February 14, 2007

Mr. Mark Bradley
Program Manager
USDA/AMS/TM/NOP
Room 4008-So.
Ag Stop 0268
1400 Independence Ave., SW
Washington, DC 20250

Dear Mr. Bradley:

Enclosed is a petition requesting the inclusion of the non-organically produced agricultural substance “rice starch” onto the National List section 205.606. I am the Stonyfield Farm Inc. contact and can be reached at:

Nancy Hirshberg
VP of Natural Resources
Stonyfield Farm Inc.
10 Burton Drive
Londonderry, NH 03053
603 437 4040 x 2270

Please contact me if you have any questions or if I can provide anymore information.

We appreciate your consideration of our request.

Sincerely,

Nancy B. Hirshberg
VP of Natural Resources

Submitted by:
Stonyfield Farm, Inc.
10 Burton Drive
Londonderry, NH 03053 USA
Contact: Nancy Hirshberg 603.437.4040 x 2270

Petition to the National Organic Standards Board

To add the substance

Rice Starch, non-modified

to the National List of Substances
Allowed in Organic Production and Handling
at 7 CFR 205.606

February 14, 2007

c/o Mark Bradley, Program Manager
USDA/AMS/TMP/NOP
1400 Independence Ave SW
Room 4008 So, Ag Stop 0268
Washington, D.C. 20090–6456.
Fax: 202/205–7808

Petition to add Rice Starch (non-modified)
To the National List the substance:

Item A

1. Category

Non-organically produced agricultural products allowed in or on processed products labeled as "organic". §205.606.

Item B

1. The common name of the substance.
Rice starch, non-modified

2. The manufacturer.
There are many manufacturers. Stonyfield Farm is using a custom product formulated that is a blend of rice starch, locust bean gum, low-methoxy pectin, and carrageenen. The rice starch original manufacturer is based in Belgium. Stonyfield uses a combination of two of their rice starch products.

3. The intended or current use of the substance.
Rice starch is used in a blend with locust bean gum, low-methoxy pectin, and carrageenen as a thickener for "squeezable" yogurt packed in single portion tubes that are suitable for children's snacks or lunchboxes, for use cold or frozen.

4. The handling activities for which the substance will be used and its mode of action.
Rice starch interacts with the other thickening agents to create a unique gelation agent. The combination of rice starch, locust bean gum, pectin, and carrageenen reinforce the gels of each component, provide an elastic texture and prevents syneresis (separation of water). The viscosity holds up after a heating step in the food processing, which is vital for the incubation period of the yogurt. It also has unique functions in a product that is frozen and thawed. It provides a desirable texture in low fat products.

The typical gel properties of the starch are relative to the structure and the ratio of amylose and amylopectin. These parameters mean that the main features of rice gel are its soft consistency and creamy feeling in the mouth. Rice is unusual in that it can be produced with varied levels of amylose and amylopectine and, in its so-called waxy form, with a very low level of amylose (1%) and with different types of amylopectin. The main distinction between standard rice starch and waxy rice starch is the gel structure and the temperature stability of the gel, as well as its stability for sterilization and deep freezing. These characteristics are far more important than its viscosity, which can be adjusted in particular with hydrocolloids (such as carageenen, locust bean gum or pectin), which are compatible with rice starch. The pectin component binds to the lactic curd and aids in water binding capacity. The locust bean gum has a synergistic effect with carrageenan to

create gelation properties and aid in viscosity and water binding capacity. Carageenan also interacts with the milk casein to form yogurt gel and aids in gel reset after shear applied for cold filling operations.

According to the manufacturer, Rice starch gel appears to fit very easily in milk protein's network as a result of the special dimensions of swollen starch granules.[1]

5. The source of the substance and a detailed description of its manufacturing or processing procedures.

Rice starch is made from the finely pulverized grains of the rice plant. Long-, medium-, and short-grain rice contain varying ratios of the two starch components, amylose and amylopectin. Amylopectin is found in highest concentrations in short-grain, also called sticky or waxy rice. Amylose is highest in long-grain rice-enabling these grains to be separate and fluffy when cooked. These rice starches have different applications in industry. Starch from waxy rice exhibits high freeze-thaw stability.

It is produced usually first by treatment with an alkali (sodium hydroxide) to soften the grain release the starch from the protein, followed by milling and centrifugation to separate the protein from the starch. Other methods in development may eventually eliminate the use of alkali treatment. [2][3]

6. A summary of any available previous reviews of the petitioned substance by State or private certification programs or other organizations.

Rice starch has not been previously petitioned. It is a NATIVE starch. Corn starch (native) appears on the National List at 205.606. "Native" cornstarch refers to unmodified types of cornstarch that are produced by soaking (usually involving treatment with sulfuric acid), wet milling, and centrifugation. Modified cornstarch is produced by further reacting the starch with chemicals to introduce hydrophobic ester groups that add cross linkages to provide further types of thickening and stabilizer functions.

The NOSB TAP review for cornstarch is available at: http://www.ams.usda.gov/nop/archive/TapReports/Cornstarch.pdf

7. Information regarding EPA, FDA, and State regulatory authority registrations.

FDA: Rice starch is included in the FDA's "EAFUS" (Everything allowed in food in the US)[4] database. This list contains ingredients added directly to food that FDA has either approved as food additives or listed or affirmed as GRAS. Although it does not have a specific listing in 21CFR, Winters also notes that it was reviewed y FDA in 1980 and

[1] www.remy-industries.be

[2] Peabody, E. "Going with the Grain" Agricultural Research Magazine, Feb. 2005. USDA, ARS http://www.ars.usda.gov/is/AR/archive/feb05/grain0205.htm. See Appendix 2

[3] Lumdubwong N, and Seib, 2000: Puchongkavarin,H. et.al 2005, see Appendix 2, abstracts

[4] http://www.cfsan.fda.gov/~dms/eafus.html

determined that it should continue its GRAS status with no limitations other than good manufacturing practices.[5]

International:
Non-organic rice starch is permitted and listed in the EU regulation for organic production:

Annex VI
SECTION C — INGREDIENTS OF AGRICULTURAL ORIGIN WHICH HAVE NOT BEEN PRODUCED ORGANICALLY, REFERRED TO IN ARTICLE 5(4) OF REGULATION (EEC) No 2092/91

C.2.2. The following sugars, starches and other products from cereals and tubers:
starch from rice and waxy maize, not chemically modified

8. The Chemical Abstract Service (CAS) numbers of the substance and labels of products that contains the petitioned substance.

Rice starch does not have a CAS number. FDA's Center for Food Safety and Nutrition has assigned it the code number of 977000-08-0. [6]

See Appendix 1 for technical information sheets and MSDSs.

9. The substance's physical properties and chemical mode of action including:

Rice starch has the smallest particle size of all the commercial starches. The average rice starch granule is between 2-8 microns. It is a white powder, with neutral taste and odor, pH form 6.0 to 7.5, with a maximum of 14% moisture content.
The mode of action is as a thickening agent (see number 4 above).

(a) chemical interactions with other substances, especially substances used in organic production;

Rice starch is used in organic handling, not organic production.

(b) toxicity and environmental persistence;

Rice starch is a food ingredient with a long history of use. It is biodegradable.

