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- Introduction to ELIANE™
- Characteristics of ELIANE™, differences with other starches
- ELIANE™ in several food applications
What is ELIANE™?

- ELIANE™ is AVEBE’s new unique amylopectin potato starch obtained by state-of-the-art classical breeding techniques (non-GMO)
What is ELIANE™?

- ELIANE™ is AVEBE’s new unique amylopectin potato starch obtained by state-of-the-art classical breeding techniques (non-GMO)
- Discovered by the university (Groningen) and developed by AVERIS, AVEBE’s breeding institute
- Complete chain control “From potato plant to end product”
ELIANE™ Compared to Other Food Starches

<table>
<thead>
<tr>
<th>Starch type</th>
<th>ELIANE™</th>
<th>Potato</th>
<th>Waxy maize</th>
<th>Tapioca</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amylose (%)</td>
<td>&lt;1%</td>
<td>20-22%</td>
<td>&lt;4%</td>
<td>17%</td>
</tr>
<tr>
<td>Phosphate (ppm)</td>
<td>800-1000</td>
<td>800-1000</td>
<td>~30</td>
<td>~90</td>
</tr>
<tr>
<td>Diameter range (μm)</td>
<td>5-100</td>
<td>5-100</td>
<td>2-30</td>
<td>4-35</td>
</tr>
<tr>
<td>Gelatinization T</td>
<td>(Very) low</td>
<td>Very low</td>
<td>Medium</td>
<td>Low</td>
</tr>
<tr>
<td>Protein (N) g/100 g</td>
<td>0.04</td>
<td>0.07</td>
<td>0.33</td>
<td>0.10</td>
</tr>
<tr>
<td>Lipids g/100 g</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Crystal structure</td>
<td>B-type</td>
<td>B-type</td>
<td>A-type</td>
<td>C-type</td>
</tr>
</tbody>
</table>

ELIANE™ has unique raw material characteristics
X-ray diffraction pattern of commonly used starches
Microscopic Pictures (100x)

Potato

ELIANE™

Tapioca

Waxy Maize
Brabenders Native Starches (5%) in Demineralized Water
Brabenders Amylopectin Starches (5%) in 2% Salt Solution
High Clarity & Stability of ELIANE™ compared to Potato Starch
High stability of low DE maltextrines of ELIANE™

<table>
<thead>
<tr>
<th>% Dry solids</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>45</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potato starch</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
</tbody>
</table>
Brabenders Modified Starches (4%)
Discrete Fragment Formation upon Shear

Before shear

After shear
ELIANE™ stands for:

- High viscosity and water binding
- High clarity
- Stability
- Clean neutral taste
- Low temperature of gelatinization (fast viscosity development/hydration)
- Smooth and shiny texture
- High expansion and soft crispy texture
ELIANE™

Applications in Food Systems

Eliane

food starch
Potato starch vs. waxy maize starch

Potato starch no 1 in:
- Instant noodles
- Snacks
- Bakery cream
- Instant soups
ELIANE™ in Instant Noodles

- Fast rehydration
- Excellent long lasting texture

**Standard noodle with potato starch**

after 3 minutes 85 °C

**Noodle with ELIANE™**, after 3 minutes 85 °C
ELIANE™ in Coated Nuts

- High expansion
- Soft crispy texture
- Special textures
- Excellent performance in baked coated nuts

Standard coated nut with a 100% potato starch formulation on the left and with 100% ELIANE™ formulation on the right
Benefits of Elianes in rice cracker products

- Soft crispy texture
- Easy to be melted in mouth
- Uniform structure (air cells)
- Controlled and uniform expansion
- Less energy required during baking

Texture analysis for rice cracker

- 10% ELIANE™
- 10% Potato starch
ELIANE™ in Instant Bakery Cream

- High bake stability
- Excellent texture

Baking Stability
(% flow at 200°C 20 min)

The lower the flow
the better the baking stability
ELIANE™ in Instant Soups & Sauces

- High viscosity
- Viscosity development at relatively low T

**Viscosity of an instant tomato soup prepared with different water temperatures**

- ELIANE™ (20% starch reduction)
- Native Potato Starch
- Native Tapioca Starch

- 90°C
- 85°C
- 80°C
- 75°C
- 70°C
Waxy maize starch no 1 in so-called ‘liquid foods’

- Dressings (mayonnaise)
- Fruit fillings
- RTE-desserts & yoghurts
- Canned soups
ELIANE™ in Cook Up Fruit Fillings

- Excellent performance at high °Brix
- High clarity
- Fresh, neutral taste

ELIANE™ vs waxy maize starch at 60 °Brix

![Graph showing viscosity comparison between Waxy Maize Starch and ELIANE™](image)
ELIANE™: a Potato Starch with a Smooth Appearance

ELIANE™ Texture in Hot Prepared Mayonnaise

- ELIANE™ potato starches (left) develop smooth textures
- Regular potato starches develop more pulpy texture
ELIANE™ in Liquid Sauces

- High viscosities
- Very low serum separation (syneresis)
- Different textures possible varying from pulpy to smooth
ELIANE™ in Low Fat Clear Dressings

- Clarity and Suspension Stability
- ELIANE™ products (right) give an excellent suspension of particles
- No non starch hydrocolloids required
- High clarity versus other starches

The clarity of ELIANE™ in dressings (right) is striking compared to the modified waxy maize starch (left)
Conclusions

- ELIANE™ is a new commercial amylopectin potato starch with unique features that adds to the existing range of starches
- ELIANE™ can be used in many traditional potato starch and waxy maize applications to give improved performance
- ELIANE™ can be used to replace expensive hydrocolloids
- ELIANE™ gives our customers the opportunity to innovate!

ELIANE™ is still in the development phase, any ideas/suggestions???