JRS Fibers for Life.

JRS – Recent Topics

Top 1: Alginates as functional coating

Top 2: Influence of bio-based fibers on biodegradability

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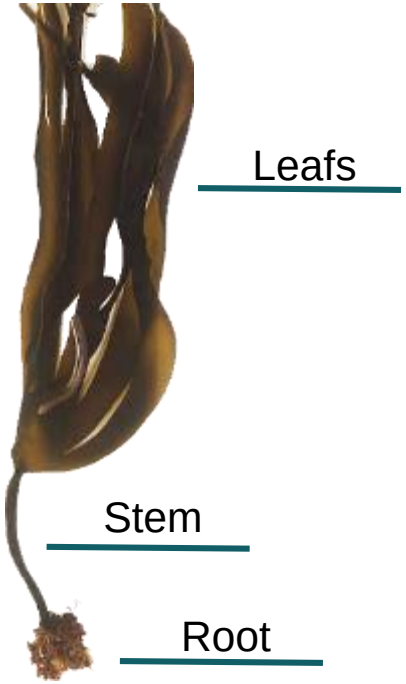
Company Profile JRS

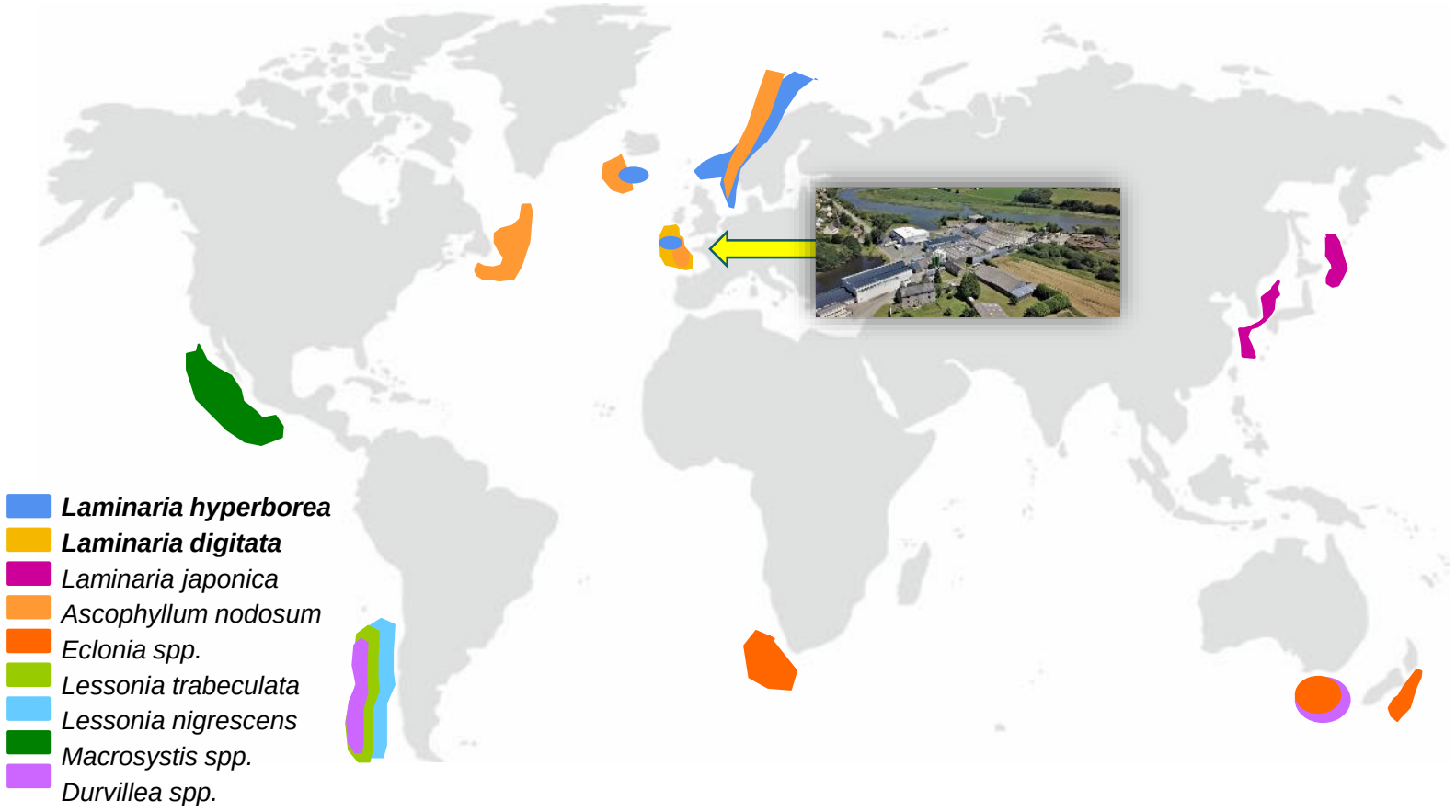
- Founded in 1878
- Owner-managed family company group with >3500 employees
- Producer of bio-based particles/fibers (wood, wheat, cellulose, corn cob, cereals, fruits,) and hydrocolloids (modified cellulose, alginates, pectins…)
- Global network structures : 90 production sites and sales offices
- Supplier for industries from pharma to road construction