(c) environmental impacts from its use or manufacture;

This is not well known, but is likely similar in impact to other food starch production (i.e. corn starch) or use of alkali in fruit peeling. Recent advances in technology may eventually make the use of alkali extractants unnecessary, so the processing would be purely mechanical. [7] Enzyme processing is also a possible alternative production method, though it appears it has not been adopted widely adopted.[8]

(d) effects on human health;

Rice starch is known for its easy digestibility. The manufacturer cites a digestibility rate of between 98 and 100%[9], which means that rice starch is one of the most easily

[5] Winters, R. 1999. A Consumer's Dictionary of Food Additives. Three Rivers Press, NY.
[6] http://www.cfsan.fda.gov/~dms/eafus.html
[7] Peabody, E. 2005. USDA, ARS See Appendix 2
[8] Lumdubwong N, and Seib, 2000: Puchongkavarin, H. et.al 2005, see Appendix 2
[9] http://www.abingredients.com/products/rice_starch/characteristics.html

digestible starches of all. It is also considered hypoallergenic, and is widely used in baby food and other special dietary foods.

(e) effects on soil organisms, crops, or livestock.

Rice starch is used in handling, not production, not applicable.

10. Safety information about the substance.

Rice starch is a food ingredient and is not hazardous; see Appendix 1 for safety sheets for this material.

11. Comprehensive research reviews and research bibliographies, including reviews and bibliographies which present contrasting positions.

See Appendix 2 for descriptive information from manufacturer, cited references, and journal abstracts.

12. A ``Petition Justification Statement'' which provides justification for inclusion of a non-organically produced agricultural substance onto the National List.

Starches have been widely used as thickeners for the food industry for many years. The primary sources of food starches are corn, wheat, potato and tapioca. Rice starch has many unique attributes that are not shared by the other thickening agents currently appearing on 205.605 or 205.606.

The rice starch is used in the Stonyfield Farm yogurt tubes “Squeezers”. The Squeezers are subjected to freezing, thawing and refrigeration which can damage the texture and body of yogurt. Since the Squeezers are packed in tubes, the yogurt must be thicker and more solid than cup yogurt to extract the product from the tube without making a mess. The target audience is children. A fun tube product is a great way to get children who often will not touch calcium rich dairy products to eat a healthful product.

Rice is the cereal type with by far the highest number of different varieties. Different climatic conditions, different soil characteristics and century-old cultivation have seen around 1.000 different commercial varieties launched to date.[10]

This variety leads to a wide range of rice starches with many different characteristics including: different starting gelatinization temperatures, textures, processing stabilities and viscosities. This means that a natural “native” rice starch like the one we use, can provide all the stability that a food processor will need without having to resort to chemical modifications.

Although some rice starch is available in organic form, it is not available in forms derived from waxy rice starch. Waxy rice starches are high amylopectin starches known for their freeze/thaw stability, creamy fat-like mouthfeel and high water binding capacity. Remy Industries, one of the worlds largest rice processors, also

[10] http://www.remy-industries.be/ “About Rice” Remy Industries

makes an organic rice starch (Remy ODR) that is derived from non-waxy rice and thus composed of a mixture of amylose and amylopectin starches. The form Stonyfield uses has a unique stability during processing. When compared to other starches, these rice starches have a better resistance to process stress, are much more stable in time (very slow retrogradation), have smooth gels with low structure, have a high hot set, and due to the small granule size are imperceptible in the mouth.

Stonyfield has inquired about the use of organic rice starch from the same manufacturer (Remy ODR) and received the following communication from the Research and Design director:

"Regarding the use of Remy ODR in this application, unfortunately I can assure you that the organic rice starch will not hold up during processing as compared to the non-organic Remyline XS. Remyline XS is a unique native starch that exhibits much of the functionality of a modified starch without the use of any chemicals or solvents. When we tried to make a similar product using Remy ODR we achieved a much stringier texture, and were not able to preserve the structure of the yogurt. The Remyline XS comes from a unique variety of waxy rice that, unfortunately, is not available in an organic form just yet. We are planning on growing some organic test fields of this rice in the coming year, although we are not certain if the yields and product quality will be comparable."

Stonyfield Farm is committed to the search for organic rice starch forms that are suitable for this use, and will switch to organic sources as soon as they become available.

List of Appendices

Appendix 1. Technical information, labels, MSDSs

a. Product information sheet Vitex AYS 27 from Cargill (PDS Vitex AYS 27.pdf)
b. Product info sheet Remyline XS-B (IS Remyline XS-B.pdf)
c. Product info sheet Remy B7 (IS Remy B7.pdf)
d. MSDS for Remyline XS-B (SDS Remyline XS-B.pdf)
e. MSDS for Remy B7 (SDS Remy B7)

Appendix 2 Reference information

a. Remyline XS : a new revolutionary native rice starch – RemyIndustries
b. Going With the Grain – ARS Magazine, Agricultural Research Feb 2005
c. Reference Abstracts

REMY INDUSTRIES n.v.
Remylaan 4
B-3018 Leuven-Wijgmaal
Belgium
Tel +32-(0)16 24 85 11
Fax +32-(0)16 44 01 44
remy@remy-industries.be
www.remy-industries.be
www.remy-industries.com
Member ORAFTI Group

Product Info sheet

Document code : IS 01.02.012/ed.H
Issue date : 2/1/2000
Revision date : 15/12/2004
Issued by : A. De Vroe (QA Assistent)
Approved by : E. Billen (QC Manager)

Product **Remy B7**

Labelling E.C. (Rice) starch, food grade

Product codes / packaging

284043	25 kg multiply paper bags on stretch wrapped pallets
284045	550 kg big bags on stretch wrapped pallets
284067	600 kg big bags on stretch wrapped pallets
284047	bulk delivery

Customs code 1108 1910 00

Certification Kosher and Pareve; certified by Le Rabbinat de la Communauté Israelite Orthodoxe de Bruxelles.

Description

Remy B-7 is a rice starch manufactured from clean, polished broken rice from a specific variety by extraction and purification of the starch. The process is executed in the best hygienic conditions without using irradiation and respecting Good Manufacturing Practice. The product has to be free of foreign odours and flavours and noticeable mould growth and insect infestation. The deliveries shall be executed in the best conditions to preserve the high quality standards.

Suggested applications

Remy B-7 is a rice starch from a specific variety. The product and its gel have a neutral taste and it is a very white powder with a coarser granulometry but with a particle size between 2 and 8 microns in suspension. It is gluten free and non allergenic. Its gel gives a more firm consistency and crispiness after drying. Therefore it is used in e.a.:

- -petfood, extruded snacks and breakfast cereals
- -bakery products
- -batter and breading systems
- -gelled dairy desserts

Storage precautions Product has to be stored in its unopened original packaging in a dry place, free from odours (solvents, combustibles, flavours, ...), insects and rodents. Under these conditions the product can be stored for 4 years.

