

WHY CAN LEAVES CAUSE RAIL DELAYS?



LEAVES ON THE LINE

Leaf residue on train tracks can reduce the friction coefficient, μ . This leads to loss of grip between the train wheels and the track, meaning longer braking distances. Additionally, leaves on the line can prevent signalling equipment detecting trains.



$\mu = 0.40-0.65$



$\mu = 0.10-0.20$



$\mu = 0.02-0.05$

WHAT CAUSES THE PROBLEM?

There are several potential explanations for the lubricating effect of leaves on train tracks.



1

Leaves can be compacted onto the tracks. The compacted layer becomes thick enough to prevent contact between wheels and rails.

2

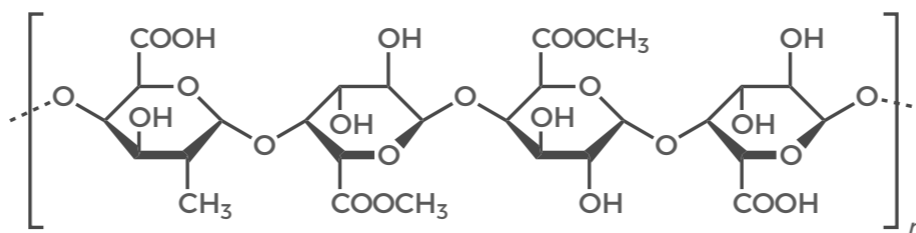
A chemical reaction between the leaf and the rail produces friction-reducing iron oxides.



● COMPRESSED LEAF FILM
● FRICTION-REDUCING LAYER
● METAL RAIL

3

Pectin in the leaves forms pectate gels with iron from the steel in the rails, reducing friction.



PECTIN (TYPICAL STRUCTURE)

DEALING WITH LEAVES ON THE LINE



£50 MILLION

ESTIMATED COST PER YEAR IN THE UK TO CLEAR LEAVES FROM TRAINLINES



5,800 HOURS

ESTIMATED DELAYS IN THE UK CAUSED BY LEAVES ON TRAINLINES IN 2015

Leaves on the line cost rail companies millions every year in delays and compensation. Below are some of the ways they deal with the problem.

1

High pressure water jets fitted to special trains are used to blast leaf residue from tracks.



1500 bar (22000 psi) pressure

2

Adhesion modifiers are applied after leaves have been washed off to improve traction.

ADHESION MODIFIER (SANDITE)



SAND



ALUMINIUM



ADHESIVE

3

In some countries lasers remove leaf films from rails (a process called laser ablation).

