



Natur-Tec[®]

Sustainable Biobased Materials



Bioplastics - An Effective Tool For Organic Waste Management

*US Composting Council, Orlando
January 30, 2013*



- Introduction
- What are Bioplastics?
- Performance of Bioplastic - Bags and Cutlery
- Disintegration Results – ASTM & at Composting Sites
- Bioplastics in Organic Waste Diversion
- Conclusions
- Q & A



Northern Technologies International Corp.

- Environmentally Beneficial Materials Science
- Headquartered in Circle Pines, MN USA
- Global distribution through 29 Joint-Ventures
- Global R&D & Manufacturing Facilities
- NASDAQ Ticker: NTIC



Global leader in corrosion management services



Proprietary biobased and biodegradable polymers

What are Bio-Plastics?



“Bio-Based” Feedstock



Must Be Certifiable as Bio-Based
- Biobased – ASTM D6866

Bio-Plastics

“Compostable” End of Life



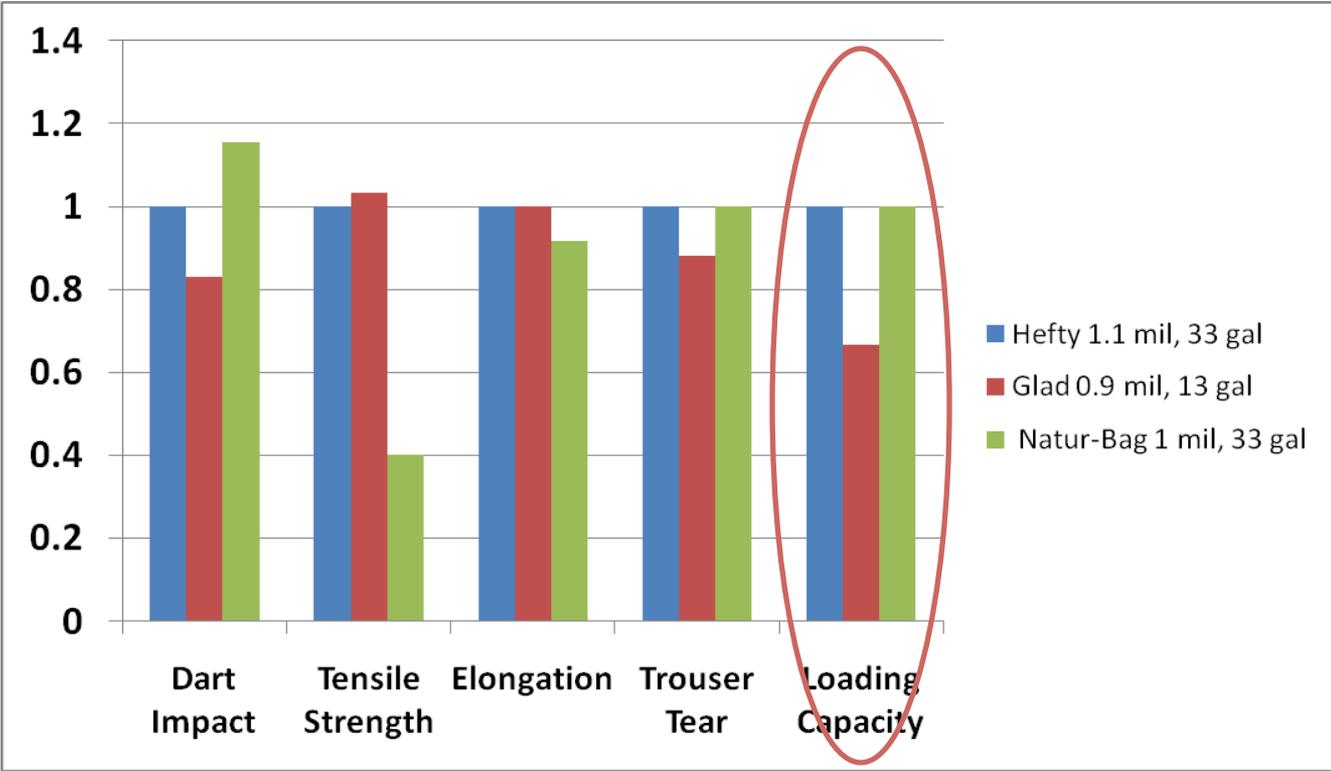
Must Be Defined and Certified
- Compostable – ASTM D6868 & ASTM D6400