Legal disclaimer

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Product Info sheet

Document code : IS 01.02.012/ed.H
Issue date : 2/1/2000
Revision date : 15/12/2004
Issued by : A. De Vroe (QA Assistent)
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Product **Remy B7**

Physico-chemical measurements	*min*	*max*	*unit*	*method*	*Spec/Mon*	
Moisture content		14.0	%	RAM4401	Spec	
Ash content		0.6	%/ds	RAM0801	Spec	
Protein content (N * 6,25)		1.0	%/ds	RAM4601	Spec	
Fat content (solvent extraction)		0.1	%/ds	RAM3001	Mon4Q	
Starch	97		%/ds	RAM7605	Mon4Q	
pH (10% solution)	6.0	7.5		RAM0203	Spec	
Sodium		2500	ppm	RAM4020	Mon4Q	
Calcium		100	ppm	RAM4022	Mon4Q	
Iron		10	ppm	RAM4011	Mon4Q	
Caloric content	400		kcal/100g	calculation		
Sieving > 150 µm	25	55	%	RAM6601	Mon	*
Sieving 75 - 150 µm	10	25	%	RAM6601	Mon	*
Sieving < 75 µm	25	65	%	RAM6601	Mon	*

Organoleptic evaluation	*min*	*max*	*unit*	*method*	*Spec/Mon*
Foreign material	absent			RAM2802	Spec
Infestation	absent			RAM2802	Spec
Colour	white			RAM1401	Spec
Odour and flavour	neutral			RAM5506	Spec
Taste	neutral			RAM5505	Mon4Q
Appearance	very fine powder			RAM5508	Spec
Discoloured particles		9	n/20g	RAM2802	Spec

Microbiological measurements	*max*	*unit*	*method*	*Spec/Mon*
Total count	10.000	n/g	RAM4205	Spec
Yeasts and moulds	100	n/g	RAM4208	Spec
Enterobacteriaceae	10	n/g	RAM4211	Spec
E. Coli	absent	n/g	RAM4219	Mon4Q
Salmonella	absent	n/ 25 g	RAM4220	Mon4Q

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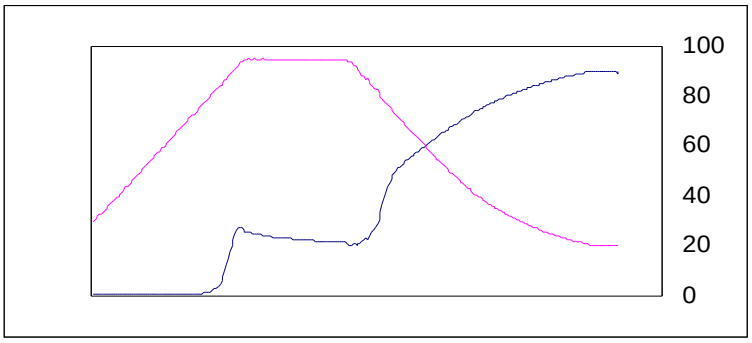
Approved by : E. Billen (QC Manager)

Product **Remy B7**

Contaminants	*max*	*unit*	*method*	*Spec/Mon*
Mycotoxins				
Total aflatoxins	4	µg/kg	RAM4104	MonRM
Aflatoxin B1	2	µg/kg	RAM4105	MonRM
Ochratoxin A	3	µg/kg	RAM4103	MonRM
Heavy metals				
Lead	0.2	mg/kg	RAM4018	MonRM
Mercury	0.03	mg/kg	RAM4010	MonRM
Cadmium	0.15	mg/kg	RAM4015	MonRM

Rheological measurements	*min*	*max*	*unit*	*method*	*Spec/Mon*	
Brabender Starting Gel Point 8%	72	78	°C	RAM7603	Spec	
Brabender Peak Viscosity 8%	300	600	BU	RAM7603	Spec	*
Brabender End Viscosity 8%	900	1.600	BU	RAM7603	Spec	
Brabender curve						

Measured on every batch = Spec
Measured regularly, but not on every batch = Mon
Measured at least every other batch = Mon1/2
Measured at least 4 times per year = Mon4Q
Measured on raw material = MonRM
Measured irregularly = Info

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Safety data sheet

Document code : SDS 01.04.027/ed.C
Issue date : 31/5/2001
Revision date : 5/1/2005
Issued by : A. De Vroe (QA Assistent)
Approved by : E. Billen (QC Manager)

Product **Remyline XS-B**

1. Product and company identification

* product name : Remyline XS-B
* product code :
  280013 25 kg multiply paper bags on stretch wrapped pallets
* supplier : Remy Industries nv
  Remylaan 4
  B-3018 Wijgmaal-Leuven
  Belgium
  Tel. : (32)16-24.85.11
  Fax : (32)16-44.01.44

2. Composition/information on ingredients

* chemical nature : waxy rice starch
* there are no impurities contributing to the HAZARD
* Remyline XS-B is GMO free

3. HAZARDS identification

* not hazardous

4. First aid measures

* Effect by inhalation : not hazardous
* Effect by skin contact : not hazardous
* Effect by eye contact : not hazardous
* Effect by ingestion : not hazardous

5. Fire - Fighting measures

* dust explosion is possible
* extinguishing media : water
* specific hazards : no further special measures required
* specific methods: any fire extinguisher may be used on nearby fires
* protection of fire fighters : /

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Product **Remyline XS-B**

6. Accidental release measures

* personal precautions : none
* environmental precautions : harmless
* methods for cleaning up : none

7. Handling and storage

7.1. Handling
* technical measures : none
* precautions : none
* safe handling advise : none

7.2. Storage
* technical measures + storage conditions : store in a dry warehouse free from odours, free from rodents and insects.
* incompatible products : /
* packaging materials : multiply paper bags

Under these conditions the product can be stored for 48 months. *

8. Exposure controls/personal protection

* control parameters : moisture : max. 14 %
Ash : max. 1 % on d.m.
Fat : max. 0.1 % on d.m.
Protein : max. 0,55 % on d.m. (N *6.25)
Sieving analysis : > 150 µm : max 40 %

* respiratory protection : not hazardous
* hand protection : not hazardous
* eye protection : not hazardous
* skin and body protection : not hazardous

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Product **Remyline XS-B**

9. Physical and chemical properties

* physical state :	powder
* colour :	white
* solubility :	insoluble in cold water thickens in hot water
* pH :	6 - 7,5
* gelification temperature:	60-68°C(6% solution)
* flash point :	/
* bulk density :	± 0.4 g/cm³

10. Stability and reactivity

not applicable

11. Toxicological information

There are no toxicological effects of the product.

12. Ecological information

/

13. Disposal considerations

Remyline XS-B is a harmless product, so there is no need for recommended methods for safe disposal.

14. Transport information

not hazardous

15. Regulatory information

not applicable
Labelling E.U.: (rice) starch *
No R/S phrases

16. Other information

none

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Approved by : E. Billen (QC Manager)

Product **Remyline XS-B**

Labelling E.U. (Rice) starch - Food grade *

Product codes / packaging 280013 25 kg multiply paper bags on stretch wrapped pallets

Customs code 1108 1910 00

Certification Kosher and Pareve; certified by Le Rabbinat de la Communauté Israelite Orthodoxe de Bruxelles.

