

NOSB NATIONAL LIST FILE CHECKLIST

PROCESSING

MATERIAL NAME: #15 Nisin



NOSB Database Form



References



MSDS (or equivalent)



FASP (FDA)



TAP Reviews from: Joe Montecalvo, Rich
Theuer

**NOSB/NATIONAL LIST
COMMENT FORM
PROCESSING**

Material Name: #15 Nisin

Please use this page to write down comments, questions, and your anticipated vote(s).

COMMENTS/QUESTIONS:

1. In my opinion, this material is:
_____ Synthetic _____ Non-synthetic.

2. Should this material be allowed in an “organic food” (95% or higher organic ingredients)? _____ Yes _____ No
(IF NO, PROCEED TO QUESTION 3.)

3. Should this substance be allowed in a “food made with organic ingredients” (50% or higher organic ingredients)? _____ Yes _____ No

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 5, 1995

Name of Material: Nisin

Reviewer Name: DR JOE MONTECALVO

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

Synthetic
If synthetic, how is the material made? (please answer here if our database form is blank)

This material should be added to the National List as:

Synthetic Allowed Prohibited Natural

or, Non-synthetic (Allowed as an ingredient in organic food)

Non-synthetic (Allowed as a processing aid for organic food)

or, this material should not be on the National List

Are there any use restrictions or limitations that should be placed on this material on the National List?

Please comment on the accuracy of the information in the file: good

Any additional comments? (attachments welcomed)

SINCE NISIN CAN BE GENETICALLY ENGINEERED AND SINCE IT CONTAINS 8 AMINO ACID RESIDUES RARELY FOUND IN NATURE I DO NOT FEEL THAT IT HAS A PLACE IN ORGANIC FOOD PROCESSING.

Do you have a commercial interest in this material? Yes; No

Signature DR. JOE MONTECALVO Date 8/22/95

**Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)**

- (1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;**

- (2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;**

- (3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;**

- (4) the effect of the substance on human health;**

- (5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;**

- (6) the alternatives to using the substance in terms of practices or other available materials; and**

- (7) its compatibility with a system of sustainable agriculture.**

TAP REVIEWER COMMENT FORM for USDA/NOSB

Use this page or an equivalent to write down comments and summarize your evaluation regarding the data presented in the file of this potential National List material. Complete both sides of page. Attach additional sheets if you wish.

This file is due back to us by: Sept 5, 1995

Name of Material: Nisin

Reviewer Name: R THEUER

Is this substance Synthetic or non-synthetic? Explain (if appropriate)

If synthetic, how is the material made? (please answer here if our database form is blank)

CANNOT DETERMINE UNLESS SPECIFIC SOURCE OF NISIN IS DISCLOSED

This material should be added to the National List as:

Synthetic Allowed Prohibited Natural

or, Non-synthetic (Allowed as an ingredient in organic food)

Non-synthetic (Allowed as a processing aid for organic food)

or, this material should not be on the National List

Are there any use restrictions or limitations that should be placed on this material on the National List?

Please comment on the accuracy of the information in the file:

Any additional comments? (attachments welcomed)

Do you have a commercial interest in this material? Yes; No

Signature 

Date Sept 5

**Please address the 7 criteria in the Organic Foods Production Act:
(comment in those areas you feel are applicable)**

- (1) the potential of such substances for detrimental chemical interactions with other materials used in organic farming systems;**

- (2) the toxicity and mode of action of the substance and of its breakdown products or any contaminants, and their persistence and areas of concentration in the environment;**

- (3) the probability of environmental contamination during manufacture, use, misuse or disposal of such substance;**

- (4) the effect of the substance on human health;**

- (5) the effects of the substance on biological and chemical interactions in the agroecosystem, including the physiological effects of the substance on soil organisms (including the salt index and solubility of the soil), crops and livestock;**

- (6) the alternatives to using the substance in terms of practices or other available materials; and**

