™

HEALTH • NUTRITION • MATERIALS

DSM Life Sciences and Material Sciences company

active in: nutrition health materials

We create solutions to bring healthier, better performing and more sustainable products to the lives of people today and for generations to come.

Net sales Workforce about € 10,000m 25,000







Nutrition	Pharma	Performance Materials	Polymer Intermediates	Emerging Business Areas
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DSM Nutritional Products



Vitamins Nutritional lipids (Omega 3 & 6) Carotenoids Health ingredients Enzymes Cultures Savory flavors Hydrocolloids Food & Crop Protection





DSM Food Specialties today

- Quality ^{for} Life
- Leading positions in food & beverage enzymes, cultures and yeast extracts
- Over 1500 employees worldwide
- Manufacturing locations in Europe, North South America, Asia, Australia
- Food Innovation Center with dedicated application and sensory specialists
- Regional application labs in China, the Netherlands, USA



DSM, Inventor of Natamycin

Natamycin, also known as Pimaricin, was first discovered by DSM (then known as Gist Broccades) in 1955 in a soil sample in the Natal province of South Africa.

Characteristics

- Naturally produced by fermentation
- Source is a bacterium Streptomyces natalensis (naturally occurring in nature)
- It is a crystal, only active when it is dissolved
- Active against a wide spectrum of fungi and yeast, not against bacteria

Safe for food consumption and EPA Approved for Pre- & Post- Harvest agriculture applications

- Reconfirmed by latest EFSA approval (December 2009)
- Approved by CODEX
- Approved by JECFA*
- Approved by EPA

*Join Expert Committee on Food Additives





How does Natamycin work?

Technical explanation

- Ergosterol is building block in cell walls of molds and yeasts;
- Natamycin interacts with ergosterol;
- Interaction between Natamycin and ergosterol takes places in the growing part of yeast and mold cells;
- Ergosterol-natamycin reaction destroys yeast and mold cells by interfering the dynamic cellular processes of growing hypha;
- Natamycin only affects active yeast and mold cells, including germinating spore;
- Natamycin avoids that spores are germinating;
- Natamycin not active against bacteria since bacteria do not contain ergosterol.





CONFIDENTIAL





Zivion[®]M: Since 2014 The bio control agent controlling Dry Bubble disease in mushroom production.

Natamycin: a natural biofungicide



Fungicide for the suppression of Dry Bubble Disease in Mushrooms

AGRICULTURAL SUSPENSION READ THE LABEL BEFORE USING

GUARANTEE REG NO. 30521 Natamycin 10.34% Pest Control Products Act

NET CONTENTS: 1L to 1000L

Net Contents: ______ This product contains 0.93 pounds of active ingredient per gallon

EPA Registration Number 87485-xx EPA Est. No. 87485-xxx-xx Batch/Lot code:



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Zivion[®] M: Mushroom Pre-harvest Application Regulatory status



The formulation Zivion[®] M was approved in the US in May 2012 under the EPA registration numbers 87485-1 and 87485-2.

In Canada by the PMRA in December 2012 under registration number 30521). Organic status in Canada since May 2015



ZIVION™ M

Fungicide for the suppression of Dry Bubble Disease in Mushrooms

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CL: Sinders & Associate Inc. 10 Description (Sp) 33:7502 Reservices: (Sp) 33:7502 Reservices: (Sp) 33:7502 Reservices: (Sp) 35:7502 Reservices: (Sp) 35:7502 Reservices: (Sp) 35:754 24 Reservices: (Sp) 37:754 24



US EPA Registration Extended (Aug 2016)

For use to control several Post-Harvest diseases on Citrus, Pome, Stone fruit, Cherries, Avocado, Kiwi, Mango, and Pomegranate

ACTIVE INGREDIENT:

Natamycin*	10.34%
OTHER INGREDIENTS:	. <u>89.66%</u>
Total:	100.00%
*CAS No. 7681-93-8	
Contains 0.93 lbs Natamycin per gallon.	



Broad Spectrum Efficacy







Green Mold (P. digitatum)

Gray Mold (B. cinerea)

Mucor Rot (*M. piriformis*) Sour Rot (G. citri-aurantii)

Mucor Rot (*M. piriformis*)



Brown Rot (*M. fructicola*)

Gray Mold (B. cinerea)

Rhizopus Rot (R. stolonifer)



ZivionTM S for Pre-harvest Strawberry Applications

Natural safe broad spectrum bio control agent



- Anthracnose (Colletotrichum spp.), gray mold (Botrytis spp.,), powdery mildew (Sphaerotheca macularis), Verticillium wilt, Rhizopus rot, Mucor fruit rot, Black Root rot (Pythium and Cylindrocarpon), Charcoal Rot (Macrophomina phasiolina)
- Can be applied both pre-plant & at-plant treatment,
- No resistance built up
- Strawberry pre-harvest application label extension is applied with EPA.



The left row in each bed is cv. Portola, the right row is cv. Fronteras. Pictures taken April 8, 2016





Key Features

- Proven safety as a food preservative for 50 years
- Expect to be exempt from tolerance
- Broad-spectrum against all major fungal diseases
- Excellent performance as a solo and mixture (IPM)
- Controls all resistant strains
- No cross-resistance
- Only fungicide that controls Mucor rot
- Potentially for organic use