PERFORMANCE

Performance Comparison of Bags



Performance of Cutlery – Heat



	Polypropylene	Polystyrene	cPLA
HDT (°F, 0.45 Mpa)	219	185	185-200



BIODEGRADABILITY

ASTM D6400 Specifies Three Criteria

1. Disintegration (Section 6.2)

- Less than 10% of test material remains on 2mm sieve
- Controlled compost conditions at thermophilic conditions (135°F / 58°C) as defined in **ASTM D5338** & **ISO 16929** test methods
- *Time: 12 weeks or less (84 days)*



2. Mineralization / Inherent Biodegradation (Section 6.3)

- *90% Conversion* to carbon dioxide, water & biomass via microbial assimilation
- **ASTM D5338** – defines test method used
- *Time: 180 days or less* (the same rate as natural materials - leaves, paper, grass, food scraps)



3. Safety (Section 6.4)

- No impacts on plant growth, using OECD Guide 208
- Regulated (heavy) metals less than 50% of EPA prescribed threshold

Compostable Plastics - Global Standards



ISO 17088

ASTM D6400 (USA) & Canada

BPI Biodegradable Products Institute
promoting biodegradable products throughout the world

COMPOSTABLE
Biodegradable Products Institute | US COMPOSTING COUNCIL

AN ESSENTIAL GUIDEPOST FOR CLIENTS,
A PLEDGE OF YOUR COMMITMENT

COMPOSTABLE
www.compostable.info

EN13432 (Europe)

Vinçotte and DinCertco

GreenPLA (Japan)

グリーンプラ®

AS4736 (Australian ABA)

Australasian Bioplastics Association

Factors Affecting Biodegradation Rate



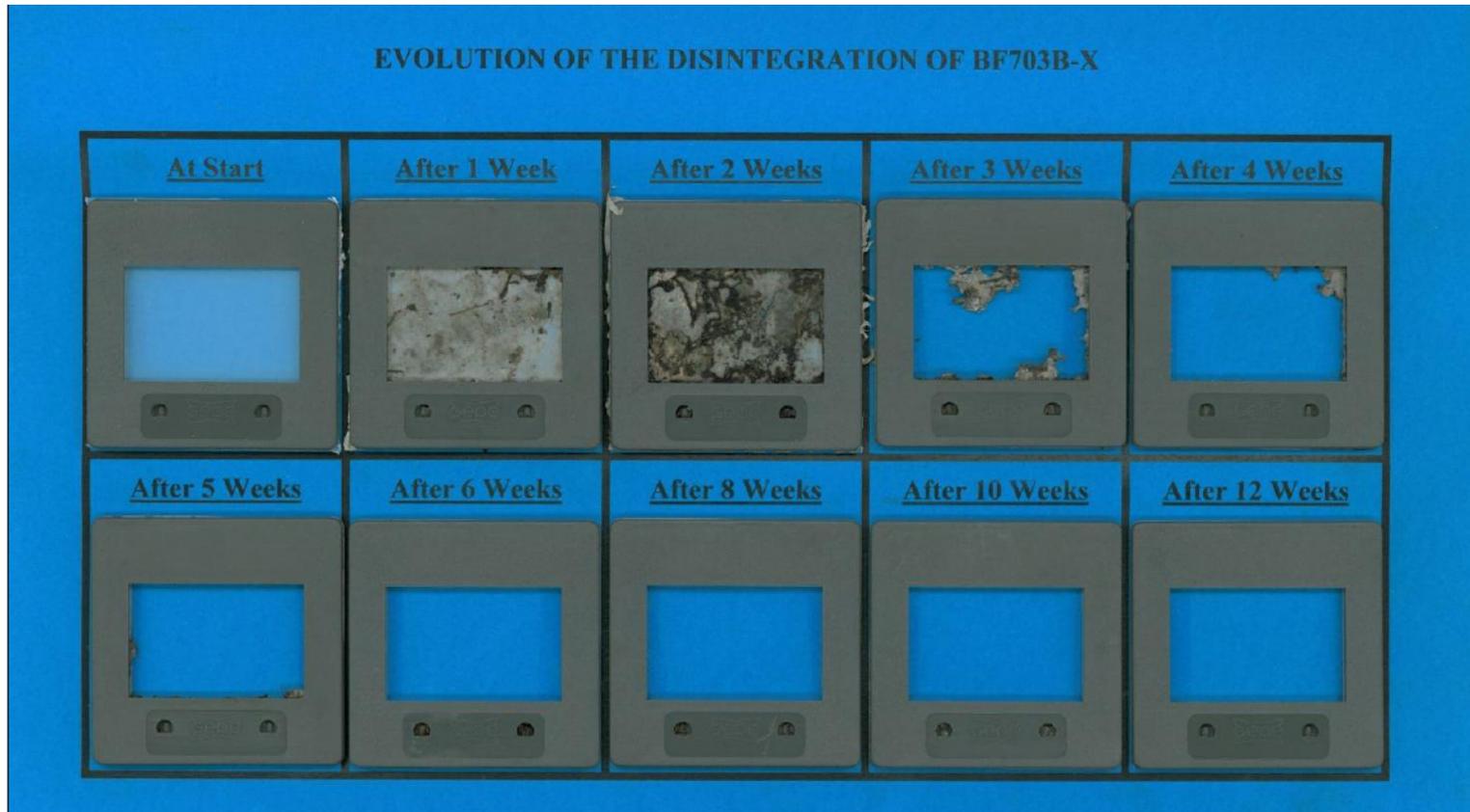
- Raw material
- Part thickness
- Crystallinity of the material