Alginates for packaging materials

Alginate origin

- Local European raw material (seaweed)
- Sustainable and controlled harvesting
- Two production plants in the Bretagne (FR)





Alginate origin

- Local European raw material (seaweed)
- Sustainable and controlled harvesting
- Two production plants in the Bretagne (FR)
- **External Control**
  - ✓ Strong relationships with **local fishermen**
  - ✓ **Superior administrative control**
  - ✓ Cooperation with **maritime scientists** and local **authorities**

Alginate key properties

- Easily soluble in water
- Shear and heat thinning
- Film forming
  - grease and oxygen barrier

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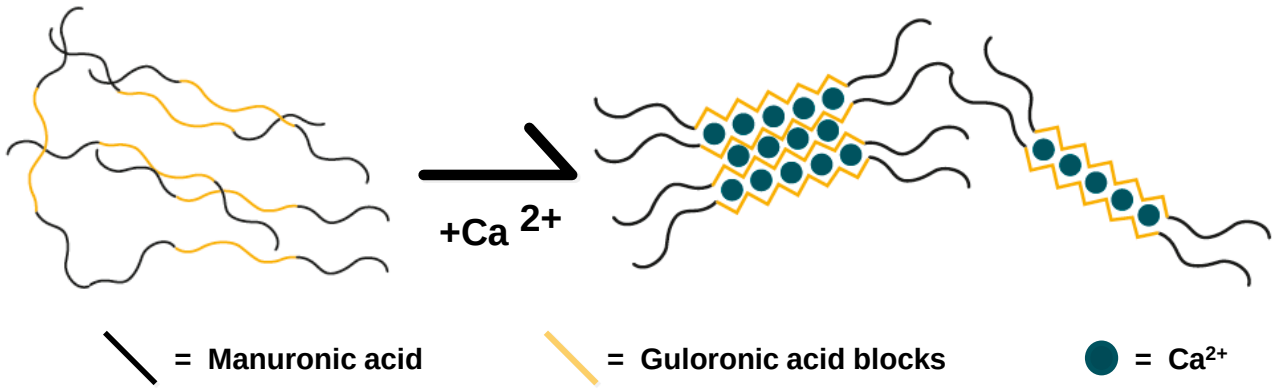
- **Strong interactions with Calcium**
  - Gelling
  - Water insoluble film
  - 2 component systems possible



Alginate as new packaging material

- Water soluble or insoluble coatings possible
- Oxygen barrier sufficient for most food packaging requirements
- Very good oil and grease barrier even with 1 g/sqm coating

OTR measurements	OTR [cm³/(m²*d*1.0 bar] 23°C, 50% humidity	Thickness [µm]
3% Alginate + 10% sorbitol	0.85	Wet: 750 Dry: ~ 40-50 (**Film**)
5% Alginate + 10% sorbitol	0.50	
3% Alginate + 3% Cellulose Gel +10% sorbitol	0.84	

KIT measurements	Kitchen oils, KIT 1 to 12	Thickness [µm]
3% Alginate	no penetration	Wet: 100 Dry: ~ 10 (**Film**)
3% Alginate + 20% glycerol	no penetration	

The above mentioned data is based on our measurements, practical knowledge and experiences and shall inform about our products and their applications.
Due to different materials and working processes, we recommend to perform sufficient trials and a consultation with us. A liability cannot be derived from these information.

