National Cotton Council of America

P.O. Box 2995 • Cordova, TN 38088-2955
(901) 274-9030 • FAX (901) 725-0510
www.cotton.org

PRODUCERS • GINNERS • WAREHOUSEMEN • MERCHANTS • COTTONSEED • COOPERATIVES • MANUFACTURERS

December 15, 2023

U.S. Environmental Protection Agency
EPA Docket Center (ORD Docket), Mail Code: 28221T
1200 Pennsylvania Avenue NW
Washington, DC 20460

RE: Docket #: EPA–HQ–ORD–2012–0830. IRIS Toxicological Review: Inorganic Arsenic

The NCC is the central organization of the United States cotton industry. Its members include producers, ginners, cottonseed processors and merchandizers, merchants, cooperatives, warehousers, and textile manufacturers. A majority of the industry is concentrated in 17 cotton-producing states stretching from California to Virginia. U.S. cotton producers cultivate between 10 and 14 million acres of cotton with production ranging from 12 to 20 million 480-lb bales annually. The downstream manufacturers of cotton apparel and home furnishings are located in virtually every state. Farms and businesses directly involved in the production, distribution, and processing of cotton employ more than 115,000 workers and produce direct business revenue of more than $22 billion. Annual cotton production is valued at more than $6.0 billion at the farm gate. Accounting for the ripple effect of cotton through the broader economy, direct and indirect employment surpasses 265,000 workers with economic activity of almost $75 billion. In addition to the cotton fiber, cottonseed products are used for livestock feed and cottonseed oil is used as an ingredient in food products as well as being a premium cooking oil.

The NCC's diverse membership shares the common interest for the successful production and sale of U.S. cotton products. Imbedded in that interest is the ability (both in operational practice and affordability) to economically produce cotton when challenged by forces of nature, utilizing crop protection tools, when necessary.

HISTORICAL CONTEXT:

Arsenical compounds were widely used as pesticides in most of agriculture during the early to mid-20th century (US and internationally). In cotton, the use of arsenical insecticides began to decline in the mid 1940's with the introduction of newer insecticide chemistries. By the 1950's, use of arsenical insecticides was rare and some arsenical insecticides were voluntarily cancelled in 1977 with EPA cancelling remaining arsenical insecticides in 1988.

The mechanical harvesting of cotton brought with it a need to remove or desiccate leaves on plants in order to reduce the amount of leaf trash in the ginned fiber. Arsenic acid was introduced in the 1950's and was used for nearly 40 years as a highly effective and relatively inexpensive cotton desiccant predominantly in stripper-harvested cotton in the southwestern U.S. The use of arsenic (As) as a harvest aid was voluntarily terminated in 1993.

Monosodium methanearsonate (MSMA) herbicide, an organic arsenical product, is registered for use in cotton, turf, and non-crop areas. The MSMA registrant and EPA reached an agreement to phase out all uses of MSMA. Its use in cotton is predominantly in areas of the southeastern U.S. to control Palmer amaranth (*Amaranthus palmeri*) that is resistant to both glyphosate and acetolactate synthase (ALS) inhibitors, two herbicide modes of action. MSMA is applied on less than 10% of all cotton acres in the U.S. as a post-directed or layby application.

BENEFITS:

There has been increasing reliance on MSMA as a critically important weed control tool due to resistance development in troublesome weed species. The reduced use of MSMA in cotton in the late 1990's coincided with the introduction of glyphosate and around this time, growers also observed greater economical benefits with MSMA as a spot treatment. However, the current state of weed resistance and overall weed pressure along with more restricted options for chemical control should be taken into account when evaluating the benefits of MSMA as a herbicide and the limitations of the possible outcomes of this risk assessment.

By the early 2000's, over 90% of U.S. cotton acreage was genetically engineered with herbicide tolerant (HT) and/or insect resistant traits. Prior to the introduction of glyphosate tolerant cotton varieties in 1997, producers implemented more diverse approaches to control a wide range of weed species in their fields,

including multiple modes of action and heavy tillage. Herbicide tolerant cotton revolutionized weed management programs for producers and allowed them to move away from tillage practices which were contributing to massive loss of soil. Producers relied heavily on glyphosate to control critical weed pests. However, especially in the southern U.S., the heavy reliance on glyphosate led to a reduction in the use of residual herbicides and alternative modes of action. This ultimately has increased the number of herbicide resistance issues that growers are currently facing.

