

# **U.S. Fire Administration TOPICAL FIRE RESEARCH SERIES**

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## **Agricultural Fires**

### **FINDINGS**

- An estimated 20,000 agricultural fires each year result in \$102 million in direct property loss.
- Nearly two-thirds of all agricultural fires occur in orchards or crops.
- Agricultural fires peak in the early spring and again in the summer.
- Equipment fires usually involve cars, trucks, or tractors.
- The leading cause of agricultural fires is open flame (candles, matches, bonfires, welding equipment).

Sources: NFPA and NFIRS

Between 1996 and 1998, there were an estimated 20,000 fires each year on U.S. agricultural properties. These fires include those in and around facilities that produce raw agricultural products or on farms. Agricultural fires are responsible for nearly 50 civilian injuries, 25 fatalities, and \$102 million in property loss each year.<sup>1</sup>

## LOSS MEASURES

Although agricultural fires are less deadly and injurious than other fires, they tend to cause slightly more damage per fire (Figure 1). This may be due to the commercial value of the crops destroyed added to the cost of the structural damage to facilities on the property.

**Figure 1. Loss Measures for Agricultural Fires**  
(3-year average, NFIRS data 1996–98)

LOSS MEASURE	ALL FIRES	AGRICULTURAL FIRES
Dollar Loss/Fire	\$5,619	\$6,125
Civilian Injuries/1,000 Fires	15.7	3.1
Civilian Fatalities/1,000 Fires	2.4	1.0

Source: NFIRS only

## WHERE FIRES OCCUR

Sixty-four percent of reported agricultural fires occur in orchards. The other third occurs in cattle, other livestock, and poultry production facilities (Figure 2). Fifty-five percent of agricultural fires are brush/grass fires, which is not surprising given that crop fires predominate (Figure 2). Of the remainder, 14% involve vehicles on agricultural properties and 13% involve structures.

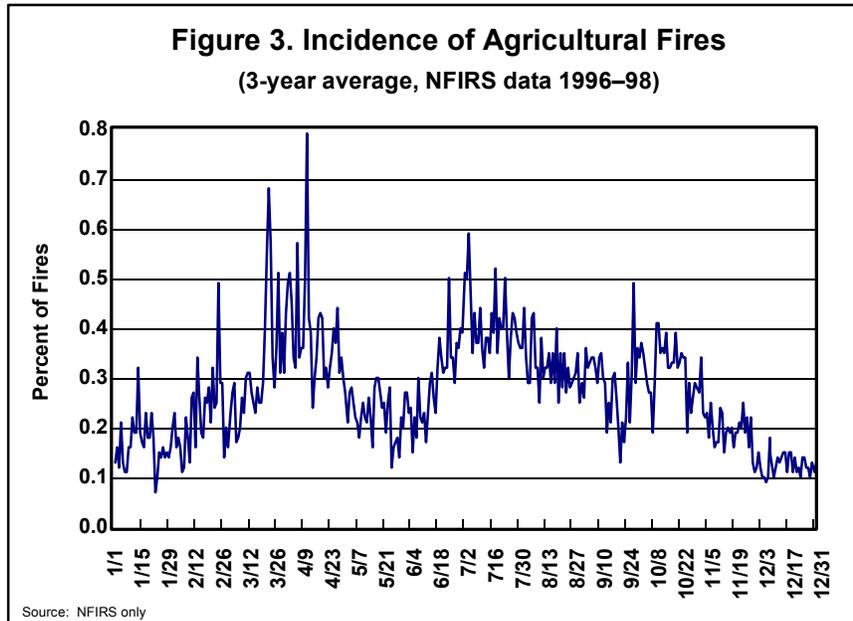
**Figure 2. Agricultural Fires: Locations and Type**  
(3-year average, NFIRS data 1996–98, adjusted percentage)

LOCATION	PERCENT OF FIRES	TYPE OF FIRE	PERCENT OF FIRES
Crops/Orchards	64	Brush/Grass	55
Cow/Cattle Production	22	Vehicle	14
Other Livestock Production	6	Structure	13
Poultry, Egg Production	3	Outside	10
		Refuse	7

