

Agricultural Burning in NE Arkansas: What It's Costing Us

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Jonesboro, Arkansas

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Outline

The Problem: What is happening, why it's happening and what it's costing.

The Solution: What should the goals be? What are the possibilities?

Next Steps: Where do we start?

The Problem

Northeast Arkansas is farm country. Wheat, soybeans, cotton, corn, peanuts and rice crops surround us. Approximately 70,000 acres are planted in rice in

Craighead County which surrounds Jonesboro; 100,000 acres in Poinsett County just to our south. There are at least one million acres of rice cultivated in Arkansas per year. After the harvest, there is rice stubble – about two foot high stalks covering all that acreage left in the field. It has no commercial use.

Each Fall, to prepare the fields for the next planting, the majority of rice stubble is burned. The burning is essentially unregulated and unmonitored, and has become more widespread over the past few years. The cumulative smoke cloud is presenting a significant health risk to residents throughout the region.

Why is this happening? Of the options available to area farmers, two management tools predominate - burning their stubble is understood to be the most cost-effective choice, costing about three dollars per acre. Tilling the stalks into the field, the other option, costs farmers approximately fifteen dollars per acre per pass, and requires 2 – 5 passes to complete the process. The relative costs for preparing a thousand acre farm are obvious. There is good evidence that tilled stubble adds back nutrients to soil, but eventually can allow pests to accumulate, requiring increased chemical use or intermittent use of burning to clear these. Rotation to other crops can be a partial solution but such decisions depend on relative market values, soil suitability and many other factors. Furthermore, many farmers are under financial stress. Market prices are low and there is pressure to cut costs wherever possible.

Current state regulations on burning are almost non-existent. The Arkansas Department of Environmental Quality (ADEQ) has limited monitoring and no enforcement power on agricultural burning. County sheriffs have some regulatory power relating to highway safety, but there are no fees, no regulation, no disincentives that relate to public health.

The Cost

There is, however, a cost to the current practice of unregulated burning. Each Fall for the past several years, medical providers in our area have noted an increased

number of patients with respiratory conditions including asthma, bronchitis, sinusitis, and worsening COPD (chronic obstructive pulmonary disease).

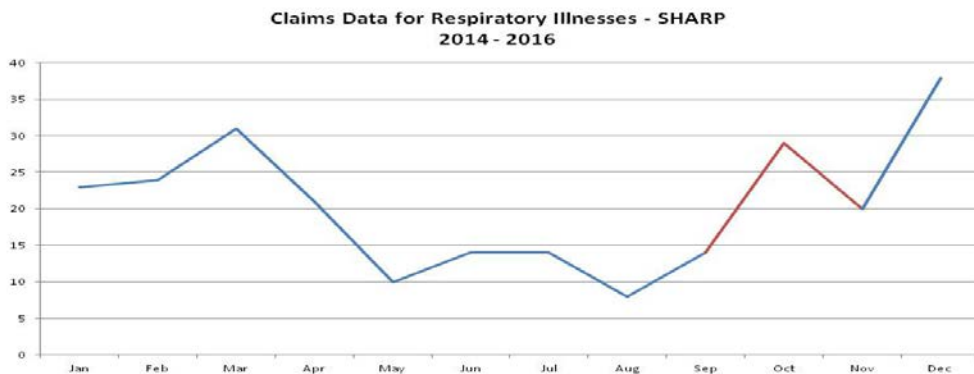


What's in agricultural smoke? Carbon monoxide, nitrous oxides, ammonia, sulfur dioxide, ozone and particulate carbon constitute the major known toxins. These pollutants produce a significant health hazard; they're not just a nuisance.

One of the most harmful (and best studied) components is small particulate carbon (PM 2.5). That substance alone is known to produce the very symptoms we see in our patients: exacerbation of wheezing and decreased lung function in asthmatics – especially children, increased frequency and severity of respiratory infections, and greater respiratory effort and lower oxygen levels in adult patients with COPD. Chronic exposure has been shown to increase risk of death from respiratory and cardiac causes in older Americans. There is good evidence that even modest elevations of particulate carbon produce adverse health consequences, and there appears to be no “safe” level below which there are no ill effects. How do we know? A great volume of data from the EPA and multiple independent studies show these effects. Many are referenced at the end of this review.

When we look at available measures of medical visits for respiratory illnesses in our area, we see a disturbing pattern. There is a spike in the Fall of the year that does not correspond to infectious disease prevalence. That pattern reflects our common experience in our medical practices.