University extension weed scientists have documented glyphosate resistance in horseweed (*Conyza canadensis*) in 25 states. Tropical spiderwort (*Commelina benghalensis*) has a natural tolerance to glyphosate. Glyphosate resistance is also documented in Palmer amaranth in all 17 U.S. cotton producing states (31 states total); with numerous confirmations of populations with resistance to multiple modes of action. Additionally, there is glyphosate resistance in common waterhemp (*Amaranthus tuberculatus*) in AR, KS, LA, MO, MS, NC, OK, TN, and TX (20 states total), and common ragweed (*Ambrosia artemisiifolia*) in AL, AR, KS, MO, MS, and NC (17 states total).

MSMA is an effective option for weed control in weeds with resistance to glyphosate, ALS inhibitors, and numerous other modes of action. MSMA-resistance in common cocklebur was confirmed in a few southern U.S. states from 1985 to 1994. Common cocklebur has not been a troublesome or economical weed pest since the widespread adoption of glyphosate resistant crops.

In light of growing herbicide resistance in significant weed pests in the Cotton Belt, producers need an arsenical like MSMA for control of annual broadleaf weeds and grasses that alternative herbicides are no longer effective on. MSMA can prolong the effectiveness of herbicides and ideally delay further resistance development. There is no longer a stand-alone option for weed control, especially post-emergence.

There are significant environmental benefits from HT cotton that MSMA supports. Producers have both an economic and environmental imperative to use and preserve best available technologies. Since the commercialization of HT cotton, growers have widely adopted agronomic practices of reduced tillage (no-tillage and strip-tillage) farming. Soil conservation saves approximately 1 billion tons of soil per year in the U.S., 306 million gallons of tractor fuel, and reduces greenhouse gas emissions. According to Cotton Incorporated researchers, conservation tillage practices as adopted in the U.S. from 1996-2004 have reduced

carbon dioxide emissions at a rate equivalent to removing 27,111 cars from the road.

The Environmental Impact Quotient (EIQ) developed at Cornell University can be used as a robust measure of environmental impact of technologies, as it incorporates key toxicity and environmental exposure data related to individual products. The EIQ has decreased by 17% in the U.S., largely due to advances in genetically modified cotton as it relates to pesticide use reduction and air, water, and soil conservation, yet yields have increased 25% from 1994-2004. Field-to-Market data show a reduction in overall chemical use over the last decade along with an increase in HT adoption and an increase in integrated pest management techniques.[1]

If HT technology is further compromised, conservation tillage will be jeopardized if growers are forced to return to the old practice of mechanical cultivation to control weeds that cannot be addressed if herbicide registrations such as MSMA are cancelled. Thus, environmental benefits of HT technology such as reduced soil erosion, pesticide runoff, stream siltation, fuel emissions and reduced climate change gasses would diminish should producers have to plow to control weeds. From an economic standpoint, cultivation increases equipment, labor, and fuel costs at a time when input prices are the highest in history. Therefore, cultivation is not an economically feasible option, and a costly component of weed management systems. Furthermore, assuming that mechanical cultivation was an economically feasible option, cultivation is an early season option only, and untimely rainfall renders tillage options useless.

STUDIES:

Two papers on analysis of gin external emissions were published in Trans ASAE in 1997. Gin external emissions are mostly soil and some plant material. These peer reviewed research papers are by the United States Department of Agriculture (USDA) and the testing/analysis was done by USDA. Arsenic levels in gin particulate emissions are discussed in both. No As was found in external emissions from cotton grown in the southeast and Mid-South although MSMA was applied to vast percentage of the acreage; low levels (usually about 1 ppm) were detected in some western cotton particulates (CA samples where MSMA could be used).