Influence of cellulose and wood fillers on biodegradability of PLA

Test 1: Aerobic biodegradability based on DIN ISO 14855-1

Test 2: Disintegration of specimen

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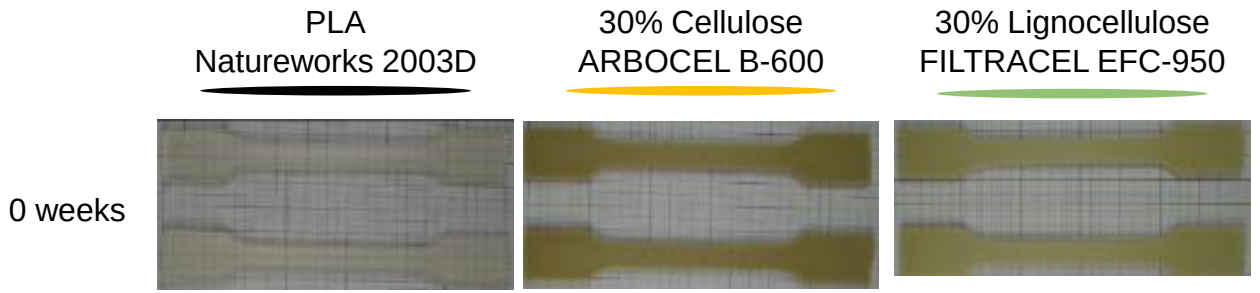

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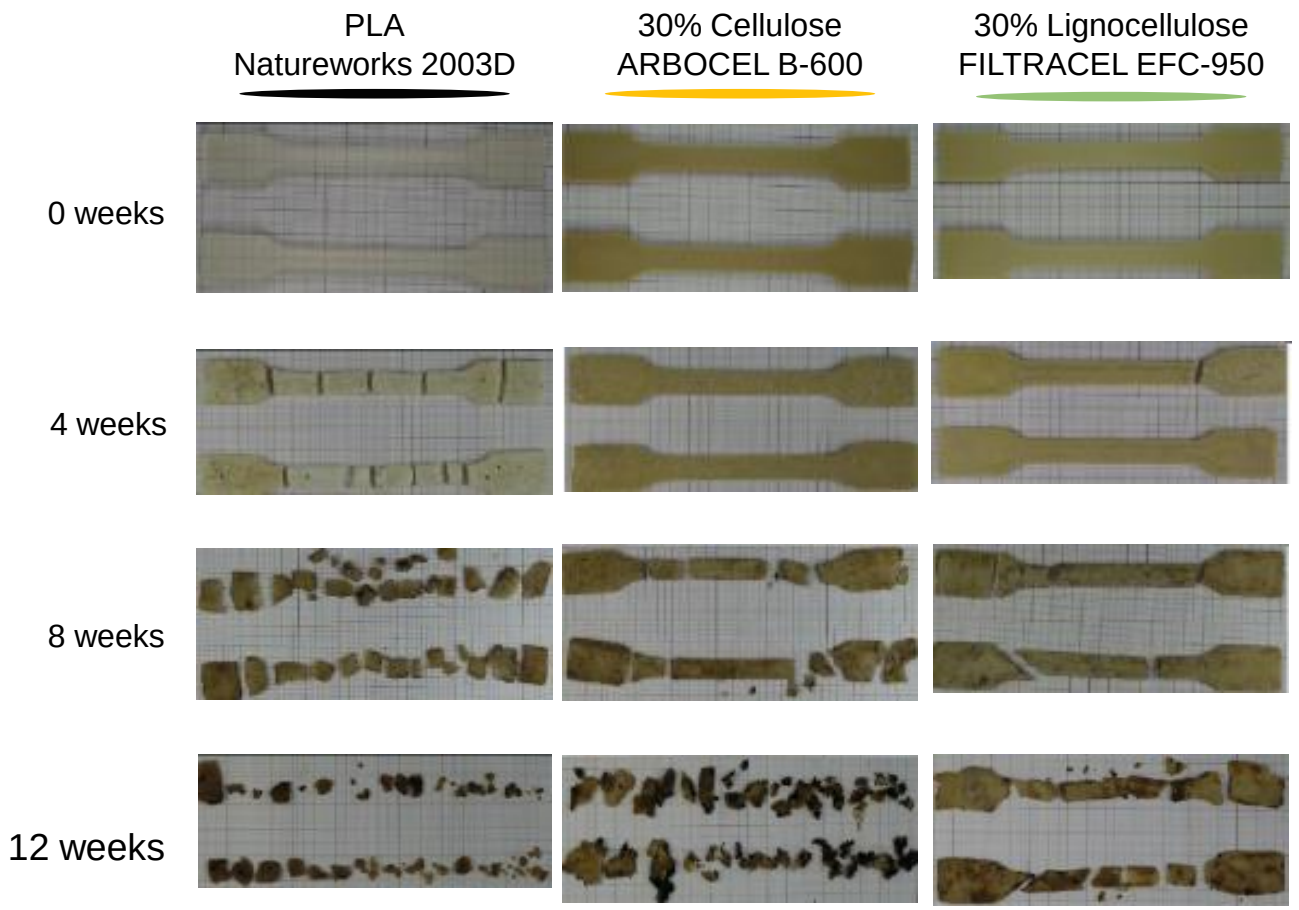