The Problem

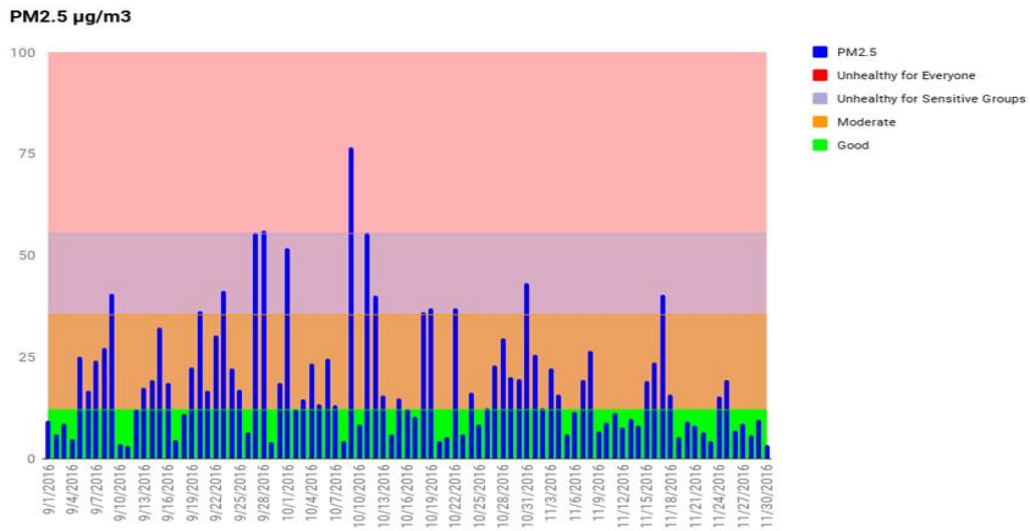


Measuring the Problem

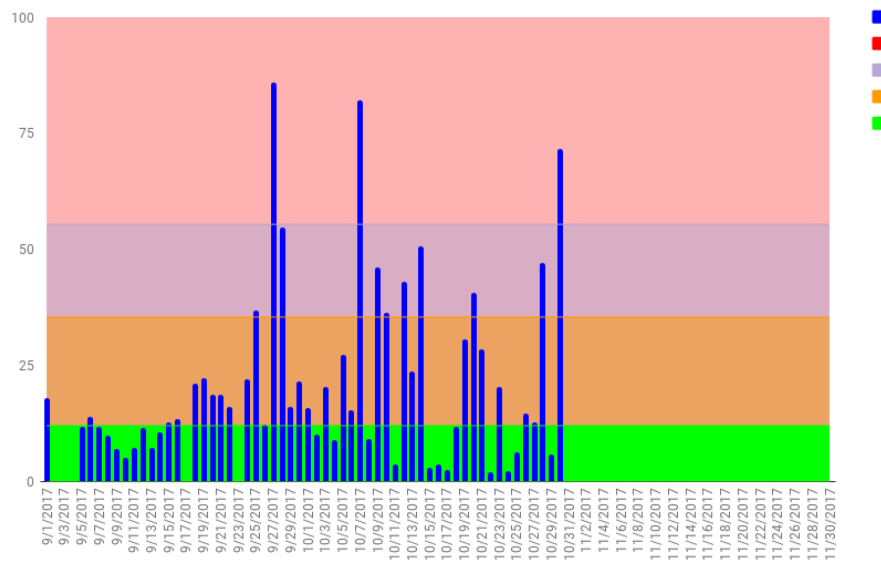
How do we measure this pollution? The ADEQ has permanent measuring stations in Newport and Marion that record 24 hour averages for particulate carbon and other toxins. But they have no capacity for spot measurements or more monitoring stations, and the existing monitors do not adequately capture the random and localized nature of agricultural burning.

Therefore, in the Summer of 2016, I obtained an EPA-approved portable laser-based aerosol mass monitor (Aerocet 831) and have performed spot measurements in downtown Jonesboro each afternoon through the Fall of 2016 and again this harvest season. The results are shown below.

Small particulate Carbon -Fall 2016



PM2.5 $\mu\text{g}/\text{m}^3$ Fall 2017



Small particulate carbon is measured in micrograms per cubic meter and the graphs depict these levels as blue bars with the EPA risk category in the background. The EPA Air Quality Guideline is included in the index and you are encouraged to review this. These carbon levels were measured miles from

burning fields and would represent average levels throughout the city (population ~75,000). The daily levels vary from safe to unhealthy, reflecting the random nature of crop burning. The elevations typically rise in early afternoon and persist until after dark. Carbon levels can be much higher in closer proximity to the burn. On October 20, 2017, at 4:45 pm, the PM 2.5 level was measured at 156.2 ug/m³ in Newport. That level is listed as “Very Unhealthy for Everyone” by the EPA. There are many smaller communities that endure such levels repeatedly throughout the burning season.