FILM Disintegration – Lab Testing



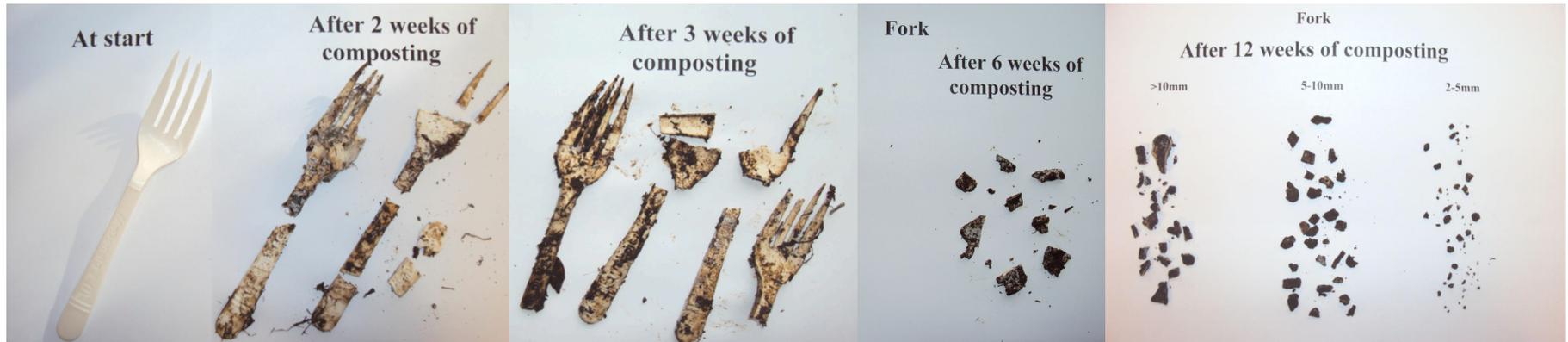
Visual presentation of the evolution of the disintegration of Natur-Tec® Compostable Film BF703B-X (77 µm)



Testing completed at Organic Waste Systems (OWS), Belgium

CUTLERY Disintegration – Lab Testing

Visual presentation of disintegration of Natur-Tec® Compostable BF3002 cutlery



Testing completed at Organic Waste Systems (OWS), Belgium

IS CUTLERY REALLY AN ISSUE??



