The Tale of DNA Earth-1

How a humble citrus extract transformed tire ecology

Reduce rolling resistance. Fuel economy improves. But grip deteriorates.

That was long the conventional wisdom—and a technological "given"—in the world of tires. Until Yokohama upturned conventional notions with a new approach to rubber compounding.

Yokohama's revolutionary technology reconciles the previously incompatible goals of low rolling resistance and high grip. And it accomplishes that breakthrough with the aid of an unlikely contributor: oil squeezed out of orange peels.

The orange-oil technology debuted in Yokohama's premium-grade DNA dB super E-spec tire. In early 2008, Yokohama deployed the technology in the mass-market DNA Earth-1. Rolling resistance with the DNA Earth-1 is 21% lower than with an industry benchmark for affordable fuel-saving tires: Yokohama's own ECOS tire. And grip is better. So is comfort.

Suppler Rubber

Orange oil has a molecular structure similar to that of rubber. It mixes well with the stuff of tires. It also makes the rubber softer.

Smear a little juice from an orange peel on an inflated rubber balloon. And… Pop! The orange oil softens the rubber. The balloon bursts.

What happens is that the oil seeps between the tightly intermeshed molecules of rubber polymer and loosens them. That's what makes the rubber more supple.

Improved Fuel Economy

Using natural rubber is a natural way to reduce rolling resistance—and improve fuel economy—in tires. Unfortunately, natural rubber generates less heat in tires than synthetic rubber does. And less heat means less grip.

Compounding orange oil with natural rubber improves grip. The increased suppleness enables the rubber to grasp even tiny projections on the road surface. So you enjoy the low rolling resistance characteristic of natural rubber. And you enjoy reliable grip.

The Continuing Evolution of the DNA Eco Tire Series

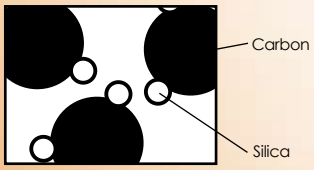
A new advance through compounding with orange oil

Yokohama was a Japanese pioneer in focusing on developing and mass-producing fuel-saving tires. The company's first DNA eco tires went on sale a decade ago as a breakthrough in reducing rolling resistance. Fuel economy has since become an important criterion for customers in selecting tires, and tire manufacturers around the world are competing to outdo one another in

1998

FIRST
generation

Gattai-gomu



Bonding particles of silica and carbon before compounding them with rubber overcomes the traditional difficulty of achieving even distribution for the silica. That makes the most of silica's value in improving grip on wet surfaces and in reducing rolling resistance.

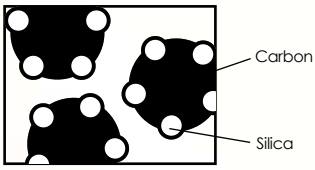
ECOS

The showcase tire of the DNA series: combines superior all-around performance with persuasive affordability

2002

SECOND
generation

Gattai-gomu II



Reducing the size of the particles of silica and carbon increases the surface area of the silica and carbon and allows for using more silica. That helps increase grip further and reduce rolling resistance further. Strengthening the bonding between the silica and carbon increases resistance to wear.

dB E551 decibel

An advance in quiet ride: a premium-grade addition to the DNA series

A More-Comfortable Ride

The DNA Earth-1 provides a smoother ride, as well as improved fuel economy. Yokohama has been especially successful in moderating the vertical shock from bumps in the road. That is largely the result of a new, rounded profile for the shoulder portion of the tire, which disperses shock.

In addition, Yokohama has downsized the filler—a triangular reinforcement strip on the edge of the carcass for imparting stiffness to the tire. That moderates the lateral stiffness and softens road impact, especially in inch-up sizes—sizes where the aspect ratio is lower and the wheel diameter larger than with the original-equipment tires.

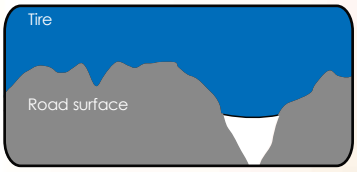
A Size Combination for Every Need

Yokohama has deployed the DNA Earth-1 in fully 70 size combinations. That makes the tire's fuel-saving benefits accessible to a vast range of customers. The DNA Earth-1 is available for vehicle models as diverse as medium-sized coupes, sedans, and minivans; subcompacts; and even minicars. Yokohama launched the new tire in February 2008 and is targeting sales of one million units in fiscal 2009.

creating tires that help conserve fuel. Yokohama retains its hard-won edge in that competition, as evidenced by the 2008 launch of the DNA Earth-1 and its orange oil compound. That compound, dubbed Super Nano-Power Rubber, marks a new chapter in the proud and continuing history of the DNA tire series.

2005 — **2007**

THIRD generation
Nano-Power Rubber



Nanotechnology supports enhancements in Gattai-gomu II through compounding with new materials. Road contact improves, and grip is better than ever.

GRAND map

For large minivans: provides steady handling and quiet ride

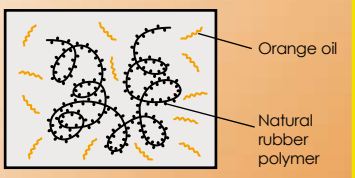
map ES340

A new standard for minivan tires: accompanies quiet ride with long-life performance

DNA S.drive

Sporty performance: adds a fun new dimension to the DNA series

FOURTH generation
Super Nano-Power Rubber



Compounding with orange oil overcomes a traditional drawback of natural rubber in achieving excellent grip. It also makes the most of natural rubber's advantage in regard to low rolling resistance. The result is an important new advance in fuel-saving tire performance.

dB super E-spec

Unexcelled environmental performance: the DNA paragon

Earth-1

All-around fuel savings: sizes for a vast range of needs