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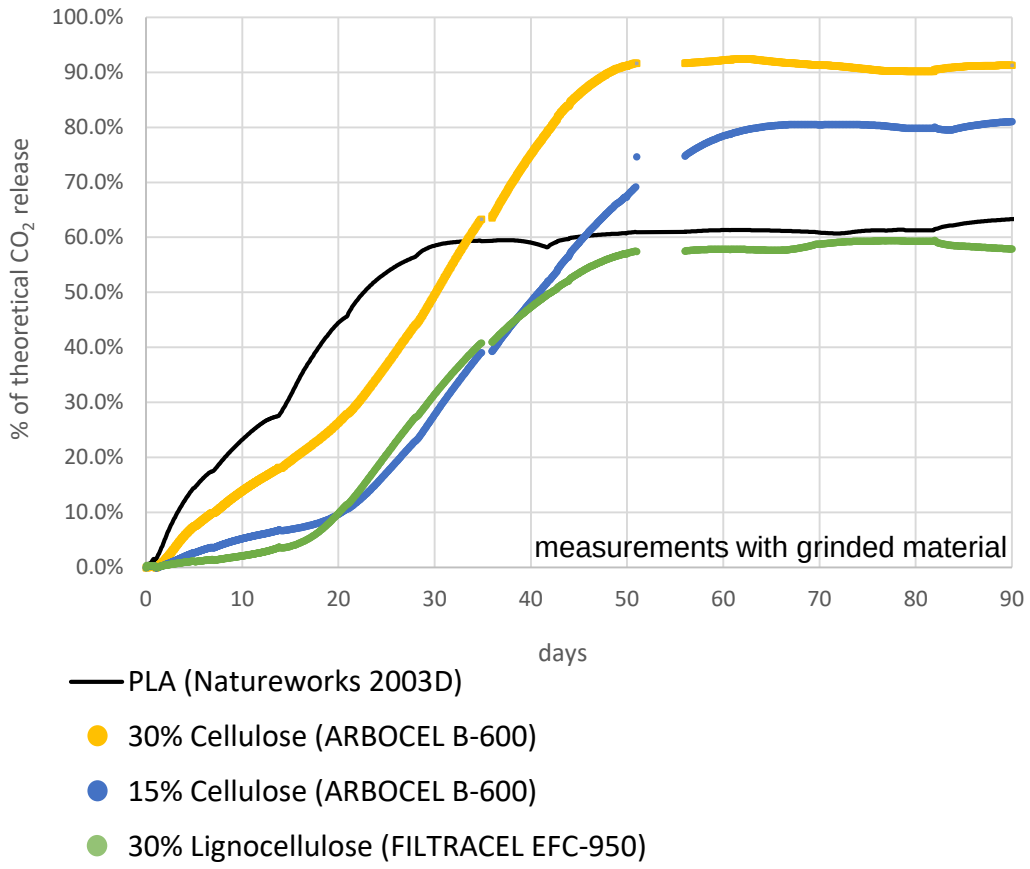

