A background image of a forest with tall, thin trees and a bright sun flare in the center, creating a hazy, dappled light effect. The text is overlaid on a semi-transparent white rounded rectangle.

Moisture availability influences the effect of ultraviolet-B radiation on leaf litter decomposition

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Litter Decomposition

Decomposition is primarily driven by biologically-mediated enzyme activity.

In arid environments:

Biotic activity is often moisture-limited.

Decomposition persists in these environments.

Additional factor: abiotic UV exposure.

Quaking aspen (*P. tremuloides*)

Aspen forests:

Latitude.

Elevation.

Periodic UV:

Spring
(pictured).

Fall

Potential impact
on

Effects of UV-B radiation

UV radiation can affect decomposition via two counteracting mechanisms:

Photodegradation.

Microbial Inhibition.

Net effects of UV exposure can be either positive or negative!

Experimental Design

Field Collection

Aspen litter

Soil/soil biota

Treatments:

UV-B exposure

Precipitation.

Soil biota.

Primary objective: Determine if the effect of UV-B radiation on litter decomposition is dependent on frequency of precipitation.

UV Supplement

Precipitation Frequency

Soil Microbial Activity

This method of soil sterilization did not include sterilization of the litter, nor did we monitor litter microbial biomass.

Percent Organic Matter Remaining

Percent Organic Matter Remaining

Litter Percent Nitrogen Remaining

Litter Decom position Rates

Concluding Remarks

I. Results from this study cannot be quantitatively extrapolated to field conditions.

III. Our results support the hypothesis that photodegradation is a critical driver of decomposition in moisture limited environments.

V. In addition, UV-B exposure appears to influence decomposition in any environment where litter is exposed to UV-B for even part of the year.

VI. Ultimately, to expand upon our findings and to enable quantitative extrapolation to the field, future research is necessary.

ACKNOWLEDGEMENT

**USDA UV-B Monitoring and
Research Program , USDA
CSREES (WeiGao).**

**National Science Foundation
grant awarded to Heidi Steltzer
and Matthew Wallenstein.**

**Also thanks to Roger Tree, Jack
Morgan, William Parton,
George Janson, John Davis,
and Roger Reddy**

Model description	Equation
No Treatment Effect	$M_t = m_0 * e^{(-k * t)}$
UV-B Effect	$M_t = m_0 * e^{(-(s_1 * UV + k_0) * t)}$
Biotic Effect	$M_t = m_0 * e^{(-(s_2 * P + k_0) * t)}$
Combined Effect	$M_t = m_0 * e^{(-(s_1 * UV + s_2 * P + k_0) * t)}$
Interactive Effect	$M_t = m_0 * e^{(-(s_1 * UV + s_2 * P + s_3 * UV * B + k_0) * t)}$