Description

Remyline XS-B is a native rice starch manufactured from clean, polished, waxy broken rice by extraction and purification of the starch. The process is executed in the best hygienic conditions without using irradiation and respecting Good Manufacturing Practice. The product has to be free of foreign odours and flavours and noticeable mould growth and insect infestation. The deliveries shall be executed in the best conditions to preserve the high quality standards.

Suggested applications

Remyline XS-B is a white powder with a neutral taste and has a very fine particle size between 2 and 8 microns in suspension. It has a soft gel with a neutral taste and a creamy mouthfeel. Its gel is pH stable, temperature stable, micro wave stable and gives no retrogradation. It is gluten free and non-allergenic. Therefore this product is used e.a. in:

- -soups and sauces, ready meals
- -bakery products
- -dairy desserts

Storage precautions

Product has to be stored in its unopened original packaging in a dry place, free from odours (solvents, combustibles, flavours, ...), insects and rodents. Under these conditions the product can be stored for 4 years.

*

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Product **Remyline XS-B**

Physico-chemical measurements	*min*	*max*	*unit*	*method*	*Spec/Mon*	
Moisture content		14.0	%	RAM4401	Spec	
Ash content		1.0	%/ds	RAM0801	Spec	
Protein content (N * 6,25)		0.55	%/ds	RAM4601	Spec	*
Fat content (solvent extraction)		0.1	%/ds	RAM3001	Mon4Q	
Starch	97		%/ds	RAM7605	Mon4Q	*
pH (10% solution)	6.0	7.5		RAM0203	Spec	
Sodium		2500	ppm	RAM4020	Mon4Q	
Calcium		100	ppm	RAM4022	Mon4Q	
Iron		10	ppm	RAM4011	Mon4Q	
Caloric content	400		kcal/100g	calculation		
Sieving > 150 µm	10	40	%	RAM6601	Spec	*
Sieving 75 - 150 µm	15	35	%	RAM6601	Spec	*
Sieving > 75 µm	30	70	%	RAM6601	Spec	*

Organoleptic evaluation	*min*	*max*	*unit*	*method*	*Spec/Mon*
Foreign material	absent			RAM2802	Spec
Infestation	absent			RAM2802	Spec
Colour	white			RAM1401	Spec
Odour and flavour	neutral			RAM5506	Spec
Taste	neutral			RAM5505	Mon4Q
Discoloured particles	9		n/20g	RAM2802	Spec
Appearance	fine powder			RAM5508	Spec

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Product **Remyline XS-B**

Microbiological measurements	*max*	*unit*	*method*	*Spec/Mon*	
Total count	10.000	n/g	RAM4205	Spec	
Yeasts and moulds	100	n/g	RAM4208	Spec	*
Enterobacteriaceae	10	n/g	RAM4211	Spec	
E. Coli	absent	n/g	RAM4219	Mon4Q	
Salmonella	absent	n/ 25 g	RAM4220	Mon4Q	

Contaminants	*max*	*unit*	*method*	*Spec/Mon*
Mycotoxins				
Total aflatoxins	4	µg/kg	RAM4104	MonRM
Aflatoxin B1	2	µg/kg	RAM4105	MonRM
Ochratoxin A	3	µg/kg	RAM4103	MonRM
Heavy metals				
Lead	0.2	mg/kg	RAM4018	MonRM
Mercury	0.03	mg/kg	RAM4010	MonRM
Cadmium	0.15	mg/kg	RAM4015	MonRM

*adapted from previous document version = **

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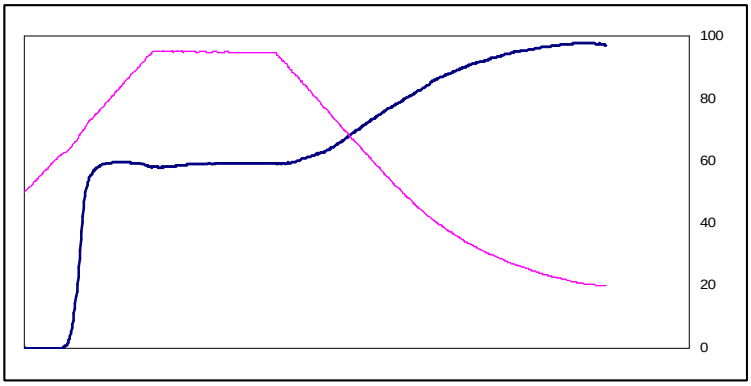
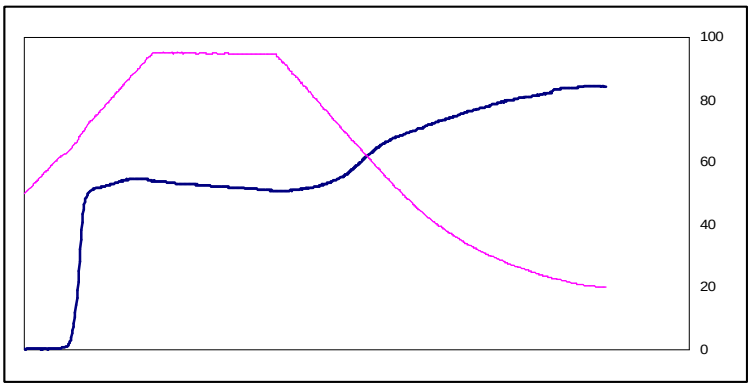
Product Info sheet

Document code : IS 01.04.027/ed.C
Issue date : 31/5/2001
Revision date : 5/1/2005
Issued by : A. De Vroe (QA Assistent)
Approved by : E. Billen (QC Manager)

Product **Remyline XS-B**

Rheological measurements	*min*	*max*	*unit*	*method*	*Spec/Mon*	
Brabender Starting Gel Point 6%	60	68	°C	RAM7603	Spec	
Brabender Peak Visc 6%, neutral	250		BU	RAM7603	Spec	
Brabender End Visc 6%, neutral	700		BU	RAM7603	Spec	
Brabender curve neutral						
Brabender Peak Visc 6%, pH 3,2	250		BU	RAM7603	Spec	
Brabender End Visc 6%, pH 3,2	700		BU	RAM7603	Spec	*
Brabender curve pH 3,2						

Measured on every batch = Spec
Measured regularly, but not on every batch = Mon
Measured at least every other batch = Mon1/2
Measured at least 4 times per year = Mon4Q
Measured on raw material = MonRM
Measured irregularly = Info

*adapted from previous document version = **

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Safety data sheet

Document code : SDS 01.02.012/ed.H
Issue date : 2/1/2000
Revision date : 15/12/2004
Issued by : A. De Vroe (QA Assistent)
Approved by : E. Billen (QC Manager)

Product **Remy B7**

1. Product and company identification

* product name : Remy B7
* product code :
  - 284043 25 kg multiply paper bags on stretch wrapped pallets
  - 284045 550 kg big bags on stretch wrapped pallets
  - 284067 600 kg big bags on stretch wrapped pallets
  - 284047 bulk delivery
* supplier : Remy Industries nv
  Remylaan 4
  B-3018 Wijgmaal-Leuven
  Belgium
  Tel. : (32)16-24.85.11
  Fax : (32)16-44.01.44

2. Composition/information on ingredients

* chemical nature : rice starch
* there are no impurities contributing to the HAZARD
* Remy B7 is GMO free

3. HAZARDS identification

* not hazardous

4. First aid measures

* Effect by inhalation : not hazardous
* Effect by skin contact : not hazardous
* Effect by eye contact : not hazardous
* Effect by ingestion : not hazardous

5. Fire - Fighting measures

* dust explosion is possible
* extinguishing media : water
* specific hazards : no further special measures required
* specific methods: any fire extinguisher may be used on nearby fires
* protection of fire fighters : /

*adapted from previous document version = **

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Safety data sheet

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Approved by : E. Billen (QC Manager)

Product **Remy B7**

6. Accidental release measures

* personal precautions :	none
* environmental precautions :	harmless
* methods for cleaning up :	none

7. Handling and storage

7.1. Handling

* technical measures :	none
* precautions :	none
* safe handling advise :	none

7.2. Storage

* technical measures + storage conditions :	store in a dry warehouse free from odours, free from rodents and insects.
* incompatible products :	/
* packaging materials :	multiply paper bags

Under these conditions the product can be stored for 4 years.