Source: NFIRS only

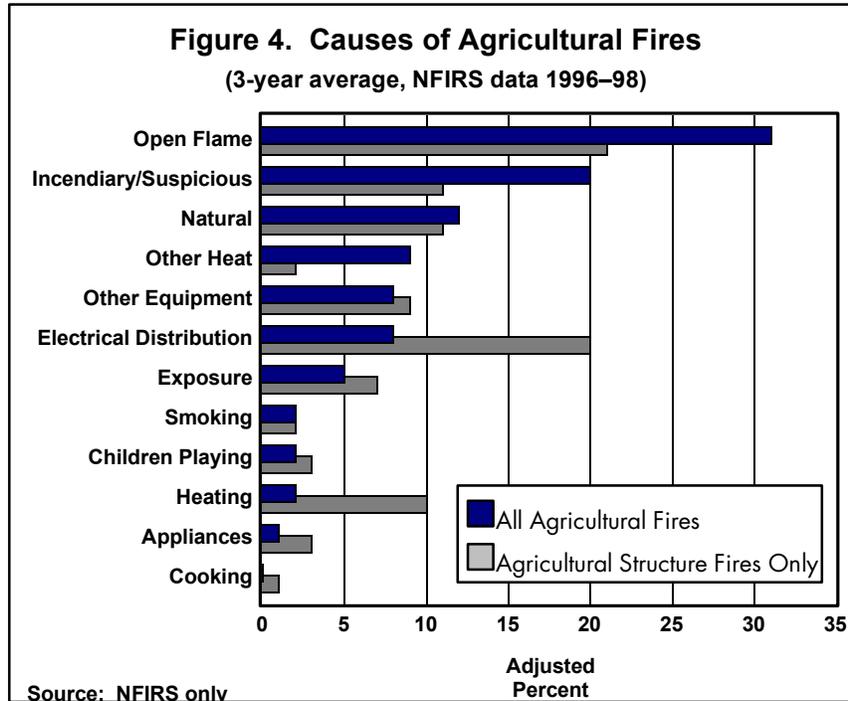
## WHEN FIRES OCCUR

Agricultural fires increase during the early spring and again in the summer (Figure 3). Peak months are April, July, and August, possibly due to seasonal differences in the harvesting and processing of crops. The pattern for structural fires is slightly different; here, the peak months are April, March, and July.



## CAUSES

As shown in Figure 4, the leading causes of agricultural fires are open flame, which includes candles, matches, bonfires, and welding equipment; incendiary/suspicious (arson); and natural sources, which include spontaneous combustion and lightning. The prominence of open flame and arson fires is consistent with the pattern seen in outdoor fires generally.



For agricultural structure fires, however, the leading causes are open flame, electrical distribution, and natural sources. Heating and electrical distribution account for a higher proportion of structure fires, while natural and other heat sources are less significant. Interestingly, arson plays a less prominent role in agricultural fires specifically and rural fires generally than is the case elsewhere. The reasons for this are not clear.

When a piece of equipment is involved in the fire's ignition, the leading equipment involved is a vehicle of some kind—car, truck, tractor (Figure 5). Other equipment involved in agricultural fires are processing equipment, fixed wiring, and torches. Equipment is involved in nearly one-third of agricultural fires (45% of structure fires and 31% of non-structure fires).

**Figure 5. Leading Equipment Involved in Ignition**  
(3-year average, NFIRS data 1996–98, adjusted percentage)

EQUIPMENT INVOLVED	PERCENT OF FIRES
Vehicle	12
Electrical Distribution	6
Processing	5
Maintenance/Service	5
Heating System	2

Source: NFIRS only

## CASUALTIES

Injuries on farms are common, particularly among children. In 1998, approximately 780 deaths and 140,000 injuries occurred on farms, making agriculture one of the most dangerous industries in the United States.<sup>2</sup> Moreover, according to one estimate, children under 20 experience nearly 33,000 agriculture-related injuries and approximately 100 fatalities each year.<sup>3</sup> Fire is responsible for only a small percentage of these casualties.

## DEVELOPING TREND

During the time period addressed by the data set used for this report, tobacco curing shed fires accounted for only about 1% of fires on agricultural properties. Beginning in 2000, some tobacco farmers have installed, at the request of the tobacco companies, heat exchangers in their barns. Heat exchangers serve to reduce the level of a carcinogen found in tobacco. Without proper shielding, however, heat exchangers can ignite the surrounding structural framing. Over the past 2 years, heat exchangers have been responsible for 30 fires in North Carolina, 15 in Georgia, 9 in South Carolina, and 2 in Virginia.<sup>4</sup>

## EXAMPLE

- In February 1999, a farmer who had spilled gasoline or diesel fuel on his clothes was killed in a granary fire. He was apparently trying to burn a tree stump when the fire ignited and spread to the surrounding building.<sup>5</sup>

## **CONCLUSION**

Like most fires, those that occur on agricultural properties are likely preventable with proper use of open flame and industrial equipment. For further information about fire prevention on farms, see the National Ag Safety Database (<http://www.cdc.gov/niosh/nasd/nasdhome.html>), or contact your local fire department, or the USFA.

## **NOTES:**

1. National estimates are based on data from the National Fire Incident Reporting System (NFIRS) (1996–1998) and the National Fire Protection Association’s (NFPA’s) annual survey, *Fire Loss in the United States*.
2. McCurdy, S. A. and Carroll, D. J., “Agricultural Injury,” *American Journal of Industrial Medicine*, October 2000, 38(4): 463–480.
3. *Fact Sheet—Agricultural Safety and Children*, National Children’s Center for Rural and Agricultural Health and Safety, January 2001.
4. “Safer Cigarette May Be Behind Barn Fires,” Associated Press, August 14, 2001.
5. “Wagner Man Dies After Granary Fire,” Associated Press, February 9, 1999.

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