- (7) its compatibility with a system of sustainable agriculture.**

Identification

Common Name	Nisin	Chemical Name	
Other Names			
Code #: CAS		Code #: Other	
N. L. Category	Non-agricultural	MSDS	<input type="radio"/> yes <input type="radio"/> no

Chemistry

Family	
Composition	Polypeptide antibiotic produced by <i>Streptococcus lactis</i> : C ₁₄₃ H ₂₃₀ N ₄₂ O ₃₇ S ₇ . Can be genetically engineered. Structure contains 34 amino acid residues, eight of which are rarely found in nature.
Properties	Soluble in dilute acids. Stable to boiling in acid solutions.
How Made	

Use/Action

Type of Use	Processing
Specific Use(s)	Preservative, especially for cheese and canned fruits and vegetables.
Action	
Combinations	

Status

OFPA
N. L. Restriction
EPA, FDA, etc
Directions
Safety Guidelines
State Differences
Historical status
International status

OEPA Criteria

2119(m)1: chemical interactions Not Applicable

2119(m)2: toxicity & persistence Not Applicable

2119(m)3: manufacture & disposal consequences

2119(m)4: effect on human health

2119(m)5: agroecosystem biology Not Applicable

2119(m)6: alternatives to substance

2119(m)7: Is it compatible?

References

The Merck Index, 10th edition. 1983. Merck and Co., Inc., Rahway, NJ

See also attached.

NISIN REFERENCES

AU: Ming,-X.T.; Daeschel,-M.A.

TI: Nisin resistance of foodborne bacteria and the specific resistance responses of *Listeria monocytogenes* Scott A.

SO: J-food-prot. Des Moines, Iowa : International Association of Milk, Food and Environmental Sanitarians. Nov 1993. v. 56 (11) p. 944-948.

CN: DNAL 44.8-J824

AB: Eight foodborne pathogenic and spoilage, type gram-positive bacteria were evaluated for their spontaneous resistance frequencies to the peptide antimicrobial nisin. A resistant mutant of *Listeria monocytogenes* Scott A (2000 U nisin per ml) was obtained by increasing stepwise exposure to nisin and was subsequently characterized. Nisin was not inactivated after exposure to mutant or parent cells growing in brain heart medium. Collectively, these observations indicated that as a resistance response to nisin, fundamental changes occurred in bacterial membrane structure and function as opposed to a resistance response involving nisin degradation.

AU: Daeschel,-M.A.; McGuire,-J.; Al-Makhlafi,-H.

TI: Antimicrobial activity of nisin adsorbed to hydrophilic and hydrophobic silicon surfaces.

SO: J-Food-Prot. Des Moines, Iowa : International Association of Milk, Food, and Environmental Sanitarians. Sept 1992. v. 55 (9) p. 731-735.

CN: DNAL 44.8-J824

AB: The antimicrobial activity of nisin was studied after its adsorption to hydrophilic and hydrophobic silicon surfaces. Once adsorbed, nisin was observed to be stable to buffer rinsing; the amount of nisin adsorbed onto each type of surface was determined to be of a quantity sufficient for inhibition of susceptible bacteria. Antimicrobial activity was maintained both upon silicon surface contact with microbial media and after nisin desorption induced by surfactant displacement.

AU: Dodd,-H.M.; Horn,-N.; Hao,-Z.; Gasson,-M.J.

TI: A lactococcal expression system for engineered nisins.

SO: Appl-Environ-Microbiol. Washington, D.C. : American Society for Microbiology. Nov 1992. v. 58 (11) p. 3683-3693.

CN: DNAL 448.3-AP5

AB: The nisin-producing *Lactococcus lactis* strain F15876 has been modified and developed for use as an expression system for engineered nisin variants. Insertional inactivation of the resident *nisA* gene had a polar effect on downstream genes, including those involved in nisin immunity. However, subsequent chromosomal rearrangements in this region involving a newly discovered insertion element (IS905) generated a strain that was deficient in the *nisA* gene product but expressed those nisin determinants necessary for prenisin maturation, secretion, and immunity. Complementation of the lesion in the *nisA* gene by plasmid-encoded *nisA* genes containing site-specific mutations resulted in the exclusive production of altered nisins containing specific amino acid substitutions.