8. Exposure controls/personal protection

* control parameters :	moisture : max. 14 % Ash : max. 0.6 % on d.m. Fat : max. 0.1 % on d.m. Protein : max. 1 % on d.m. (N *6.25) Sieving analysis : > 150 µm : 25-55 % *

* respiratory protection :	not hazardous
* hand protection :	not hazardous
* eye protection :	not hazardous
* skin and body protection :	not hazardous

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Document code : SDS 01.02.012/ed.H
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Approved by : E. Billen (QC Manager)

Product **Remy B7**

9. Physical and chemical properties

* physical state :	powder
* colour :	white
* solubility :	insoluble in cold water thickens in hot water
* pH :	neutral
* gelification temperature:	72-76°C(8% solution)
* flash point :	/
* bulk density :	± 0.4 g/cm³

10. Stability and reactivity

not applicable

11. Toxicological information

There are no toxicological effects of the product.

12. Ecological information

/

13. Disposal considerations

Remy B7 is a harmless product, so there is no need for recommended methods for safe disposal.

14. Transport information

not hazardous

15. Regulatory information

not applicable
Labelling E.C.: (rice) starch
No R/S phrases

16. Other information

none

*adapted from previous document version = **

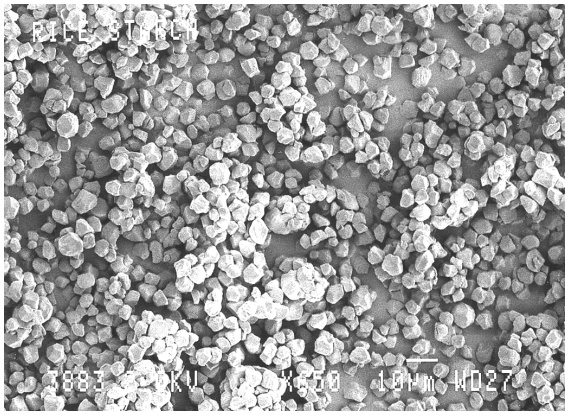
Remyline XS : a new revolutionary native rice starch

Johan Geeroms (Technical Service Manager), Remy Industries

Introduction

Rice derivatives have gained since long their place in the food industry, as they deliver some unique functional advantages for a large number of food products. The good stability in time, the smooth structure, the bland taste and the high whiteness are strong advantages when using rice starches. As the native functionality is already excellent, for a large number of applications native rice starches can do what slightly modified other starches can do. As this trend of using more natural products is reinforcing, especially in Europe, Remy Industries now bridges the gap to the more demanding applications with a newly developed waxy rice starch. Remyline XS is very resistant to all kinds of process stress, and yet retains the excellent properties of rice starches. It can favourably be used in dairy products, soups and sauces, etc. where traditionally chemically modified starches are used.

General properties rice starches



As rice is part of human nutrition for over 10,000 years, it's no wonder that it's digested easily, and that no allergies are known. As rice is grown world-wide, a lot of different rice varieties are grown, each with unique properties. Research showed the rice starch molecular structure to be responsible for this. Amylose, the essentially linear glucose polymer, contains a limited number of branches. Rice amylose contains more branches than other starches. Amylopectin is the highly branched glucose polymer, and also here, rice amylopectin has more branches. Moreover, the rice starch branch length distribution shows up more short chains than other starches.

Differences between the rice varieties can be found in the ratio amylose / amylopectin, the internal ordering and the side chain length distribution. This gives rise to the wide functionality of rice starches. When compared to other starches, rice starches have a better resistance to process stress, are much more stable in time (very slow retrogradation), have smooth gels with low structure, have a high hot set, and due to the small granule size are imperceptible in the mouth.

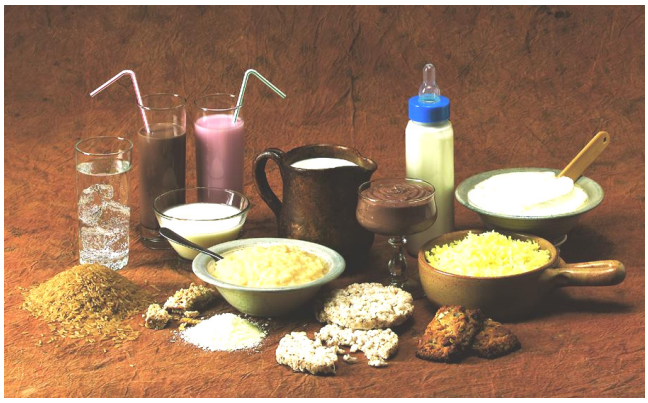
Remy Industries

Remy Industries is your specialist in rice derivatives, world-wide. 150 Years of experience pay off : today we deliver a full range of top quality rice flours and rice starches. As market leader, we are active in all continents, we give you all the technical support necessary, and we continuously invest in innovation.

Remy range of products

Remy buys raw materials world-wide, as this can assure us to have control over the functional advantages of the wide range of natural variation. From each type of rice, a number of different derivatives is produced. Flours vary not only by rice type, but also by granulometry and shelf life stability. Also some specialities are produced : organic rice flour, baby food grade rice flour, pre-cooked rice flours, brown rice flour, UHT-quality, …

Starches are also produced from a range of different rice types, and here the resulting functional properties to play with are the gel strength, the gelling temperature and the starch granule rigidity. Also here some specialities are produced : different powder granulometry, low ash content, improved microbiology, organic, pre-cooked, …
Chemically modified rice starches are produced on different rice types. The modifications involved are acetylation, cross-linking and the combined modification. Also here pre-gelatinised products are possible.
Further products are rice protein, rice syrups, and blends with rice starches and/or rice flours.