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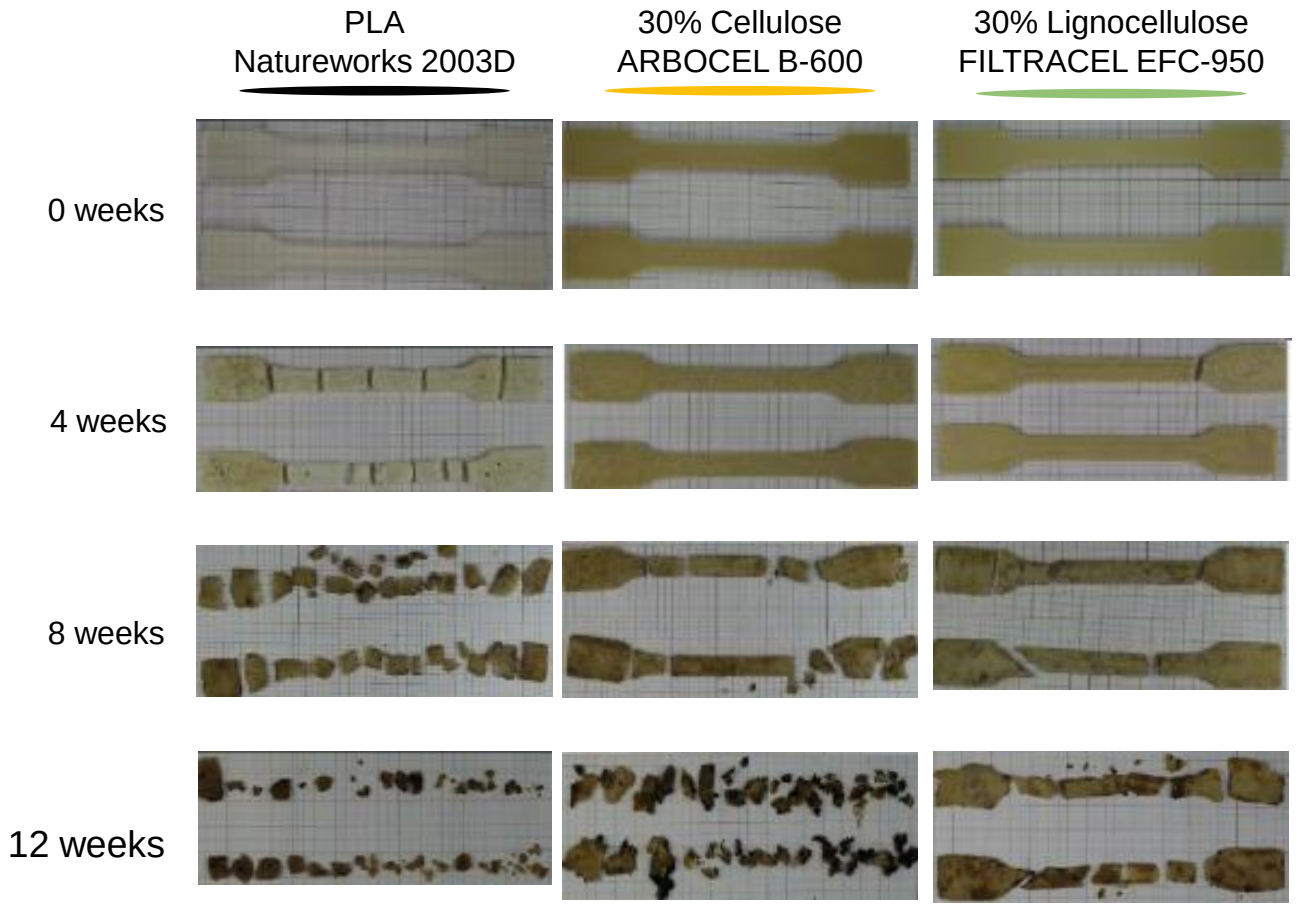

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Thank you for your attention!