Starch-based “Biodegradable” cutlery found at a composting facility

Disintegration of Natur-Tec's mPLA cutlery

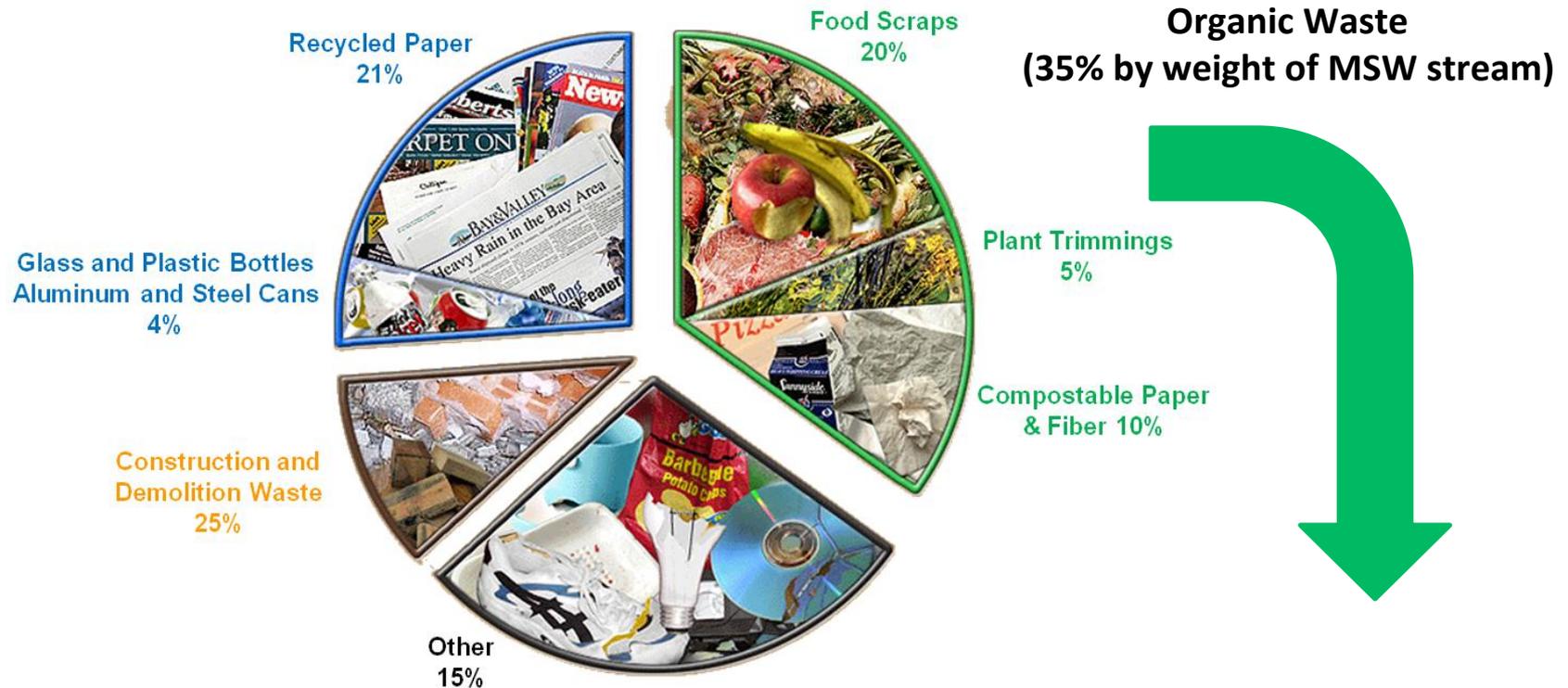


Tested at Specialized Environmental Technologies Inc. (SET)
Composting facility, MN



Day 1 through Day 18

WHY Organic Waste Diversion?



Source: Dept. of Environment, City and County of San Francisco; All% by weight (tons)

Diverted away from Landfills to Centralized Composting Facilities

How Do Bioplastics help with Organic Waste Diversion?