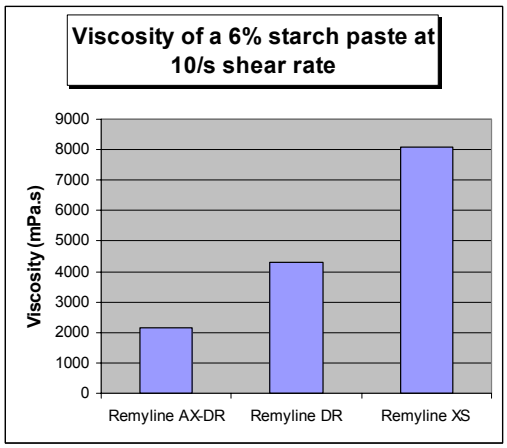
Applications of rice derivatives

Amongst the wide range of applications, we mention as the most important ones : baby food, coatings, extruded products, meat preparations, soups, sauces, dressings, canned mushrooms, dairy products, dragees, cereal bars, baked goods and bakery cream, health products, marinades, …

Natural products trend

The market trend towards natural, healthy, nutritional foods is indiscernible in Europe. Remy is an active player in this by several means. We produce a full range of organic products (flour, pre-cooked flour, starch, pre-cooked starch), we assist product and process developers to use native rice starches instead of modified starches, and, of course, rice is a healthy food ingredient by itself.

Granule rigidity



Key to this improved functionality is the wide range of different rice starches to choose from. Recently we achieved to master the most difficult functional property of starches : granule rigidity. This property of a starch is the resistance of a swollen starch granule to process stress (temperature, shear, acidity). For example, for our waxy rice starches we have now a range of starches with increasing granule rigidity : Remyline AX-DR (smoothest, lowest rigidity), Remyline DR (increased viscosity, shorter structure, medium rigidity) and now Remyline XS (excellent stress tolerance, high granule rigidity). Such a span of functionality is unique amidst the native starches.

Remyline XS

This newly developed native waxy rice starch outperforms a lot of other starches, even a lot of modified ones. Its strong points are the high resistance to heating temperature, shear and acid pH, or a combination of those. Up till now we tested UHT-treatment, high pressure homogeniser, or pH 3.2 at boiling temperature. Also a combination of high temperature and mildly acid pH proved not to be a problem. Of course, the rest of the typical advantages of rice derivatives is also present here : white powder, colourless and neutral gel, soft structure and extreme stability in time.
We tested out this brand new product in several applications. Remyline XS performs very well in dairy desserts like crème dessert, and in neutral and acid soups it can withstand static or UHT sterilisation. Baby food and fruit preparations also benefit from the smooth and short structure of this rice starch.

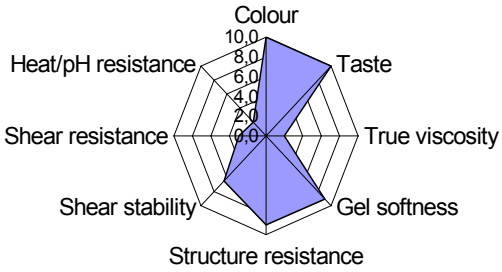
Technical positioning of Remyline XS

We compared this new high performance rice starch with other starches, and we scored it for a number of characteristics.

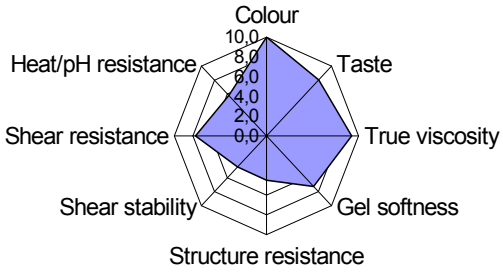
- **Colour** : Remyline XS has the same whiteness as the other Remy rice starches, and no thermal treatments have been done that colour the starch
- **Taste** : the extreme taste neutrality of rice starches can be found back in this Remyline XS. The pH has no influence on this, and this compares favourably with the typical taste of modified starches.
- **True viscosity** : is measured by oscillation rheology to distinguish it from structure. Remyline XS has a viscosity comparable to modified waxy rice and waxy corn starches. Hydro-thermally treated waxy corn starches perform poor on this aspect.
- **Gel softness** : is the inverse of gel structure. As opposed to corn and waxy corn starches, Remyline XS, like most rice starches, has a high gel softness. Creamy mouthfeel is associated herewith, as opposed to pudding-like structure, which is strongly present in corn starch and hydro-thermally treated waxy corn starches.
- **Structure resistance** : is a very strong point of Remyline XS. A moderate shear or deformation has a limited influence on the structure of Remyline XS. Most of the corn starches have a dramatic drop in structure when sheared, modified waxy corn starches coming closer to the rice starches behaviour. Hydro-thermally treated waxy corn starches perform poor on this aspect.
- **Shear stability** : is the inverse of (reversible) shear thinning, and typically is problematic for amylose containing starches. Remyline XS performs slightly better than modified waxy rice and corn starch.
- **Shear resistance** : is the combination of two aspects. Each starch has a shear rate where the swollen granules start to degrade, and the second aspect is the speed of viscosity loss above this critical shear rate. Remyline XS reaches a resistance comparable to modified starches.
- **Heat / pH resistance** : gives an indication of the applicability of the starch in food systems. Today, high temperature heat treatments are used for increasing the shelf life of sometimes rather acidic food products. Remyline XS is capable to resist these treatments without much viscosity loss, and this compares favourably with modified starches.

We summarised this in radar graphs, whereby scores from 0 (poor performance) to 10 (excellent performance) were used to indicate these above mentioned quality aspects. Remyline XS is compared to other starches : another native and a modified waxy rice starch, a modified waxy corn starch and a hydro-thermally treated native waxy corn starch. From this it is clear that Remyline XS is an excellently performing and all-round starch.

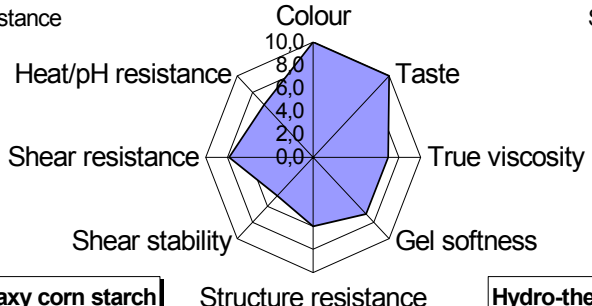
Remyline AX-DR



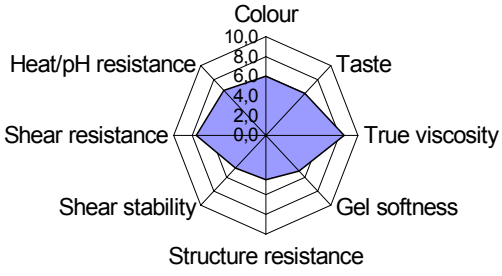
Remygel 663



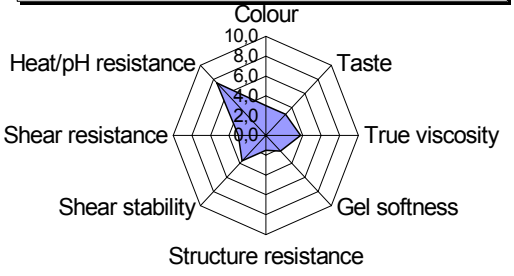
Remyline XS



Cross-linked acetylated waxy corn starch



Hydro-thermal treated native waxy corn starch (strong)



Conclusions

The newly developed native waxy rice starch Remyline XS is an excellent example of the effect of starch granule rigidity on the resistance to process stress. This highly demanded functional property, together with the smooth and short structure, the bland taste and the extreme whiteness make this starch a valid alternative for a lot of modified starches. Remy Industries has a long tradition in delivering top quality rice starches with desirable functionality, and this starch complements the high end range of the native rice starches. The trend to more natural food has now a valuable broadly applicable ingredient : Remyline XS.