Mechanical measurements based on DIN EN ISO 527/E-Module

JRS Fibers for Life.

Matrix	Filling Material		E-Module	Tensile Strength	Elongation at Tensile Strength	Tear Strength	Elongation at Break	HDT
	%	Type	Et [Mpa]	σM [Mpa]	ϵM [%]	σB [Mpa]	ϵB [%]	T [°C]
PLA 2003D		Not filled	3580 ± 28	74.2 ± 0.3	2.6 ± 0.0	61.3 ± 0.7	5.8 ± 0.3	55.8 ± 0.3
	15	Cellulose (ARBOCEL® B-600)	4290 ± 101	66.1 ± 0.2	2.0 ± 0.0	61.9 ± 0.4	2.8 ± 0.2	57.2 ± 0.2
	30	Cellulose (ARBOCEL® B-600)	5200 ± 185	68.2 ± 0.8	1.8 ± 0.1	68.1 ± 0.7	1.8 ± 0.1	56.2 ± 0.2
	30	Wood (ARBOCEL® C-100)	6230 ± 97	72.3 ± 0.6	2.7 ± 0.1	71.1 ± 1.8	2.7 ± 0.1	58.5 ± 0.2
	30	CTMP (FILTRACEL® EFC-950)	6110 ± 154	74.2 ± 0.4	1.8 ± 0.0	74.0 ± 0.3	1.9 ± 0.1	58.9 ± 0.2
PLA L130		Not filled	3552 ± 34	69.7 ± 0.6	2.1 ± 0.0	61.4 ± 3.6	7.0 ± 1.7	53.6 ± 0.1
	30	Cellulose (ARBOCEL® B-600)	5505 ± 31	63.8 ± 0.6	1.2 ± 0.0	63.3 ± 1.3	2.4 ± 0.1	57.5 ± 0.1
	30	Wood (ARBOCEL® C-100)	6239 ± 99	68.1 ± 0.8	2.4 ± 0.1	66.2 ± 1.8	2.4 ± 0.1	59.4 ± 0.2
	30	CTMP (FILTRACEL® EFC-950)	6441 ± 94	70.4 ± 0.6	2.4 ± 0.1	69.1 ± 1.1	2.4 ± 0.1	59.8 ± 0.1

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	%	Type	Et [Mpa]	σM [Mpa]	ϵM [%]	σB [Mpa]	ϵB [%]	T [°C]
PLA 2003D		Not filled	3580	74.2	2.6	61.3	5.8	55.8
	15	Cellulose (ARBOCEL® B-600)	+ 20%	- 11%	- 23%	+ 1%	- 52%	+ 3%
	30	Cellulose (ARBOCEL® B-600)	+ 45%	- 8%	- 31%	+ 11%	- 69%	+ 1%
	30	Wood (ARBOCEL® C-100)	+ 74%	- 3%	- 3%	+ 16%	- 53%	+ 5%
	30	CTMP (FILTRACEL® EFC-950)	+ 71%	+ 0%	- 31%	+ 21%	- 67%	+ 6%
PLA L130		Not filled	3552	69.7	2.1	61.4	7.0	53.6
	30	Cellulose (ARBOCEL® B-600)	+ 55%	- 8%	- 44%	+ 3%	- 63%	+ 7%
	30	Wood (ARBOCEL® C-100)	+ 76%	- 2%	+ 12%	+ 8%	- 63%	+ 11%
	30	CTMP (FILTRACEL® EFC-950)	+ 81%	+ 1%	+ 13%	+ 13%	- 63%	+ 12%

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