[1] https://fieldtomarket.org/media/2020/02/Field-to-Market-Trends-In-Pest-Management-Report-Feb-2020_WEB.pdf

These papers do not distinguish between organic and inorganic As nor is it known whether As compounds were used on the tested cotton. No soil samples were tested but the analysis/testing of these particulate emissions would be essentially the same as testing the soil, since gin external particulate emissions are mostly soil.[2]

There are other data on levels of arsenic on gin by-products and in cotton fiber usually less than 1 ppm but no greater than 1.5 ppm.[3] A summary of data can be found in *Public and Environmental Issues*. Chapter 10: ***Cotton Harvest Management: Use and Influence of Harvest Aid,*** authors P.J. Wakelyn, J. Supak, F.C. Carter, and B. Roberts**.** The Cotton Foundation Reference Book Series, Number Five. J.R. Supak and C.E. Snipes, eds. The Cotton Foundation, Memphis, TN. 2001. pp.275-302.

The Bremen Cotton Exchange has tested for possible pollutants since 1993. The tests were carried out by the Hohenstein Research Institute according to the Eco-Tex 100 standard. All tests so far show that the samples were within permissible values of the Eco-Tex 100 standard [<0.05 ppm] and confirm that the treatment and use of pesticides poses no hazard for the processor of the raw material and none for the end consumer. Arsenic levels on the U.S. samples from CA as well as all samples from other countries were always <0.05 ppm [by ICP-MS; test data do not distinguish between organic and inorganic As or is it known whether Arsenic compounds were used on the cotton tested].[4]

COMMENTS:

IRIS has taken 13 years to produce this draft after the 2010 attempt was highly criticized and not implemented. With over a decade of work and a lack of public transparency, stakeholders were only given 60 days to review, digest and respond to hundreds of pages of scientific analysis. The allotted time was completely inadequate and inappropriate. In addition, evidence tables were not provided making it impossible to fully determine how the assessment created.

---

[2] S.E. Hughs, P.J. Wakelyn, M.A. Rousselle, and E.P. Columbus. Chemical Composition of Cotton Gin External Emissions: Proximate and Elemental Analysis. *Trans. ASAE* 40(3), 519-527 (1997). [**see pp 525-527**]

S.E. Hughs, P.J. Wakelyn, and M.A. Rousselle. Chemical Composition of Cotton Gin External Emissions: Crop Protection Products. *Trans. ASAE* 40(6), 1685-92 (1997). [**see pp 1690-91**]

[3] Perkins and Brushwood *Textile Chemist and Colorist* 23(2), 26-28, 1991.

[4] http://www.baumwollboerse.de/index.php?l=2&n=16,0,0

As in the past, the agency has ignored mode of action data that concludes there is an inorganic arsenic threshold below which there are no observable adverse impacts to the human body.

As has been known for some time, human health effects such as cancer are found to result from high levels of arsenic exposure. The question has been what happens at lose dose exposure and at what level or threshold. This IRIS study uses epidemiology studies of populations exposed to high arsenic levels and then models low dose exposure outcomes. The populations studied are not representative of the general U.S. population.

This results in a discussion of a 1 parts per billion (ppb) action level which is lower than most Americans are exposed to. Such an action level will lead to, in some cases, unobtainable regulatory limits and enormous costs. Many of these adverse results will fall on rural areas without the resources to comply. Another result will be, once again, the safety of the food supply being questioned with U.S. agriculture trying to comply with such a standard that in some cases is lower than naturally occurring levels.

For example, The IRIS arsenic assessment states that arsenic concentrations in U.S. soils fall from 1 to 40 mg/kg. The United States Geologic Survey lists median arsenic levels in the U.S. at 5.5 mg/kg. When combined in a regulatory context with the draft assessment's proposed action level/cancer slope factor, many U.S. soils will fall at or above risk levels. The social and economic repercussions will reverberate through many industries. While the aim of this research is to protect Americans, the costs to public health will also be a factor as people are frightened away from nutritious foods and/or are unable to afford the food, fiber and fuel that U.S. agriculture provides.

CONCLUSION:
The National Cotton Council respectfully requests that EPA withdraw this draft and with further study, seek a proposal aligned with other national and international limits which can set the stage for a more sustainable regulatory regime.

Regards,

Steve Hensley
National Cotton Council