Going *With* the Grain

Rice starch and protein are found in a wide range of products, including frozen foods, sauces, soups, dressings, reduced-fat baked goods, baby food, health bars, and medicinal tablets. **(K11768-1)**

ARS scientist finds a more natural way to separate rice's valuable starch and protein.

It's the creamy component in some ice creams and yogurts, a satisfying alternative to fat in reduced-fat foods, and a thickener that adds a smooth finish to soups and sauces. While many consumers aren't able to detect it, rice starch —with its tiny granule size, neutral taste, and soft mouthfeel—can be found in a wide range of foodstuffs.

This list also includes more unexpected consumables, like frozen foods, meat products, and—thanks to rice starch's hypoallergenic nature—even pharmaceuticals and cosmetics.

But a cost-effective and environmentally friendly process for accessing rice starch—by breaking down milled rice into its starch and protein fractions—has been elusive. For nearly 60 years, the processing of this starch has hardly changed, relying always on the action of a corrosive alkali, sodium hydroxide, to slowly dissolve rice protein and release the starch.

This procedure, and the copious amounts of salt waste it generates, could soon be replaced with a more benign and efficient separation method developed by food technologist Harmeet Guraya. Guraya, who works at ARS's Southern Regional Research Center in New Orleans, Louisiana, believes his approach could help rebuild the rice starch and protein production industries in the United States, which now imports about $40 million worth of rice starch each year.

The technology—perhaps in commercial use by next year —could also increase the bottom line for U.S. rice farmers

and millers, who have historically lost out on valuable rice derivatives because of a lack of cost-effective processing.

Why Rice?

Whether it's long-grain, sticky, or a specialty type like aromatic, rice is fast becoming a popular grain. And its components—starch, protein, and bran—are equally desirable.

Long-, medium-, and short-grain rices contain varying ratios of the two starch components, amylose and amylopectin. Amylopectin is found in highest concentrations in short-grain (also called "sticky" or "waxy") rice. Amylose is highest in long-grain rice—enabling these grains to be separate and fluffy when cooked.

Each possessing its own unique chemistry, these rice starches have different applications in industry. "With cosmetics and tableting, the kind of starch used is not necessarily important," explains Guraya, "but with foods, starch type does matter."

For instance, starch from waxy rice exhibits high freeze-thaw stability. "Because this starch holds water well, a food product—say Buffalo wings—won't lose valuable moisture or juices when it's frozen and then thawed," says Guraya.

Rice protein is valued for its easy digestibility. Baby foods and formula and special dietary goods rely on a steady stream of this protein, since some children and adults are sensitive to the proteins in other grains.

And the bran, which sits just under rice's outer hull, is getting increasing acclaim for biologically active compounds that may act as powerful, cell-protecting antioxidants. High in dietary fiber, too, bran can impart a hearty flavor to breads and other baked goods.

Despite its potential, says Guraya, "most of the rice bran produced in the United States is a byproduct of milling and is used for animal feed or simply discarded."

While it seems a treasure trove of nutritional, food, and sensory possibilities, a grain of rice doesn't easily give away its valued parts. Processes that separate and extract bound-up rice fractions can alter the nutritional qualities of starch and protein and are often not cost effective.

Without a Grain of Salt

Milled rice contains agglomerates, or clumps, of starch and protein. Typically, rice is steeped in sodium hydroxide for several hours to dissolve the protein and let the starch molecules break free. But that degrades the protein, leaving it bitter-tasting and unfit for human consumption. Salts and other potentially harmful waste products are also generated.

Guraya's approach instead relies on very high pressure, supplied by a special homogenizer known as a microfluidizer, to physically split apart the starch-protein agglomerates. A single pass through this piece of equipment yields many small, individual particles of starch and protein homogeneously dispersed in a watery matrix. The starch and protein components can then be separated by traditional density-based separation processes.

And Guraya's technology preserves valuable rice protein. "The protein from our processing hashigher integrity and functionality," he says. "It hasn't been degraded with pH adjustments and washings."

Guraya, who's been developing his rice starch separation process for about 4 years, established a cooperative research and development agreement with Sage V Foods, a rice-based products company, in 1999. Based in Los Angeles, with facilities in Freeport, Texas, Sage V Foods

produces rice-based ingredients that are sold to major U.S. food companies.

An important part of their collaboration has been trying out a scaled-up version of Guraya's technology. "Being able to produce rice starch in the lab is not enough," he says. "We have to show that it can be done in a large-scale, continuous process."

A complete production line was set up in March 2004, and thousands of pounds of rice starch were generated. The samples, from different kinds of rice, are currently being analyzed by Sage V Foods.

"So far, the results from our tests are very encouraging," says Pete Vegas, president of Sage V Foods. "While there's still some uncertainty about the costs related to the process, we're very hopeful."

Guraya continues to offer technical advice to Sage V Foods, but he's moved on to another project that's an ideal complement to his rice starch technology. "It's a method for extracting protein from rice bran," he says, "and could ultimately make use of bran's other fractions—oil and starch—which are currently being underused."—By **Erin K. Peabody,** Agricultural Research Service Information Staff.

This research is part of Quality and Utilization of Agricultural Products, an ARS National Program (#306) described on the World Wide Web at www.nps.ars.usda.gov.

Harmeet Guraya is with the USDA-ARS Food Processing and Sensory Quality Research Laboratory, 1100 Robert E. Lee Blvd., New Orleans, LA 70124-4305; phone (504) 286-4258, fax (504) 286-4419.

"Going *With* the Grain" was published in the **February**

2005 issue of *Agricultural Research* magazine.

[Top]

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REFERENCE ABSTRACTS

Document title
Gelation mechanism and rheological properties of rice starch
Author(s)
CHENG-YI LII [(1)] ; YI-YUAN SHAO ; KUO-HSUEN TSENG ;
Author(s) Affiliation(s)
[(1)] National Taiwan Univ., Graduate Inst. Food Sci. Technology, Taipei, TAIWAN,
Résumé / Abstract
Three rice starches were isolated from indica (KSS7), japonica (TNu67) and waxy (TCW70) varieties, respectively. Amylose contents of isolated starches were 25.6% for KSS7; 14.80% for TNu67; and 0.99% for TCW70. When heated from 55 to 95°C at 10° C intervals, starch with higher amylopectin content had higher swelling power. Both swelling power and water solubility index increased with increased temperature. The blue values of all samples were <0.08. As examined by scanning electron microscope and x-ray diffractometer, the typical A-type diffraction pattern of the peak became slightly flattened at the temperature below the gelatinization temperature (GT), and no peak was detected at the temperature higher than the GT. The change of starch during heating or cooling was also analyzed by mechanical spectrometry with an oscillatory rheometer. G' and G were dependent on amylose content and starch concentration.

