

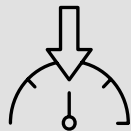


Exceed™ Tough+

Dania Agricultural increases the PCR content in mulch film while simultaneously downgauging, without compromising on film quality or tear properties



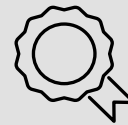
Incorporates
recycled content



Downgauging
potential



Tear
resistance



Film
quality

Data and results presented herein apply specifically to the noted application under this fact sheet. Your results may differ depending on factors such as operating conditions, equipment and materials used.

Challenge

Replace C4LL-based mulch film solutions to increase incorporation of post-consumer recycled (PCR) content and downgauge without sacrificing film quality.

Mulch films are typically laid on the soil for a seasonal crop collection and after the season is collected manually using manpower or automated retrieving tractor machines. This requires superior tear resistance properties along the machine direction (MD Tear). Increasing PCR content or reducing the film thickness reduces the MD tear properties. Dania Agricultural, a producer and exporter of greenhouse and mulch films located in Amman, Jordan, engaged with ExxonMobil Signature Polymers experts to create a solution.

Solution

Dania turned to Exceed™ Tough+ m 0516.ML metallocene polyethylene as a replacement for C4LL while increasing the PCR content in the formulation and downgauging, without compromising the tear resistance of the mulch film. Increasing the PCR content reduced waste and required less virgin material than previous formulations. The solution was created on a 3-layer blown film co-extrusion production line.

“We worked with the ExxonMobil Signature Polymers team and arranged multiple trials with Exceed Tough+ 0516 that addressed higher PCR incorporation, and aggressive downgauging in our mulch production. With support of ExxonMobil technology, sales and marketing teams, we have observed a potential 52% reduction in mulch film cost per unit area and up to 70% reduction in use of virgin resin as a result of superior tear resistance performance of the Exceed Tough+ series performance polymers,” by Nael Al Jabaly, Owner and plant manager.

Results

Exceed™ Tough+ m 0516.ML with its superior tear resistance helped achieve improved puncture and tear properties, even after downgauge and increased PCR content. Findings are as follows:

Increased PCR

- PCR content was successfully increased from 20% to 46% while maintaining tear properties through the introduction of 15% Exceed™ Tough+ m 0516.ML

Downgauging without PCR


- Superior tear and puncture properties vs reference film even after downgauging of 25% of the mulch film thickness through introducing 15% of Exceed Tough+ m 0516.ML.
- Similar tear and puncture properties vs reference film even after downgauging of 50% of the mulch film thickness through introducing 25% of Exceed Tough+ m 0516.ML.

Simultaneous downgauge and increased PCR


- Similar tear and puncture properties vs reference film even after downgauging of 25% of the mulch film thickness and simultaneously increasing PCR content to 40% through introducing 30% of Exceed Tough+ m 0516.ML.
- Similar tear and puncture properties vs reference film even after downgauging of 50% of the mulch film thickness and simultaneously increasing PCR content to 40% through introducing 40% of Exceed Tough+ m 0516.ML.

*Black masterbatch is used as 8% across all trial formulations.
 ** Reductions based on formulation with Exceed Tough+ m 0516.ML incorporating 40% PCR content at 50% downgauging compared to the previous C4LL-based formulation with no PCR content



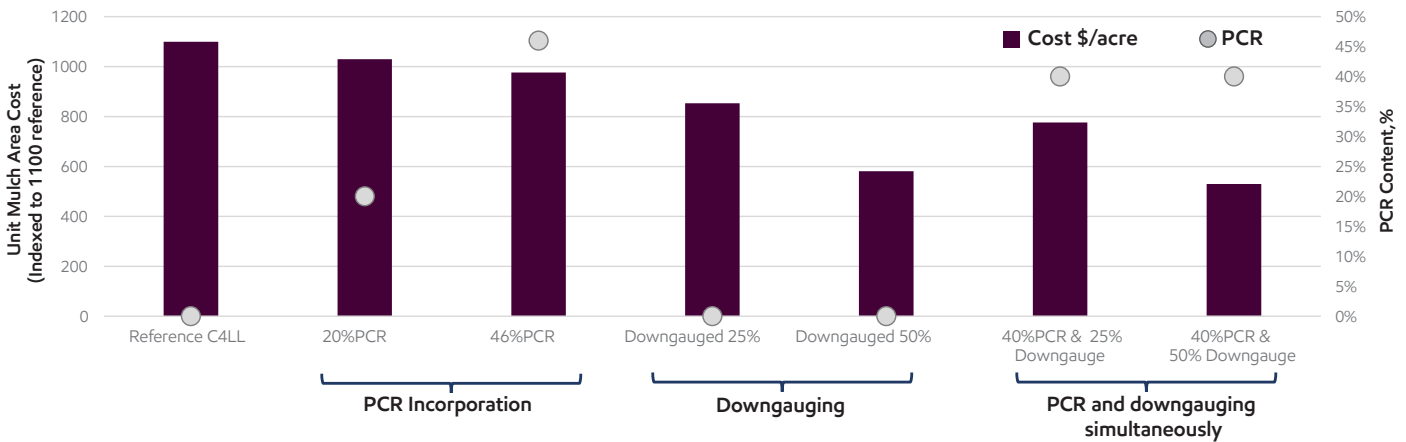


52%
Potential reduction in mulch film cost/unit area



70%
Potential reduction in use of virgin resin

Exceed Tough+ 0516 Tear Booster Mulch Formulation Economics vs PCR and Downgauging
 (At similar or improved MD tear and puncture vs reference)



Test item	Test method
Tensile	ExxonMobil test method based on ASTM D882-18
Elmendorf tear	ExxonMobil test method based on ASTM D1922
Dart	ExxonMobil test method based on ASTM D1709
Needle puncture	ExxonMobil test method based on ISO CEN 14477
Probe puncture	ExxonMobil test method based on ASTM D5748-95

Data from tests performed by or on behalf of ExxonMobil



Bring your impossible



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What's new: ExxonMobil Signature Polymers

All our polymers are now positioned under a single portfolio brand: ExxonMobil Signature Polymers. The aim is to simplify our product architecture and naming to improve portfolio navigation for you. We would like to stress that our commitment to high quality products remains the same, it is the names that change. Everything else remains the same. We will be making these modifications over the next six months so you will see both old and new grade names highlighted during that time.

Here's a quick overview of brands and grade names that have changed in this document:

Legacy commercial name	New commercial name
Exceed™ XP 8656	Exceed™ Tough+ m 0516

Some of our existing Exceed, Achieve, Paxon and premium PP/HD grades have moved to Exceed brand; most existing Enable grades have moved to Exceed Flow[+]; most of our existing Exceed XP grades have moved to Exceed Tough[+]; most of our existing Exceed S grades have moved to Exceed Stiff[+]. More details here https://www.exxonmobilchemical.com/en/brands/signature-polymers/exceed_high_performance_polymers or contact your ExxonMobil representative to know more.

Want to see what's changed in our portfolio? Go to [exxonmobilchemical.com/sptransform](https://www.exxonmobilchemical.com/sptransform)