AU: Gasson,-M.J.

TI: Transfer of sucrose fermenting ability, nisin resistance and nisin production into *Streptococcus lactis* 712 [Dairying].

SO: F-E-M-S-Microbiol-Lett-Fed-Eur-Microbiol-Soc. Amsterdam : Elsevier Biomedical. Jan 1984. v. 21 (1) p. 7-10. ill.

CN: DNAL QR1.F44

AU: Somers,-E.B.; Taylor,-S.L.

TI: Further studies on the antitoxigenic effectiveness of nisin in acidic media Control of *Clostridium botulinum* in cooked meat medium.

SO: J-Food-Sci. Chicago, Institute of Food Technologists. Nov/Dec 1981. v. 46 (6) p. 1972-1973.

CN: DNAL 389.8-F7322

AU: Fowler,-G.G.

TI: Nisin antimicrobial substance produced by certain strains of naturally occurring *Streptococcus lactis*: Will it be used here? Food preservatives.

SO: Food-Eng. Radnor, Pa., Chilton Company. May 1981. v. 53 (5) p. 82-83. ill.

CN: DNAL 389.8-F737

AU: Hurst,-A.

TI: Nisin Polypeptide, *Streptococcus lactis*, food microbiology.

SO: Adv-Appl-Microbiol. New York, Academic. 1981. v. 27 p. 85-123. ill.

CN: DNAL 448.2-UM1

AU: Rayman,-M.K.; Aris,-B.; Hurst,-A.

TI: Nisin: a possible alternative or adjunct to nitrite in the preservation of meats.

SO: Appl-Environ-Microbiol. Washington, D.C., American Society for Microbiology. Feb 1981. v. 41 (2) p. 375-380. ill.

CN: DNAL 448.3-AP5

AU: Fowler,-G.G.

TI: The potential of nisin produced by strains of *Streptococcus lactis*, in controlling bacterial activity in the storage of various foods.

SO: Food-Manuf. London Feb 1979. v. 54 (2) p. 57, 59. ill.

CN: DNAL 389.8-F736

AU: Lipinska,-E

TI: Nisin and its applications [in heat preservation of foods]

SO: In Antibiotics and Antibiosis in Agriculture; Easter School In Agricultural Science, 1976 (Pub. 1977), 25th: 103-130. Ref.

CN: DNAL SF918.A5E2-1976

AU: Oberman,-H; Kasperkiewicz,-T; Lysiak,-B

TI: Production of nisin by *Streptococcus lactis* strains after freezing

SO: Acta-Aliment-Pol, 1975, 1 (1): 53-62. Ref.

CN: DNAL TX341.A32

AU: Wajid,-H-R-A; Kalra,-M-S

TI: Nisin as an aid for extending shelf life of sterilized milk

SO: J-Food-Sci-Tech, Jan/Feb 1976, 13 (1): 6-8.

CN: DNAL 389.8-J823

AU: Kalra,-M-S; Dudani,-A-T

TI: Effect of calcium carbonate on nisin production in a milk culture

SO: Indian-J-Dairy-Sci, June 1974, 27 (2): 146-148.

CN: DNAL 44.8-IN28

AU: Fowler,-G-G; McCann,-B

TI: The use of Nisin in the food industry. [Dairy products]

SO: Food-Indus-S-Afr, Oct 1972, 25 (6): 49, 51, 55.

CN: DNAL 389.8-F7372

AU: Jarvis,-B; Farr,-J

TI: Partial purification, specificity and mechanism of action of the nisin-inactivating enzyme from *Bacillus cereus*. [Fermentation]

SO: Biochim-Biophys-Acta, Feb 10, 1971, 227 (2): 232-240.

CN: DNAL 381-B522