Journal Title
Cereal chemistry (Cereal chem.) **ISSN** 0009-0352 **CODEN** CECHAF
Source
1995, vol. 72, n°4, pp. 393-400 (35 ref.)
Publisher
American Association of Cereal Chemists, St. Paul, MN, ETATS-UNIS (1924) (Revue)
http://cat.inist.fr/?aModele=afficheN&cpsidt=3613105

Document title
Effect of rice starch-lipid complexes on in vitro digestibility, complexing index, and viscosity
Auteur(s) / Author(s)
GURAYA H. S. [(1)] ; KADAN R. S. [(1)] ; CHAMPAGNE E. T. [(1)] ;
Affiliation(s) du ou des auteurs / Author(s) Affiliation(s)
[(1)] USDA ARS Southem Regional Research Center, PO Box 19687, New Orleans, LA 70179, ETATS-UNIS

Abstract
Effects of nonwaxy (21% amylose, 79% amylopectin) and waxy (100% amylopectin) rice starch-lipid complexes on the rate of in vitro digestibility were determined. Long-chain (≥C:18) saturated emulsifiers reduced digestibility more than short-chain (<C:18) saturated and unsaturated emulsifiers when complexed with nonwaxy and waxy rice starch. The largest decrease in digestibility (33%) was achieved with Polyaldo 10-1-2 (100% C18:0 with decaglyceryl monostearate modification) for nonwaxy rice. Waxy rice starch did not complex with most of the emulsifiers, in contrast to nonwaxy rice starch. Most of the emulsifiers that reduced digestibility by 10% or less were composed of unsaturated monoglycerides, including some acetylated and succinylated monoglycerides. The fluid behavior of nonwaxy rice starch-emulsifier solutions was more pseudoplastic than waxy rice starch-emulsifier

solutions. The consistency index varied with emulsifiers. The nonwaxy rice starch-emulsifier solutions and some of those prepared using waxy rice starch would be suitable for semisolid food applications. The waxy rice starch-emulsifier solutions with low consistency (0.4-0.7) and high-flow behavior (0.7-0.8) indices would be suitable for beverage applications.

Revue / Journal Title
Cereal chemistry (Cereal chem.) **ISSN** 0009-0352 **CODEN** CECHAF
Source / Source
1997, vol. 74, n°5, pp. 561-565 (30 ref.)
Publisher
American Association of Cereal Chemists, St. Paul, MN, ETATS-UNIS (1924) (Revue)
http://cat.inist.fr/?aModele=afficheN&cpsidt=2825034

Document title
Effects of amylopectin branch chain length and amylose content on the gelatinization and pasting properties of starch

Auteur(s) / Author(s)
JANE J. [(1)] ; CHEN Y. Y. [(1)] ; LEE L. F. [(1)] ; MCPHERSON A. E. [(1)] ; WONG K. S. [(1)] ; RADOSAVLJEVIC M. [(1)] ; KASEMSUWAN T. [(1)] ;
Affiliation(s) du ou des auteurs / Author(s) Affiliation(s)
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Résumé / Abstract
Structures and properties of starches isolated from different botanical sources were investigated. Apparent and absolute amylose contents of starches were determined by measuring the iodine affinity of defatted whole starch and of fractionated and purified amylopectin. Branch chain-length distributions of amylopectins were analyzed quantitatively using a high-performance anion-exchange chromatography system equipped with a postcolumn enzyme reactor and a pulsed amperometric detector. Thermal and pasting properties were measured using differential scanning calorimetry and a rapid viscoanalyzer, respectively. Absolute amylose contents of most of the starches studied were lower than their apparent amylose contents. This difference correlated with the number of very long branch chains of amylopectin. Studies of amylopectin structures showed that each starch had a distinct branch chain-length distribution profile. Average degrees of polymerization (dp) of amylopectin branch chain length ranged from 18.8 for waxy rice to 30.7 for high-amylose maize VII. Compared with X-ray A-type starches, B-type starches had longer chains. A shoulder of dp 18-21 (chain length of 6.3-7.4 nm) was found in many starches; the chain length of 6.3-7.4 nm was in the proximity of the length of the amylopectin crystalline region. Starches with short average amylopectin branch chain lengths (e.g., waxy rice and sweet rice starch), with large proportions of short branch chains (dp 11-16) relative to the shoulder of dp 18-21 (e.g., wheat and barley starch), and with high starch phosphate monoester content (e.g., potato starch) displayed low gelatinization temperatures. Amylose contents and amylopectin branch chain-length distributions predominantly affected the pasting properties of starch.

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Document title
Rice starch isolation by alkaline protease digestion of wet-milled rice flour
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Résumé / Abstract
Alkaline protease digestion with a food-grade enzyme was used to produce rice starch from wet-milled rice flour (WMRF). In a 3 × 3 factorial modelling experiment, recoveries of starch and levels of protein contamination were determined at pH 8.5-10.0, protease levels of 0.5-1.5% (based on WMRF), and digestion times of 5.0-30.0 h. The following digestion conditions were kept constant; 55 °C with mild agitation, 34-37% (w/v) flour solids, and alkalinity to within ± 0.2 pH units. Regression equations with the three variables explained 92% and 98%, respectively, of the variances in starch recovery and protein contamination. Upon digestion with 1.1% protease at pH 10.0 and 18.0 h, starch recovery was 95% and protein contamination was 0.5%. Most hydrolysis of rice protein occurred in the first 3-4h of digestion as determined by the consumption of sodium hydroxide (NaOH). Rice starch also was isolated by extraction of WMRF with C. 2.5 parts of 0.05 M NaOH at c. pH 12. The recovery of starch was c. 10% higher with the protease method than with the NaOH method, and the effluents contained mostly amino acid salts as opposed to protein mixed with alkali. The rice starch isolated by protease digestion was lighter in appearance, contained more lipid, and gave a somewhat lower consistency after pasting. The raw materials used to isolate rice starch by the protease method were approximately twice as costly in 1996 as those in the NaOH method, principally because of the cost of the protease (55% of total).
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Document title
Comparative study of pilot scale rice starch production by an alkaline and an enzymatic process
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Résumé / Abstract
Rice starch is commonly isolated by alkaline (sodium hydroxide) extraction because this process provides high yield, high purity and is low in capital costs. This process produces an highly loaded alkaline effluent that contributes significantly to general costs of wastewater treatment. The present study attempted to develop an enzymatic procedure to isolate pure rice starch and to investigate the physico-chemical properties in comparison with that of rice starch produced by an alkaline process of comparable scale. The isolation of starch from polished rice grain was effected by application of cellulase under slightly acidic conditions in order to degrade the cellular tissue, followed by protease (Corolase 7089 or papain) under neutral conditions in order to loosen the protein bodies that are associated with starch granules. In comparison with the alkaline process, the enzyme process provided rice starch with a slightly elevated protein content, but less damaged starch. No differences were found between the two proteases used. Washing the enzyme-isolated starch with 0.2% sodium hydroxide or 0.5% sodium dodecylsulphate (SDS) solutions further improved the purity of rice starch. The physico-chemical properties of the enzymatically-isolated starches were mostly comparable with starch from the alkaline process. The developed process allows to replace the alkaline process and thus eliminates critical levels of mineral load in effluents of rice starch plants.
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