Dissipation of Penoxsulam, a New Sulfonamide Herbicide, in Simulated Rice Field Conditions

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Abstract
Penoxsulam (trade name Sanox, a new sulfonamide herbicide) is being developed for the control of annual grasses, sedges, and broadleaf weeds in rice culture. In this laboratory study, dissipation and air-water partitioning of penoxsulam in simulated rice field conditions were investigated. Penoxsulam dissipated rapidly in flooded rice soil in sunlight at high rates. The DT50 of penoxsulam was approximately 5 days. No residual metabolites were detected. Photodegradation of penoxsulam was extensive in both outdoor and indoor experiments, with approximately 99% degradation in 10 days under sunlight. Penoxsulam had extremely low vapor pressure and moderate Henry’s Law constant (HLC), indicating that its dissipation from soil and water is controlled by air-water partitioning and photodegradation.

Results

Air-Water Partitioning
- Experimental setup and procedures
- Penoxsulam partitioning in flooded rice soil
- Penoxsulam partitioning in sediment

Biodegradation
- Penoxsulam bioavailability in flooded rice soil
- Penoxsulam biotransformation products

Photodegradation
- Penoxsulam photodegradation in sunlight
- Penoxsulam photodegradation in simulated rice field conditions

Materials & Methods
- Penoxsulam and experimental setup
- Dissipation and air-water partitioning
- Biodegradation experiments
- Photodegradation experiments

Discussion
- The rapid dissipation of penoxsulam in flooded rice soil is controlled by air-water partitioning and photodegradation.
- Penoxsulam has extremely low vapor pressure and a moderate HLC, indicating that its dissipation is primarily controlled by air-water partitioning and photodegradation.
- Penoxsulam is likely to be rapidly biotransformed in flooded rice soil.

Conclusions
- Penoxsulam is a promising new herbicide for rice fields.
- The rapid dissipation of penoxsulam in flooded rice soil is controlled by air-water partitioning and photodegradation.
- Penoxsulam has a favorable ecotoxicology profile, making it suitable for use in rice fields.