The Solution

What should the goals be? Realistic targets toward which to aim will ideally include the following components:

1. A significant decrease in total burning.
2. Elimination of the spikes over populations centers.
3. To accomplish these changes with the least pain for farmers or taxpayers.

The ultimate goal is to reduce a significant health burden that now exists.

Three elements will likely be required in any comprehensive solution. They fall under the following headings: monitor, innovate, and regulate.

Monitor: There are too many gaps in air quality monitoring. We’re not measuring the problem. The ADEQ needs more funding and a clear mandate to enhance their surveillance throughout our region – to include spot-checking capability. And we need a mechanism for real-time public advisories when levels present or are anticipated to present a hazard.

We need a more robust analysis of hospital, ED, and insurance claims information to better quantify the health effects of agricultural burning.

Innovate: Our Arkansas research and educational institutions (schools of agriculture, Cooperative Extension Service) need to be encouraged to consider public health in their best practice recommendations.

More research is needed in areas that include improved options for cost-effective management of crop residue, broader viable choices for crop rotation, and a more comprehensive look at burn patterns in the Fall. Drs. Jared Hardke (Chief Rice Agronomist, UA School of Agriculture) and Yi Liang (Asst. Professor-Air Quality, UA School of Agriculture) are among the few directing pertinent research in these areas. Their efforts need to be strongly supported.

Regulate: Our state legislature has an important role to play here. No meaningful solution will be arrived at on a county by county basis. The current bar for regulation of burning is not very high. It can help to look at what other states do:

State	Crop Residue Burning Regulations
California	<ul style="list-style-type: none"> • Requires a burning permit; • Burning only on burn days determined by local Air Districts in consultation with the California Air Resource Board; • Residues required to be shredded and piled when possible (CARB, 2006).
Florida	<ul style="list-style-type: none"> • Sugar cane farmers initiated burning oversight with Florida Department of Forestry (FLDOF) in 2004; • FLDOF issues burn permits between November and March (FLDOF, 2005).
Louisiana	<ul style="list-style-type: none"> • Farmers can burn during the daytime and are required to have certified Burn Managers at the burn (I.SU Ag Center, 2000).
Oregon	<ul style="list-style-type: none"> • In 1991, House Bill 3343 established an open field burning acreage phase-down, propane flaming limitation, and residue burn permitting issued by the Oregon Department of Agriculture (ODA) for the Willamette Valley; • 102,500 acres of grass seed and cereal residues can be burned per year, which is enforced through aerial and ground surveys; • ODA has the right to fine growers that burn on no-burn days (ODA, 2007).
Washington	<ul style="list-style-type: none"> • Washington Department of Ecology (DOE) under the 1991 Clean Air Act of Washington issues all burning permits and determines burn days based on atmospheric conditions and U.S. Forest Service fire danger ratings; • Cost of permits are \$2.00 per acre to be paid by the farmers; • DOE can fine farmers \$10,000 for any illegal crop residue burning; • DOE uses aerial photography, tip hotline, and remote sensing for enforcement (WA DOE, 2005).

Table 1. State-level regulations for crop residue burning in California, Florida, Louisiana, Oregon, and Washington.

What will work for Arkansas? A number of concurrent efforts may be necessary to fully address this issue.

Consider providing grants and mandates to fund more extensive monitoring, and for further research toward the ultimate goal of reducing the overall seasonal burning. Could a portion of the recent Volkswagen settlement be earmarked for this?

Consider a permit system with oversight and enforcement, perhaps modeled after the successful Smoke Management Program now in use by our state foresters (see index). An important adjunct would be a mechanism for warning area residents within the air-shed of the proposed burn, to allow them to take appropriate precautions.

Consider adoption of a burning fee paired with a tax credit for non-burning alternatives, with a graduated phase-in. A variety of balanced incentives are in place and have proven successful in the field of medical care and other areas of commerce.

Next Steps

In the short term, there is a need for expansion of the dialogue among relevant organizations and stakeholders of all stripes – there are many other individuals and agencies who can contribute to this discussion and there is more collective knowledge to be gained. I intend to do my part to facilitate this. There is more to learn, but I would submit that we already know enough to pursue some action steps along the lines presented. A great many area residents have very urgent health concerns. I am at your service to discuss this further at any time and place.

I would ask for the Committee members' careful consideration of this important issue, and for your assistance in working toward a positive solution.