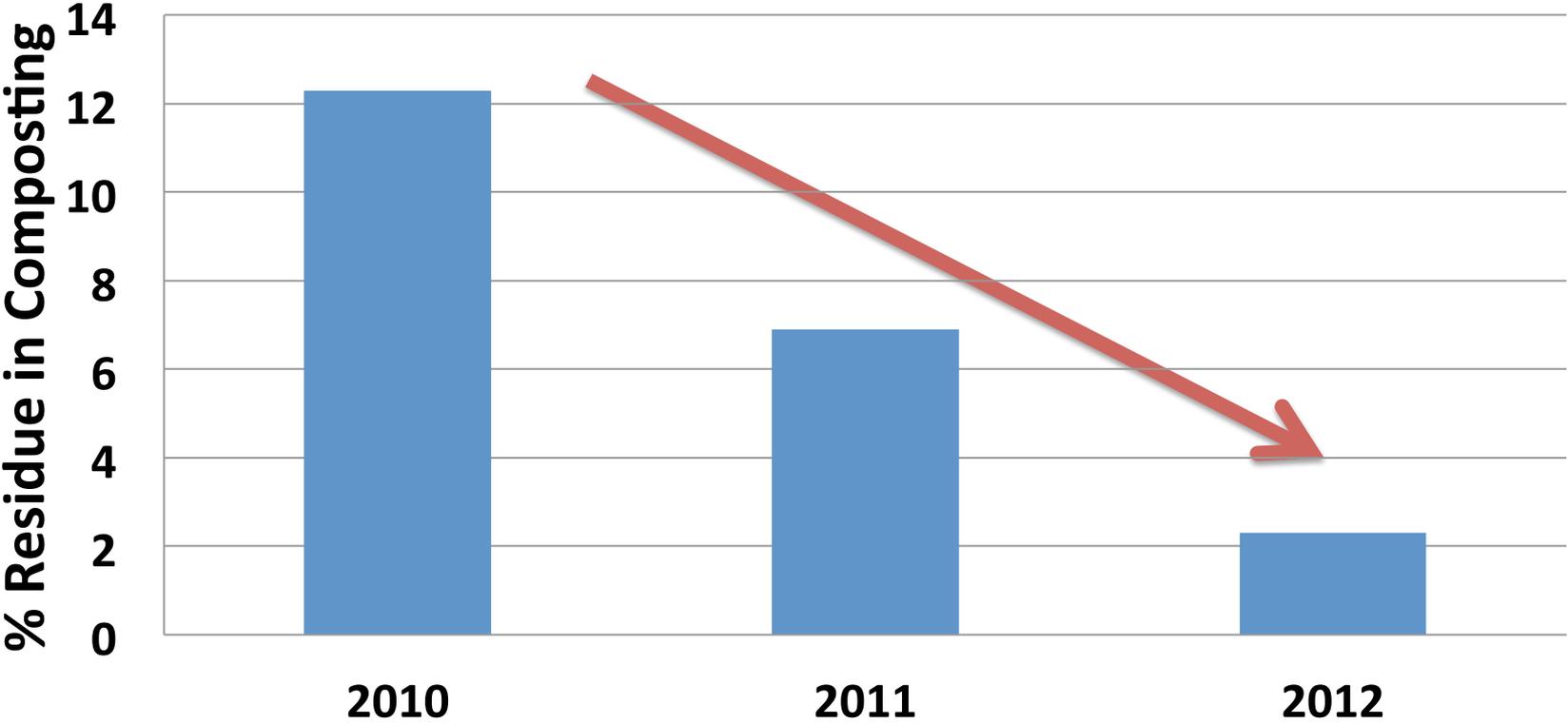
Organic Waste!!!



Decreasing Compost Scrap/ Overs



Data as reported by Specialized Environmental Technologies, Inc., MN



Carver County Organics Program

Residential - Schools - Commercial - Events - Internal



Reference: Anne Ludvik, SET, MN

Organic Diversion Programs



- Seattle Mariners
 - Safeco Field, Seattle, WA
- Portland Trail Blazers
 - Rose Garden Arena, Portland, OR
- Commonwealth Properties
 - 560 Mission, San Francisco, CA



- Compostable plastics
 - Perform comparable to traditional plastics
 - facilitate organic waste diversion and assist in source separated organic (SSO) management
 - not only help improve compost yields but also compost quality by eliminating plastic as a source of contamination
 - DO COMPOST!!!

HAPPY COMPOSTER!!!



Thank You!

