

**EMISSION REDUCTION TECHNIQUES FOR
AGRICULTURAL BURNING AND
WILDLAND FIRE -
DRAFT ANNOTATED BIBLIOGRAPHY,
INDICES, AND SUMMARY TABLE**

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MACTEC FEDERAL PROGRAMS
RESEARCH TRIANGLE PARK, NC

OVERVIEW

- **PURPOSE OF PROJECT**
- **GENERAL DATA REFERENCES**
- **DRAFT ANNOTATED BIBLIOGRAPHY**
- **DRAFT INDICES**
- **DRAFT SUMMARY TABLES**
- **ISSUES**

PURPOSE OF THE PROJECT

- To develop an annotated bibliography on emission reduction techniques (ERTs) available to reduce emissions from the burning of agricultural residues and wildland fuel.

GENERAL DATA REFERENCES

- Keyword searches performed on over 80 Internet sites
- Made contacts based on list of over 220 names/agencies
- Identified over 500 potential references
- Obtained about 200 references for review

ANNOTATED BIBLIOGRAPHY

- Approximately 200 references examined
- 51 references (currently) included in annotated bibliography
- 35 for ag residues; 19 for wildland
- Chronological Distribution
 - 1960s – 4
 - 1970s – 28
 - 1980s – 10
 - 1990s – 7
 - 2000s - 5

ANNOTATED BIBLIOGRAPHY

- Sorted by author
- Individual references
- Original research, compilation, other
- EF, Reductions, Resource Effects
- Annotation contents (Purpose, Fuel type, ERT, Pollutants, reductions, factors, Caveats)
- Types of Fuel, ERTs, Variables, Time of Year, Location

ANNOTATED BIBLIOGRAPHY EXAMPLE

Author	Date of Publication	Original Research <input checked="" type="checkbox"/>
Darley, Ellis	January, 1977	Compilation <input type="checkbox"/>
Additional Authors	Date study was performed	Other <input type="checkbox"/>
	1974 - 1977	
Title	URL Address	
Emission Factors from Burning Agricultural Wastes Collected in California		
	Publication Reference	
Annotation		
<p>The purpose of this study was to determine pollutant emission factors from burning 31 field, vine, and orchard crops and weeds in an out-of-door, instrumented burning tower at the University of California Riverside. This study was conducted from 1974 to 1977. Field crops and weeds were burned as head and back fires at an air dry moisture level. Orchard and vine crops were burned in piles at two moisture levels and two systems of ignition (cold and roll-on). Pollutants observed include particulates, carbon monoxide and hydrocarbons. Size distribution of smoke particles was determined. This study reported that backfiring of field crops resulted in lower emissions of particulates versus head firing, but this was not so for carbon monoxide or hydrocarbons. No significant reduction of particulate or carbon monoxide was obtained by drying most orchard crops below about 35 percent moisture. Back firing produced smaller particles than head firing. Roll-on orchard fires produced larger particles than the first fire of the pair. Overall, orchard crops had less emissions than field crops.</p>		

ANNOTATED BIBLIOGRAPHY EXAMPLE

Agricultural or Wildland <input type="text" value="Agricultural"/>	Emissions Factors <input checked="" type="checkbox"/>	Emission Reductions <input type="checkbox"/>	Resource Effects <input type="checkbox"/>
Type of Fuel(s) <input type="text" value="Various fuel types, including field crops, vine crops, orchard crops, weeds"/>	Baseline/Type of ERT(s) <input type="text" value="Back burning vs. front burning
Piles
Cold start ignition
Roll-on ignition
Low moisture"/>	Variables <input type="text" value="Moisture
Ignition type
Slopes of 15 and 25%"/>	
Time of year burn performed <input type="text" value="Not clear"/>	Location of burn <input type="text" value="Burning tower, University of California Riverside"/>	Annotated Author Designation <input type="text" value="Darley (1)"/>	

INDICES

- **Split between agricultural residues and wildland**
- **Organized by**
 - fuel type then by emission reduction technique
 - emission reduction technique then by fuel type
- **Annotated authors shown**

EXAMPLE AG INDEX

Agricultural Fuel Types

Emission Reduction Techniques	Fuel type	Annotated Author(s)
Baseline - Strip Heading Fire	Cereal Grain	Schaaf
Burn Before New Fuels Appear - Before Green Up	Ryegrass, Annual and Perennial	Meland
Increase Combustion Efficiency - Alternate Year Burn	Straw	Conklin (1)
	Weeds - Tules	Darley (1)
Increase Combustion Efficiency - Mobile Field Sanitizer	Field, Grass and Straw Stubble	Conklin (2)
	Grass Straw	OMNI (1), Freeburn
	Rice Straw	Miller (1)
	Straw	Conklin (1)
Increase Combustion Efficiency - Moisture Variation / Drying Time	Cereal Grain	Schaaf
	Orange	Darley (4)
	Lemon	Darley (4)
	Rice Straw	Darley (4)
	Thistle, Russian	Darley (4)

SUMMARY TABLES

- Agricultural residue vs wildland
- By ERT then fuel type
- Pollutants
- Emission factors (lb/ton of fuel)
- Emission reductions
- Author
- Other information

ISSUES

- Fuel type then ERT or vice-versa
- Resource effects
- Cumulative emission effects of ERTs
- Compilations