Index

EPA Air Quality Guide for Particle Pollution

Arkansas Voluntary Smoke Management Guidelines

Jonesboro physicians in support of crop burning regulation

Communications from families

Air Quality Guide for Particle Pollution

Harmful particle pollution is one of our nation's most common air pollutants. Use the chart below to help reduce your exposure and protect your health. For your local air quality forecast, visit www.airnow.gov

Air Quality Index	Who Needs to be Concerned?	What Should I Do?
Good (0-50)	It's a great day to be active outside.	
Moderate (51-100)	Some people who may be unusually sensitive to particle pollution.	Unusually sensitive people: Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier. Everyone else: It's a good day to be active outside.
Unhealthy for Sensitive Groups (101-150)	Sensitive groups include people with heart or lung disease, older adults, children and teenagers.	Sensitive groups: Reduce prolonged or heavy exertion. It's OK to be active outside, but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath. People with asthma should follow their asthma action plans and keep quick relief medicine handy. If you have heart disease: Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.
Unhealthy (151-200)	Everyone	Sensitive groups: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling. Everyone else: Reduce prolonged or heavy exertion. Take more breaks during outdoor activities.
Very Unhealthy (201-300)	Everyone	Sensitive groups: Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better. Everyone else: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.
Hazardous (301-500)	Everyone	Everyone: Avoid all physical activity outdoors. Sensitive groups: Remain indoors and keep activity levels low. Follow tips for keeping particle levels low indoors.

PM 2.5 levels: Good = 0-12.5 ug/m³

Moderate = 12.6-35.4 ug/m³

Unhealthy for Sensitive Groups = 35.5-55.4 ug/m³

Unhealthy for Everyone = 55.5-150.4 ug/m³

Arkansas Voluntary Smoke Management Guidelines



Arkansas
Forestry
Commission
forestry.arkansas.gov



**GUIDELINES FOR WHEN TO BURN
AND HOW TO MANAGE SMOKE**

BEFORE YOU BURN, CALL 1-800-830-8015

The undersigned physicians of Northeast Arkansas would like to express an urgent concern about the adverse health effects of agricultural burning in our area. Each Fall, the air we breathe is repeatedly contaminated with smoke from the burning of crop residue. That smoke contains toxins including particulate carbon, nitrogen oxide, sulfur dioxide, ammonia, and carbon monoxide, and presents a significant health risk to the citizens of N.E. Arkansas, especially those with underlying medical conditions. We would encourage the State of Arkansas to adopt any means necessary to reduce this hazard. (Drafted 8/29/16)

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<u>[Signature]</u>	<u>[Signature]</u>	<u>John Morris</u>	<u>Shirley Johnson (Pike)</u>
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From the mother of a family of eight living near Jonesboro:

“While many welcome and enjoy the fall and harvest season by opening their windows to enjoy the cool, fresh air, that is never an option for my family. Our allergy and asthma doctor has instructed us to never open our windows. Harvest season is fiercely dreaded by my family.” “There are days that the air quality near our home is so bad that just walking outside to our automobile will result in an asthma attack for one or more of us.” “During the burning of the harvested fields, there are many days my children must spend their recess inside as a result of the smoke from the surrounding burning fields.” “I believe the farming practice of burning harvested fields is a risk asthmatics should not have to endure.”

From a retired teacher living in Swifton; her husband is a retired farmer:

“I am writing because of a very serious health problem in Northeast Arkansas. This problem is harming children, elderly, COPD patients, asthmatics etc. It is the farmers burning rice field stubble.” “Today I tried to go out and water my flowers and had to go inside because I couldn’t breathe.” “My friend has to wear a mask in her own house. She had a severe asthma attack and had to have medical treatment. The doctors have told her this would happen every time the farmers burn.” “This should be against the law just as the law that was passed to prevent cigarette smoking in public places.” “Please, somebody help solve this horrible health problem. This has to be stopped. Don’t these farmers care about their own children, grandchildren and families, even if they don’t give a continental damn about the rest of us?”

Sources

Personal Communication:

Joseph Bates, MD, Gary Wheeler MD, and Richard McMullen PhD – Arkansas Department of Health

Mark McCorkle - Air Quality Division, Arkansas Department of Environmental Quality

Brannon Theisse, Craighead County Extension Agent

Several area farmers

Yi Liang PhD, Asst. Professor – Air Quality, UA School of Agriculture

Jared Hardke PhD - Chief Rice Agronomist, UA School of Agriculture

SHARP-PHO; Quality Assurance Division

Womack, Phelps and McNeill, P.A.; Attorneys at Law

Don McBride, Assistant State Forester – Resource Protection

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